California High-Speed Rail Authority

Los Angeles to Anaheim Project Section

Hydrology and Water Resources Technical Report

October 2025



CALIFORNIA High-Speed Rail Authority

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being or have been carried out by the State of California pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated July 22, 2024, and executed by the Federal Railroad Administration and the State of California.

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ACRONYMS AND ABBREVIATIONS

Term	Definition
Amtrak	National Railroad Passenger Corporation
ARTIC	Anaheim Regional Transportation Intermodal Center
Authority	California High-Speed Rail Authority
BFE	base flood elevation
BMP	best management practice
BNSF	BNSF Railway
Caltrans	California Department of Transportation
CFR	Code of Federal Regulations
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CWA	Clean Water Act
DWR	California Department of Water Resources
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FIRM	flood insurance rate map
FIS	flood insurance study
FRA	Federal Railroad Administration
GIS	geographic information systems
HSR	high-speed rail
HUC-8	Hydrologic Unit Code–8
I-	Interstate
IAMF	impact avoidance and minimization feature
LACFCD	Los Angeles County Flood Control District
LAUS	Los Angeles Union Station
LID	low-impact development
LMF	light maintenance facility
mg/L	milligram per liter
MS4	Municipal Separate Storm Sewer System
MTBE	methyl tert-butyl ether
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OCFCD	Orange County Flood Control District
OCS	overhead contact system
OCWD	Orange County Water District

Term	Definition
pH	percentage of hydrogen
project section	Los Angeles to Anaheim Project Section
QSD	qualified stormwater pollution prevention plan developer
QSP	qualified stormwater pollution prevention plan practitioner
RCP	reinforced concrete pipe
RSA	resource study area
RWQCB	Regional Water Quality Control Board
SWMTP	stormwater management and treatment plan
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TMDL	total maximum daily load
TPSS	traction power substations
UPRR	Union Pacific Railroad
U.S.C.	U.S. Code
USACE	U.S. Army Corps of Engineers
USEO	U.S. Presidential Executive Order
USEPA	U.S. Environmental Protection Agency
WSE	water surface elevation

EXECUTIVE SUMMARY

This Hydrology and Water Resources Technical Report for the Los Angeles to Anaheim Project Section (project section) of the California High-Speed Rail (HSR) System serves to characterize existing conditions and provides an evaluation of impacts on water resources that would result from implementation of the project section of the HSR system.

The California High-Speed Rail Authority (Authority) and the Federal Railroad Administration (FRA) have prepared program-wide Tier 1 environmental documents for the HSR system under the California Environmental Quality Act and the National Environmental Policy Act. Specifically, the Authority and FRA prepared the Statewide Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) (Authority and FRA 2005) to evaluate the ability of the HSR system to meet existing and future demands on the capacity of California's intercity transportation system.

The Authority is now undertaking second-tier project environmental evaluations for several sections of the statewide system. Prior to July 23, 2019, the FRA was also involved in second-tier project environmental evaluations for several sections of the statewide system. This technical report is for the Los Angeles to Anaheim Project Section. This project section of the California HSR System is approximately 30 miles long, running through the cities of Los Angeles, Vernon, Bell, Commerce, Montebello, Pico Rivera, Santa Fe Springs, Norwalk, La Mirada, Buena Park, Fullerton, and Anaheim. There are two build alternatives. Shared Passenger Track Alternatives A and B for the project section include an alternative with the light maintenance facility (LMF) at 26th Street (Shared Passenger Track Alternative A) and an alternative with the LMF at 15th Street (Shared Passenger Track Alternative B). A description of the alternatives and their locations can be found in Chapter 2, Alternatives, of the Draft EIR/EIS. This technical report evaluates hydrology and water resources pertinent to the Shared Passenger Track Alternatives within the project section.

The project alignment would share the existing Los Angeles – San Diego – San Luis Obispo rail corridor with existing rail operations, including National Railroad Passenger Corporation (Amtrak) passenger trains, Metrolink commuter trains, and BNSF Railway (BNSF) freight trains. In addition to new tracks for HSR, this project section would include an HSR station in Anaheim, as well as a maintenance of infrastructure siding, an LMF with alternatives at 26th Street or 15th Street, and electric power utility improvements. Intermediate station options for one additional HSR station in Norwalk/Santa Fe Springs or Fullerton are included in the project section. Sharing the existing corridor is part of the Authority's adopted strategy to blend HSR with existing rail systems on shared infrastructure to accelerate and broaden benefits, improve efficiency, minimize community impacts, reduce environmental impacts, and reduce construction costs. The majority of the existing railroad is currently at grade, but many road, railroad, and other transportation facility crossings are grade separated at their intersection with the existing railroad. The project would include grade separating many of the remaining at-grade crossings along the corridor so that HSR service would not interrupt or interface with other modes of transportation. Safety-based improvements, such as pedestrian undercrossings, would be considered for crossings that remain at grade. Within the existing rail corridor, the Los Angeles County Metropolitan Transportation Authority owns the railroad right-of-way from Los Angeles Union Station (LAUS) to Redondo Junction, BNSF owns the railroad right-of-way from Redondo Junction to Fullerton Junction, and Orange County Transportation Authority owns the railroad right-of-way from Fullerton Junction to the end of the project section limits at the Anaheim Regional Transportation Intermodal Center (ARTIC). Southern California Regional Rail Authority operates the Metrolink commuter rail service in the corridor, Amtrak provides passenger service, and BNSF operates freight trains throughout this corridor.

This technical report characterizes existing conditions and analyzes the hydrology and water quality effects of the Shared Passenger Track Alternatives. Hydrology and water resources comprise surface water hydrology, water quality, groundwater, and floodplains. This report includes federal, state, regional, and local regulations and requirements; the methods used for the analysis of effects; a description of the affected environment; applicable environmental

commitments; and a discussion of effects on hydrology and water resources along the project section that could result from construction and operation of the Shared Passenger Track Alternatives.

Methodology

The methods used to evaluate hydrology and water resources include:

- Qualitative review of available hydrology and water resources information for the resource study area (RSA)
- Evaluation of surface water hydrology, surface water quality, groundwater, and floodplain resources in the RSA

The direct RSA is the area in which the environmental investigations specific to hydrology and water resources are conducted to determine the resource characteristics and potential impacts of the project. In addition, the indirect RSA includes the regional study area, including the following elements:

- **Surface Water:** Watersheds and receiving waters of project runoff
- **Groundwater:** Aquifer(s) underlying the project footprint
- **Floodplains:** Federal Emergency Management Agency (FEMA)-mapped flood-hazard areas within receiving waters of the project section disturbance area, as well as any areas that could affect flood frequency, extent, and duration

The direct RSA used for calculating impacts on hydrology and water resources includes the combined Shared Passenger Track Alternatives footprint (e.g., stations, track, LMF, and temporary construction areas).

Findings

The project section would cross the Los Angeles River, San Gabriel River, Santa Ana River, and Seal Beach Watersheds. The Shared Passenger Track Alternative includes a set of electrified tracks for HSR, which would be usable by passenger rail, as well as a set of nonelectrified tracks, which would be used by freight and passenger rail. The two sets of tracks would cross or encroach on 14 FEMA-mapped 100-year floodplains (i.e., rivers, creeks, and storm drains), a total of 11 open surface waters (i.e., Los Angeles River, Hobart Channel, Rio Hondo, San Gabriel River, North Fork Coyote Creek, La Mirada Creek, Coyote Creek, Brea Creek, Balcom Avenue Storm Drain, Fullerton Creek, and Carbon Creek) and the Coastal Plains of the Los Angeles and Orange County Groundwater Basins. The following section summarizes the potential hydrology and water resource impacts and design standards and best management practices (BMPs) as part of impact avoidance and minimization features (IAMFs) that would be implemented to reduce impacts. Generally, effects on hydrology and water resources from the Shared Passenger Track Alternatives would be similar. Pollutants that could be generated during construction and operation of the Shared Passenger Track Alternatives would be similar. Shared Passenger Track Alternative A would disturb approximately 891 acres of land, compared to approximately 939 acres of disturbed land for Shared Passenger Track Alternative B, representing a smaller footprint of similar types of impacts. Generally, effects on hydrology and water resources from the Shared Passenger Track Alternatives include increased polluted stormwater runoff from demolition and excavation activities, staging areas, and the use of temporary drainage systems during construction, which could alter existing drainage patterns and stormwater runoff. New and replaced impervious surfaces collect pollutants, including sediment, which may be mobilized by runoff during storm events. Shared Passenger Track Alternative A would result in an increase of approximately 7 percent in impervious surface area (53.1 acres); Shared Passenger Track Alternative B would result in an increase of approximately 8 percent in impervious surface area (61.5 acres). The 15th Street LMF proposed for Shared Passenger Track Alternative B would cover a larger area (63.1 acres) than the 26th Street LMF (54 acres) proposed for Shared Passenger Track Alternative A.

Surface Water Hydrology

Construction of the Shared Passenger Track Alternatives would result in an overall decrease in impervious surface across the alignment. A decrease in impervious area would decrease the volume of runoff during a storm, which would reduce the transport of pollutants to receiving waters, including stormwater systems. Construction activities, however, could redirect and increase the volume and rate of shallow overland flows, increasing the potential for erosion and siltation in areas with exposed soils and along channel banks. The effects on surface water hydrology will be minimized by designing the alignment to follow existing transportation rights-of-way to the maximum extent feasible and incorporating design standards and BMPs as part of IAMFs. Bioswales (i.e., vegetated channels that receives rainwater runoff and slow and filter it to reduce pollution) are proposed along some at-grade sections, where feasible, to transport flows on the surface prior to discharging into a storm drain. Retention basins are also proposed in some locations along the alignment to infiltrate water into the ground. These IAMFs will reduce the severity of effects, such as the rate of stormwater runoff, temporary changes to river and channel hydrology, and potential erosion and siltation caused by increased rates of volumes and flow. The proposed drainage system will convey runoff from the track right-of-way to the existing storm drain system while maintaining the existing drainage pattern, in compliance with the Municipal Separate Storm Sewer System (MS4) permit. By following existing transportation rights-of-way, the number of new waterbody crossings and resulting changes to surface water hydrology and drainage patterns will be minimized.

Surface Water Quality

During construction, soil would be exposed, increasing the potential for soil erosion compared to the existing condition. Construction activities would compact soil, thereby resulting in a decrease in infiltration and increase in the volume and rate of stormwater runoff during storm events. In addition, chemicals, liquid products, petroleum products (such as paints, solvents, and fuels), and concrete-related waste may be spilled or leaked and have the potential to be transported by stormwater and nonstormwater runoff to receiving waters, which could affect water quality. The contractor will implement various erosion and sedimentation controls as part of IAMFs to stabilize disturbed soils and prevent erosion from occurring along slopes or prevent sediments from entering nearby storm drains and waterbodies. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared and implemented during construction. The construction SWPPP will identify specific BMPs to be implemented during construction so as not to cause or contribute to an exceedance of any applicable water quality standards included in the applicable Regional Water Quality Control Board (RWQCB) Basin Plan. Waste management, materials pollution controls, and spill prevention and response measures will also prevent trash, hazardous substances, and other materials from being discharged to waters.

Groundwater may be encountered during construction activities, including dewatering and construction of the concrete columns (piers) associated with the water crossings. If groundwater was encountered, it will be removed and disposed of according to the requirements of the applicable RWQCB's Groundwater Dewatering Permit. Adherence to the requirements of the applicable RWQCB's Groundwater Dewatering Permit will ensure that water discharged to surface water or land will not degrade the existing surface water quality.

Pollutants generated during operation of the Shared Passenger Track Alternatives would be similar to existing conditions because the HSR alignment would be within an existing rail corridor. Several of the receiving waters are listed on the Clean Water Act Section 303(d) list of impaired waters. Operation of the Shared Passenger Track Alternatives has the potential to contribute to existing heavy metal, nutrient, sediment, organic compound, trash and debris, and oil and grease water quality impairments. During operations, the Shared Passenger Track Alternatives stormwater system would divert runoff and pollutants from roads and tracks to project-specific BMPs (low-impact development techniques), such as bioswales or infiltration basins, prior to entering the stormwater drainage system. Project-specific BMPs would diminish the amount of contaminants that reach waterbodies and affect surface water quality, in compliance with the MS4 permit. Low-impact development techniques would retain runoff on site and reduce the volume

and rate of off-site runoff, in compliance with the MS4 permit. Vegetation planted within the channel, such as native plants or grasses, would also help to slow the flow of water and filter out pollutants. Retention basins use the natural filtering ability of the soil to remove pollutants in stormwater runoff. Infiltration facilities store runoff until it gradually filters through the soil and eventually enters the water table. These BMPs also will be incorporated into portions of the existing right-of-way that do not currently have stormwater treatment.

Groundwater

Groundwater extraction would not be required during construction or operation of the Shared Passenger Track Alternatives. Groundwater could be affected during construction and operation of the Shared Passenger Track Alternatives through the discharge of pollutants that seep into groundwater and potential depletion of groundwater supplies (primarily through construction dewatering). An increase in impervious surfaces could also affect groundwater recharge, although the extent of these surfaces would be small compared to the size of the groundwater recharge area. The contractor will apply measures under IAMFs that will reduce the effects of dewatering by controlling and minimizing groundwater withdrawal and requiring treatment before discharge. IAMFs will also include the use of permeable and vegetated areas to provide for soil infiltration.

Floodplains

As summarized in Table E-1, the project section would cross or run adjacent to the following FEMA-mapped floodplains associated with open waterbodies: Rio Hondo, San Gabriel River, North Fork Coyote Creek, Brea Creek, Fullerton Creek, and Carbon Creek. The project section would cross the FEMA-mapped floodplains associated with the Southeast Anaheim Channel and the following storm drains: Bond Issue, Lakeland Road, Lakeside Drive, Gilbert Street and Artesia Avenue, and Balcom Avenue. Other floodplain crossings (not associated with open waterbodies) include Lawrence Avenue and Yale Avenue. No regulatory floodways are crossed by the project section.

Table E-1 Federal Emergency Management Agency Floodplains within the Resource Study Area

Floodplain Name	Project Component
Los Angeles River	No modifications needed; would be crossed on existing bridge
Rio Hondo	New bridge and modification of existing bridge: new bridge built adjacent to and south of the modified existing bridge, including a new pier wall in the center of the channel
San Gabriel River	New bridge: built adjacent to and south of the existing bridge, including placement of two new pier walls and footings in the river
Lakeland Road storm drain	Adjacent: viaduct structure and multiple columns
North Fork Coyote Creek	New bridge and modification of existing bridge: improved existing railroad bridge and a new HSR bridge adjacent to and north of the existing bridge
Brea Creek	New bridge/extension: placement of pier walls and footings and the existing railroad crossing bridge would be modified
Lakeside Drive storm drain	Adjacent: retaining walls and underpass
Fullerton Creek	No modifications to existing box culvert needed
Gilbert Street and Artesia Avenue storm drain	New bridge and extension of box culvert
Lawrence Avenue	No modifications needed

Floodplain Name	Project Component
Yale Avenue	No modifications needed
Balcom Avenue storm drain	Extension of box culvert
Carbon Creek	Extension of box culvert
Southeast Anaheim Channel	At grade

Sources: Authority 2025b

The project section would cross the existing Los Angeles River railroad bridge (outside of the floodplain), without any structural modifications to the bridge, except it would be electrified. The project section would also cross La Mirada Creek (outside of the floodplain); the northern existing railroad bridge would be modified to support HSR operations, and the southern bridge would remain.

Construction activities within floodplains will require implementation of standard measures, such as BMPs, to minimize impacts on floodplains, such as a change in flows within waterways and increased flood risks. BMPs may include limiting the number of equipment trips across a floodplain and selecting equipment that exerts the least amount of ground surface pressure. In addition, construction workers and local districts will monitor weather conditions for heavy storms (i.e., potential floodflows) and relocate construction equipment outside the floodplain if a heavy storm or flood event is identified.

Changes to the hydrology, hydraulics, and connectivity of natural watercourses, including floodplains, could occur as a result of construction and operation of the Shared Passenger Track Alternatives. The potential for an increase in flooding as a result of construction and operation will be minimized with incorporation of design standards and flood protection measures, as part of IAMFs; water crossings will be designed to maintain existing hydraulic capacity and connectivity and minimize any increase in water surface elevation. Flood protection measures will include avoiding the placement of structures that would impede or redirect floodflows within the 100-year flood-hazard area and any measurable change in water surface elevation that would result in conditions that would exceed the capacity of the existing flood channels or floodplains. Therefore, the design of the Shared Passenger Track Alternatives will minimize potential harm to or within the floodplain to the maximum extent practicable, in compliance with the requirements set forth in U.S. Presidential Executive Order 11988 and the FEMA regulations.

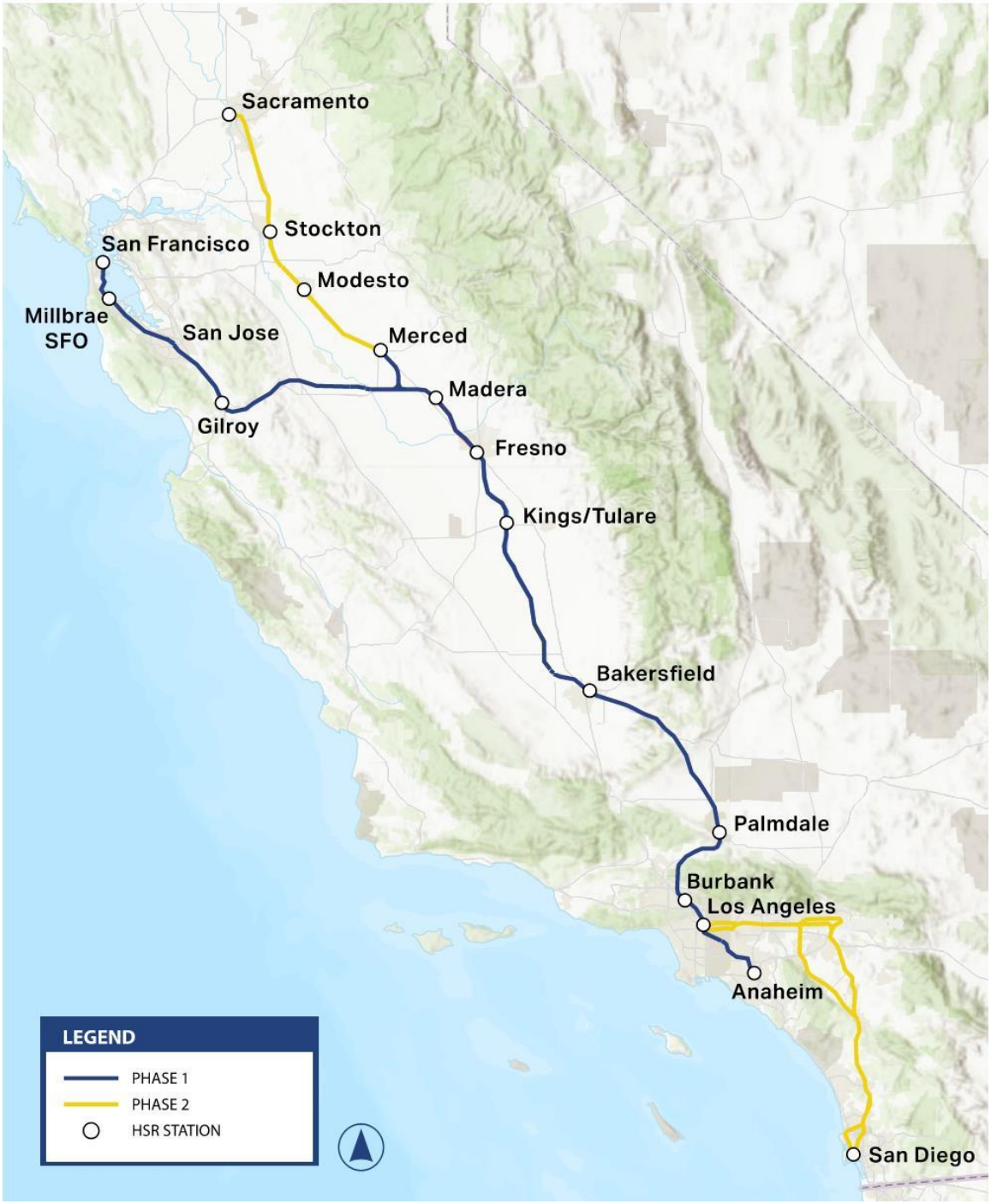
1 INTRODUCTION

1.1 California High-Speed Rail System Background

The California High-Speed Rail Authority (Authority), a state governing board formed in 1996, is responsible for planning, designing, building, and operating the California High-Speed Rail (HSR) System. Its statutory mandate is to develop an HSR system that coordinates with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports. The California HSR System will provide intercity, high-speed service on more than 800 miles of tracks throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the southern Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego, as depicted on Figure 1-1.[1] It will use state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, including contemporary safety, signaling, and automated train control systems, with trains capable of operating up to 220 miles per hour.

The California HSR System is planned to be implemented in two phases. Phase 1 would connect San Francisco to Los Angeles and Anaheim via the Pacheco Pass and the Central Valley. Phase 2 would extend the HSR system from the Central Valley (starting at the Merced Station) to the state's capital in Sacramento and from Los Angeles to San Diego.

[1] The alignments depicted on Figure 1-1 reflect the Authority/Federal Railroad Administration decisions made in the 2005, 2008, and 2012 Programmatic Environmental Impact Report/Environmental Impact Statement documents.



Source: Authority 2023a

Figure 1-1 California High-Speed Rail System

1.2 Los Angeles to Anaheim Project Section Background

The Los Angeles to Anaheim Project Section (project section) of the HSR system would extend approximately 30 miles between Los Angeles Union Station (LAUS) in Los Angeles and Anaheim Regional Transportation Intermodal Center (ARTIC) in Anaheim. This narrow, existing railroad corridor is constrained by the surrounding urban environment and other existing rail operators in

the area, including trains operated by the National Railroad Passenger Corporation (Amtrak), Metrolink (governed by the Southern California Regional Rail Authority), the Union Pacific Railroad (UPRR), and BNSF Railway (BNSF).

The Authority, in cooperation with the Federal Railroad Administration (FRA), completed the *Final Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Proposed California High-Speed Train System* in November 2005 (Authority and FRA 2005). For the Los Angeles to Anaheim Project Section, the Authority and FRA selected the existing Los Angeles – San Diego – San Luis Obispo Rail Corridor, with the intent of sharing the existing right-of-way as the alignment.

In 2007, the Authority and FRA released the Notice of Preparation/Notice of Intent to inform the public of the beginning of the preparation of a Draft EIR/EIS for the project section.[2] The Authority and FRA engaged in project scoping, completed a Preliminary Alternatives Analysis Report in 2009, and completed Supplemental Alternatives Analysis Reports in 2010 and 2016. The 2016 Supplemental Alternatives Analysis considered two alternatives: Alternative 1 (formerly called the Dedicated High-Speed Track Alternative) and Alternative 2 (formerly called the Consolidated Shared-Track Alternative), and advanced Alternative 2 (HSR Project Alternative) for analysis in the project Draft EIR/EIS.

In 2017 and 2018, BNSF conducted operational modeling that indicated a need for additional capacity during construction and operation of this project section. Consequently, the Authority added BNSF staging tracks in Lenwood (Lenwood Component) and a Colton Intermodal Facility (Colton Component) in San Bernardino County to the project. In 2020, the Authority initiated revised scoping to include the Lenwood and Colton Components in the project section. Stakeholder feedback received during scoping included substantial opposition to the BNSF Components far outside the project corridor.

In response, the Authority prepared a Supplemental Alternatives Analysis (Authority 2023b) to evaluate a new alternative that would eliminate the need for a BNSF Intermodal Facility in San Bernardino County. The 2023 Supplemental Alternatives Analysis examined three new build alternatives that did not include an Intermodal Facility and proposed advancing the Shared Passenger Track Alternative for further consideration in the EIR/EIS, which closely resembled the 2018 HSR Project Alternative without the Lenwood and Colton Components. Operationally, the Shared Passenger Track Alternative would reduce the peak service level for HSR trains to two trains per hour per direction, and up to 10 freight trains per day could operate on the passenger tracks, eliminating the need for the BNSF Intermodal Facility.

Additional design refinements and outreach occurred, and in May 2024, a Preliminary Impacts Assessment Report further defined elements of the Shared Passenger Track Alternative, such as HSR station options, light maintenance facility (LMF) sites, and grade crossings. The Preliminary Impacts Assessment Report recommended the Shared Passenger Track Alternative be split into two build alternatives, Shared Passenger Track Alternative A and Shared Passenger Track Alternative B, which are similar in all aspects, except for the LMF size and location. Shared Passenger Track Alternative A proposes an LMF at 26th Street in Vernon, and Shared Passenger Track Alternative B proposes an LMF at 15th Street in Los Angeles. In May 2024, the Board identified Shared Passenger Track Alternative A as the Preferred Alternative.

1.3 Project Description Purpose

This project description provides a condensed version of the technical information discussed in Chapter 2, Alternatives, of the Draft EIR/EIS and includes references to other documents for additional details and discussion. The basis of this project description is the Draft Los Angeles to Anaheim Preliminary Engineering for Project Definition document. Chapter 2 of the Draft EIR/EIS includes additional details beyond the content discussed herein, including information on the proposed operating plans and scenarios, construction plans, and capital and operating costs.

[2] The Notice of Intent was issued in the *Federal Register* on March 15, 2007 (72 Fed. Reg. 12,250).

1.3.1 Report Purpose

This technical report has been prepared to analyze the hydrology and water resources of the project section. This technical report provides support and detailed evaluation of hydrology and water resources related to the No Project Alternative and the Shared Passenger Track Alternatives. The primary focus of this report is to describe the affected environment (i.e., existing conditions) and to evaluate the range of possible effects on hydrology and water resources during construction and operation of the Shared Passenger Track Alternatives.

2 PROJECT DESCRIPTION

The project section is approximately 30 miles long and travels through the cities of Los Angeles, Vernon, Commerce, Bell, Montebello, Pico Rivera, Santa Fe Springs, Norwalk, La Mirada, Buena Park, Fullerton, and Anaheim. The project's alignment would share a portion of the existing Los Angeles – San Diego – San Luis Obispo Rail Corridor with existing rail operators. The Authority adopted a strategy of sharing the existing corridor and blending HSR with existing rail systems on shared infrastructure (referred to as "blended operations"[3]) to accelerate and broaden benefits, improve efficiency, minimize community impacts, and reduce construction costs.

This section describes the No Project Alternative and Shared Passenger Track Alternatives A and B.

2.1 No Project Alternative

Under the No Project Alternative, the project section would not be built. The No Project Alternative represents the condition of the project section as it currently exists in the base year, and as it would exist without the California HSR System at the planning horizon year of 2040.

In assessing future conditions, it was assumed that all currently known, programmed, and funded improvements to the statewide transportation system (highway, rail, and transit) and reasonably foreseeable local land development projects would be implemented by the year 2040. The No Project Alternative is based on a review of and consultation with several documents and data sources, including, but not limited to, transportation plans such as the 2020 Southern California Association of Governments' Regional Transportation Plan[4]; the Governor's Office of Land Use and Climate Innovation CEQAnet Database; the Federal Aviation Administration's Air Carrier Activity Information System and Airport Improvement Plan grant data; the California State Transportation Commission's State Transportation Improvement Program; airport master plans and interviews with airport officials; intercity passenger rail plans; and city and county general plans and planning officials.

2.2 High-Speed Rail Build Alternatives

The project proposes two build alternatives: Shared Passenger Track Alternative A and Shared Passenger Track Alternative B. Shared Passenger Track Alternative A proposes an LMF at 26th Street, whereas Shared Passenger Track Alternative B proposes an LMF at 15th Street. Both alternatives include an HSR station option in either Norwalk/Santa Fe Springs or Fullerton. The main elements of the build alternatives are summarized in Table 2-1 and depicted on Figure 2-1.

Table 2-1 Summary of Design Features of Shared Passenger Track Alternative A and Shared Passenger Track Alternative B

Feature	Total
Total length (linear miles)	29.7
At-grade profile (linear miles)	23.8
Elevated profile (linear miles)	5
Below-grade/braced trench profile (linear miles)	0.9
Number of straddle bents[1]	16

[3] California High-Speed Rail Business Plans (California High-Speed Rail 2022 Business Plan) suggest blended railroad systems and operations. These terms refer to integrating the HSR system with existing intercity, and commuter and regional rail systems through coordinated infrastructure (blended systems) and scheduling, ticketing, and other means (blended operations).

[4] The No Project Alternative uses the 2020 Southern California Association of Governments Regional Transportation Plan as the basis for analysis, with the exception of the transportation analysis, which uses the 2016 Regional Transportation Plan as the baseline. This is because of the date and availability of traffic counts collected for the project.

Feature	Total
Number of at-grade railroad crossings[2]	8
Number of major water crossings[3]	9
Number of roadway overcrossings and undercrossings	58

[1] A straddle bent is a pier structure that spans (or "straddles") the functional/operational limit of a roadway, highway, or railway.
[2] Railroad crossing means a railroad crossing another railroad.
[3] Features considered major water crossings are Los Angeles River, Rio Hondo (and basins), San Gabriel River, North Fork Coyote Creek, La Mirada Creek, Coyote Creek, Brea Creek, Fullerton Creek, and Carbon Creek.



Source: Authority 2025a

Figure 2-1 Los Angeles to Anaheim Project Section Alignment

Currently, two to three mainline tracks occur throughout the corridor, with a variable number of freight siding tracks. The HSR project seeks to maintain existing operations in the corridor while minimizing impacts outside of the existing right-of-way. To accomplish this, the HSR project would add one new mainline track from LAUS to Fullerton Junction and would use existing tracks, where possible, to ensure that, overall, the project section includes two electrified tracks along the corridor for HSR, which would be shared with other passenger rail operators. These two electrified tracks are referred to herein as *shared tracks*. The specific details of Shared Passenger Track Alternative A and Shared Passenger Track Alternative B are discussed further below.

2.2.1 Shared Passenger Track Alternative A

2.2.1.1 Alignment

Table 2-2 summarizes the alignment of Shared Passenger Track Alternative A through the corridor cities. Figure 2-2 depicts the northern project section limit and its relationship with Los Angeles County Metropolitan Transportation Authority's proposed Link Union Station Project. Figure 2-3 through Figure 2-8, as referenced therein, provide cross-sections of various points along the project alignment discussed in Table 2-2. Where applicable, Table 2-2 also provides references to later sections of this project description that provide further details of other project components including, but not limited to, ancillary facilities, HSR and passenger rail stations, and the LMFs.

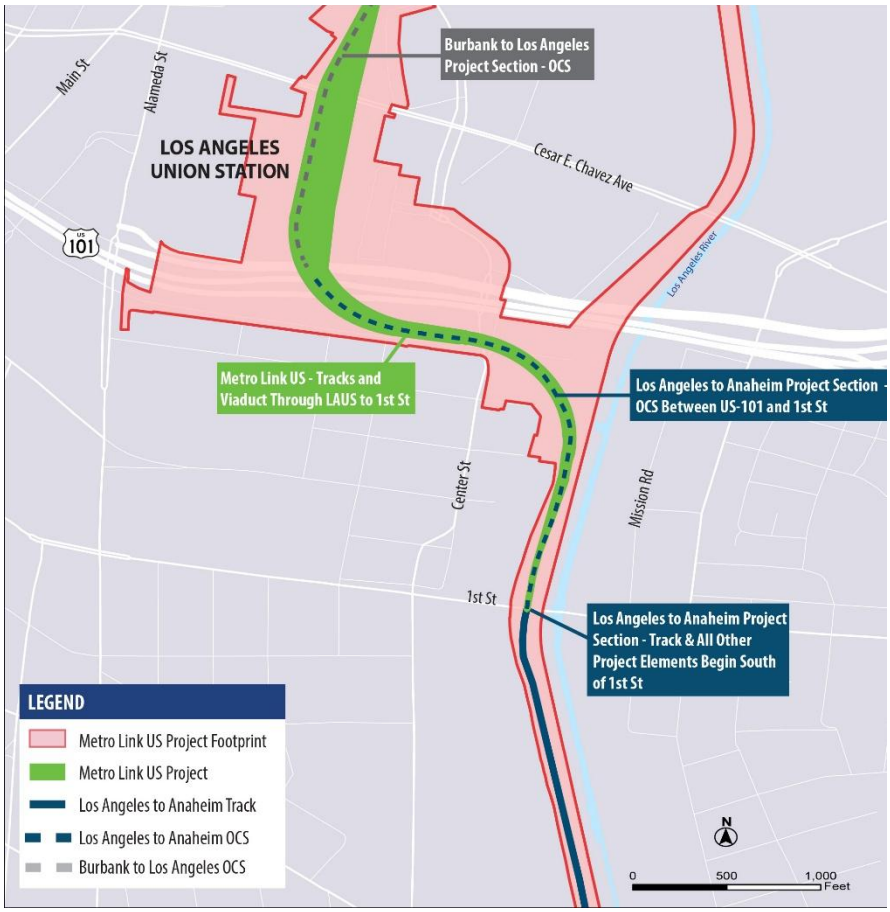
Table 2-2 Shared Passenger Track Alternative A Alignment

Project Section Segment	Segment Alignment Description
Los Angeles and Vernon	▪ The project section would begin immediately south of LAUS, at the northern edge of US 101, where a viaduct built as part of the Link US Project would begin. The installation of the OCS north of US 101 was previously approved as part of the Burbank to Los Angeles Project Section in January 2022. From US 101 to 1st St, the Authority would build the OCS for HSR. At 1st St, Shared Passenger Track Alternative A would include the HSR project tracks and all other project infrastructure south to ARTIC. ▪ Starting at the LAUS platforms, HSR trains would run on tracks built as part of Link US, cross over US 101, Commercial St, and Ducommun St on a viaduct, and come down to grade just before 1st St, joining the existing railroad right-of-way. From this tie-in point south, the HSR trains would use the existing tracks, which would be upgraded with an OCS. Refer to Figure 2-3 for a cross section of the track between 1st St and 4th St. ▪ Between 7th St and I-10, two HSR layover tracks would be added west of the shared tracks; refer to Section 2.2.1.2, Ancillary Facilities, for more information. The shared tracks would cross under the Olympic Blvd roadway overcrossing and rise onto an existing railroad bridge to cross over Washington Blvd and the Los Angeles River. The shared tracks would return to at grade east of Soto St and enter Vernon. ▪ The BNSF and shared tracks would pass by the BNSF Los Angeles Intermodal Facility (referred to as Hobart Yard). The proposed 26th St LMF would be south of Hobart Yard and is described in more detail in Section 2.2.1.4, Light Maintenance Facility.
Commerce, Bell, Montebello, and Pico Rivera	▪ East of Hobart Yard, the tracks would cross at grade under I-710 and enter Commerce. Starting from west of Eastern Ave, the shared tracks would rise onto a new elevated structure, referred to as the *Commerce Flyover*; refer to Section 2.2.1.5, Freight or Passenger Railroad Modifications, and Figure 2-4 for more information on the Commerce Flyover, which is designed to pass by the BNSF Commerce Intermodal Facility (referred to as *Commerce Yard*). ▪ The Commerce Flyover would cross over Eastern Ave and pass by the existing Commerce Metrolink Station. The elevated shared tracks would not connect with the Commerce Metrolink Station's existing location, which would be relocated. Refer to Section 2.2.1.5 for more information on the Commerce Metrolink Station's relocation. The elevated tracks would return to grade before I-5 and would remain so throughout Montebello and Pico Rivera.

Project Section Segment	Segment Alignment Description
Santa Fe Springs and Norwalk	▪ The tracks would continue east into Santa Fe Springs and cross over Pioneer Blvd, Norwalk Blvd, and Los Nietos Rd. All of these would be new grade separations, with the roadway lowered and tracks crossing over on new railroad bridges; refer to Section 2.2.1.6, State Highway or Local Roadway Modifications. ▪ From Slauson Ave to Telegraph Ave, the track configuration would remain at grade with four tracks, as depicted on Figure 2-5. ▪ South of Telegraph Rd, the shared tracks would diverge outside of the existing railroad right-of-way and rise onto retained fill to cross over Florence Ave on a new bridge, while three BNSF mainline tracks would cross Florence Ave on the existing railroad bridge. The shared tracks would transition from retained fill onto an elevated structure that crosses over Lakeland Rd, while the BNSF tracks would remain at grade in their current configuration throughout this segment. The elevated structure would continue south and transition from the west side of the corridor over to the east side. Figure 2-6 depicts the track configuration south of Lakeland Rd. ▪ The elevated structure would veer east out of the existing railroad corridor and cross over Imperial Hwy, necessitating modifications to the existing Norwalk/Santa Fe Springs Metrolink Station, described in Section 2.2.1.3, High-Speed Rail Station Facilities, in more detail. Under Shared Passenger Track Alternative A, HSR trains would not stop at the Norwalk/Santa Fe Springs Metrolink Station. ▪ South of the station, the elevated structure would rejoin the existing railroad corridor and transition back down to at grade just west of Carmenita Rd.
La Mirada and Buena Park	▪ The tracks would continue at grade through La Mirada and Buena Park. In Buena Park, the track design would conflict with the location of the existing Buena Park Metrolink Station platform, necessitating the station's relocation (refer to Section 2.2.1.5 for more information).
Fullerton	▪ East of Dale St, the tracks would enter Fullerton. The Fullerton Municipal Airport is south of the railroad corridor, and the shared tracks would require lowering as they pass by the airport to prevent the HSR project, including the OCS, trains, and all other project components, from conflicting with the airport runway protection zone. The shared tracks on the north side of the corridor would also need to transition to the south side in order to serve the existing Fullerton Metrolink/Amtrak Station farther south. ▪ The shared tracks would transition underneath the BNSF tracks via a short below-grade section, in a braced trench. The trench would start approximately 850 feet east of Dale St and, approaching the eastern end of the Fullerton Airport, would cross under the BNSF tracks to the south side of the corridor, continuing adjacent to the existing BNSF tracks (which would remain at grade). Refer to Figure 2-7 for a cross section of the shared tracks in the trench after they transition to the south side of the corridor. ▪ The shared tracks would return to grade just before Gilbert St. Continuing east, a fourth track would be added to the south side of the corridor at the Fullerton Metrolink/Amtrak Station, which would require modifications, described in more detail in Section 2.2.1.3. Under Shared Passenger Track Alternative A, HSR trains would not stop at the Fullerton Metrolink/Amtrak Station. ▪ East of the station at Fullerton Junction, the three tracks along the north side of the corridor would be dedicated to BNSF trains and would continue east through Fullerton Junction. The tracks along the south side of the corridor would be dedicated to passenger trains and travel south to ARTIC.

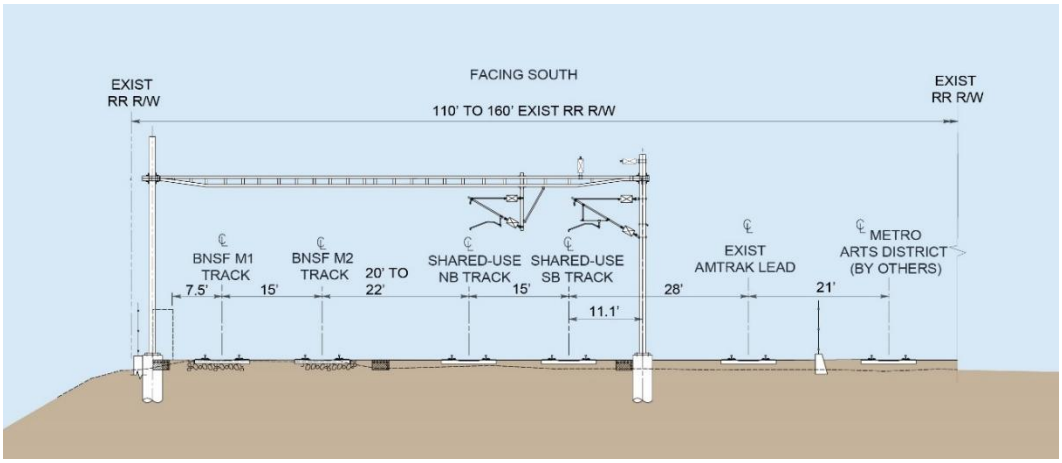
Project Section Segment	Segment Alignment Description
Anaheim	▪ South of Fullerton Junction, the tracks would enter Anaheim. From Fullerton Junction to ARTIC, the two existing tracks would be electrified to allow for shared operations with Metrolink. Several freight trains per day currently run on the existing tracks and would retain operation rights in the future. The two shared tracks would remain at grade through the rest of Anaheim. ▪ The existing at-grade crossings at Orangethorpe Ave, La Palma Ave, Sycamore St, Broadway St, Santa Ana St, South St, Vermont Ave, and Ball Rd would be maintained. Refer to Figure 2-8 for the cross section that is representative of the two-track configuration throughout this segment. ▪ From south of Ball Rd to south of Cerritos Ave, two HSR layover tracks would be added along the west side of the corridor. Cerritos Avenue and State College Blvd would be grade separated, with the roadways lowered and the tracks crossing over the road on new railroad bridges. ▪ The tracks would end at ARTIC, where HSR platforms and station facilities would be added to the existing station, described in more detail in Section 2.2.1.3.

ARTIC = Anaheim Regional Transportation Intermodal Center; Authority = California High-Speed Rail Authority; BNSF = BNSF Railway; HSR = high-speed rail; I = interstate; LAUS = Los Angeles Union Station; Link US = Link Union Station; OCS = overhead contact system; project section = Los Angeles to Anaheim Project Section; US 101 = U.S. Highway 101



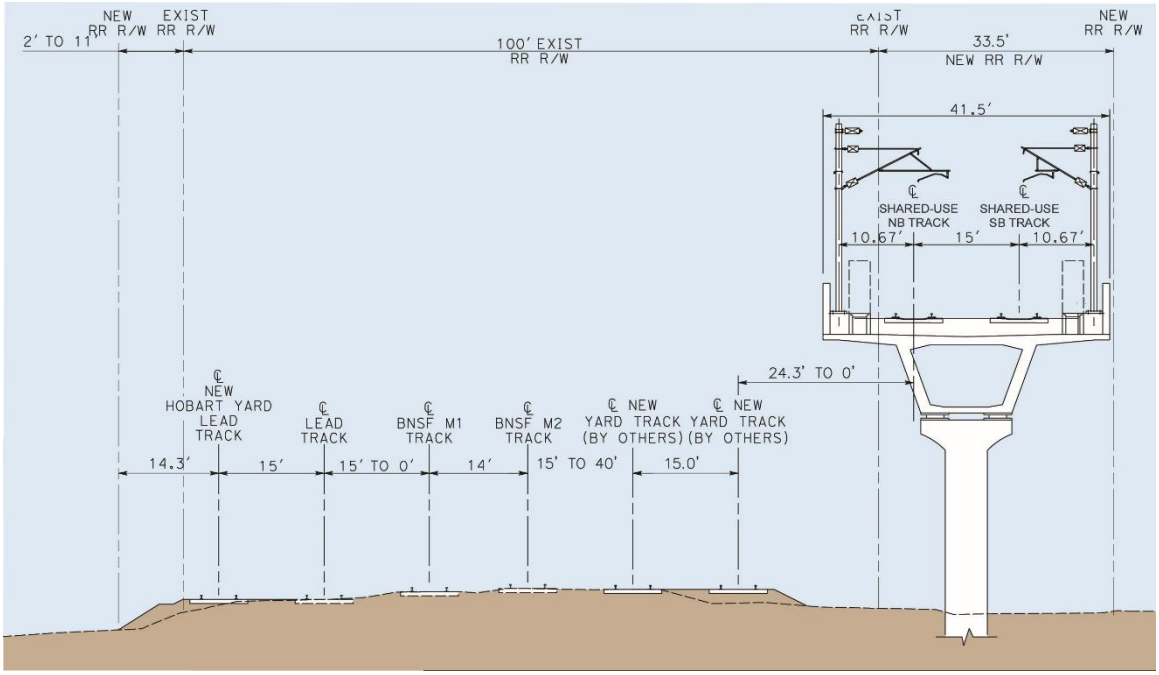
Source: Authority 2025a
Link US = Link Union Station; Metro = Los Angeles County Metropolitan Transportation Authority; OCS = overhead contact system

Figure 2-2 High-Speed Rail and Link Union Station Project



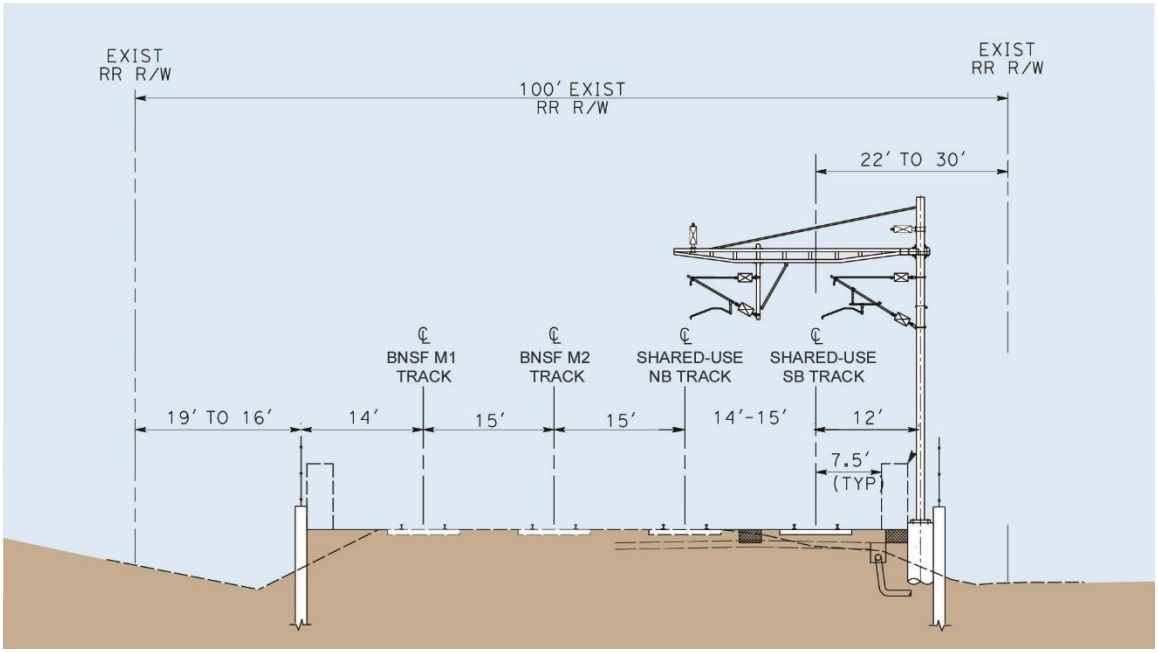
Source: Authority 2025a
M = main track; RR = railroad; R/W = right-of-way; NB = northbound; SB = southbound

Figure 2-3 At-Grade Cross Section between 1st Street and 4th Street



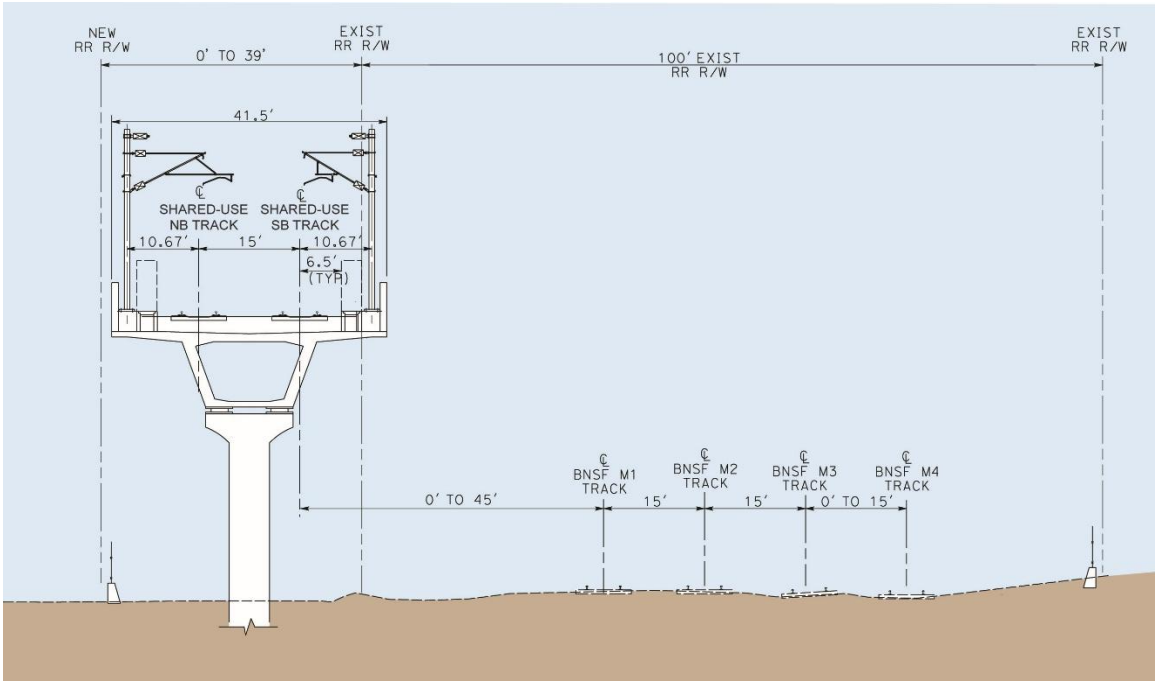
Source: Authority 2025a
M = main track; RR = railroad; R/W = right-of-way; NB = northbound; SB = southbound

Figure 2-4 Elevated Cross Section between Atlantic Boulevard and Eastern Avenue (Commerce Flyover)



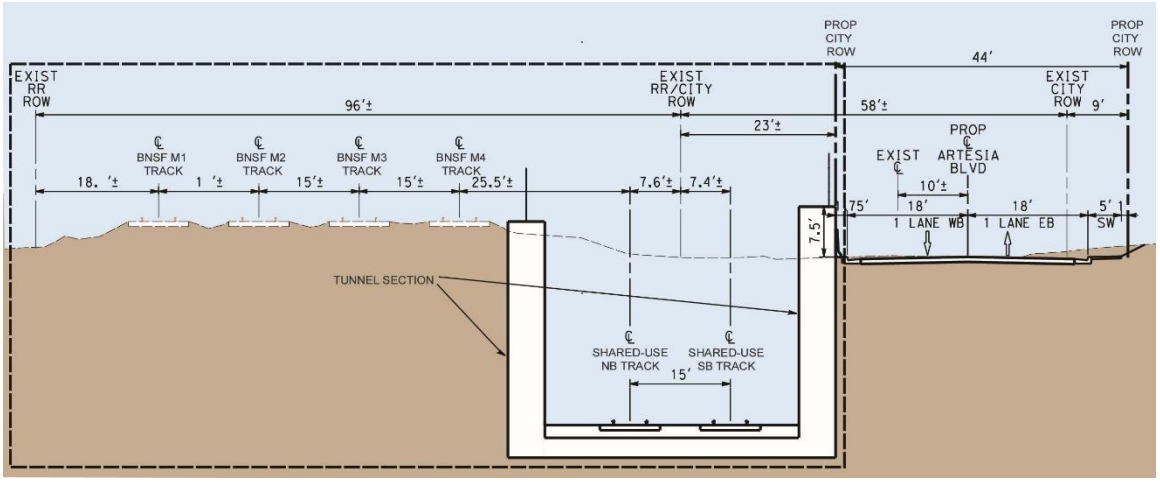
Source: Authority 2025a
M = main track; RR = railroad; R/W = right-of-way; NB = northbound; SB = southbound

Figure 2-5 At-Grade Cross Section from Slauson Avenue to Telegraph Road



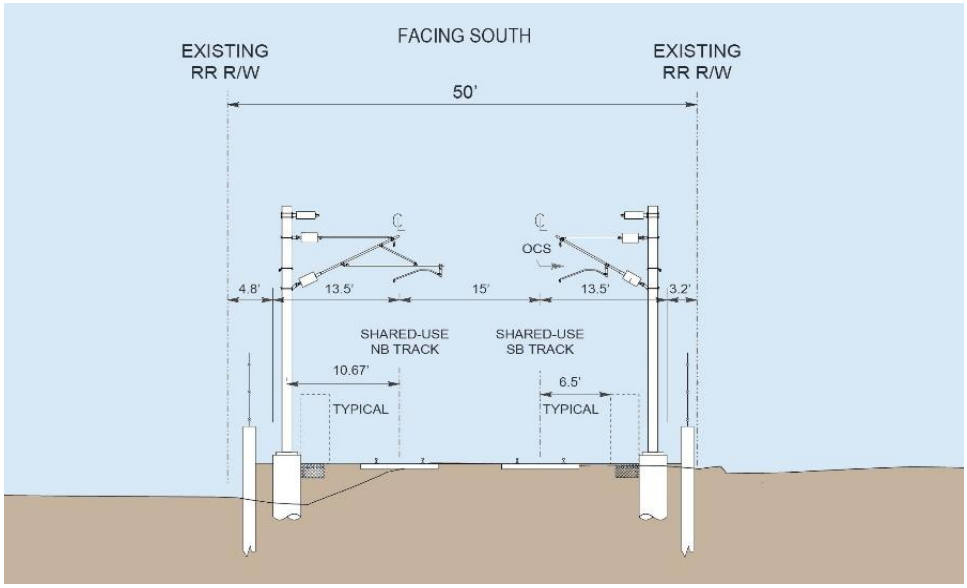
Source: Authority 2025a
M = main track; RR = railroad; R/W = right-of-way; NB = northbound; SB = southbound

Figure 2-6 Elevated Cross Section South of Lakeland Road



Source: Authority 2025a
Figure not to scale
M = main track; OCS = overhead contact system; RR R/W = railroad right-of-way

Figure 2-7 Braced Trench Cross Section East of Fullerton Airport



Source: Authority 2025a
OCS = overhead contact system; RR = railroad; R/W = right-of-way; NB = northbound; SB = southbound

Figure 2-8 At-Grade Cross Section between La Palma Avenue and Ball Road

2.2.1.2 Ancillary Facilities

Systems Facilities

HSR trains would draw power from California's existing electricity grid, with power distributed to the trains via the overhead contact system (OCS). The project would not include construction of a separate power source; rather, the existing grid would supply power to the OCS through the extension of underground or overhead transmission lines to a series of power substations positioned along the railroad corridor. The transformation and distribution of electricity would occur through the following three types of stations:

- Traction power substations (TPSS), which would transform high-voltage electricity supplied by public utilities to the train operating voltage. The project section would include two TPSS sites (Los Angeles and Anaheim), which would both be adjacent to existing utility transmission lines and outside of the existing right-of-way. The TPSS sites would be spaced apart by approximately 30 miles along the project alignment and each include an approximately 450-square-foot control room and two 115/50-kilovolt or 230/50-kilovolt, single-phase transformers that would both be rated at 60 megavolt-amperes. The foregoing components would be installed within an approximately 32,000-square-foot area, and screening of each TPSS would be provided by a wall or fence.
- A switching station to connect and balance the electrical load between tracks and switch OCS power on or off in the event of a power outage or emergency. A switching station would be installed in Santa Fe Springs, generally midway between the two TPSS sites, approximately 15 miles from the nearest TPSS and 0.1 mile northeast of the project alignment. Installation of the station's equipment would require approximately 9,600 square feet.
- Paralleling stations, or autotransformer stations, to provide voltage stabilization and equalize current flow. Two paralleling stations would be installed along the project alignment, with one each along the segments between the Santa Fe Springs switching station and the Los Angeles and Anaheim TPSS sites. Each paralleling station would be adjacent to the HSR right-of-way, include an approximately 450-square-foot control room, and require approximately 8,000 square feet.

Table 2-3 provides the locations of the proposed TPSSs, switching station, and paralleling stations.

Table 2-3 Traction Power, Paralleling, and Switching Station Locations

Traction Power Station Type	Location
Traction power substation (two sites)	**City of Los Angeles:** South of Washington Blvd, and west of Soto St, adjacent to the existing railroad viaduct **City of Anaheim:** On the northeast corner of Lewis St and Cerritos Ave, southwest of the HSR tracks
Paralleling station (two sites)	**City of Montebello:** Southwest corner of Maple Ave and Sycamore St, south of the HSR tracks (co-located with the relocated Commerce Metrolink Station) **City of Fullerton:** Northwest corner of Dale St and Artesia Ave, south of the HSR tracks
Switching station	**City of Santa Fe Springs:** Northeast corner of Los Nietos Rd and Santa Fe Springs Rd, north of BNSF Railway tracks

Source: Authority 2025a
HSR = high-speed rail

Signaling and Train-Control Elements

The National Transportation Safety Board, FRA, and other agencies mandate Positive Train Control, a train safety system designed to automatically implement safety protocols and provide communication with other trains to reduce the risk of a potential collision. Because of the lower operating speed of HSR trains in this project section compared to other HSR project sections, this project section would operate using conventional Positive Train Control signaling rather than a specialized HSR signaling system. This project section would use a radio-based communications network, including a fiber optic backbone and communications towers approximately every 2 to 3 miles, depending on the terrain and selected radio frequency. The towers would be in the HSR corridor in a fenced area of approximately 20 feet by 15 feet, including a 10- by 8-foot communications shelter and a 6- to 8-foot diameter, 100-foot-tall communications pole. These

communications facilities could be co-located within the TPSSs. Where communications towers cannot be located with TPSSs or other HSR facilities, they would be within or near the HSR corridor in an approximately 20- by 15-foot fenced area.

Layover Tracks

Layover tracks are used to store and restock trains during the day, in between service runs, and to store trains at night at terminus stations when they are not in service. Layover tracks are required where high-speed trains would end their runs, near LAUS and ARTIC, to support layover functions such as overnight storage, draining of waste tanks, filling of potable water tanks, and cleaning of windows, among others, as well as daily scheduled interior cleaning of passenger areas that would occur prior to the train entering revenue service. The Los Angeles layover tracks would be between Seventh Street and Interstate (I-) 10, and could be accessed for cleaning activities through the Amtrak Eighth Street Yard. The Anaheim layover tracks would be from south of Ball Road to south of Cerritos Avenue, and would have a layover support facility at the northeast corner of Lewis Street and Cerritos Avenue.

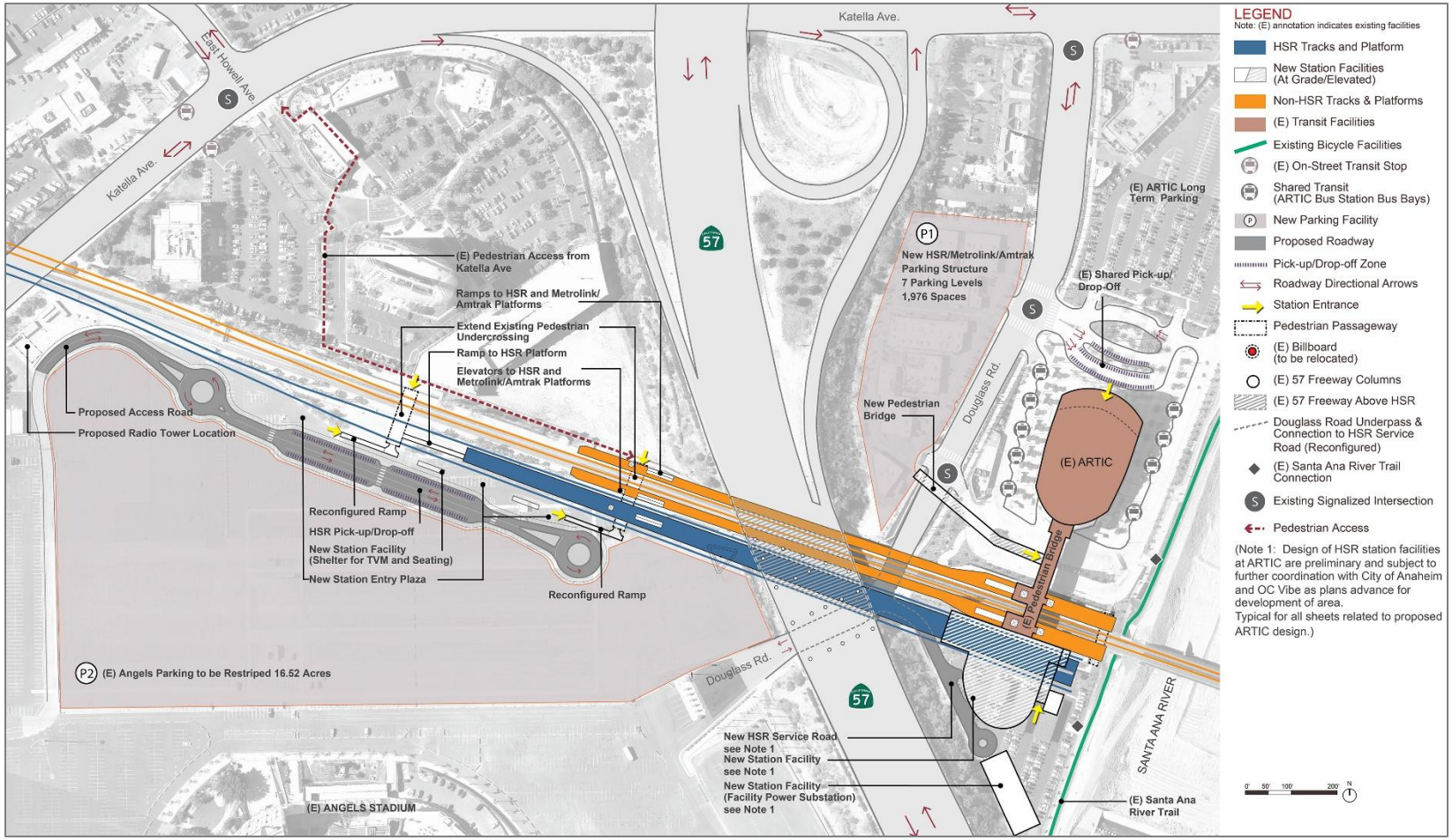
2.2.1.3 High-Speed Rail Station Facilities

Because the project section is within an existing corridor with passenger rail service, Shared Passenger Track Alternative A does not propose new HSR stations but rather modifies existing passenger rail stations to allow for shared operations with HSR. Shared Passenger Track Alternative A would include an HSR station platform and facilities at ARTIC, described below.

ARTIC High-Speed Rail Platform and Station Facilities

The proposed HSR platform and station facilities at the existing ARTIC station would be at grade, with two new HSR tracks and a single 1,410-foot center platform for HSR, south of and parallel to the existing Metrolink/Amtrak tracks and platforms. The HSR platform would be accessed through an extension of ARTIC's existing pedestrian bridge from the northeast and through an extension of two existing pedestrian tunnels on the western end of the existing ARTIC platforms. The Authority would work with the City of Anaheim, as the ARTIC passenger terminal owner, to share the passenger amenities inside ARTIC in the near term. Once ridership increases enough that combined HSR and local-provider passenger volumes exceed the design capacity of the ARTIC passenger terminal building, the Authority would build a separate HSR passenger terminal. This new HSR station building, included within the project footprint and depicted on Figure 2-9, would be at the southern end of the pedestrian bridge, along with a facility power substation to provide electricity to the building. The existing Metrolink/Amtrak parking lot north of Angel Stadium would be reconfigured into a pick-up/drop-off area and connected to the existing access road from Katella Avenue. The project would maintain the two existing access points between the Santa Ana River Trail and ARTIC. Radio towers would be built adjacent to the access road at Katella Avenue.

This project would include a new parking structure adjacent to State Route 57 and Katella Avenue, providing 1,350 HSR parking spaces and 626 replacement parking spaces to account for existing parking spaces at ARTIC that would be displaced by the HSR tracks and platform, for a total of 1,976 parking spaces. Figure 2-9 provides an illustration of the HSR platform and station facilities at ARTIC.



Source: Authority 2025a

Figure 2-9 High-Speed Rail Platform and Facilities at ARTIC

2.2.1.4 Light Maintenance Facility

HSR operations in Southern California would require a Level III[5] LMF for fleet storage, cleaning, repair, overnight layover accommodations, and servicing facilities, including the necessary water cistern and power facilities. The 26th Street LMF is designed to follow the Authority's *Requirements for High-Speed Trainset Fleet and Infrastructure Maintenance Facilities Technical Memorandum* (Authority 2024a).

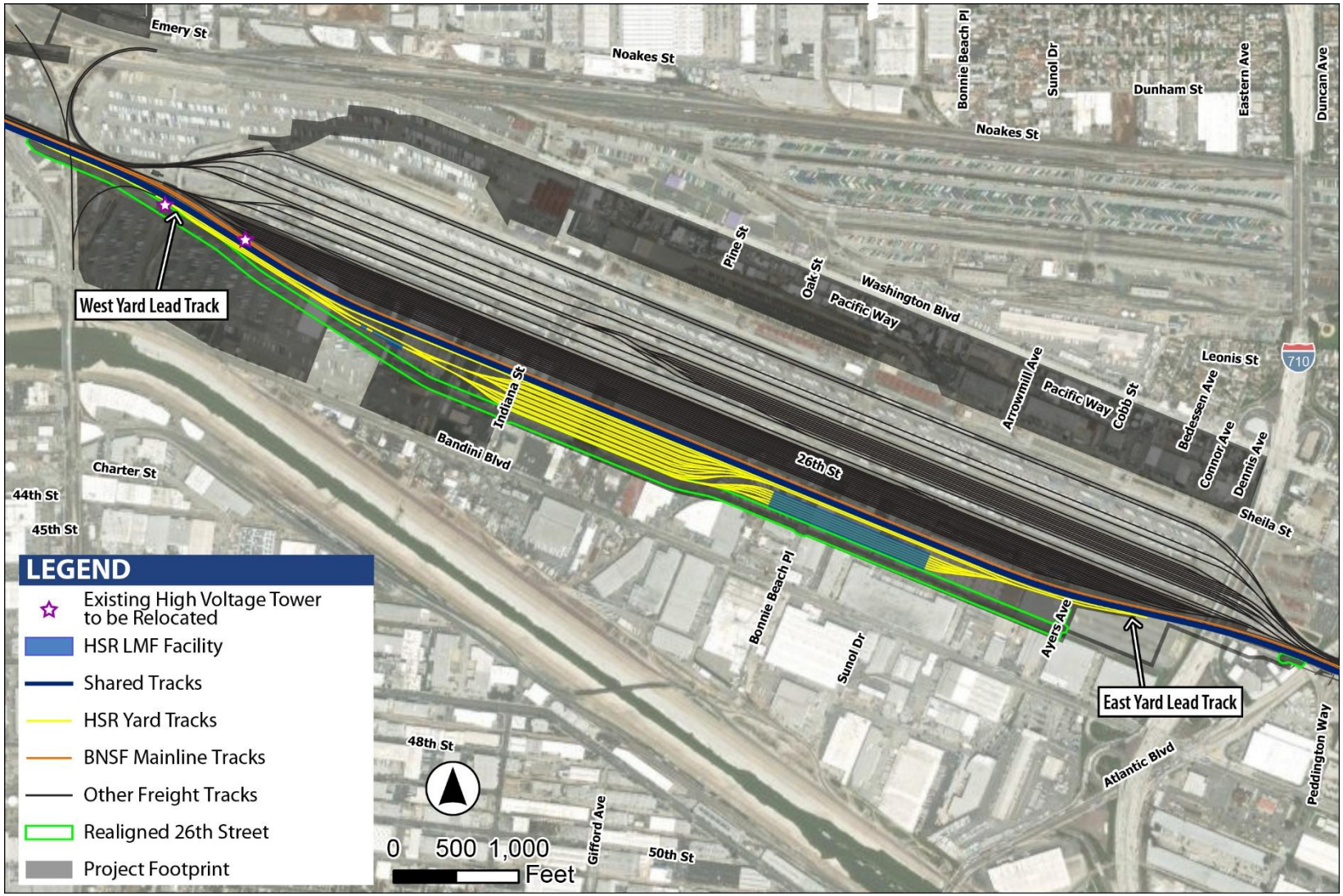
Refer to Figure 2-10 for an overview of the 26th Street LMF, which would have an overall size of 50 acres and be roughly bounded by the realigned mainline tracks on the north, a relocated 26th Street on the south, Downey Road on the west, and I-710 on the east. The changes on the south side of Hobart Yard would require 26th Street to be realigned, which would provide access to the LMF. Two high-voltage utility towers would be relocated to accommodate the 26th Street realignment. Refer to Section 2.2.1.5 for more details on changes adjacent to Hobart Yard.

The LMF would be double-ended, with all tracks having access from the mainline on both the eastern and western sides. HSR trains would access the LMF from the east and west on two new yard lead tracks, which would be south of the mainline tracks. Within the 26th Street LMF, there would be an outdoor train yard with 12 yard tracks to allow for the storage of 24 single trainsets, along with a 1,345-foot-long, six-track shop building, which could accommodate 12 trainsets. The internal LMF access roads would be wide enough to accommodate service vehicles, consolidate commissary functions, and provide more clearance from the OCS poles to the yard tracks.

2.2.1.5 Freight or Passenger Railroad Modifications

Shared Passenger Track Alternative A would modify the existing rail corridor to create a corridor that is primarily four mainline tracks (two electrified and shared with other passenger rail operators) from Los Angeles to Fullerton, and two mainline tracks (electrified and shared with both passenger rail and freight operators) from Fullerton to Anaheim. Freight rail would operate primarily on the nonelectrified tracks, although the electrified tracks could accommodate freight traffic if necessary (up to 10 BNSF freight trains per day would be able to use the two passenger rail tracks), while maintaining service and operation levels for all operators within the corridor. The following sections describe the freight and passenger railroad modifications in more detail, which include modifications to BNSF storage and intermodal facilities as well as modifications to and relocations of existing passenger rail stations.

[5] The Authority defines three levels of maintenance to be conducted at an LMF.



Source: Authority 2025a

Figure 2-10 Shared Passenger Track Alternative A: 26th Street Light Maintenance Facility

BNSF Railway Storage and Intermodal Facilities

Adding and electrifying tracks in the existing right-of-way would require the Authority to remove or modify track and right-of-way that is currently used or planned for future use by BNSF for train storage and intermodal operations. This requires modifications to BNSF's plans for expansion at its yards in Vernon and Commerce. In several locations, Shared Passenger Track Alternative A would require removal/relocation of existing BNSF infrastructure. Thus, Shared Passenger Track Alternative A would replace the affected BNSF infrastructure, primarily adjacent to Hobart Yard, to maintain BNSF capacity and avoid disruptions to operations.

Table 2-4 lists the BNSF storage capacity that would be removed from the corridor and relocated to the new consolidated storage yard adjacent to Hobart Yard; refer to Figure 2-11 for an overview of the relocated infrastructure. The new storage yard would provide 101,094 track feet of storage, including 5,850 track feet for a new runaround track,[6] which is slightly more than the amount removed from the corridor (90,940 track feet). This is a result of the layout and overall length of the new consolidated yard. The tracks need to be operational while fitting within the new yard space and maintaining the removed storage capacity, and therefore some replacement tracks would be longer than the ones that are being removed from the corridor. In addition to the relocations described in Table 2-4, some BNSF yard lead and storage tracks throughout the corridor would be relocated and replaced within the same area, with the same level of storage capacity and operational functionality maintained. This includes the Pico Rivera Yard north and south lead tracks, La Mirada Yard lead track and storage track, and Fullerton storage track on the southern side between Commonwealth Avenue and Highland Avenue.

Table 2-4 BNSF Railway Facility or Track to Be Removed or Modified

HSR Project Element Affecting BNSF Infrastructure	BNSF Facility/Track to Be Removed/Relocated/Modified	Length of Removed/ Relocated Tracks (TF)
HSR mainline and layover tracks	BNSF 8th St Yard (BNSF storage tracks between 1st St and I-10 along West Bank)	35,000
Relocated Commerce Metrolink Station	South Vail Support Track (between Vail St and Minson Wy)	3,800
4th mainline track	Pico Rivera Storage Tracks	4,000
4th mainline track	Norwalk Support Track (between Telegraph Rd and Florence Ave)	4,400
4th mainline track	Santa Fe Springs Staging Track (through existing Norwalk/Santa Fe Springs Metrolink Station area)	14,600
Fullerton braced trench	Buena Park/Fullerton Storage Tracks (on north side between Dale St and Gilbert St)	15,840
4th mainline track	Fullerton support track (north of Fullerton Amtrak/Metrolink Station)	4,500
4th mainline track	Fullerton storage track (on north side between Commonwealth Ave and Highland Ave)	8,800
Total		**90,940**

Source: STV 2025
BNSF = BNSF Railway; HSR = high-speed rail; I = interstate; TF = track feet

[6] Runaround tracks allow a locomotive to move around the train and attach to the opposite end, enabling the train to be switched or moved in the desired direction. The runaround track must be as long as the longest set of cars that would be pulled. A runaround track is generally recommended for all modern rail yards to reduce overall freight congestion.



Source: STV 2025

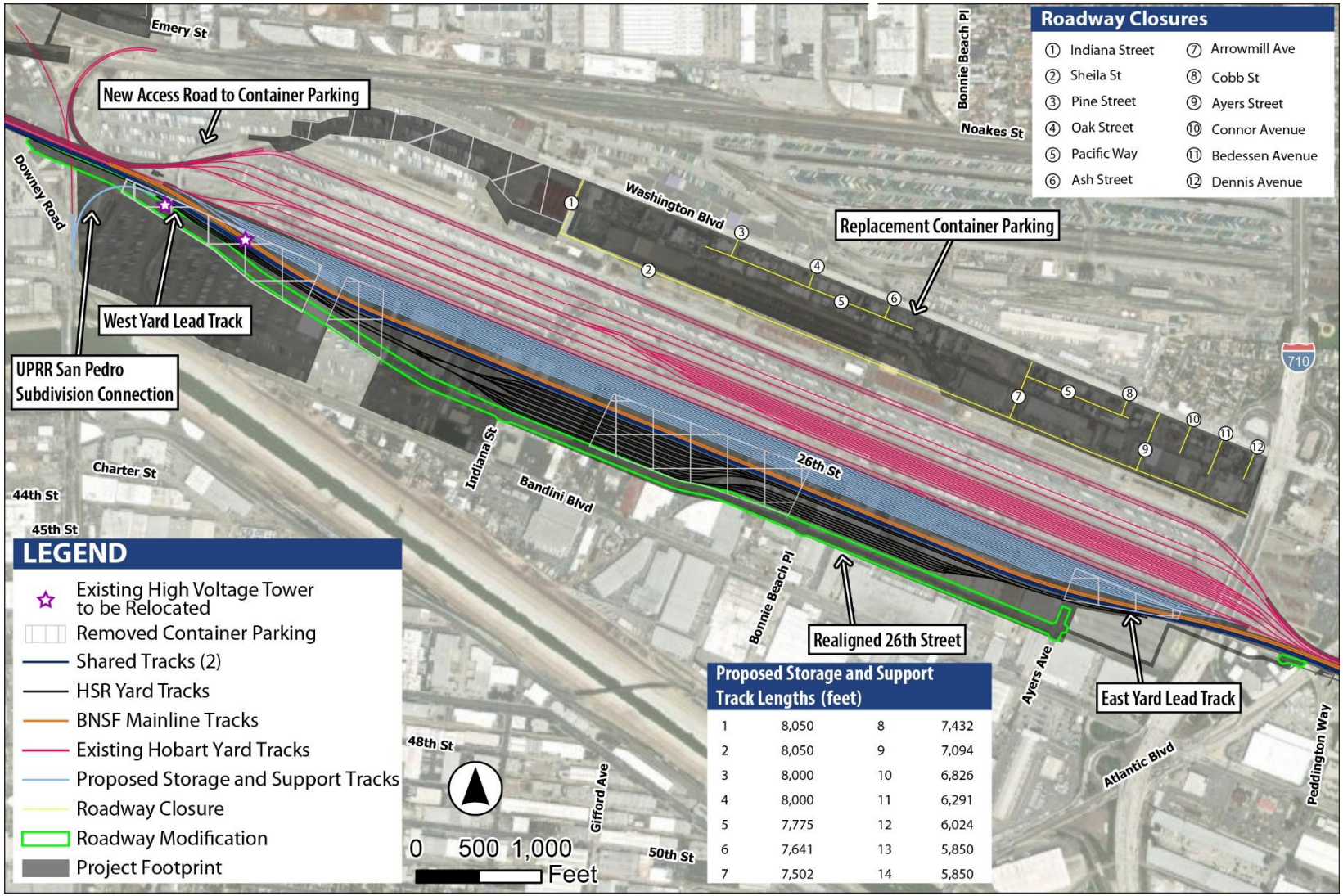
Figure 2-11 BNSF Railway Infrastructure Affected by the Los Angeles to Anaheim Project Section

BNSF Railway Los Angeles Intermodal Facility (Hobart Yard)

Figure 2-12 depicts the proposed changes at Hobart Yard. The consolidated storage yard, BNSF mainline tracks, shared tracks, and new connection to the UPRR San Pedro Subdivision would be up to 250 feet south of the current southern limit at Hobart Yard and into properties south of 26th Street. New second lead tracks into Hobart Yard from the west and east would also be added. These additional lead tracks would allow freight trains to move off the mainline tracks at speed and avoid delays and backups in an already heavily congested corridor. These track changes would require the vacation and realignment of the 26th Street right-of-way from Downey Road to Atlantic Boulevard.

The changes described above, along with LMF yard lead tracks, would displace some existing BNSF container parking south of the railroad corridor. This container parking would be replaced by acquiring properties north of Hobart Yard along the south side of Washington Boulevard, which would require a new access road north of Hobart Yard and the closure of several roads between Washington Boulevard and Sheila Street (refer to Section 2.2.1.6, State Highway or Local Roadway Modifications, for more details on roadway changes related to Hobart Yard). The new access road would also displace some existing container parking that would be replaced in the new container parking area.

Additionally, two high-voltage utility towers would be relocated to accommodate the 26th Street realignment.



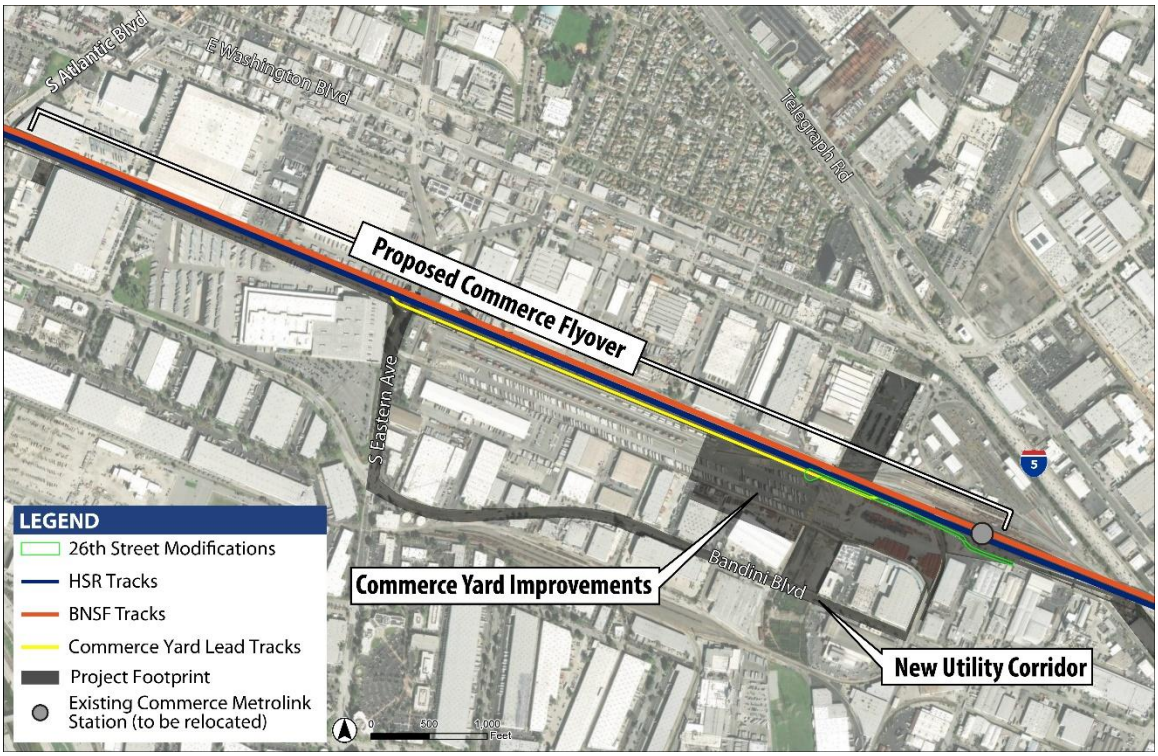
Sources: Authority 2025a; ESRI 2020

Figure 2-12 Hobart Yard Modifications (Shared Passenger Track Alternative A)

BNSF Railway Commerce Intermodal Facility (Commerce Yard)

Adjacent to Commerce Yard, the Commerce Flyover would separate passenger trains on an elevated structure from the freight trains running at grade. Figure 2-13 depicts the modifications required throughout the Commerce Yard area to maintain operations. Two new BNSF yard tracks would be added, converging into a new BNSF stub lead track west of I-5, with additional connector tracks. Improvements would include reconstructing several of the lead tracks, relocating the truck entrance gates and internal access road, and adding truck storage parking and a switching tail track. These yard improvements would require a portion of 26th Street to be closed; 26th Street currently provides access to the yard from the east, but the new entrance to the yard would require approximately 1,300 feet of the road to be closed.

Existing utilities along the south side of the railroad corridor would be relocated to the south in a new utility corridor, within Bandini Boulevard. Additionally, the high-voltage power lines currently running south of and parallel to the railroad corridor must be raised to provide the required clearance from the Commerce Flyover structure.



Sources: Authority 2025a; ESRI 2020

Figure 2-13 Commerce Flyover and Commerce Yard Modifications

Modified Metrolink Stations

Norwalk/Santa Fe Springs Metrolink Station Modifications

HSR trains would not stop at the Norwalk/Santa Fe Springs Metrolink Station, but modifications would be required for HSR operations, as depicted on Figure 2-14. The existing platforms at Norwalk/Santa Fe Springs Metrolink Station are in an area that would not be able to accommodate an additional mainline track and shared operations between HSR and Metrolink. Adding the additional mainline track would require shifting the existing platforms to an area with a straight section of track. Therefore, the Metrolink platforms would be moved to be served by the shared tracks on the new elevated structure, approximately 350 feet east of the existing alignment (at their farthest points). The modified station would be elevated, with two 680-foot side

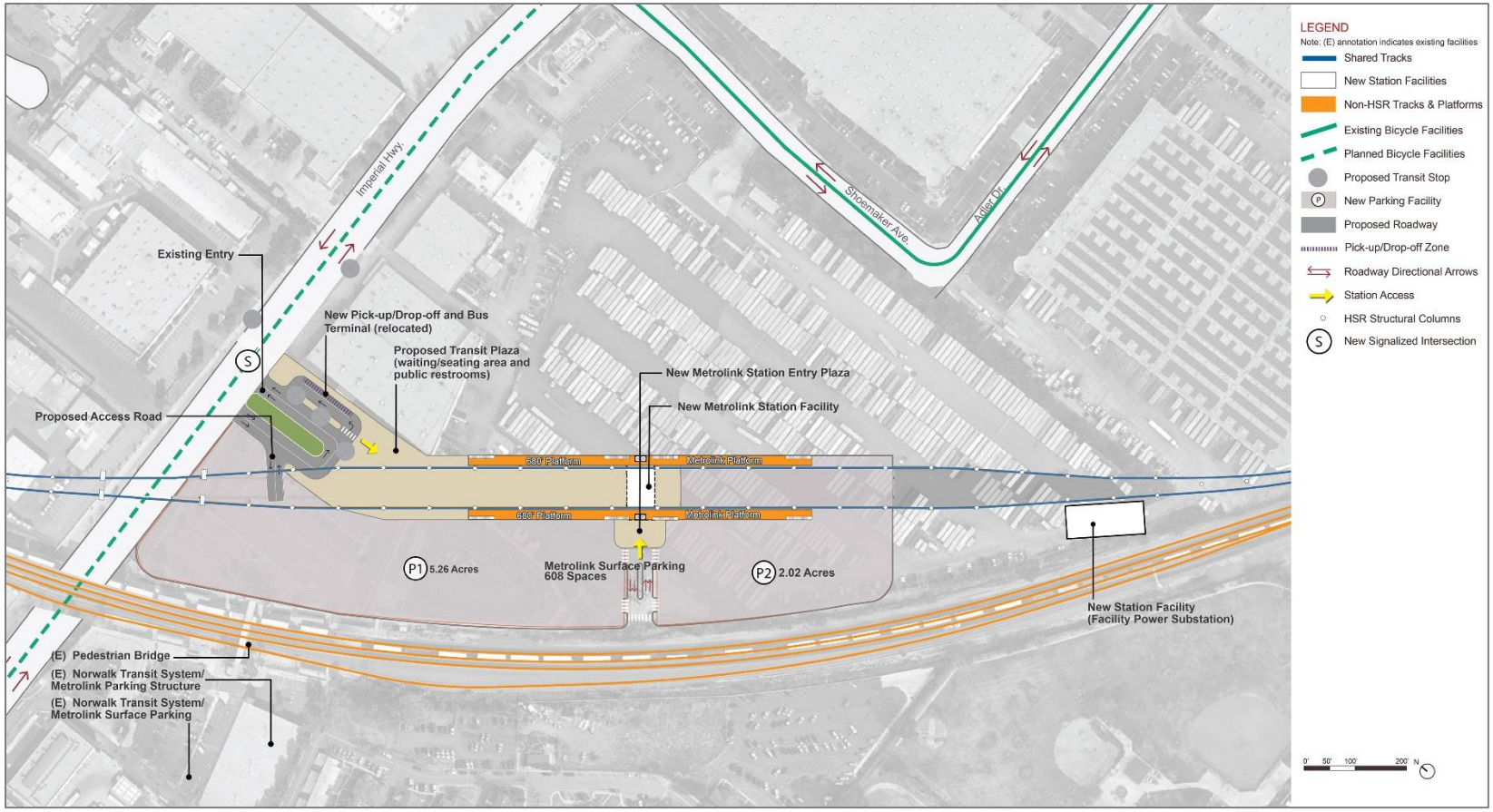
platforms, capable of future extension to 1,000 feet; the space for the future extension is included within the project footprint.

The existing Metrolink parking and bus drop-off west of the railroad corridor would be relocated to the east of the elevated structure to provide better access to the modified Metrolink platforms. Station entry points would be on Imperial Highway to the north and at Shoemaker Avenue and Adler Drive to the east and would require new access roadways. On Imperial Highway, the signalization leading into the parking garage would require modifications, as required by the City of Norwalk. The project would provide 608 surface parking spaces west of the modified platforms to replace the parking spaces at the existing Norwalk/Santa Fe Springs Metrolink Station displaced by the HSR modifications. Parking and pick-up/drop-off for Metrolink passengers would be within surface parking lots.

Fullerton Metrolink/Amtrak Station Modifications

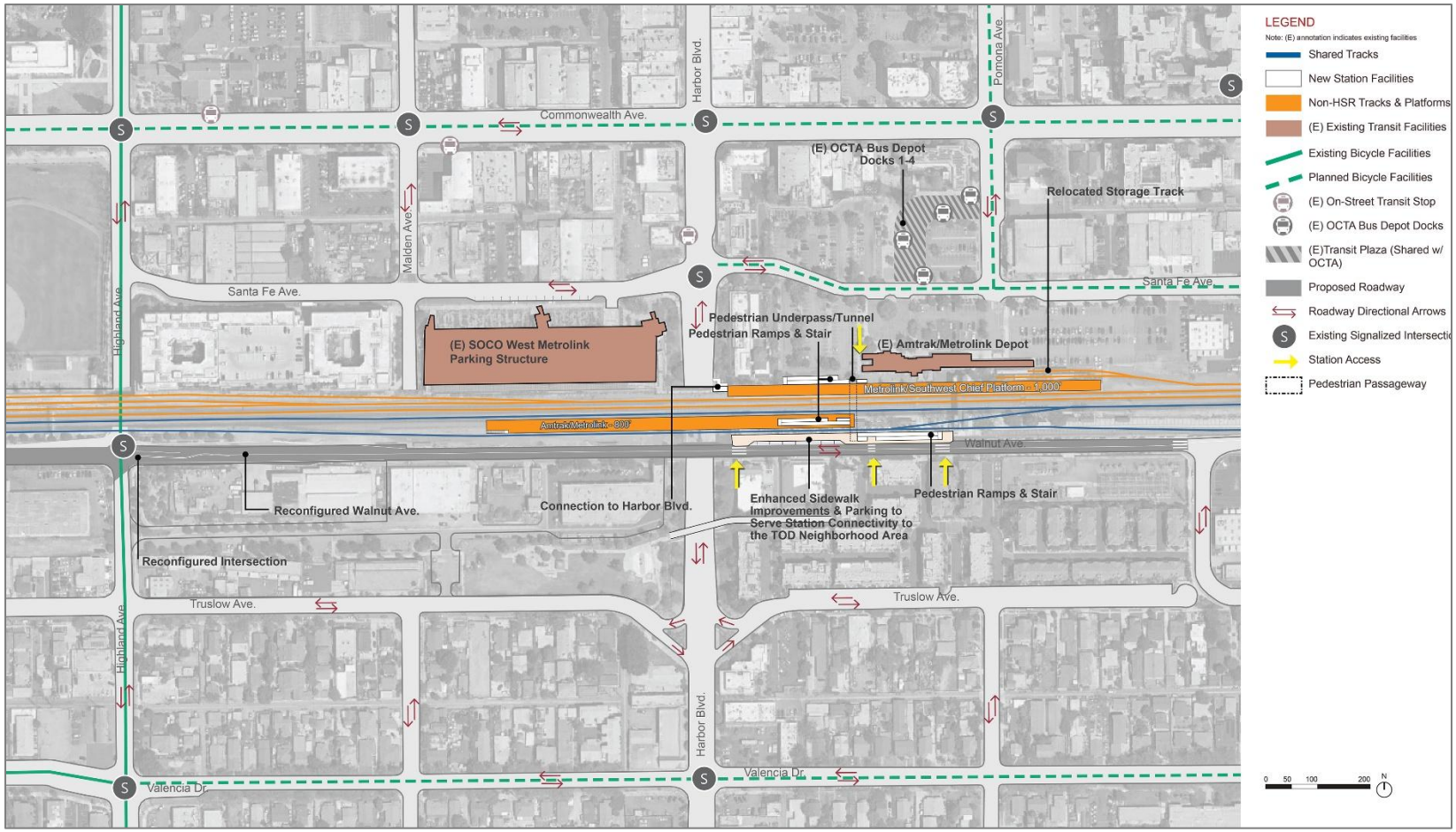
HSR trains would not stop at the Fullerton Metrolink/Amtrak Station, but modifications would be required for HSR operations, as depicted on Figure 2-15. At the Fullerton Metrolink/Amtrak Station, a fourth mainline track would need to be added on the southern side of the corridor, outside of the existing railroad right-of-way, to allow HSR trains to pass through the station. A new railroad bridge would be built over Highland Avenue to accommodate the new shared track, which requires Walnut Avenue to be slightly realigned to the south, and the intersection of Walnut Avenue and Highland Avenue would need to be redesigned.

Several modifications would occur for the Metrolink/Amtrak station platforms. The two existing platforms on the southern side would be removed, and a new 800-foot center platform would be added over Harbor Boulevard. The existing pedestrian bridge east of Harbor Boulevard that connects the two side platforms would be removed and replaced by a new pedestrian underpass that connects the existing northern platform, new center platform, and Walnut Avenue to the south, with ramps and stairs providing access. South of the new Metrolink/Amtrak center platform, Walnut Avenue would be slightly narrowed, and sidewalk improvements and crosswalks would be added east of Harbor Boulevard to improve station connectivity to the neighborhood.



Source: Authority 2025a

Figure 2-14 Modified Norwalk/Santa Fe Springs Metrolink Station Site Plan



Source: Authority 2025a

Figure 2-15 Modified Fullerton Metrolink/Amtrak Station Site Plan

Relocated Metrolink Stations

Commerce Metrolink Station Relocation

As stated in Section 2.2.1.1, the Commerce Flyover would require the Commerce Metrolink Station to be relocated to an area northeast of the intersection of Telegraph Road and Maple Avenue, which is approximately 0.75 mile to the east of its current location. The relocated Commerce Metrolink Station would be for Metrolink trains only; no HSR trains would stop at this station. An HSR paralleling station would be co-located at the relocated station site. Most of the relocated station would be within Montebello, including the replacement surface parking, plaza, and internal access roads; the platform and nonpublic station facilities north of the railroad corridor would be within Commerce.

The relocated station would have a center platform along the southern side of the rail corridor, accessible from the north via Sycamore Street via a new pedestrian underpass, and from the south via Maple Avenue. The intersection of Sycamore Street and Supply Avenue would be modified with pedestrian crosswalks, and the intersection of Telegraph Road and Maple Avenue would have a new signal and crosswalks to provide safe access to the new station location. All the existing station facilities, such as a transit plaza for buses, bicycle parking, vehicle parking (140 spaces), and a pick-up/drop-off area for motorists, would be replaced south of the corridor, to be accessed via Maple Avenue.

Buena Park Metrolink Station Relocation

As stated in Section 2.2.1.1, the HSR project would add and realign tracks through the existing Buena Park Metrolink Station, necessitating the relocation of the station. The Buena Park Metrolink Station would be relocated to between South Coyote Creek and Beach Boulevard, approximately 0.75 mile northwest of its current location within Buena Park. The proposed relocated Buena Park Metrolink Station would be for Metrolink trains only; no HSR trains would stop at this station.

The relocated station would have a center platform provided along the northern side of the existing rail corridor, accessible from the north via Stage Road and from the east via Beach Boulevard. A new signalized intersection is proposed at the intersection of Coyote Creek and Stage Road. All existing station facilities would be replaced, including a transit plaza for buses, bicycle parking, vehicle parking (313 spaces), and a pick-up/drop-off area for motorists.

2.2.1.6 State Highway or Local Roadway Modifications

Modifications at Roadway Crossings

Shared Passenger Track Alternative A would cross 58 federal, state, and locally controlled roadways, most of which are currently grade separated. A portion of the foregoing roadway crossings would require, in general, one of the following three types of roadway modifications:

- **New grade separations:** There are six roadway crossings where new railroad grade separations (railroad bridge crossings) would be needed. Five of the existing at-grade roadways would be fully grade separated and lowered to cross under the proposed railroad bridges. One roadway (Lakeland Road) would be partially grade separated and would not require vertical realignment, because the shared tracks would cross over the roadway on a new bridge.
- **Modified existing grade separations (roadway vertical realignment):** The alignment would use existing railroad bridges throughout the corridor, most of which would need to be widened or new bridges would need to be added adjacent to the existing bridges to accommodate new tracks. At nine of these existing grade separations, the roadways would require vertical realignments (i.e., be lowered) to provide the required clearances between the road and the railroad bridge.

- **Modified existing grade separations (new piers and abutments):** Thirteen existing grade separations would require modified piers or abutments to accommodate new or widened railroad bridges. No vertical realignment of the roadway would be required.

Eight at-grade crossings at Orangethorpe Avenue, La Palma Avenue, Sycamore Street, Broadway, Santa Ana Street, Sixth Street, Vermont Avenue, Ball Road, and Lewis Street would remain at grade and would be modified only to add OCS to the existing tracks.

Additionally, all existing roadway overcrossings that would span over the shared tracks would be modified to have protective barriers on the top to prevent people or objects from entering the HSR right-of-way from the bridge. Detailed plans of barrier type and installation details will be determined during the Preliminary Engineering for Procurement design phase and coordination with the corridor stakeholders.

Table 2-5 lists all the crossings and any modifications that would be required along the Shared Passenger Track Alternative A alignment.

Table 2-5 Modifications to Roadway Crossings (from northwest to southeast)

Roadway	City	Current Crossing Configuration	Proposed Modification
1st St	Los Angeles	Overcrossing	None
4th St	Los Angeles	Overcrossing	None
6th St/Whittier Blvd	Los Angeles	Overcrossing	None
7th St	Los Angeles	Overcrossing	None
I-10 (Santa Monica freeway)	Los Angeles	Overcrossing	None
Olympic Blvd	Los Angeles	Overcrossing	None
Washington Blvd	Los Angeles	Undercrossing	None
Soto St	Los Angeles	Undercrossing	None
Downey Rd	Vernon	Undercrossing	New pier and abutments within roadway
Private access road	Vernon	Overcrossing	None
I-710 (Long Beach freeway)	Vernon	Overcrossing	None
Atlantic Blvd	Commerce	Undercrossing	New piers and abutments within roadway
Eastern Ave	Commerce	Undercrossing	New piers and abutments within roadway
I-5 (Santa Ana freeway)	Commerce	Undercrossing	None
Telegraph Rd	Commerce	Undercrossing	None
Garfield Ave	Commerce	Undercrossing	None
Greenwood Ave	Montebello	Undercrossing	None
Paramount Blvd	Pico Rivera	Undercrossing	None
SR 19 (Rosemead Blvd)	Pico Rivera	Undercrossing	Road vertical realignment, new abutments within roadway
Passons Blvd	Pico Rivera	Undercrossing	New pier and abutments within roadway
Slauson Ave	Santa Fe Springs	Overcrossing	Pier modifications

Roadway	City	Current Crossing Configuration	Proposed Modification
I-605 (San Gabriel freeway)	Santa Fe Springs	Overcrossing	None
Pioneer Blvd	Santa Fe Springs	At grade	New grade separation; roadway lowered to cross under tracks on a new railroad bridge
Norwalk Blvd	Santa Fe Springs	At grade	New grade separation; roadway lowered to cross under tracks on a new railroad bridge
Los Nietos Rd	Santa Fe Springs	At grade	New grade separation; roadway lowered to cross under tracks on a new railroad bridge
Santa Fe Springs Rd	Santa Fe Springs	Undercrossing	New piers and abutments within roadway
Telegraph Rd	Santa Fe Springs	Undercrossing	New pier and abutments within roadway
Florence Ave	Santa Fe Springs	Undercrossing	New pier and abutments within roadway
Lakeland Rd	Santa Fe Springs	At grade	New grade separation (for HSR only); roadway remains at grade and shared tracks on elevated structure
Imperial Hwy	Santa Fe Springs, Norwalk	Undercrossing	None
Carmenita Rd	Santa Fe Springs	Undercrossing	Roadway vertical realignment, new piers and abutments within roadway
Rosecrans Ave/Marquardt Ave	Santa Fe Springs	Overcrossing	None
Valley View Ave	Santa Fe Springs, La Mirada	Undercrossing	New piers and abutments within roadway
Alondra Blvd	La Mirada	Overcrossing	Bridge replacement, roadway vertical realignment
SR 39 (Beach Blvd)	Buena Park	Undercrossing	New piers and abutments within roadway
Dale St	Buena Park	Undercrossing	Roadway vertical realignment, new piers and abutments within roadway
Gilbert St	Fullerton	Undercrossing	Roadway vertical realignment, new pier and abutments within roadway
Commonwealth Ave	Fullerton	Undercrossing	Roadway vertical realignment, new piers and abutments within roadway
Euclid St	Fullerton	Undercrossing	New pier and abutments within roadway
Highland Ave	Fullerton	Undercrossing	New abutments within roadway
Harbor Blvd	Fullerton	Undercrossing	New piers and abutments within roadway
Lemon St	Fullerton	Undercrossing	None

Roadway	City	Current Crossing Configuration	Proposed Modification
Orangethorpe Ave	Anaheim	At grade	None
SR 91 (Riverside freeway)	Anaheim	Overcrossing	None
La Palma Ave	Anaheim	At grade	None
Sycamore St	Anaheim	At grade	None
Lincoln Ave	Anaheim	Undercrossing	None
Broadway	Anaheim	At grade	None
Santa Ana St	Anaheim	At grade	None
South St	Anaheim	At grade	None
Vermont Ave	Anaheim	At grade	None
Ball Rd	Anaheim	At grade	None
Lewis St	Anaheim	Undercrossing	Roadway vertical realignment, new piers and abutments within roadway
Cerritos Ave	Anaheim	At grade	New grade separation; roadway lowered to cross under tracks on a new railroad bridge
State College Blvd	Anaheim	At grade	New grade separation; roadway lowered to cross under tracks on a new railroad bridge
Katella Ave	Anaheim	Undercrossing	Roadway vertical realignment, roadway widening, new piers and abutments within roadway
SR 57 (Orange freeway)	Anaheim	Overcrossing	None
Douglass Rd	Anaheim	Undercrossing	Roadway vertical realignment, new piers and abutments within roadway

Source: Authority 2025a
Authority = California High-Speed Rail Authority; HSR = high-speed rail; I = interstate; overcrossing = road over train tracks; SR = State Route; undercrossing = road under train tracks

New Grade Separations

As indicated in Table 2-5, five existing at-grade roadways would be grade separated for passenger rail and freight, with the roadway lowered to cross under new railroad bridges. These new grade separations are described in detail in Table 2-6, which includes references to the temporary and permanent footprints depicted on Figure 2-16 through Figure 2-19. The temporary project footprint includes areas such as utility easements and construction staging areas while the permanent project footprint includes areas that would be needed permanently for operation of HSR or areas that would permanently lose access from changes in roadway elevation. These grade separations are early action projects, which are described further in Section 2.3.1, Grade Separations.

Lakeland Avenue would be grade separated for HSR and passenger rail on a new elevated structure, but the freight tracks would remain at grade, with a minimal area of temporary and permanent impacts. Therefore, it is not included in Table 2-6.

Table 2-6 New Grade Separations with Roadway Vertical Realignments

Roadway	Grade Separation Description
Pioneer Boulevard (Figure 2-16)	– The existing roadway configuration at the Pioneer Blvd crossing in Santa Fe Springs consists of two northbound and two southbound traffic lanes and left-turn lanes to Rivera Rd (which is immediately adjacent and to the north of the railroad corridor) in both directions, with sidewalks on both sides of the road. – The at-grade crossing would be grade separated as a roadway undercrossing, with the railroad tracks on a bridge structure. Approximately 1,275 feet of Pioneer Blvd would be lowered, with the roadway approximately 20 feet below its current elevation at the lowest point of the undercrossing. Additional excavation depths would be required for bridge footings, utilities, pump station, and roadway subbase. – Direct access to Rivera Rd would be removed and a new roadway that loops west and south just north of the crossing would provide access from Pioneer Blvd to Rivera Rd.
Norwalk Boulevard (Figure 2-17)	– The existing roadway configuration at the Norwalk Blvd crossing in Santa Fe Springs consists of two northbound and two southbound traffic lanes and a southbound left-turn lane to eastbound Los Nietos Rd (which is immediately south of the crossing), with sidewalks on both sides of the roadway. – The at-grade crossing would be grade separated as a roadway undercrossing, with the railroad tracks on a bridge structure. Approximately 1,325 feet of Norwalk Blvd would be lowered by approximately 20 feet below its current elevation at the lowest point. Roadway clearance from bottom of bridge to top of pavement would be approximately 15 to 16.5 feet. Additional excavation depths would be required for bridge footings, utilities, pump station, and roadway subbase. – The intersection of Norwalk Blvd and Los Nietos Rd would also be lowered, as also described below.
Los Nietos Road (Figure 2-17)	– The existing roadway configuration at the Los Nietos Rd crossing in Santa Fe Springs consists of two westbound and two eastbound traffic lanes and a westbound left-turn lane to Norwalk Blvd (which is immediately west of the crossing), with sidewalks on both sides of the roadway. – The at-grade crossing would be grade separated as a roadway undercrossing, with the railroad tracks on a bridge structure. Approximately 1,700 feet of Los Nietos Rd would be lowered, with the roadway elevation approximately 25 feet below its current elevation at the lowest point. Roadway clearance from bottom of bridge to top of pavement would be approximately 15 to 16.5 feet. Additional excavation depths would be required for bridge footings, utilities, pump station, and roadway subbase. – The intersection of Norwalk Blvd and Los Nietos Road would also be lowered as part of this and the Norwalk Blvd grade separation.
Cerritos Avenue (Figure 2-18)	– The existing roadway configuration at the Cerritos Ave crossing in Anaheim consists of two westbound and two eastbound traffic lanes with sidewalks on both sides of the roadway. – The at-grade crossing would be grade separated as a roadway undercrossing, with the railroad tracks on a bridge structure. Approximately 1,850 feet of Cerritos Ave would be lowered by 25 feet below its current elevation at the lowest point. Roadway clearance from bottom of bridge to top of pavement would be approximately 15 to 16.5 feet. Additional excavation depths would be required for bridge footings, utilities, pump station, and roadway subbase. – In order to maintain its intersection with Cerritos Ave, Vernon St would need to be lowered about 5 feet below its existing elevation. Similarly, Lewis St would need to be lowered to maintain the intersection with Cerritos Ave.

Roadway	Grade Separation Description
State College Boulevard (Figure 2-19)	– The existing roadway configuration at the State College Blvd crossing in Anaheim consists of three northbound and three southbound traffic lanes with sidewalks on both sides of the roadway. – The at-grade crossing would be grade separated as a roadway undercrossing, with the railroad tracks on a bridge structure. Approximately 1,660 feet of State College Blvd would be lowered below its current elevation, up to 25 feet at the lowest point. Roadway clearance from bottom of bridge to top of pavement would be approximately 17.5 feet. Additional excavation depths would be required for bridge footings, utilities, pump station, and roadway subbase. – In order to maintain its intersections with State College Blvd, Howell Ave and Wright Circle would also need to be lowered below its existing elevation, along with multiple driveways and access roads along State College Blvd.



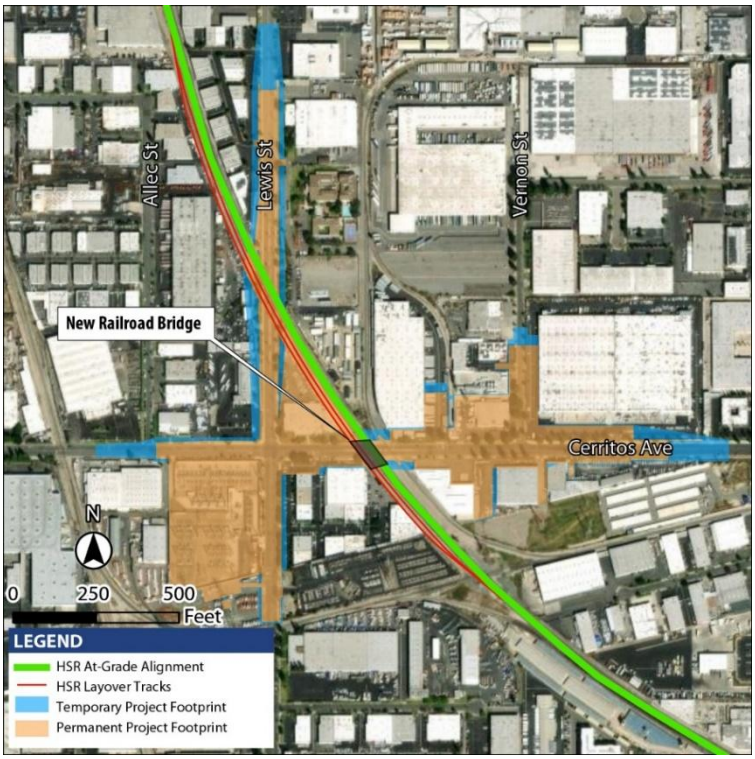
Sources: Authority 2025a; ESRI 2020

Figure 2-16 Pioneer Boulevard Grade Separation



Sources: Authority 2025a; ESRI 2020

Figure 2-17 Norwalk Boulevard and Los Nietos Road Grade Separations



Sources: Authority 2025a; ESRI 2020

Figure 2-18 Cerritos Avenue Grade Separation



Sources: Authority 2025a; ESRI 2020

Figure 2-19 State College Boulevard Grade Separation

Modifications to Other Roadways

In addition to modifications to roadway crossings described above for the railway alignment, several other roadways along the alignment would require modifications as a result of other project elements.

Roadway Modifications by Hobart Yard

The addition of new storage tracks and realignment of existing tracks throughout the Hobart Yard area would require 26th Street to be realigned. The roadway currently forms the southern boundary of Hobart Yard. At the eastern end of the yard, at Atlantic Boulevard, 26th Street connects to Pennington Way. From the UPRR San Pedro Subdivision track to Atlantic Boulevard, 26th Street would be realigned about 500 feet south from its existing location, at the farthest point. The realigned 26th Street would provide access to the 26th Street LMF, just north of the street. Currently, 26th Street intersects with Indiana Avenue, Bonnie Beach Place, and Ayers Avenue. Indiana Avenue and Bonnie Beach Place would connect with the realigned 26th Street, and the segments north of the realigned 26th Street would be closed. The realigned 26th Street would not connect to Pennington Way; it would end at Ayers Avenue, and Pennington Way would end in a cul-de-sac west of Atlantic Boulevard, accessible only from Bandini Boulevard. The existing segment of 26th Street between Ayers Avenue and Pennington Way would be closed.

Several roads between Sheila Street and Washington Boulevard are proposed to be closed because of the relocated BNSF truck parking. These roadway closures include the following, and are depicted on Figure 2-12 in yellow:

- Indiana Street
- S Pine Street
- Pacific Way
- Oak Street

- Ash Street
- Arrowmill Avenue
- Ayers Avenue
- Bedessen Avenue
- Connor Avenue
- Dennis Avenue

Roadway Modifications by Commerce Yard

Access is provided by 26th Street to BNSF's Commerce Yard from the east, but the yard improvements would require the entrance to the yard to be relocated approximately 1,300 feet to the east. This segment of 26th Street, within BNSF property, would be closed, and a new cul-de-sac would be provided at the end of the road.

Roadway Modifications by the Fullerton Braced Trench

The braced trench in Fullerton would be located partially outside the existing railroad right-of-way along the south side of the corridor, within the existing Artesia Boulevard right-of-way. Artesia Boulevard would be realigned slightly south, from approximately Pritchard Avenue to Gilbert Street. The intersection of Artesia Avenue and Gilbert Street would be reconfigured.

Roadway Modifications by Fullerton Metrolink/Amtrak Station

The changes at the Fullerton Metrolink/Amtrak Station would require Walnut Avenue to be realigned. Walnut Avenue currently runs east to west from Richman Avenue to Lawrence Avenue, south of and adjacent to the existing railroad corridor. With the addition of a fourth mainline track, Walnut Street would be slightly realigned south, from Richman Avenue to Lemon Street. All existing lanes and sidewalks would be maintained. At Highland Avenue, Walnut Street would be lowered slightly to meet the new, lowered grade of Highland Avenue, and the intersection would be reconfigured.

2.2.2 Shared Passenger Track Alternative B

Shared Passenger Track Alternative B would follow the same alignment and share the same project features and operational assumptions as Shared Passenger Track Alternative A, except for the location of the LMF as discussed below.

2.2.2.1 Alignment

The BNSF mainline and shared tracks for Shared Passenger Track Alternative B would be the same as those discussed for Shared Passenger Track Alternative A, as described in Section 2.2.1.1, because the LMF location would not affect the BNSF mainline and shared tracks.

2.2.2.2 Ancillary Facilities

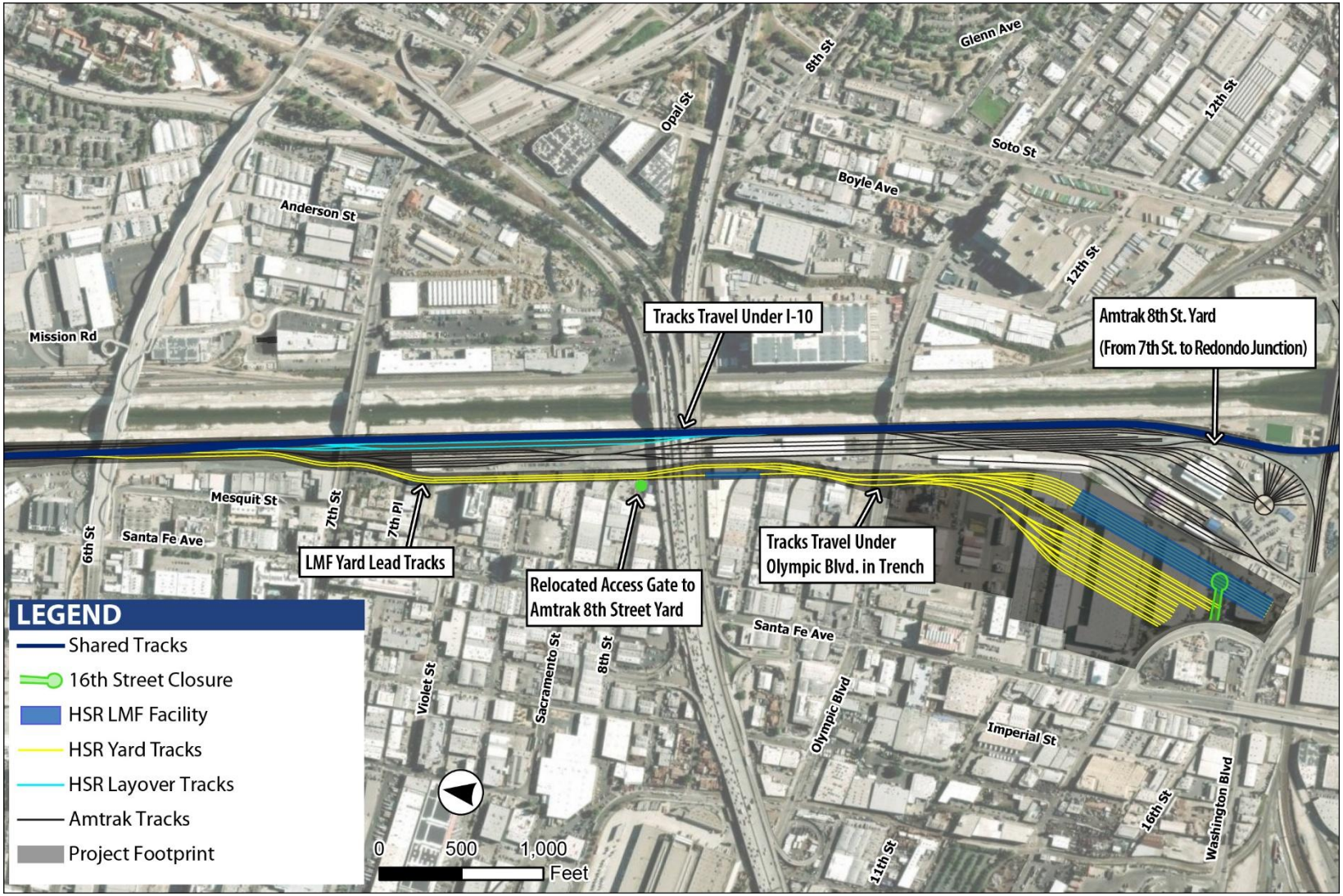
The proposed ancillary facilities for Shared Passenger Track Alternative B would be the same as those discussed for Shared Passenger Track Alternative A. Refer to Section 2.2.1.2 for more information on proposed ancillary facilities.

2.2.2.3 High-Speed Rail Station Facilities

Under Shared Passenger Track Alternative B, the proposed HSR station facilities at ARTIC would be the same as for Shared Passenger Track Alternative A. Refer to Section 2.2.1.3 for more information on proposed station sites.

2.2.2.4 Light Maintenance Facility

Shared Passenger Track Alternative B proposes an LMF between Olympic Boulevard and 15th Street, immediately adjacent to the existing Amtrak Eighth Street Yard. The 15th Street LMF would include the same maintenance operation facilities as the 26th Street LMF under Shared Passenger Track Alternative A, described in Section 2.2.1.4. Refer to Figure 2-20 for an overview of the 15th Street LMF.



Source: Authority 2025a

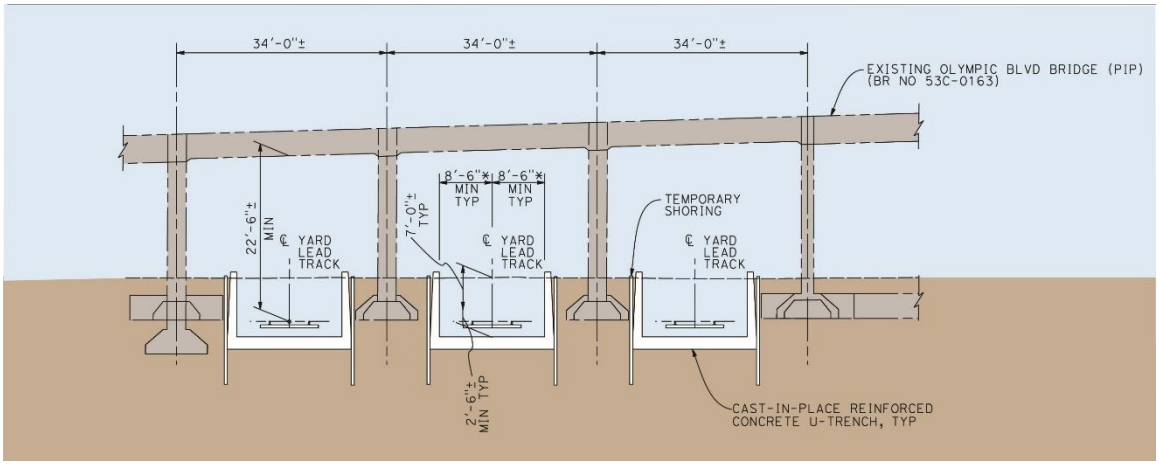
Figure 2-20 Shared Passenger Track Alternative B: 15th Street Light Maintenance Facility

The 15th Street LMF would have an overall size of 52 acres and would include a six-track shop building able to accommodate 12 trainsets, along with an outdoor train yard with a storage capacity of 20 HSR trainsets. The 15th Street LMF would be a single-ended yard, with access to and from the mainline tracks provided only from one side, at the northern end.

Primary roadway access to the 15th Street LMF would be from Washington Boulevard and 15th Street. HSR trains would access the yard via new yard lead tracks, which would start north of Seventh Street; the HSR project has been designed in coordination with the Los Angeles County Metropolitan Transportation Authority so that it would not conflict with the planned Metro Arts District Station, proposed north of Seventh Street. Two yard lead tracks would diverge from the mainline tracks out of the existing railroad right-of-way, cross under Seventh Street, and then branch into three tracks. Continuing south, the tracks would cross through part of Amtrak's existing primary access road to its Eighth Street Yard, which is currently gated at Eighth Street; these gates would need to be relocated to the west, but Amtrak would still be able to use the road to access its Eighth Street Yard. The three 15th Street LMF yard lead tracks would continue south to cross under I-10.

Approaching Olympic Boulevard, the tracks would descend to provide the minimum required 24-foot clearance between the OCS and the historic Olympic Boulevard overpass. Only one track would fit between each of the Olympic Boulevard overpass' four piers. As depicted on Figure 2-21, each track would pass through the piers within a separate trench at a finished depth of 7 feet. The Olympic Boulevard piers would not be altered during construction and would remain in place during HSR operations.

South of Olympic Boulevard, the 15th Street LMF yard lead tracks would connect to the yard on a curve, which requires special trackwork (turnout tracks). To make this connection, the LMF site would be lowered to meet the yard lead tracks. This is because the yard lead tracks would still be below grade as they come out of the Olympic Boulevard trenches, and there would not be enough room to transition the tracks back up to the existing elevation of the LMF site. Additionally, the special trackwork to connect the yard leads to the LMF tracks needs to be located on flat sections of track, not on a slope. Therefore, to make the connection between the below-grade yard lead tracks and the yard tracks, the northern portion of the LMF site (approximately 25 acres) would be excavated up to an approximate depth of 8 feet and regraded at a finished depth of approximately 5 feet to match the grade of the yard lead tracks.



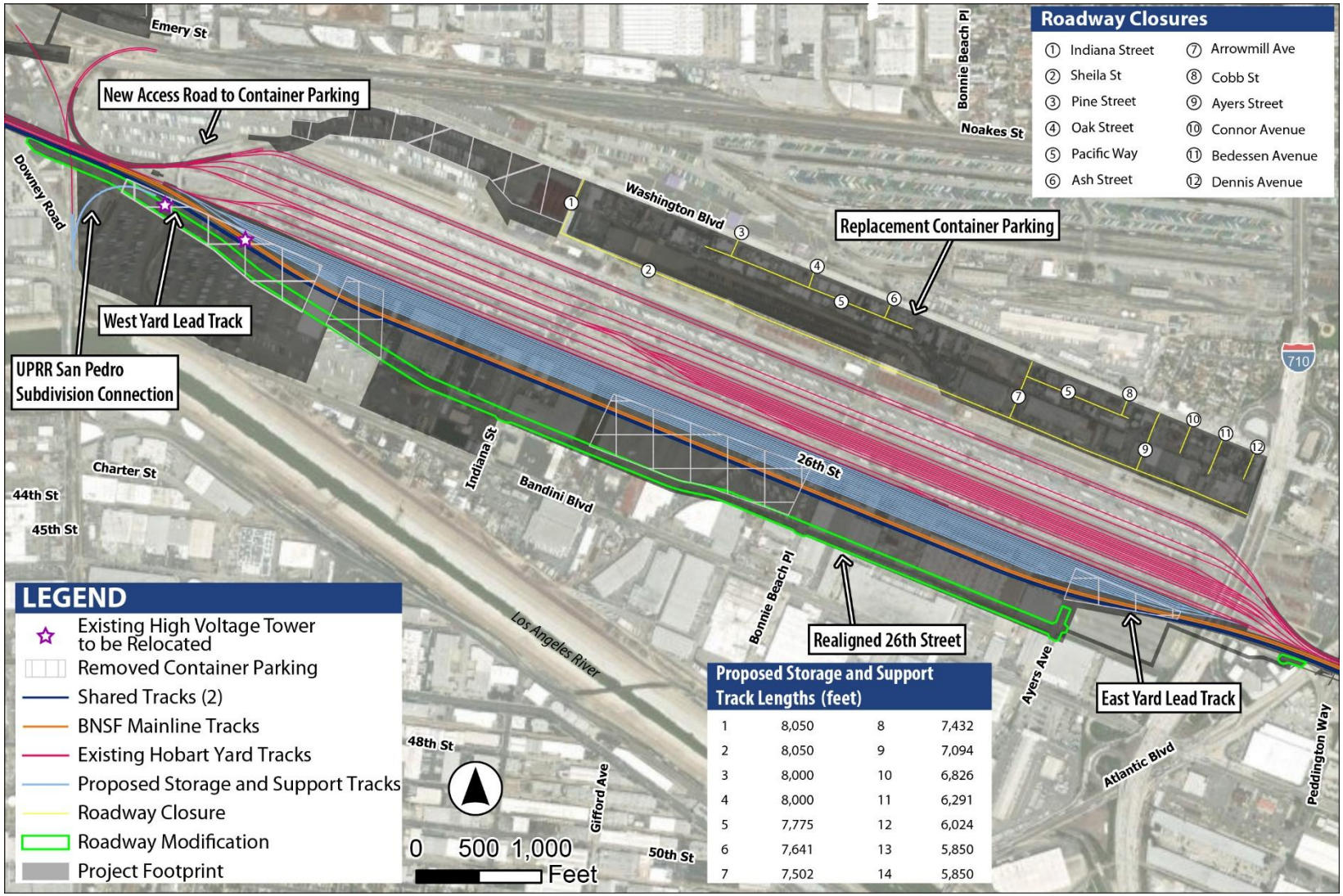
Source: Authority 2025a

Figure 2-21 Trenches for 15th Street Light Maintenance Facility Yard Lead Tracks Under Olympic Boulevard

2.2.2.5 Freight or Passenger Railroad Modifications

Freight and passenger railroad modifications for Shared Passenger Track Alternative B would be the same as for Shared Passenger Track Alternative A, except for one difference at Hobart Yard. Figure 2-22 illustrates Hobart Yard without the 26th Street LMF. Because there would not be LMF lead tracks or yard tracks running through BNSF's existing container parking areas, Shared Passenger Track Alternative B would displace slightly less container parking compared to Shared Passenger Track Alternative A.

The two passenger rail station modifications (Norwalk/Santa Fe Springs and Fullerton) and two Metrolink station relocations (Buena Park and Commerce) would be the same for Shared Passenger Track Alternative B as described for Shared Passenger Track Alternative A.



Sources: Authority 2025a; ESRI 2020

Figure 2-22 Shared Passenger Track Alternative B: Hobart Yard

2.2.2.6 State Highway or Local Roadway Modifications

The proposed modifications to roadways for Shared Passenger Track Alternative B would be the same as for Shared Passenger Track Alternative A, described in Section 2.2.1.6, except for the area around the 15th Street LMF site. Note that although the 26th Street LMF would not be included under Shared Passenger Track Alternative B, the realignment of 26th Street would still occur.

At the 15th Street LMF, Shared Passenger Track Alternative B would cross through part of Amtrak's access road to its Eighth Street Yard and through its existing access gate at Eighth Street. The access gate would be shifted to the west, and Amtrak would still be able to use its access road, but it would have to cross the three HSR yard lead tracks at grade to reach the road. The 15th Street LMF would also require the closure of a small portion of 16th Street, and the intersection of 15th Street and 16th Street would be reconfigured as a T-intersection. This portion of 16th Street, which is an existing cul-de-sac, serves the properties that would be acquired for construction of the 15th Street LMF. Refer to Figure 2-20, which depicts the portion of 16th Street that would be closed in green.

2.3 Early Action Projects

As described in the 2023 Project Update Report, the Authority has committed to investing in regionally important early action projects to provide early benefits to transit riders and local communities in Southern California, while laying a solid foundation for implementation of the HSR system. These early investments would be made by the Authority in collaboration with local and regional agencies. The types of projects include grade separations, track enhancements, and improvements at passenger rail stations, which would increase capacity, improve safety and air quality, and provide immediate mobility and reliability benefits for existing freight and passenger rail operations. The potential temporary construction and permanent operational environmental effects associated with these early action projects are included in the total evaluation of the Shared Passenger Track Alternatives. These early action projects may be implemented as standalone projects by other local agencies relying on the environmental analyses and conclusions of the Los Angeles to Anaheim Project Section in advance of the HSR system. The early action projects described below would be the same for both Shared Passenger Track Alternatives.

2.3.1 Grade Separations

The following five new railroad/roadway grade separations would be built as part of buildout of the project section and are identified as early action projects:

- Pioneer Boulevard
- Norwalk Boulevard and Los Nietos Road (considered a single early action project because of the adjacency of the two crossings)
- Cerritos Avenue
- State College Boulevard

The potential temporary construction and permanent operational environmental effects associated with these early action projects are analyzed in site-specific detail and included in the total evaluation of the project. Refer to Section 2.2.1.6 for more information.

2.3.2 Metrolink Station Relocations

Passenger rail currently operates within the Los Angeles – San Diego – San Luis Obispo Rail Corridor and would continue to do so with the introduction of HSR service. The relocations of the existing Commerce and Buena Park Metrolink Stations are necessary for implementation of either of the Shared Passenger Track Alternatives for reasons described in more detail in Section 2.2.1.5.

Existing transit service to the current Metrolink station locations would need to be modified to serve the relocated Metrolink station locations. Future coordination with Metrolink, Amtrak, and transit service providers would be necessary to determine bus routes and schedules for the

relocated Metrolink station locations and to inform final design of bus facilities at and near the station. Access roads, curb space, and passenger and operations facilities for buses have been included in the footprint in anticipation of this reconfigured service.

2.3.3 Fullerton Metrolink/Amtrak Modifications (Fullerton Interlocker)

The Shared Passenger Track Alternatives would modify the tracks and platforms throughout the Fullerton Metrolink/Amtrak Station, as well as the tracks east to Fullerton Junction, as described in Section 2.2.1.1. However, some of these proposed HSR modifications could be completed as an early action project to support the Metrolink Fullerton Interlocker Project, which is being planned by BNSF in coordination with Metrolink and the Authority. This project is critical to Metrolink's Southern California Optimized Rail Expansion Program and will allow for more frequent and regular service in Southern California. The Authority has incorporated the Fullerton Interlocker Project design as part of HSR's Fullerton/Metrolink Amtrak modifications, based on coordination with BNSF and Metrolink and on the anticipated timelines of the two projects.

If the Fullerton Interlocker Project occurs prior to HSR implementation, the early action project would consist of the same modifications described in Section 2.2.1.3 to the Fullerton Metrolink/Amtrak Station, with one exception. The fourth mainline track on the southern side of the corridor would only extend from east of Highland Avenue to Fullerton Junction because, in the absence of HSR, a fourth mainline track would not be added throughout the entire segment between LAUS and Fullerton Junction. All other modifications would be included: the removal of the southern side platforms, addition of a new center platform over Harbor Boulevard, new pedestrian underpass, and realignment and modifications to Walnut Avenue. If the HSR project is implemented later, the southern track would be extended west past Highland Avenue to connect to the fourth mainline track of the HSR alternatives.

2.3.4 Reconfiguration of Freight Rail Facilities

As discussed in Section 2.2.1.5, the project requires new or modified BNSF facilities to add and electrify tracks in the existing BNSF right-of-way between Los Angeles and Fullerton. The Hobart Yard modifications and Commerce Yard modifications (including the Commerce Flyover) could be implemented as early action projects to allow for improvements to existing Amtrak and Metrolink service in the Los Angeles – San Diego – San Luis Obispo Rail Corridor.

2.4 Optional High-Speed Rail Station

HSR trains would not stop at the Norwalk/Santa Fe Springs Metrolink Station or Fullerton Metrolink/Amtrak Station under either Shared Passenger Track Alternative A or Shared Passenger Track Alternative B. However, an option for a full-stop HSR station is considered, at either Norwalk/Santa Fe Springs or Fullerton. The inclusion of the HSR station option would require additional elements to support full-stop HSR service, in addition to the modifications described in Section 2.2.1.5. These HSR station elements are described in detail below.

2.4.1 High-Speed Rail Station Option: Norwalk/Santa Fe Springs

If the Norwalk/Santa Fe Springs Metrolink Station HSR Station Option is included, several additional elements would be included along with the station modifications described above for Shared Passenger Track Alternative A. An overview of the HSR station option elements is depicted on Figure 2-23, with the additional HSR station elements highlighted in green. The other elements depicted on Figure 2-23 would be completed as part of Shared Passenger Track Alternative A.

The Norwalk/Santa Fe Springs HSR Station Option would add two more electrified passenger rail tracks, for a total of four tracks through the station. The two tracks described under Section 2.2.1.1, Alignment, would serve the modified Metrolink side platforms; the two tracks added as part of the HSR station option would serve an HSR center platform in between the modified Metrolink side platforms. The HSR platform would be 1,000 feet long and capable of future extension to 1,410 feet.

The HSR station option would also require more parking to be added to serve HSR passengers. Parking and pick-up/drop-off for HSR and Norwalk/Santa Fe Springs Metrolink passengers would be combined within new surface parking lots. The HSR station option at Norwalk/Santa Fe Springs would provide 640 more parking spaces compared to what Shared Passenger Track Alternative A would otherwise provide, for a total of 1,248 parking spaces. A new access road would be provided from Imperial Highway, along the east side of the site, to the Shoemaker Avenue/Adler Drive intersection, with new signalized intersections.

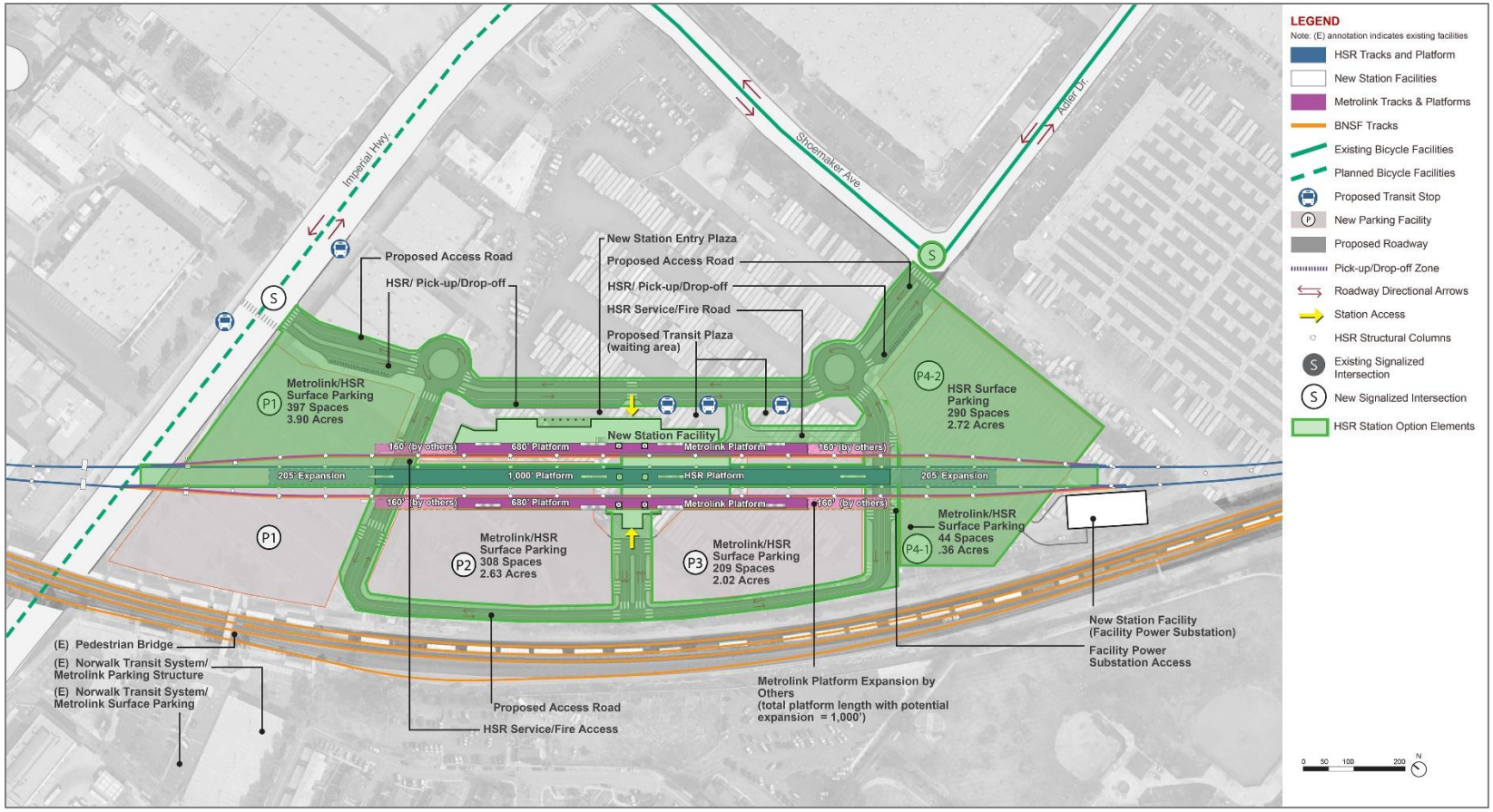
2.4.2 High-Speed Rail Station Option: Fullerton

If the Fullerton HSR Station Option is included, several additional elements would be included along with the station modifications described above for Shared Passenger Track Alternative A. An overview of the HSR station option elements is depicted on Figure 2-24, with the additional HSR station elements highlighted in green. The other elements depicted on Figure 2-24 would be completed as part of Shared Passenger Track Alternative A.

The overall track configuration would be the same as described in Section 2.2.1.1, but the southernmost shared track would be shifted south to accommodate a 1,000-foot HSR platform extending over Highland Avenue. The platform would be 48 inches above the rail on retained fill, at 10 feet at the highest point. A pedestrian ramp would connect the HSR platform to the Metrolink/Amtrak platform.

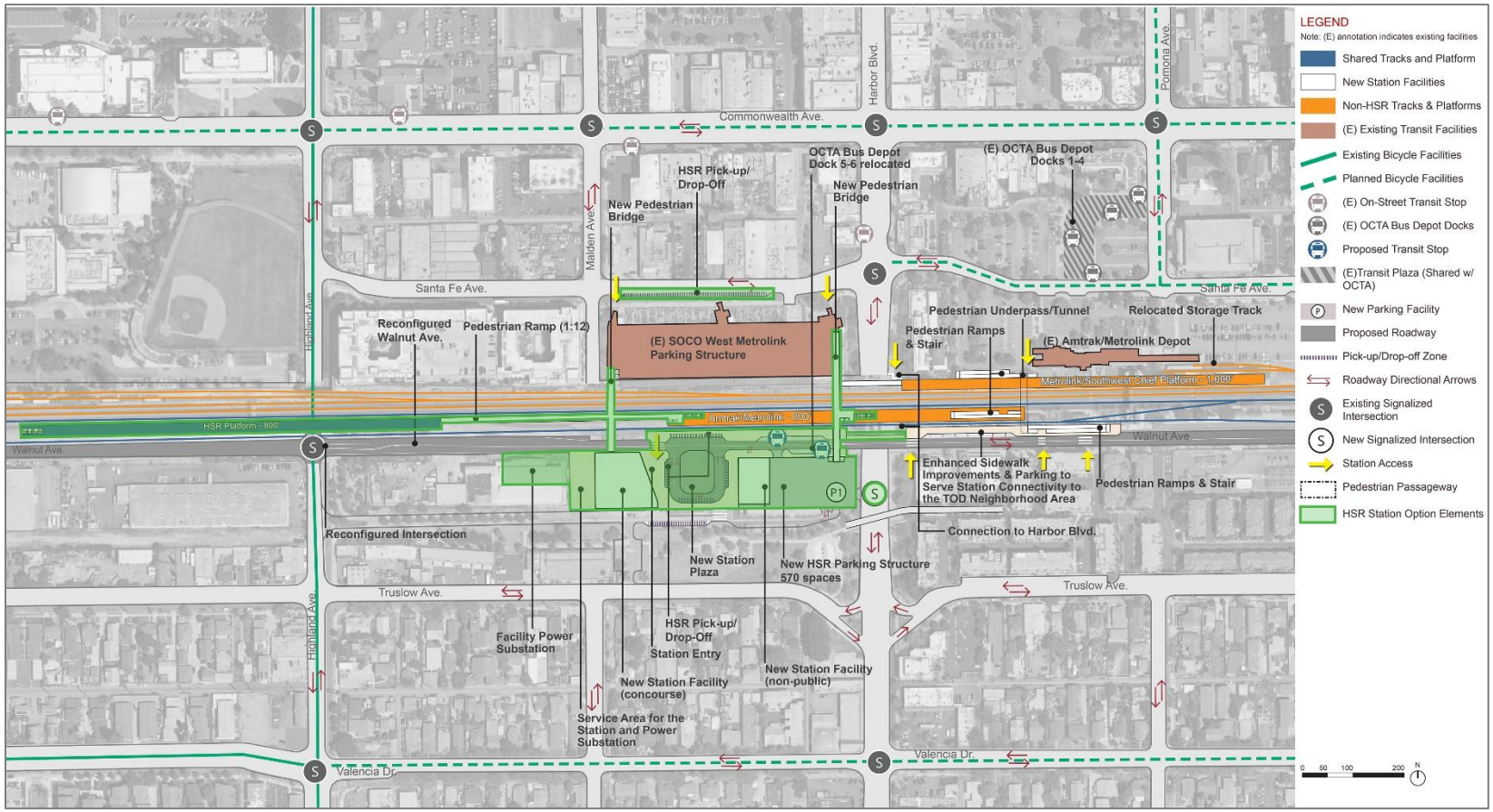
South of Walnut Avenue, the HSR station option would add HSR station buildings, a facility power substation, and a new multilevel parking structure that would provide a total of 570 new HSR parking spaces. The intersection of Highland Avenue and Walnut Avenue would be reconfigured to accommodate the new track and the Highland Avenue railroad bridge, along with improvements for transit stops and pedestrian crossings.

The HSR station option would add two pedestrian bridges: one west of Harbor Boulevard to connect the existing Metrolink parking structure to the HSR parking structure, and another east of Malden Avenue to connect the existing Metrolink parking structure to the HSR station building. A new signalized intersection on Harbor Boulevard would also be required to provide access to the HSR parking garage.



Source: Authority 2025a
Future platform extension not included in project definition for the environmental impact report/environmental impact statement.

Figure 2-23 Norwalk/Santa Fe Springs High-Speed Rail Station Option



Source: Authority 2025a

Figure 2-24 Fullerton High-Speed Rail Station Option

2.5 Project Construction

For the Los Angeles to Anaheim Project Section of the California HSR System, specific construction elements would include surface and elevated track; track work; grade-separated roadway crossings; and installation of a Positive Train Control system, as summarized in Table 2-7. Construction would take approximately 7.5 to 8 years.

Surface track sections would be built using conventional railroad construction techniques. A typical construction sequence includes clearing, grubbing, grading, and compacting the railbed; applying crushed rock ballast; laying track; and installing electrical and communications systems.

Elevated track sections would use the precast, segmented construction method. In this construction method, large concrete bridge segments are mass-produced at an on-site, temporary casting yard. Precast segments are then elevated atop the already completed portions of the elevated viaduct or embankment, and installed using a special gantry crane positioned on the aerial structure. Although the precast segmental method is the favored technique for aerial structure construction, other methods may be used, including cast-in-place, box girder, or precast, span-by-span techniques.

Preconstruction activities would occur during final design and would include geotechnical investigations, identification of staging areas, initiation of site preparation and demolition, relocation of utilities, and implementation of temporary, long-term, and permanent road closures. Additional studies and investigations to develop construction requirements and worksite traffic control plans would occur as needed.

Major construction activities for the project section would include earthwork and excavation support, systems construction, bridge and aerial structure construction, and railway systems construction (including trackwork, traction electrification, signaling, and communications).

During peak construction periods, work would be under way at several locations along the route simultaneously, with overlapping construction of various project elements. Working hours and the number of workers present at any time would vary depending on the activities being performed.

Table 2-7 Los Angeles to Anaheim Project Section Construction Schedule

Activity	Tasks	Schedule[7]
Right-of-way acquisition	Commencement of right-of-way acquisitions once State Legislature appropriates funds in annual budget, environmental due diligence	Prior to construction
Survey and preconstruction	Location of utilities, establishment of right-of-way and project control points and centerlines, establishment/relocation of survey monuments	Prior to construction
Mobilization	Safety devices and special construction equipment mobilization	Prior to construction
Site preparation	Utilities relocation; clearing/grubbing right-of-way; establishment of detours and haul routes; preparation of construction equipment yards, stockpile materials, and precast concrete segment casting yard	January 2031–January 2034
Earth moving	Excavation and earth support structures	April 2031–October 2036
Construction of road crossings	Surface street modifications, grade separations	July 2031–July 2037

[7] Schedule as of September 2023.

Activity	Tasks	Schedule[7]
Construction of aerial structures	Aerial structure and bridge foundations, substructure, and superstructure	July 2032–July 2036
Construction of underground structures	Straddle bent trench	October 2032–April 2036
Track laying	Includes backfilling operations and drainage facilities	July 2033–December 2037
Systems	Train control systems, OCS, communication system, signaling equipment	October 2035–October 2037
Demobilization	Includes site cleanup	At completion of construction
HSR stations and station relocations	Demolition, site preparation, foundations, structural frame, electrical and mechanical systems, finishes	Commerce Metrolink Station relocation: January 2031–January 2032
		Buena Park Metrolink Station Relocation: January 2034–March 2035
		Norwalk/Santa Fe Springs HSR/Metrolink Station: July 2033–July 2036[1]
		Fullerton HSR/Metrolink Station: January 2033–June 2035[1]
		Anaheim HSR platform and facilities: November October 2034–September 2037

Source: Authority 2024a
[1] Construction schedule for Norwalk/Santa Fe Springs and Fullerton Station dependent on station selection.
OCS = overhead contact system; HSR = high-speed rail

2.6 Independent Utility of the Los Angeles to Anaheim Project Section

The Authority and FRA divided the HSR system they established with Tier 1 process into individual project sections for Tier 2 planning, environmental review, and decision making. The FRA, consistent with regulations issued by the Federal Highway Administration, considers three criteria when determining the scope of a project to be considered in an EIS: (1) whether it connects "logical termini" and has "sufficient length to address environmental matters on a broad scope"; (2) whether it has "independent utility or independent significance," meaning that it will "be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made"; and (3) whether it will "restrict consideration of alternatives for other reasonably foreseeable transportation improvements" (23 Code of Federal Regulations Part 771.111(f)). *Logical termini* is defined by the Federal Highway Administration as the rational starting and ending points for a transportation improvement project and for review of the environmental impacts of the project (FHWA 1993).[8] The project section connects logical termini at planned passenger stations where HSR service would be provided, at LAUS to the north and at ARTIC to the south. If other sections of the HSR system are not completed, the infrastructure

[8] The Federal Highway Administration criteria for determining project scope, as established in 23 Code of Federal Regulations Part 771.11(f), do not specifically address the scope of individual projects considered in the second tier of a tiered National Environmental Policy Act process. With the tiered National Environmental Policy Act process, the same general principles apply, but they are applied in the context of the decisions made in Tier 1—in this case, the decision to build the HSR system as a whole. Therefore, in determining the scope of individual project sections for Tier 2 studies, the Authority and FRA focused primarily on determining whether each project section could serve a useful transportation purpose on its own, and ensuring that a decision in one project section does not limit consideration of reasonable alternatives for completing the HSR system in an adjacent section for which the National Environmental Policy Act process has not yet been completed.

could be used by regional and intercity services to improve their capacity, reliability, and performance (Authority 2009).

2.7 Operation of the Los Angeles to Anaheim Project Section

The conceptual HSR service plan for Phase 1 begins with service between Los Angeles/Anaheim running through the Central Valley from Bakersfield to Merced, and traveling northwest into the Bay Area. Subsequent sections in Phase 2 of the HSR system include a southern extension from Los Angeles to San Diego and an extension from Merced to Sacramento, which do not have an anticipated implementation date.

The Shared Passenger Track Alternatives would be within an active passenger and freight rail corridor, which would require a change in operational patterns and frequency for users. Because the project proposes new and realigned tracks throughout the corridor shared by other passenger rail and freight operators, implementation would change the tracks on which the various users operate. Currently, the Metrolink Orange County line and 91 line, Amtrak Pacific Surfliner, BNSF, and UPRR freight trains operate within the project section. The introduction of HSR service between Los Angeles and Anaheim would not conflict with the California State Rail Plan (Caltrans 2023).

Under the Shared Passenger Track Alternatives, there would be up to two HSR passenger trains per hour (peak) in each direction. Up to 10 freight trains per day could operate on the passenger tracks. The Shared Passenger Track Alternatives would maintain current and projected freight train volume within the corridor.

3 LAWS, REGULATIONS, AND ORDERS

Federal, state, and local laws, regulations, orders, or plans relevant to hydrology and water resources in the geographic area affected by the Shared Passenger Track Alternatives are presented below.

3.1 Federal

3.1.1 Federal Railroad Administration, Procedures for Considering Environmental Impacts (64 Federal Register 28545)

On May 26, 1999, the FRA released *Procedures for Considering Environmental Impacts* (FRA 1999). These FRA procedures describe the FRA's process for assessing the environmental impacts of actions and legislation proposed by the agency and for the preparation of associated documents (42 U.S. Code [U.S.C.] 4321 et seq.). The FRA *Procedures for Considering Environmental Impacts* states that "the EIS should identify any significant changes likely to occur in the natural environment and in the developed environment. The EIS should also discuss the consideration given to design quality, art, and architecture in project planning and development as required by U.S. Department of Transportation Order 5610.4." These FRA procedures state that an EIS should consider possible effects on water quality, flood hazards, and floodplains.

3.1.2 Clean Water Act (33 U.S.C. 1251 et seq.)

The Clean Water Act (CWA) is the primary federal law protecting the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. The CWA prohibits discharge of pollutants into the nation's waters unless specifically authorized by a permit. The applicable sections of the CWA are further discussed below.

- Section 102 (33 U.S.C. 1289) requires the planning agency of each state to prepare a Basin Plan that sets forth regulatory requirements for the protection of surface water quality, including designated beneficial uses for surface waterbodies, as well as specified water quality objectives to protect those uses. Applicable Basin Plans are noted in Section 3.3.1.1, Basin Plans and Water Quality Objectives.
- Section 303(d) (33 U.S.C. 1313 (d)) requires each state to provide a list of impaired surface waters that do not meet or are expected not to meet state water quality standards as defined by that section. It also requires each state to develop total maximum daily loads (TMDL)[9] of pollutants for impaired waterbodies. The TMDL must account for the pollution sources causing the water to be listed.
- Under Section 401 (33 U.S.C. 1341), applicants for a federal license or permit to conduct activities that may result in the discharge of a dredged or fill material into waters of the U.S. must obtain certification that the discharge of fill would not violate water quality standards, including water quality objectives and beneficial uses. The certification is issued by the state in which the discharge would originate or from the interstate water pollution control agency with jurisdiction over affected waters. In California, the Regional Water Quality Control Boards (RWQCB) and the State Water Resources Control Board (SWRCB) issue Section 401 certifications.
- Under Section 402 (33 U.S.C. 1342), all point-source discharges, including, but not limited to, construction-related runoff discharges to surface waters and some post-development discharges, are regulated through the National Pollutant Discharge Elimination System (NPDES) program. Project sponsors must obtain an NPDES permit from the SWRCB. NPDES permits that are relevant to the project section are described in Section 3.3, Regional and Local.

[9] A TMDL is the calculation of the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards for that particular pollutant. A TMDL determines a pollutant reduction target and allocates load reductions necessary to the source(s) of the pollutant.

- Under Section 404 (33 U.S.C. 1344), the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA) regulate the discharge of dredged and fill materials into the waters of the U.S. Project sponsors must obtain a permit from USACE for discharges of dredged or fill materials into jurisdictional waters over which USACE determines that it will exert jurisdiction. The project section is anticipated to be permitted through multiple Nationwide Permits, one for each water crossing rather than an individual Section 404 permit.

3.1.3 Rivers and Harbors Act of 1899 (33 U.S.C. 401 et seq.)/General Bridge Act of 1946 (33 U.S.C. 525 et seq.)

The Rivers and Harbors Act is the primary federal law for regulating activities that may affect navigation on the nation's waterways, including:

- Section 9 of the Rivers and Harbors Act and Section 9 of the General Bridge Act require a U.S. Coast Guard permit for the construction of bridges and causeways over certain navigable waters of the U.S. to ensure marine traffic is not adversely affected. Section 9 bridge permits are required only for waters that are currently or potentially navigable for commerce; general recreational boating is typically not enough to establish jurisdiction. Navigable waters are defined as those waterbodies that are subject to the ebb and flow of the tide or that are used currently, potentially, or historically in their natural condition or, by reasonable improvements, a means to transport interstate or foreign commerce.
- Section 10 of the Rivers and Harbors Act requires authorization from USACE for the construction of a structure in, over, or under navigable waters of the U.S.
- Section 14 of the Rivers and Harbors Act requires USACE permission for the use, including modification or alteration, of any flood control facility work built by the U.S. to ensure that the usefulness of the federal facility is not impaired. The permission for occupation or use is to be granted by an appropriate real estate instrument in accordance with existing real estate regulations. USACE permission is granted through the issuance of a Section 408 permit.

3.1.4 Watershed Protection and Flood Prevention Act (16 U.S.C. 1001 et seq.)

The Watershed Protection and Flood Prevention Act allows the U.S. Department of Agriculture's Natural Resources Conservation Service to provide planning assistance and funding to local sponsors, often flood control districts, for the implementation of flood protection projects. The use, modification, or alteration of any flood protection project built under this act requires coordination and permission from the local sponsor and the Natural Resources Conservation Service. The permitting process under the Watershed Protection and Flood Prevention Act is similar to the process of obtaining Section 408 permission under the Rivers and Harbors Act.

3.1.5 Floodplain Management (U.S. Presidential Executive Order 11988) and U.S. Department of Transportation Order 5650.2 (Floodplain Management and Protection)

U.S. Presidential Executive Order (USEO) 11988 requires that federal agency construction, permitting, or funding of a project must avoid incompatible floodplain development, be consistent with the standards and criteria of the National Flood Insurance Program, restore and preserve natural and beneficial floodplain values, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. U.S. Department of Transportation Order 5650.2 contains policies and procedures for the transportation agencies to implement USEO 11988 on transportation projects. USEO 11988 stipulates that if the proposed action involves a significant encroachment on a base floodplain, the EIS shall contain a finding that there is no other practicable alternative that avoids significant encroachment on a base floodplain. This finding is required to be supported by a description of why the proposed action must be in the floodplain (including the alternatives considered and why they were not practicable) and accompanied by a statement that the action conforms to applicable state and local floodplain protection standards. Requirements for compliance are outlined in 23 CFR Part 650(a).

3.1.6 Protection of Wetlands (Executive Order 11990)

USEO 11990 aims to avoid direct or indirect impacts on wetlands from federal or federally approved projects when a practicable alternative is available. If wetland impacts cannot be avoided, all practicable measures to minimize harm must be included.

3.1.7 National Flood Insurance Act (42 U.S.C. 4001 et seq.) and Flood Disaster Protection Act (42 U.S.C. 4001 to 4128)

The purpose of the National Flood Insurance Act is to identify flood-prone areas and provide insurance. The act requires purchase of insurance for buildings in special flood-hazard areas. The act is applicable to federally assisted acquisition or construction projects in an area identified as having special flood hazards. Projects should avoid construction in, or develop a design to be consistent with, Federal Emergency Management Agency (FEMA)-identified special flood-hazard areas.

To be eligible for federally backed flood insurance, a community must participate in the National Flood Insurance Program. Participating communities must adopt and enforce floodplain management ordinances meeting or exceeding FEMA requirements for reducing the risks of future flood damage. According to 44 CFR, Emergency Management and Assistance, FEMA has set a minimum national standard, allowing no more than a 1-foot increase in base flood elevations (BFE) (whether mapped or not mapped) from the cumulative impact of local development and no increases in the BFE of regulatory floodways.

If a project would substantially alter the extent or depth of the base flood, the Authority must submit supporting documentation and modeling. If the development proposal is approved by FEMA, FEMA issues a Conditional Letter of Map Revision. After construction is complete, as-built construction plans and modeling are submitted to FEMA, and FEMA issues a Letter of Map Revision, which officially updates the flood insurance rate map (FIRM).

3.1.8 Safe Drinking Water Act of 1974 (42 U.S.C. 300 et seq.)

The Safe Drinking Water Act was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The act authorizes USEPA to set national health-based standards for drinking water to protect against both naturally occurring and human-produced contaminants that may be found in drinking water. The act applies to every public water system in the U.S.

The Sole Source Aquifer Protection Program is authorized by Section 1424(e) of the act. The Sole Source Aquifer designation is a tool to protect drinking water supplies in areas where there are few or no alternative sources to the groundwater resource and where, if contamination occurred, using an alternative source would be extremely expensive. All proposed projects receiving federal funds are subject to USEPA review to ensure that they do not endanger a water source.

3.2 State

3.2.1 Porter-Cologne Water Quality Control Act (California Water Code, Section 13000 et seq.)

The Porter-Cologne Water Quality Control Act requires the regulation of pollutant discharges, including wastes in project runoff that could affect the quality of the state’s water. Any entity proposing to discharge waste must file a Report of Waste Discharge with the appropriate RWQCB or SWRCB unless the CWA Section 401 water quality certification application covers all waters subject to regulation under the Porter-Cologne Water Quality Control Act. The RWQCBs are responsible for implementing CWA Sections 401, 402, and 303(d). Because the HSR project is a project of statewide importance, CWA Section 401 water quality certification applications and any Reports of Waste Discharge would be filed with the SWRCB. The act also provides for the development and periodic review of Basin Plans that designate beneficial uses for California’s major rivers and groundwater basins and establish water quality objectives for those waters.

3.2.2 Construction Activities, National Pollutant Discharge Elimination System General Construction Permit

Under the federal CWA, discharges of stormwater from construction sites must comply with the conditions of an NPDES permit. The SWRCB is the permitting authority in California and has adopted the statewide General Permit for Stormwater Discharges Associated with Construction Activity that applies to projects resulting in 1 or more acres of soil disturbance. For projects disturbing more than 1 acre of soil, a construction stormwater pollution prevention plan (SWPPP) is required that specifies site management activities to be implemented during site development. These management activities include construction stormwater best management practices (BMP), erosion and sedimentation controls, dewatering (nuisance-water removal), runoff controls, and construction equipment maintenance.

The General Permit requires permittees to file a Notice of Intent before discharging stormwater from construction activities and the permittees or their contractors to implement and maintain the SWPPP on site. On July 1, 2010, the statewide General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (SWRCB Water Quality Order No. 2009-0009-DWQ, NPDES No. CAS000002) superseded the previous statewide General Permit. This permit was later revised by Order No. 2010-0014-DWQ and Order No. 2012-006-DWQ. The new statewide permit implements a risk-based permitting approach, specifies minimum BMP requirements, and requires stormwater monitoring and reporting.

3.2.3 National Pollutant Discharge Elimination System General Industrial Permit

Another required permit is the statewide General Permit for Discharges of Stormwater Associated with Industrial Activities (SWRCB Water Quality Order No. 2014-0057-DWQ, NPDES No. CAS000001, as amended by Order WQ 2015-0122-DWQ and Order WQ 2018-0028-DWQ). Qualifying industrial sites are required to prepare SWPPPs describing BMPs that would be employed to protect water quality. Industrial facilities are required to use best conventional pollutant control technology for control of conventional pollutants and best available technology economically achievable for toxic and nonconventional pollutants. Monitoring runoff leaving the site is also required. For transportation facilities, this permit applies only to vehicle maintenance shops and equipment-cleaning operations. The permit establishes a number of action levels that reflect California Environmental Protection Agency benchmark values for selected parameters, minimum BMP requirements, a revised monitoring protocol, and exceedance response actions if a numeric action level is exceeded.

3.2.4 California Department of Transportation National Pollutant Discharge Elimination System Statewide Stormwater Permit

The California Department of Transportation (Caltrans) operates under a permit (Order No. 2012-0011-DWQ, NPDES No. CAS000003) that regulates stormwater discharge from Caltrans properties, facilities, and activities and requires the Caltrans construction program to comply with the adopted statewide Construction General Permit (discussed above). The permit requires Caltrans to implement a year-round program in all parts of the state to control stormwater and nonstormwater discharges effectively (SWRCB 2012). The Caltrans permit is applicable to portions of the project that involve modifications to state highways.

3.2.5 California High-Speed Rail Authority National Pollutant Discharge Elimination System Permit

On August 24, 2014, the SWRCB designated the Authority as a nontraditional permittee under the Phase II Municipal Separate Storm Sewer System (MS4) permit (Order No. 2013-0001-DWQ, as amended by Order WQ 2015-0133-EXEC, Order WQ 2016-0069-EXEC, WQ ORDER 2017-XXXX-DWQ, Order WQ 2018-0001-EXEC, and Order WQ 2018-0007-EXEC). The combined (amended) permit is marked “unofficial” until an Order number is assigned; however, the permit, as amended, is fully in effect and enforceable. This order is the only MS4 permit for which the Authority has obtained coverage as a nontraditional permittee. The Authority must follow the

discharge, program, and monitoring requirements described in Section F of the Phase II MS4 permit within its right-of-way in Los Angeles County (Los Angeles RWQCB jurisdiction) and Orange County (Santa Ana RWQCB jurisdiction). The Authority's MS4 permit replaces county-/city-specific MS4 permits that would otherwise be applicable to the project. If runoff enters another agency's MS4 (i.e., Caltrans) or if the project extends into local rights-of-way (i.e., county or city), the jurisdictional agency's MS4 permit applies. The county-/city-specific MS4 permits are described further below in Section 3.3.2, Stormwater Management Programs. Low-impact development (LID) design standards and a post-construction stormwater management program are required under the MS4 permit.

3.2.6 General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality

Low-threat discharges, which include small/temporary dewatering projects such as excavations during construction, are regulated under the Low-Threat Discharge General Permit regional general permit (Order No. 2003-0003-DWQ). Low-threat construction discharges shall not contain concentrations of pollutants in excess of the Basin Plan ground or surface water quality objectives.

3.2.7 Cobey-Alquist Floodplain Management Act (California Water Code Section 8400 et seq.)

The Cobey-Alquist Floodplain Management Act encourages local governments to adopt and enforce land use regulations to accomplish floodplain management. It also provides state assistance and guidance for flood control.

3.2.8 Streambed Alteration Agreement (California Fish and Game Code, Sections 1601 to 1603)

The California Fish and Game Code requires the Authority to notify the California Department of Fish and Wildlife prior to implementing any HSR project that would divert, obstruct, or change the natural flow or bed, channel, or bank of any river, stream (including intermittent streams), or lake.

3.2.9 Sustainable Groundwater Management Act

On September 16, 2014, Governor Edmund G. Brown Jr. signed historic legislation to strengthen local management and monitoring of groundwater basins most critical to the state's water needs. The three bills, Senate Bill 1168 (Pavley), Assembly Bill 1739 (Dickinson), and Senate Bill 1319 (Pavley), together make up the Sustainable Groundwater Management Act. The act establishes phased requirements for high- and medium-priority basins to adopt groundwater sustainability plans, depending on whether a basin is in critical overdraft. The act requires locally controlled groundwater sustainability agencies to adopt groundwater sustainability plans by January 31, 2020, for all high- or medium-priority basins in overdraft condition and by January 31, 2022, for all other high- and medium-priority basins unless the basin is legally adjudicated or otherwise managed sustainably.

The act further requires the formation of local groundwater sustainability agencies, which are required to adopt Groundwater Sustainability Plans to manage the sustainability of groundwater basins. The adoption of a Groundwater Sustainability Plan is required for high- and medium-priority basins as identified by the California Department of Water Resources (DWR). Groundwater sustainability agencies that are responsible for high- and medium-priority basins must adopt groundwater sustainability plans within 5 to 7 years of implementation of the Sustainable Groundwater Management Act, depending on whether the basin is in critical overdraft. Agencies may adopt a single plan covering an entire basin or combine a number of plans created by multiple agencies. Plans must include a physical description of the basin, including groundwater levels, groundwater quality, subsidence, information on groundwater/surface water interaction, data on historical and projected water demands and supplies, monitoring and management provisions, and a description of how the plan would affect other plans, including city and county general plans.

The Central Basin was adjudicated in 1965 and has been managed by the Central Basin Watermaster since June 30, 2014, when the DWR retired as the Watermaster. The act requires that groundwater sustainability agencies implement plans and achieve long-term groundwater sustainability within 20 years of implementation of the Sustainable Groundwater Management Act.

3.2.10 California General Plan Law (California Government Code 65302)

California Government Code 65302 requires cities and counties to include in their general plan a statement of development policies setting forth objectives, principles, standards and plan proposals for seven policy areas, including safety. The safety element is to provide for the protection of the community from unreasonable risks associated with seismic hazards and flooding.

3.3 Regional and Local

This section discusses regional and local programs, policies, regulations, and permitting requirements. The project section would be within Los Angeles and Orange Counties and the cities of Los Angeles, Vernon, Commerce, Bell, Montebello, Pico Rivera, Santa Fe Springs, Norwalk, La Mirada, Buena Park, Fullerton, and Anaheim. Cities and counties within the project section, as well as regional agencies, have developed ordinances, policies, and other regulatory mechanisms to minimize negative effects during a project's construction and operation. The regional and local plans and policies listed below are applicable to the project section.

3.3.1 Regional Water Quality Control Board

The RWQCBs were established in the Porter-Cologne Water Quality Control Act. The project section is within the jurisdiction of the Los Angeles RWQCB and the Santa Ana RWQCB. The RWQCBs make water quality decisions for their regions. Responsibilities include setting water quality standards for surface waters and groundwater, implementing the NPDES program, issuing waste discharge requirements, determining compliance with those requirements, and taking appropriate enforcement actions. In addition, the RWQCBs develop and implement Basin Plans that consider regional beneficial uses, water quality characteristics, and water quality problems.

3.3.1.1 Basin Plans and Water Quality Objectives

CWA Section 102 requires the planning agency of each state (in California, the SWRCB) to prepare a Basin Plan to set forth regulatory requirements for protection of surface water quality, including designated beneficial uses for surface waterbodies, as well as specified water quality objectives to protect those uses. The Los Angeles RWQCB has authority over a portion of the project section and has adopted the Water Quality Control Plan for the Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties. The Santa Ana RWQCB has authority over the portion of the project section in Orange County and has adopted the Water Quality Control Plan for the Santa Ana River Basin. These plans designate beneficial uses for specific surface water and groundwater resources, establish water quality objectives to protect those uses, and sets forth policies to guide the implementation of programs to attain the objectives.

3.3.1.2 Groundwater Dewatering Permits

Waste Discharge Requirements for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles

Discharges of treated or untreated groundwater generated from temporary dewatering operations or other applicable wastewater discharges not specifically covered in other general or individual NPDES permits are currently regulated under a regional general permit, General Waste Discharge Requirements for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties (Order No. R4-2023-0429, NPDES No. CAG994004). Permittees are required to monitor their discharges from groundwater extraction waste from construction and dewatering activities to

ensure that proposed effluent limitations for constituents are not exceeded. This permit applies to construction dewatering operations within Los Angeles County.

Santa Ana General Waste Discharge Requirements for Low-Threat Discharges to Surface Waters

Low-threat discharges, which include construction dewatering wastes and dewatering wastes from subterranean seepage, are currently regulated under a regional general permit, General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant Threat to Water Quality (Order No. R8-2020-0006, NPDES No. CAG998001). Low-threat discharges are not expected to cause toxicity; therefore, no toxicity limits are specified in the General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant Threat (De Minimis) to Water Quality permit. However, effluent limitations are specified for total dissolved solids, total inorganic nitrogen, total petroleum hydrocarbons, total residual chlorine, suspended solids, sulfides, oil and grease, and percentage of hydrogen (pH). This permit applies to construction dewatering operations within Orange County.

3.3.2 Stormwater Management Programs

Stormwater discharges are permitted under the NPDES program. Section 402(p) of the CWA requires that stormwater management programs be developed and implemented for municipalities to meet the requirements for stormwater discharges from MS4 permits. Stormwater management programs limit, to the maximum extent practicable, the discharge of pollutants from storm sewer systems. A single state agency or a coalition, often consisting of more than one municipality (such as cities and counties), may implement these programs. Each program includes BMPs intended to reduce the quantity and improve the quality of stormwater discharged to the stormwater system. Discharges to storm sewer systems must comply with the stormwater management program's requirements.

In compliance with this requirement to develop a stormwater management program, the county and cities in Los Angeles and Orange Counties developed stormwater management programs, which are discussed in more detail below.

3.3.2.1 County or Metropolitan Area Stormwater Management Plans

Los Angeles County Municipal Separate Storm Sewer System Permit

The Los Angeles RWQCB adopted Order No. R4-2021-0105, NPDES Permit No. CAS004004, Waste Discharge Requirements and NPDES Permit for MS4 Discharges within the Coastal Watersheds of Los Angeles County and Ventura Counties, referred to herein as the Los Angeles County MS4 permit. The Los Angeles County MS4 permit identifies programs and objectives associated with municipal discharges of stormwater and nonstormwater by the Los Angeles County Flood Control District (LACFCD), the County of Los Angeles, and the 84 incorporated cities within the county. The Los Angeles County MS4 permit identifies programs that must be tailored and implemented by the permittees, some of which are applicable to the HSR program, including, but not limited to, the construction program and the new development/redevelopment program. The Los Angeles County MS4 permit requires the co-permittees to prepare a Stormwater Quality Management Plan, specifying the BMPs that the permittees would implement to reduce the discharge of pollutants in stormwater to the maximum extent practicable. The emphasis of the Stormwater Quality Management Plan is pollution prevention through education, public outreach, planning, and implementation of source-control BMPs first, followed by structural- and treatment-control BMPs.

The Stormwater Quality Management Plan also requires that new development implement BMPs designed to control pollutants in stormwater runoff, specify sizing criteria for BMPs, and specify flow-control requirements. The BMPs include structural, source-control, treatment, and site-design BMPs to address water quality.

As a result of the Los Angeles County MS4 permit requirements, the co-permittees have developed ordinances and policies; those that are relevant to the project are described in Section 3.3.3.2, Cities.

Orange County Municipal Separate Storm Sewer System Permit

The Santa Ana RWQCB adopted Order No. R8-2009-0030, as amended by R8-2010-0062 and R8-2019-0050, NPDES No. CAS618030, Waste Discharge Requirements for the County of Orange, Orange County Flood Control District (OCFCD) and the Incorporated Cities of Orange County within the Santa Ana Region: Areawide Urban Stormwater Runoff, referred to herein as the Orange County MS4 permit. Similar to the Los Angeles County MS4 permit, the Orange County MS4 permit identifies programs that must be implemented by the permittees, some of which are applicable to the project, including, but not limited to, the construction program and the new development/significant redevelopment program. As a result of the Orange County MS4 permit requirements, the permittees have developed ordinances and policies; those that are relevant to the project are described in Section 3.3.3.2.

The Orange County MS4 permit requires the co-permittees to prepare a Local Implementation Plan, specifying the BMPs that the city would implement to reduce the discharge of pollutants in stormwater to the maximum extent practicable. The Local Implementation Plan also requires that new development implement BMPs designed to control pollutants in stormwater runoff, specify sizing criteria for BMPs, and specify flow-control requirements. The BMPs include structural, source-control, treatment, and site-design BMPs to address water quality.

3.3.3 General Plan Policies and Ordinances

The State of California requires cities and counties to adopt general plans and municipal codes that provide objectives, policies, goals, and ordinances addressing public health and safety, including protection of water resources and flood events. The local general plan objectives, policies, and goals and municipal code ordinances below were identified and considered in the preparation of this analysis. Table 3-1 lists county and city plans, policies, and ordinances relevant to the Shared Passenger Track Alternatives.

3.3.3.1 Counties

Table 3-1 Los Angeles County Plans, Policies, and Ordinances

Policy Title	Summary
SCAG Regional Comprehensive Plan (2008)	SCAG adopted the *2008 Regional Comprehensive Plan* in October 2008. The plan includes water goals and constrained policies for implementation of those water goals. Constrained Policy WA-23: Local governments should encourage Low Impact Development and natural spaces that reduce, treat, infiltrate and manage runoff flows caused by storms and impervious surfaces. Constrained Policy WA-24: Local governments should prevent development in flood hazard areas lacking appropriate protections, especially in alluvial fan areas. Constrained Policy WA-27: Developers and local governments should maximize pervious surface area in existing urbanized areas to protect water quality, reduce flooding, allow for groundwater recharge, and preserve wildlife habitat. New impervious surfaces should be minimized to the greatest extent possible, including the use of in-lieu fees and off-site mitigation. Constrained Policy WA-34: State and regional agencies should design and operate regional transportation facilities so that stormwater runoff does not contaminate surrounding watershed ecosystems.

Policy Title	Summary
SCAG 2024–2050 Connect SoCal Regional Transportation Plan/Sustainable Communities Strategy (2024)	SCAG adopted the Connect SoCal RTP/SCS in 2024, including the following policies related to water: Policy 48. Promote sustainable development and best practices that enhance resource conservation, reduce resource consumption and promote resilience Policy 56. Consider the full environmental life cycle of clean transportation technologies, including upstream production and end of life as an important part of meeting SCAG's objectives in economic development and recovery, resilience planning and achievement of equity
Water Quality Control Plan for the Los Angeles Region (Basin Plan) (2024)	The *Water Quality Control Plan for the Los Angeles Region* designates beneficial uses for specific surface water and groundwater resources, establishes water quality objectives to protect those uses, and sets forth policies to guide the implementation of programs to attain the objectives.
Los Angeles County 2035 General Plan (2025)	The Conservation and Natural Resources Element includes goals and policies to protecting and using local surface water resources, groundwater resources, and protecting healthy watersheds. ▪ Goal C/NR 5: Protected and useable local surface water resources. – Policy C/NR 5.1: Support the LID philosophy, which seeks to plan and design public and private development with hydrologic sensitivity, including limits to straightening and channelizing natural flow paths, removal of vegetative cover, compaction of soils, and distribution of naturalistic BMPs at regional, neighborhood, and parcel-level scales. – Policy C/NR 5.2: Require compliance by all County departments with adopted Municipal Separate Storm Sewer System (MS4), General Construction, and point source NPDES permits. – Policy C/NR 5.6: Minimize point and non-point source water pollution. – Policy C/NR 5.7: Actively support the design of new and retrofit of existing infrastructure to accommodate watershed protection goals, such as roadway, railway, bridge, and other— particularly—tributary street and greenway interface points with channelized waterways. ▪ Goal C/NR 6: Protected and usable local groundwater resources. – Policy C/NR 6.1: Support the LID philosophy, which incorporates distributed, post-construction parcel-level stormwater infiltration as part of new development. – Policy C/NR 6.2: Protect natural groundwater recharge areas and regional spreading grounds. – Policy C/NR 6.3: Actively engage in stakeholder efforts to disperse rainwater and stormwater infiltration BMPs at regional, neighborhood, infrastructure, and parcel-level scales. – Policy C/NR 6.5: Prevent stormwater infiltration where inappropriate and unsafe, such as in areas with high seasonal groundwater, on hazardous slopes, within 100 feet of drinking water wells, and in contaminated soils. ▪ Goal C/NR 7: Protected and healthy watersheds. – Policy C/NR 7.1: Support the LID philosophy, which mimics the natural hydrologic cycle using undeveloped conditions as a base, in public and private land use planning and development design. The Safety Element contains goals and policies related to minimizing injury, loss of life, and property damage due to flood and inundation hazards.

Policy Title	Summary
	▪ Goal S 3: An effective regulatory system that prevents or minimizes personal injury, loss of life, and property damage due to flood and inundation hazards. – Policy S 3.1: Strongly discourage development in the County's Flood Hazard Zones, unless it solely provides a public benefit. – Policy S 3.2: Strongly discourage development from locating downslope from aqueducts, unless it solely provides a public benefit. – Policy S 3.3: Promote the use of natural, or nature-based flood protection measures to prevent or minimize flood hazards, where feasible. – Policy S 3.4: Ensure that developments located within the County's Flood Hazard Zones are sited and designed to avoid isolation from essential services and facilities in the event of flooding. – Policy S 3.5: Ensure that biological and natural resources are protected during rebuilding after a flood event. – Policy S 3.6: Infiltrate development runoff on-site, where feasible, to preserve or restore the natural hydrologic cycle and minimize increases in stormwater or dry weather flows.
Los Angeles County Code of Ordinances (2025)	▪ Chapter 12.80, Stormwater and Runoff Pollution Control: This chapter protects the beneficial uses, marine habitats, and ecosystems of receiving waters within the county from pollutants carried by stormwater and non-stormwater discharges. ▪ Chapter 12.84 Low-Impact Development (LID) Standards: This chapter minimizes pollutant loadings from impervious surfaces by requiring development projects to incorporate properly designed, technically appropriate BMPs and other LID strategies. ▪ Chapter 21 Stormwater and Runoff Pollution Control: This chapter regulates the stormwater and non-stormwater discharges to the facilities of the Los Angeles County Flood Control District for the protection of those facilities, the water quality of the waters in and downstream of those facilities, and the quality of the water that is being stored in water-bearing zones underground.
Los Angeles County Grading Code (2022)	Chapter 26: Building Code, Appendix J, Grading, includes provisions applicable to grading, excavation, and earthwork construction, including fills and embankments and the control of runoff from graded sites, including erosion sediments and construction-related pollutants.
Los Angeles County Low-Impact Development Ordinance (2019)	The LID Ordinance ensures that development and redevelopment projects mitigate runoff in a manner that captures rainwater at its source, while using natural resources.
Los Angeles County Green Street Policy (2011)	The Green Street Policy for Los Angeles County states that street improvements within transportation corridors should provide source control for stormwater, limit the transport of pollutant loads, restore predevelopment hydrology if possible, and incorporate LID strategies, including permanent BMPs. This Green Street Policy references the Green Infrastructure Guidelines as a source of information for projects that are developing or redeveloping streets and transportation corridors. Green street projects are required to develop a LID Plan, similar to that specified in the LID ordinance.

Policy Title	Summary
LA River Master Plan (2022)	The *LA River Master Plan* seeks to build on prior and current planning efforts to reimagine the Los Angeles River from a single-use corridor to a tangible, multibenefit resource that connects people, culture, water, open space, and wildlife. Research and analysis for the plan is based on a data-driven watershed and community approach. Relevant goals are: ▪ Reduce flood risk and improve resiliency. ▪ Promote healthy, safe, clean water.

Sources: County of Los Angeles 2011, 2019, 2022, 2025a, 2025b; County of Los Angeles and Los Angeles County Public Works 2022; Los Angeles RWQCB 2024; SCAG 2008, 2024
BMP = best management practice; LACFCD = Los Angeles County Flood Control District; LID = low-impact development; MS4 = Municipal Separate Storm Sewer System; RTP/SCS = Regional Transportation Plan/Sustainable Communities Strategy; SCAG = Southern California Association of Governments

Table 3-2 lists County of Orange adopted plans, policies, and ordinances.

Table 3-2 Orange County Plans, Policies, and Ordinances

Policy Title	Summary
Water Quality Control Plan for the Santa Ana River Basin (2019)[1]	The *Water Quality Control Plan for the Santa Ana River Basin* designates beneficial uses for specific surface water and groundwater resources, establishes water quality objectives to protect those uses, and sets forth policies to guide the implementation of programs to attain the objectives.
General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (*de minimis*) Threat to Water Quality (2020)[1]	The *General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (de minimis) Threat to Water Quality* (Order No. R8-2020-0006) includes requirements for construction dewatering activities.
County of Orange General Plan, Resources Element (2025)	The *County of Orange General Plan* Resources Element contains policies on the conservation and management of water resources within the county: ▪ To support groundwater management efforts that are conducted by county water agencies. ▪ Protect and improve water quality through continued management, enforcement, and reporting requirements. ▪ Promote coordination between the county, cities, and other stakeholders in the identification and implementation of watershed protection and Low-Impact Development (LID) principles. ▪ Consider implementation of LID principles to conserve natural features (trees, wetlands, streams, etc.), hydrology, drainage patterns, topography, and soils. ▪ Encourage the creation, restoration, and preservation of riparian corridors, wetlands, and buffer zones. ▪ Intergovernmental coordination to encourage and support a cooperative effort among all agencies toward the resolution of problems and the utilization of opportunities in the planning, management, and protection of water resources, including water quality.
Codified Ordinances of the County of Orange (2024)	Resources Element: Title 9, Water Quality, Division 1, Stormwater Management and Urban Runoff ▪ Title 7: Land Use and Building Design, Grading and Excavation

Policy Title	Summary
Orange County Grading and Excavation Code (2017)	Subarticle 5 Grading Permit Requirements Subarticle 11 Draining and Terracing Subarticle 13 Erosion and Sediment Control
County of Orange and Orange County Flood Control District Stormwater Program Local Implementation Plan (2019)	The *Stormwater Program Local Implementation Plan* provides the description and detail of how to implement model programs designed to prevent pollutants from entering receiving waters is accomplished on a local level.

Sources: County of Orange 2017, 2019, 2024, 2025; Santa Ana RWQCB 2019, 2020;
[1] The Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) and the General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (*de minimis*) Threat to Water Quality are not exclusive to Orange County but cover multiple counties within the Santa Ana Regional Water Quality Board's jurisdiction.
BMP = best management practice; DAMP = Drainage Area Management Plan; LID = low-impact development; MS4 = Municipal Separate Storm Sewer System; U.S.C. = U.S. Code

3.3.3.2 Cities

Table 3-3 lists the plans, policies, and ordinances adopted for the cities within the resource study area (RSA).

Table 3-3 Cities Plans, Policies, and Ordinances

Policy Title	Summary
City of Los Angeles	
City of Los Angeles General Plan (2024)	Safety Element: Objective 1.1: Implement comprehensive hazard mitigation plans and programs that are integrated with each other and with the City's comprehensive emergency response and recovery plans and programs. Infrastructure Element: Water System Plan, Objective 2 – To introduce and utilize new technologies for the improvement of the water system in order to meet the ever increasing demand for water at the most economical rates possible. Conservation Element: Section 8 Erosion Objective – protect the coastline and watershed from erosion and inappropriate sedimentation that may or has resulted from human actions. Open Space Element: Areas which should be maintained for open space includes lands needed for water supply, water recharge, water quality protection, as well as natural drainage channels, and floodplains.
Los Angeles Municipal Code (2025)	Los Angeles Ordinance No. 181899 (updated in 2024 as Ordinance #188125) amended Sections 64.70.01 and 64.70.01 of Article 4.4 of Chapter VI of the Los Angeles Municipal Code.
City of Los Angeles Grading Code (2020)	Chapter 70 provides provisions for grading, excavation, and fills.
City of Los Angeles LID Ordinance (2015)	Los Angeles Ordinance No. 181899 requires LID measures to be incorporated into the design plans of new development and redevelopment projects in order to mitigate stormwater quality impacts and is implemented through the city's plan review and approval process.
City of Los Angeles Green Streets Policy (2009)	Street improvements within transportation corridors should provide source control for stormwater, limit the transport of pollutant loads, restore predevelopment hydrology if possible, and incorporate LID strategies, including permanent BMPs.

Policy Title	Summary
Cornfield/Arroyo Seco Specific Plan (2024)	The *Cornfield/Arroyo Seco Specific Plan* improves the ecology surrounding the Los Angeles River Watershed and Arroyo Seco and supports the goals of the *Los Angeles River Revitalization Master Plan.* Chapter 2.4 focuses on Open Space and Chapter 3.1 on Streets including stormwater BMPs.
Los Angeles River Revitalization Master Plan (2007)	The *Los Angeles River Revitalization Master Plan* aims to enhance existing communities by creating a safe environment with more open space, parks, trails, recreation, environmental restoration, riverfront living and commerce, neighborhood identity, and economic development. Relevant goals are: ▪ Enhance flood storage ▪ Enhance water quality
U.S. Army Corps of Engineers and City of Los Angeles	
Los Angeles River Ecosystem Restoration Project (2015)	The Los Angeles River Ecosystem Restoration Project would restore approximately 11 miles of the Los Angeles River from Griffith Park to downtown Los Angeles. The project developed in conjunction with the U.S. Army Corps of Engineers would reestablish riparian strand, freshwater marsh, and aquatic habitat communities and reconnect the river to major tributaries, its historical floodplain, and the regional habitat zones of the Santa Monica, San Gabriel, and Verdugo Mountains. The Los Angeles River Watershed's current and former ecosystems would maintain existing levels of flood risk management. The goals of the project are to restore valley foothill riparian strand and freshwater marsh habitat, increase habitat connectivity, and increase passive recreation.
City of Vernon	
City of Vernon General Plan (2023)	*Circulation and Infrastructure Element* ▪ Goal CI-5: Maintain the storm drainage system to assure the protection of lives and property of in Vernon *Resources Element* ▪ Goal R-1: Conserve and protect the region's water and energy resources – Policy R-1.3: Seek and pursue the most practicable and cost-effective means of implementing National Pollutant Discharge Elimination Systems requirements.
The Code of the City of Vernon (2024)	Chapter 13.24: Storm Sewer System Ordinance: ▪ Section 13.24.200 Control of pollutants from other construction activities ▪ Section 13.24.210 Control of pollutants from new developments/ redevelopment projects
City of Vernon Grading Code (2024)	Chapter 15: Building and Construction Prior to any soil disturbance or construction, a City of Vernon building, grading, or encroachment permit would be obtained.
City of Bell	
City of Bell General Plan, Resource Management Element (2022)	Resource Management Element Policy 25: The City of Bell shall review its zoning ordinance and make appropriate changes that support drought tolerant planting over traditional landscape planted areas. The new regulations shall provide guidance with hardscape landscaping that has less impact to the environment.

Policy Title	Summary
City of Bell Municipal Code (2024)	Chapter 13.08: Stormwater and Urban Runoff Control ▪ Section 13.08.070 Stormwater pollution control measures ▪ Section 13.08.080 Urban runoff mitigation requirements for construction ▪ Section 13.08.085 Low impact development plan (LID)—Development projects
City of Bell Grading Code (2023)	Chapter 15.04: Building Laws. Prior to any soil disturbance or construction, a City of Bell grading permit would be obtained.
City of Commerce	
City of Commerce 2020 General Plan (2008)[1]	The *Resource Management Plan* promotes the protection of the environment in the city. The plan provides a citywide approach to the utilization, conservation, and management of the city's resources ▪ Safety Policy 4.1: The city of Commerce will ensure that appropriate mitigation measures relative to soil contamination and soils characteristics (subsidence, erosion, etc.) are required for development and redevelopment in order to reduce hazards. ▪ Safety Policy 4.2: The city of Commerce will work with other agencies to reduce the potential flood hazard in the city.
Commerce Municipal Code (2024)	Chapter 6.17: Stormwater and Runoff Pollution Control provides standards, guidelines, and criteria to comply with the Federal Clean Water Act, the California Porter-Cologne Water Quality Control Act, and the Municipal NPDES Permit. Chapter 19.24.070: Soil and Grading Requirements provides general provisions handling of soil including testing and grading requirements.
City of Montebello	
City of Montebello General Plan (2024)	Our Natural Community ▪ P1.1: Enhance air and water quality, increase public green space through the integration of green infrastructure. ▪ P3.7: Maintain high-quality reliable potable water and non-potable water services, diversify supply and maintain and create facilities that meet existing and future water demands including drought conditions. ▪ P3.9: Ensure that wastewater in the City of Montebello is safely and efficiently conveyed and treated under all demand scenarios, including existing and future average and peak flow sewer flow scenarios. ▪ P3.10: Utilize and maintain a robust stormwater conveyance system that protects the City from flooding impacts while seeking multi-benefit solutions including water quality. ▪ P7.3: Promote, expand, and protect a green infrastructure that links the natural habitat.
Montebello Municipal Code (2024)	The intent of Chapter 8.36: Stormwater and Urban Runoff Pollution Prevention is to enhance and protect the water quality of the receiving waters consistent with the Clean Water Act and the municipal NPDES permit. Chapter 15.48: Grading, includes provisions to safeguard health, safety, and public welfare by regulating and controlling the design, construction, quality of materials, and the location of work related to the grading and filling of land within the city.

Policy Title	Summary
City of Pico Rivera	
City of Pico Rivera General Plan, Environmental Resources Element (2014)	Environmental Resources Element: Goal 8.4 Policy 8.4-1 Surface Water, 8.4-2 Groundwater, 8.4-3 Recharge Policy, 8.4-4 Regional Coordination, 8.4-5 National Pollutant Discharge Elimination System.
Pico Rivera Municipal Code (2025)	Chapter 16.04: Stormwater and Urban Runoff Pollution Prevention ▪ Section 16.04.110: Control of pollutants from new developments/redevelopment projects Title 15 Building and Construction, Chapter 38: Grading and Excavation.
City of Santa Fe Springs	
Re-Imagine Santa Fe Springs 2040 General Plan, Conservation and Open Space Element (2022)	▪ Goal COS-4: Clean Surface Water, Drainages, and Groundwater: – Policy COS-4.1: Groundwater Supply Remediation. Work with appropriate agencies and seek funding as appropriate to clean local groundwater to safe conditions. – Policy COS-4.2: Contaminated Soils. Coordinate with responsible agencies to avoid threats that contaminated soils pose to groundwater quality. – Policy COS-4.3: Groundwater Contamination. Evaluate all proposed nonresidential development plans, activities, and uses for their potential to create groundwater contamination hazards from point and nonpoint sources and confer with other appropriate agencies to assure adequate review. – Policy COS-4.4: Runoff Pollution Prevention. Require that new developments incorporate features into site drainage plans that reduce impermeable surface area, increase surface water infiltration, and minimize surface water runoff during storm events. Such features may include additional landscape areas, parking lots with bio-infiltration systems, permeable paving designs, and stormwater detention basins.
Code of Santa Fe Springs (2025)	Chapter 52: Stormwater Management and Discharge Control Section 52.11: Standard Urban Stormwater Mitigation Plan and Low-Impact Development Requirements for New Development and Redevelopment Projects.
City of Santa Fe Springs Grading Code (2023)	Title XV: Land Usage, Chapter 150, Building Laws provides general provisions for the construction and operation of buildings and structures.
City of Norwalk	
Vision Norwalk – The City of Norwalk General Plan, Conservation Element (2023)[1]	The objectives of the *City of Norwalk General Plan* Conservation Element are to encourage efforts to reduce pollution and encourage efforts to clean up contaminated earth, air, and water resources. The plan includes: ▪ Policy 9: Minimize the amount of paved surfaces in new development to reduce the "urban heat island" effect, where temperatures in urban areas are increased due to reflection of heat.
Norwalk Municipal Code (2024)	Chapter 15.04: Building Code provides general provisions for the construction and operation of buildings and structures. Chapter 18.04: Stormwater Management and Discharge Control provides standards for reducing pollutants in stormwater discharges.

Policy Title	Summary
City of La Mirada	
City of La Mirada General Plan (2003)	The *City of La Mirada General Plan* Land Use Element includes stormwater requirements for development planning and construction.
La Mirada Code of Ordinances (2024)	Chapter 13.12: Urban Runoff, Section 13.12.110, SUSMP and LID requirements for new development and redevelopment projects.
City of La Mirada Grading Code (2021)	Chapter 17.04, Building Code provides general provisions for the construction and operation of buildings and structures.
City of Buena Park	
City of Buena Park 2035 General Plan, Conservation and Sustainability Element (2022)	Conservation and Sustainability Element: ▪ Goal CS-4: Natural resources and features within the City are enhanced and preserved. – Policy CS-4.6: Incorporate natural drainage systems into developments, where appropriate and feasible. – Policy CS-4.7: Substantial alterations or channelization of floodways should be limited. – Policy CS-4.8: Design new development and redevelopment projects in a manner that avoids adverse environmental effects to the maximum extent feasible, considering the following environmental factors: Natural topography, Wildlife habitat and linkages, Erosion protection and sedimentation, Drainage patterns and Groundwater recharge capability. – Policy CS-4.12: The City will participate in the Coyote Creek Watershed Management Plan including restoration of the existing soft bottom sections of the creeks, stepped gabion walls for erosion control, creation of walking trails and pocket parks adjacent to the creeks, and other restoration components.
Buena Park Municipal Code (2025)	Chapter 13.32.030 provides standards to control urban runoff.
City of Buena Park Grading Code (2010)	Chapter 15.86.010 provides grading and excavation requirements.
City of Fullerton	
The Fullerton Plan (2025)	Chapter 16 Water: The purpose of the Water Element of *The Fullerton Plan* is to ensure that the city has adequate water resource capacities and water quality to meet future growth needs. Overarching Policy OAP1: Comply with State and Federal laws and regulations while maintaining local control in decision-making. ▪ Goal 19: An adequate, safe, and reliable water supply – P19.5 Water Quality – P19.7 Sustainable Water Practices in New Development ▪ Goal 20: A healthy watershed and clean urban runoff – P20.4 Local Watersheds – P20.6 Construction Impacts – P20.7 Development Impacts
City of Fullerton Municipal Code (2025)	Chapter 12.18 Water Quality Ordinance provides criteria and requirements related to water quality.

Policy Title	Summary
City of Fullerton Grading Code (2019)	Chapter 14.03 Building Code provides general provisions for the construction and operation of buildings and structures.
City of Anaheim	
City of Anaheim General Plan (2025)	Public Services and Facilities Element ▪ Goal 6.1 Maintain a storm drain system that will adequately protect and enhance the health, safety and general welfare of residents, visitors, employees, and their property. – Policy 1: Improve the City's storm drain system to address current deficiencies as well as long-term needs associated with future development to minimize flood damage and adequately convey rainfall and subsequent runoff from a 25-year frequency storm. – Policy 2: Develop Anaheim's flood control system for multi-purpose uses whenever practical and financially feasible (i.e., recreational, water quality/treatment, infiltration, etc.). – Policy 3: Minimize the amount of impervious surfaces in conjunction with new development. – Policy 4: Minimize the disturbance of natural water bodies and natural drainage systems, where feasible, resulting from development including roads, highways, and bridges.
Anaheim Municipal Code (2025)	Chapter 10.09: National Pollutant Discharge Elimination System contains guidance related to discharges and urban runoff.
City of Anaheim Grading Code (2005)	Chapter 17.04: Grading, Excavation, Fills, provides standards and requirements related to ground-disturbing activities, grading, and fill.

Sources: City of Anaheim 2005, 2025a, 2025b; City of Bell 2022, 2023, 2024; City of Buena Park 2010, 2022, 2025; City of Commerce 2008, 2024; City of Fullerton 2019, 2025a, 2025b; City of La Mirada 2003, 2021, 2024; City of Los Angeles 2007, 2009, 2015, 2020, 2024a, 2024b, 2025; City of Montebello 2024a, 2024b; City of Norwalk 2023, 2024; City of Pico Rivera 2014, 2025; City of Santa Fe Springs 2022, 2023, 2025; City of Vernon 2023, 2024a, 2024b; USACE and City of Los Angeles 2015

[1] This plan is currently undergoing an update as of January 2025.

BMP = best management practice; LID = low-impact development; MS4 = Municipal Separate Storm Sewer System; NPDES = National Pollutant Discharge Elimination System; SUSMP = Standard Urban Stormwater Mitigation Plan

3.3.4 Flood Control Districts

3.3.4.1 Los Angeles County Flood Control Act

The Los Angeles County Flood Control Act was adopted by the California legislature in 1915. The Los Angeles County Flood Control Act established LACFCD and empowered it to provide flood protection, water conservation, recreation, and aesthetic enhancement within its boundaries. LACFCD exercises regulatory authority within its jurisdiction to maintain the integrity of the existing flood control system and designated floodways. LACFCD encompasses an area of more than 3,000 square miles, 85 cities, and approximately 2.1 million land parcels. It includes the vast majority of drainage infrastructure within incorporated and unincorporated areas in every watershed, including 500 miles of open channel, 2,800 miles of underground storm drains, and an estimated 120,000 catch basins (County of Los Angeles Department of Public Works 2016d).

LACFCD requires construction activities within Los Angeles County Department of Public Works Flood Control District rights-of-way or that cross a storm drain structure to obtain a flood permit from the Los Angeles County Department of Public Works Flood Control District.

3.3.4.2 Orange County Flood Control Act

OCFCD, established May 23, 1927, under authorization of the Orange County Flood Control Act, Chapter 723 of the State of California Statutes of 1927, was created to provide control of flood

and stormwaters of the district, which is the boundary of Orange County, as well as streams flowing into the district (e.g., the Santa Ana River or San Juan Creek); mitigate the effects of tides and waves; and protect the harbors, waterways, public highways, and property in the district from such waters.

OCFCD, administered by Orange County Public Works, is governed by the Orange County Board of Supervisors. OCFCD is a political entity that has no employees but owns land and assesses an annual benefit on taxable real property in Orange County. Because OCFCD has no specific employees, the district and its property are administered, maintained, and operated by Orange County Public Works staff members who are in turn employed by the County of Orange.

OCFCD requires construction activities within the OCFCD right-of-way to obtain a flood encroachment permit from Orange County Public Works.

3.3.5 Grading Codes

County and city grading codes are summarized below.

3.3.5.1 Los Angeles County

The Los Angeles County Grading Code is included as Appendix J of the County Building Code (Title 26 of the Los Angeles County Code). The grading code regulates grading on private property, sets forth rules and regulations to control grading, establishes procedures for the issuance of permits, and provides for approval of grading plans.

3.3.5.2 Orange County

The intent of the Orange County Grading and Excavation Code is to safeguard life, limb, property, and the public welfare by regulating grading on private property in the unincorporated areas of Orange County. The code sets forth rules and regulations to control excavation, grading, and earthwork construction, including fills and embankments, and establishes administrative requirements for issuance of permits and approval of plans and inspection of grading construction in accordance with the requirements for grading and excavation as contained in the California Building Code then in effect.

3.3.5.3 Cities

Table 3-4 summarizes the grading codes of the cities along the project section.

Table 3-4 City Grading Codes

Policy Title	Summary
City of Los Angeles	The City of Los Angeles, Chapter IX, Building Regulations, Article 1, Division 70, provides regulations and permitting procedures governing grading and excavation. The Los Angeles Building Code and the Los Angeles Residential Code adopt by reference portions of the 2022 California Building Code and the 2022 California Residential Code.
City of Vernon	Chapter 15 (Building and Construction) of the City's Municipal Code adopted by reference the California Building Code. The provisions of Appendix J apply to grading, excavation, and earthwork construction, including fills and embankments and the control of grading site runoff, including erosion sediments and construction-related pollutants.
City of Bell	Chapter 15.04 (Building Laws) of the City's Municipal Code adopted by reference the California Building Code.
City of Commerce	Chapter 15.04 (Building Code) of the City's Municipal Code adopted by reference the Los Angeles County Building Code, Title 26 of the Los Angeles County Code. Chapter 19.24.070 identifies the soil and grading requirements.

Policy Title	Summary
City of Montebello	Chapter 15.48 (Grading) of the City's Municipal Code establishes rules and regulations to safeguard health, safety, and public welfare by regulating and controlling the design, construction, quality of materials, and the location of work, as the same pertains to the grading and filling of land within the city.
City of Pico Rivera	Title 15, Chapter 38 (Grading and Excavation) of the City's Municipal Code establishes rules and regulations to control excavation, grading, and earthwork construction, including fills and embankments; establishes the administrative procedure for issuance of permits; and provides for approval of plans and inspection of grading construction, including private streets and utilities therein.
City of Santa Fe Springs	Title XV, Land Usage, Chapter 150 (Building Laws), of the City's Municipal Code adopted by reference the Los Angeles County Building Code, Title 26 of the Los Angeles County Code, regulating and controlling the design, construction, quality of materials, grading, use, occupancy, location, and maintenance of buildings or structures and prescribing conditions under which such work may be carried on within the city and providing for the issuance of permits and the collection of fees therefor.
City of Norwalk	Chapter 15.04 (Building Code) of the City's Municipal Code adopted by reference the 2022 California Building Code to provide regulations and permitting procedures governing grading and excavation.
City of La Mirada	Chapter 17.04 (Building Code) of the City's Municipal Code adopted by reference the Los Angeles County Building Code, Title 26 of the Los Angeles County Code, incorporating the 2022 California Building Code, regulating and controlling the design, construction, quality of materials, grading, use, occupancy, location, and maintenance of buildings or structures and prescribing conditions under which such work may be carried on within the city and providing for the issuance of permits and the collection of fees therefor.
City of Buena Park	Chapter 15.86.010 adopted the Orange County Grading and Excavation Code by reference as the grading and excavation code of the City of Buena Park. (Ord. 1546 Section 9, 2010).
City of Fullerton	Chapter 14.03 (Building Code) of the City's Municipal Code establishes rules and regulations to control excavation, grading, and earthwork construction (including fills).
City of Anaheim	Chapter 17.04, Grading, Excavations, Fills, requires that excavations and fills that may affect drainage and watercourses be performed in accordance with good engineering practice, thereby reducing to a minimum hazards and damage to public and private property from such work. The City of Anaheim adopted the 2022 California Building Code.

Sources: City of Anaheim 2005; City of Bell 2024; City of Buena Park 2010; City of Commerce 2014; City of Fullerton 2019; City of La Mirada 2021; City of Los Angeles 2025; City of Montebello 2024b; City of Norwalk 2024; City of Pico Rivera 2025; City of Santa Fe Springs 2023; City of Vernon 2024b

4 METHODS FOR EVALUATING IMPACTS

This section describes the RSAs and the methods used to identify potentially affected hydrology and water resources and determine National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) impacts. Analysis of impacts is presented in Chapter 6, Effects Analysis.

4.1 Definition of Resource Study Area

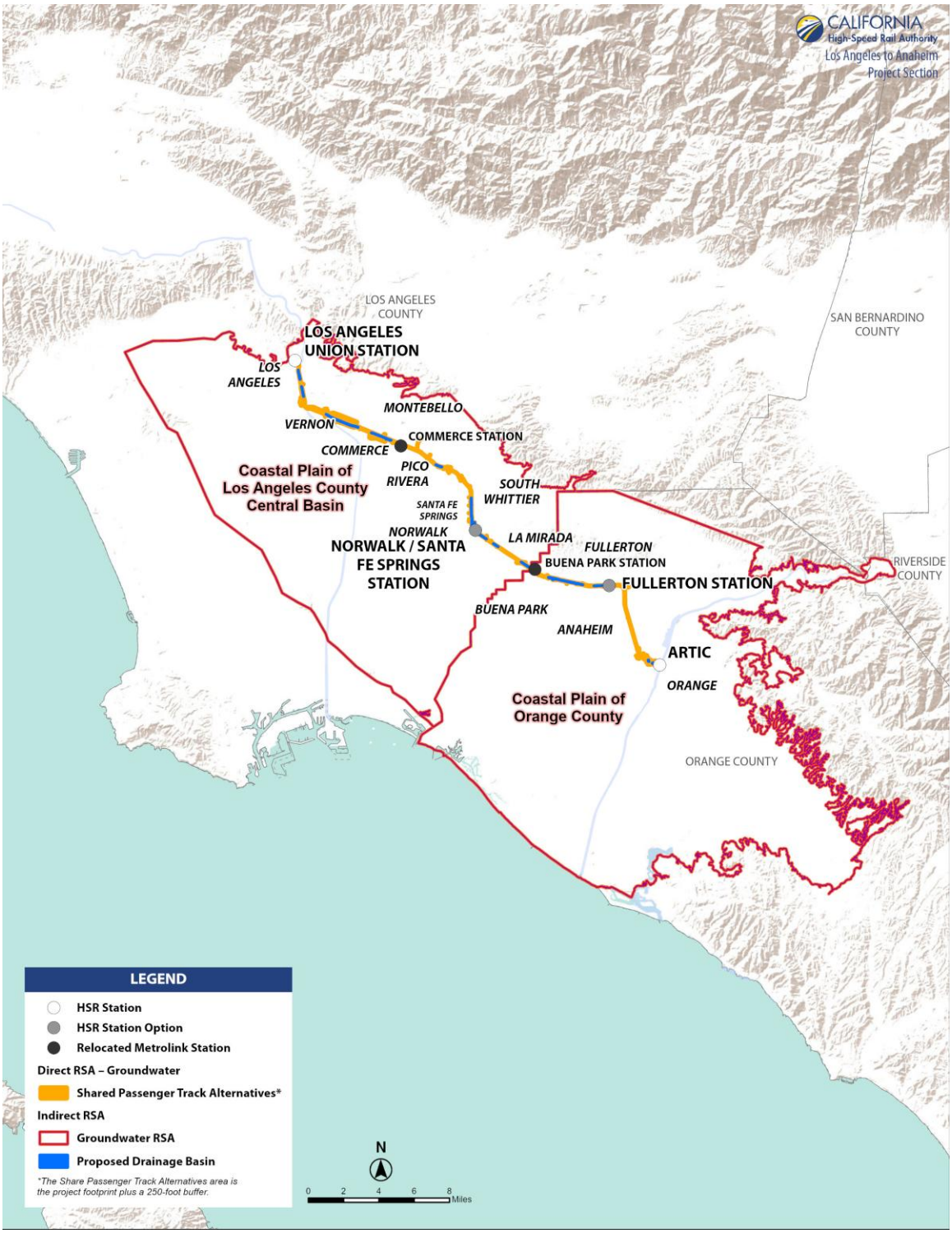
The RSA is the area in which environmental investigations specific to each resource are conducted to determine the resource characteristics and potential impacts of the project. It consists of a direct RSA and indirect RSA. The direct RSA for effects on hydrology and water resources includes the project footprint of the Shared Passenger Track Alternatives (e.g., stations, track, LMF) plus a 250-foot buffer (e.g., the project footprint plus the 250-foot buffer including the temporary construction areas) (Figure 4-1 through Figure 4-3). The RSA is sized appropriately to allow for analysis of potential direct project impacts on waters of the U.S. The indirect RSA is the area beyond the direct RSA's 250-foot buffer and includes water resources downstream, depending on topography, soil conditions, and runoff rates and volumes, that could receive runoff and sediment from the potential area of disturbance. The limits of the indirect RSA include the direct RSA and the following additional elements:

- **Surface Water**: Watersheds and receiving waters of project runoff
- **Groundwater**: Aquifer(s) underlying the project footprint
- **Floodplains**: FEMA-mapped flood-hazard areas within receiving waters of the disturbance area, as well as areas that could affect flood frequency, extent, and duration



Sources: USGS 2018; STV 2009; DWR 2016; Authority 2024e; ESRI/National Geographic 2024

Figure 4-1 Surface Water Direct and Indirect Resource Study Areas



Sources: DWR 2016; Authority 2024e; ESRI/National Geographic 2024

Figure 4-2 Groundwater Direct and Indirect Resource Study Areas



Sources: FEMA 2023; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 4-3 Floodplain Direct and Indirect Resource Study Areas

4.2 Methodology for Effect Analysis

The following information sources (and associated geographic information systems [GIS] data) were used to describe the affected environment:

- **Climate, Precipitation, and Topography:** Sources of information for these elements included the Statewide Program EIR/EIS, the Western Regional Climate Center (WRCC 2016a, 2016b, 2016c, 2016d), and U.S. Geological Survey topographic maps.
- **Regional and Local Hydrology and Water Resources:** The existing hydrology and water resources features in the direct RSA are prominent surface water features that include rivers and creeks; water quality impairments; and groundwater aquifers. Information regarding these features and their conditions originates in the following sources: the Statewide Program EIR/EIS, U.S. Geological Survey topographic maps, aerial imagery, the Los Angeles and Santa Ana Basin Plans (Los Angeles RWQCB 2024; Santa Ana RWQCB 2019), and the CWA Section 303(d) list of water quality-impaired reaches (SWRCB 2022).
- **Existing Floodplain Conditions:** The existing conditions with respect to floodplains are based on available data, reports, studies, and topographic and floodplain mapping. The FEMA-mapped 100-year floodplain areas (known as special flood-hazard areas under FEMA regulations) were identified and mapped using GIS and are based on FEMA's FIRMs for Los Angeles and Orange Counties (FEMA 2023). The special flood-hazard area designations and BFE information were obtained from the FIRMs.

To evaluate potential impacts on hydrology and water resources, both quantitative and qualitative analyses were performed:

- Conceptual-level plans and profiles (15 percent design) were reviewed and compared with information on surface water features, groundwater basins, and floodplains.
- Station locations and footprints were reviewed and compared with information on surface water features, groundwater basins, and floodplains.
- Federal and state statutes regulating water resources were reviewed as part of the analysis of potential flooding, hydrology, and water quality impacts. The applicable statutes establish water quality standards, regulate discharges and pollution sources, and protect drinking water systems, aquifers, and floodplain values.
- County and city general plans and ordinances were also reviewed for applicable policies and regulations to determine whether implementation of the Shared Passenger Track Alternatives would result in potential impacts on hydrology or water resources.
- A review of available documents from various agencies, including the U.S. Geological Survey, FEMA, SWRCB, and RWQCB, was completed to determine whether water quality or water resources would be affected by the Shared Passenger Track Alternatives.
- A review of supporting documents, including the following:
  - *Los Angeles to Anaheim Project Section Stormwater Management Technical Report* (Authority 2024b)
  - *Los Angeles to Anaheim Project Section Floodplain, Hydrology, and Hydraulics Technical Report* (Authority 2024c)
  - *Los Angeles to Anaheim Project Section Draft Aquatic Resources Delineation Report* (Authority 2025b)
  - *Los Angeles to Anaheim Project Section Geology, Soils, and Seismicity Technical Report* (Authority 2025c)
  - *Burbank to Los Angeles Project Section Hydrology and Water Resources Technical Report* (Authority 2020)
  - *Los Angeles to Anaheim Project Section Aquatic Resources Impact Memorandum* (Authority 2025d)

- *Los Angeles to Anaheim Project Section Hazardous Materials and Wastes Technical Report* (Authority 2025e)
- *Los Angeles to Anaheim Project Section Paleontological Resources Technical Report* (Authority 2025f)

4.2.1 Surface Water Hydrology

Project construction and operation could affect surface water hydrology. Conditions that could potentially lead to an impact include increases in impervious surface area leading to increases in the runoff volumes and rates. Project construction and operation could also result in temporary or permanent alterations in drainage patterns, changes in local drainage infrastructure, or localized or regional drainage impacts.

An evaluation of the potential effects the Shared Passenger Track Alternatives could have on surface waters includes the following:

- The Authority overlaid GIS layers for the proposed Shared Passenger Track Alternatives on the GIS layers for surface waters and flood-prone areas, U.S. Geological Survey topographic maps, and aerial photography from web mapping services to identify the potential effects on surface waters. The Authority then used these GIS layers to identify where the project section would cross rivers, creeks, and other waterbodies.
- The Authority used GIS to estimate the length of rivers, creeks, and drainages crossed by the project section.
- The Authority estimated the amount of surface area that would be disturbed by the Shared Passenger Track Alternatives using GIS. The amount of disturbed area includes permanent features and areas requiring temporary access.
- The amount of impervious surface area that would be created by the footprint was estimated using GIS to first identify the impervious area under the existing conditions; secondly by making assumptions on the percentage of imperviousness for the permanent features based on existing conditions; and thirdly by multiplying the assumed imperviousness percentage with the area of permanent feature type in the project footprint to calculate the total amount of proposed impervious surface area created by the Shared Passenger Track Alternatives. The amount of proposed impervious area includes permanent features such as access roads, bridge access, graded areas, roadways, stations, tracks, radio sites, and permanent access areas. Increases in impervious surfaces would lead to increases in the timing and volume of water runoff.
- The changes to drainage patterns in the direct RSA during construction and operation were evaluated based on the hydraulic model results included in the *Los Angeles to Anaheim Project Section Floodplain, Hydrology, and Hydraulics Technical Report* (Authority 2024c) and the *Los Angeles to Anaheim Project Section Aquatic Resources Impacts Memorandum* (Authority 2025d).

4.2.2 Surface Water Quality

Project construction and operation could affect surface water quality. During construction, sediment or ground disturbance could impact surface water quality through increased erosion or accidental spill of hazard materials used during construction activities. New and replaced impervious surfaces could collect and mobilize pollutants by runoff during storm events, and potentially discharge pollutants into surface waters.

The following methods were used to evaluate the potential effects the Shared Passenger Track Alternatives could have on surface water quality:

- The Authority used GIS software and CWA Section 303(d) lists of water quality–impaired reaches (SWRCB 2022) to identify and consider the locations of stream segments with impaired water quality in relation to the proposed alternative alignments and project footprint.

- The Authority evaluated construction activities for the potential to effect surface water quality through uncontrolled runoff and discharges. These activities include accidental releases of construction-related hazardous materials, ground disturbance and associated erosion and sedimentation, stormwater discharges, and dewatering discharges, particularly in locations within or close to a surface waterbody.
- The Authority considered in-water construction work that could potentially directly contaminate surface water quality and redirect flows.
- The Authority reviewed operation and maintenance activities with the potential to introduce pollutants into the environment, with a particular focus on stormwater runoff from Shared Passenger Track Alternatives facilities.
- The Authority evaluated the potential of the Shared Passenger Track Alternatives to create significant new sources of pollutants (e.g., construction equipment and parking lots), leading to new sources of contaminated runoff in the direct RSA).
- The Authority evaluated the use of treatment control BMPs in the direct RSA based on the information included in the *Los Angeles to Anaheim Project Section Stormwater Management Technical Report* (Authority 2024b).

4.2.3 Groundwater

Potential effects on groundwater resources were evaluated using documents available from DWR, Los Angeles and Santa Ana RWQCBs, Los Angeles and Orange Counties, and other agencies. During construction, excavation in areas of high groundwater could affect groundwater quality or quantity from dewatering activities.

To evaluate the potential effects the Shared Passenger Track Alternatives could have on groundwater, GIS database layers for groundwater basins were used to estimate the length and acreage of groundwater basins beneath the Shared Passenger Track Alternative's footprints. Additionally, the available documentation from the DWR (e.g., DWR Bulletin 118) was reviewed to obtain estimates of the depth to groundwater within the groundwater RSA.

The Authority evaluated the following potential construction impacts:

- Excavation activities that could result in intrusions below the groundwater table could be a direct mechanism for contaminants to enter groundwater
- Dewatering activities that could potentially deplete localized groundwater supplies
- Potential for contaminated site runoff to percolate to the groundwater aquifer

The Authority evaluated the following potential operational impacts:

- Increases in impervious surfaces as a result of the Shared Passenger Track Alternatives that could reduce groundwater recharge
- Creation of substantial new sources of pollutants, such as parking lots and maintenance facilities, leading to new sources of contaminated runoff that could percolate to the aquifer

4.2.4 Floodplains

Project construction and operation could affect floodplains. The Shared Passenger Track Alternatives could result in changes to the hydraulics and connectivity of the waterbodies and associated floodplains. Redirected or impeded floodflows have the potential to redefine flood hazard areas and cause flooding in areas previously not at risk to the 100-year flood.

To evaluate the potential effects the Shared Passenger Track Alternatives could have on floodplains, conceptual-level plans (15 percent design) for the Shared Passenger Track Alternatives were reviewed and compared with information on existing floodplains. The Shared Passenger Track Alternatives would cross designated floodplains on bridges and elevated structures. The evaluation of potential impacts of the Shared Passenger Track Alternatives on floodplains includes the following analyses:

- Estimation of the area of the floodplains (defined as 100-year floodplains or special flood-hazard areas) crossed by the station options by overlaying GIS layers for the Shared Passenger Track Alternatives onto the GIS layers for floodplains
- Evaluation of changes to floodplains, based on hydraulic model results included in the *Los Angeles to Anaheim Project Section Floodplain, Hydrology, and Hydraulics Technical Report* (Authority 2024c)
- Review of Shared Passenger Track Alternatives facilities within a designated floodplain that could expose the Shared Passenger Track Alternatives to risks related to flooding and subject other areas to impacts resulting from changes in the location and or direction of floodflows
- Evaluation of the potential for the Shared Passenger Track Alternatives to increase flood height or divert floodflows using flood information from the FEMA FIS and available topographic data
- Evaluation of the potential for the Shared Passenger Track Alternatives to result in incompatible floodplain development and affect floodplain values, using flood information from the FEMA flood insurance studies
- Consideration of construction activities within a floodplain that could redirect flows and pose a risk to construction workers and equipment

Crossing locations have been identified based on the FIRMs for Los Angeles County and unincorporated areas, revised by FEMA in 2021, and the FIRMs for Orange County and unincorporated areas, revised by FEMA in 2019. GIS software was used to overlay the proposed project footprint with the most currently available FIRMs. Locations where the proposed project footprint would intersect the base flood zones, as outlined in the FIRMs, are identified in Chapter 5, Affected Environment.

5 AFFECTED ENVIRONMENT

This section describes the affected environment for hydrology and water resources in the direct RSA for the project section. It includes information regarding surface water hydrology (climate and precipitation), surface water quality, soils and erosion potential, groundwater hydrology and quality, and floodplains.

5.1 Resource Study Area Watersheds

The project section crosses the following watersheds: Los Angeles River, San Gabriel River, Santa Ana River, and Seal Beach (otherwise known as Anaheim Bay-Huntington Harbour). The watersheds in the RSA are depicted on Figure 4-1. The U.S. Geological Survey classifies these watersheds as Hydrologic Unit Code 8 (HUC-8) watersheds and assigns them the following HUC-8 designations (USGS 2016):

- Los Angeles River (HUC-8 18070105)
- San Gabriel River (HUC-8 18070106)
- Santa Ana River (HUC-8 18070203)
- Seal Beach (HUC-8 18070201)

Table 5-1 summarizes the major water features within each HUC-8 watershed and total acreage of each HUC-8 watershed occurring within the RSA.

Table 5-1 Subwatersheds in the Resource Study Area

Hydrologic Unit Code–8	Major Water Features within the RSA	Subwatershed Area (acres)
Los Angeles River (18070105)	Los Angeles River, Rio Hondo, Rio Hondo spreading grounds	531,790
San Gabriel River (18070106)	San Gabriel River, Coyote Creek, La Mirada Creek, North Fork Coyote Creek, Brea Creek, Lakeside Residential Community Pond, Fullerton Creek, Carbon Creek, Raymond Retarding Basins	579,977
Santa Ana River (18070203)	Santa Ana River	1,084,238
Seal Beach (18070201)	None	81,533
Total	**--**	**2,277,538**

Source: USGS 2016

The Los Angeles River subwatershed covers a land area of 531,790 acres. The eastern portion spans from the Santa Monica Mountains to the Simi Hills and, in the west, from the Santa Susana Mountains to the San Gabriel Mountains. The watershed encompasses and is shaped by the path of the Los Angeles River, which flows from its headwaters in the mountains eastward to the northern corner of Griffith Park. Here, the channel turns southward through the Glendale Narrows before it flows across the coastal plain and into San Pedro Bay near Long Beach. The Los Angeles River has evolved from an uncontrolled, meandering river, providing a valuable source of water for early inhabitants, into a major flood protection waterway (County of Los Angeles Department of Public Works 2016a).

The San Gabriel River subwatershed covers a land area of 579,977 acres and drains into the San Gabriel River from the San Gabriel Mountains, flowing 58 miles south until its confluence with the Pacific Ocean. Major tributaries to the San Gabriel River include Walnut Creek, San Jose Creek, Coyote Creek, and numerous storm drains from the 19 cities that the San Gabriel River passes through. Channel flows pass through different sections in the San Gabriel River, diverting from the riverbed into four different spreading grounds. Flows are held behind several rubber

dams for controlled flow and groundwater recharge and controlled through 10 miles of concrete channel bottom from below Whittier Narrows Dam to past Coyote Creek (County of Los Angeles Department of Public Works 2016b).

The Santa Ana River subwatershed covers a land area of 1,084,238 acres. Banks of the Santa Ana River are stabilized. Only 20 percent of the Santa Ana River is a concrete channel, the majority of which is near the mouth of the river. Discharges from publicly owned wastewater treatment facilities have changed natural surface flows and provided the base flow in many parts of the Santa Ana River's drainage network. This treated wastewater has altered the natural system by providing year-round river flow.

The Seal Beach subwatershed covers a land area of 81,533 acres and is composed of a number of channels, none of which is a dominant river for the watershed. However, each drains a substantial portion of the watershed (Orange County Public Works 2016). These channels are not included in the Water Quality Control Plan for the Santa Ana River Basin. Ultimately, the channels converge along the coast where they empty into Huntington Harbour and Anaheim Bay. The headwaters for these channels begin in the northern and eastern reaches of the watershed, which are almost completely urbanized. These areas have very low slopes, having once been primarily swamplands or low coastal floodplains for the San Gabriel and Santa Ana Rivers. Channel reaches within the watershed are improved (lined) for flood control. The typical flow in the Seal Beach Watershed is almost completely dry-weather runoff (Orange County Public Works 2016).

5.2 Climate, Precipitation, and Topography

The climate within the Los Angeles Basin (including the RSA) is arid to semi-arid. Summer and fall seasons (dry season) are generally hot and dry, with the majority of rain falling during the mid-winter months (wet season). Rainfall stations within the RSA indicate that approximately 80 percent of annual precipitation occurs between November and April. Accordingly, the condition of water resources (e.g., presence of surface water) is seasonally variable between the wet and dry seasons. Rainwater often inundates the watercourses and waterbodies within the RSA during winter storms, common from November through March, but many are completely dry or contain only nuisance or wastewater low flows during other seasons (NOAA 2024a, 2024b).

Adiabatic cooling (i.e., cooling caused by change in air pressure) causes warm, moisture-laden air masses to be generated over the Pacific Ocean, which condense and cool as they are pushed upward and over the San Gabriel and San Fernando Mountains, resulting in moderate to heavy precipitation on the southwestern slopes. The resulting snowpack is highly variable but averages from 5 to 70 inches as elevation increases from the lower foothills to the mountain peaks. Similar to snowpack, mean annual precipitation for the downtown Los Angeles (University of Southern California Campus) meteorological station is highly variable, ranging from 3.85 inches in 1953 to 34.04 inches in 1983, and averaging 14.77 inches per year (WRCC 2016a). Mean annual temperature records for the same station site indicate an average high temperature of 74 degrees and an annual average low temperature of 56 degrees (WRCC 2016a). Key climatic factors influencing this high variability in intra-seasonal and inter-annual precipitation include the Madden-Julian Oscillation (NOAA 2024a) and the El Niño Southern Oscillation (NOAA 2024b), respectively.

Table 5-2 presents annual precipitation data for four stations in the surface waters indirect RSA. Average annual precipitation ranges from 12.01 inches at Brea Dam to 20.24 inches in Pasadena (WRCC 2016b, 2016c).

Table 5-2 Historical Annual Precipitation

Station	Location Relative to RSA	Elevation (msl)	Data Range	Mean Annual Rainfall (inches)
Pasadena (046719)	North	820 feet	1893–2015	20.24

Station	Location Relative to RSA	Elevation (msl)	Data Range	Mean Annual Rainfall (inches)
Brea Dam (041057)	East	300 feet	1948–2013	12.01
Los Angeles Downtown USC Campus (045115)	West	175 feet	1877–2016	14.77
Santa Ana Fire Station (047888)	South	110 feet	1906–2016	13.69

Source: WRCC 2016a, 2016b, 2016c, 2016d
msl = mean sea level; RSA = resource study area

5.3 Surface Water Hydrology

Surface water features include rivers, creeks, sloughs, cuts, and gulches. Only rivers and creeks are present within the RSA and are discussed in the following subsections. Prominent watercourses in the RSA include the Los Angeles River, Rio Hondo, San Gabriel River, La Mirada Creek, Coyote Creek, Brea Creek, Fullerton Creek, Carbon Creek, and Santa Ana River, as depicted on Figure 4-1. Prominent basins in the RSA include the four Rio Hondo spreading grounds, the Lakeside residential community pond, and the two Raymond Retarding Basins (Authority 2025b).

5.3.1 Surface Water Features

This project section would cross 11 existing open drainage features, as depicted on Figure 4-1 and summarized in Table 5-3. The first six crossings are within Los Angeles County, while the following five are within Orange County. At the northern end of the direct RSA, the Shared Passenger Track Alternatives alignment would cross the Los Angeles River twice and run parallel to the river between the crossings. The project would cross the Los Angeles River at the existing Metrolink bridge overcrossing near East Washington Boulevard. The project footprint would then cross Hobart Channel in Hobart Yard, followed by the Rio Hondo and San Gabriel River in Pico Rivera. The project footprint would continue east and cross North Fork Coyote Creek and La Mirada Creek before crossing into Orange County. Beginning in Buena Park, the project footprint would cross Coyote Creek and continue east, crossing Brea Creek before entering Fullerton where the project footprint would cross the Balcom Avenue Storm Drain and head south before crossing Fullerton Creek. The project alignment would then continue south in Anaheim and cross Carbon Creek adjacent to the Raymond Retarding Basin.

Table 5-3 Water Crossings – Drainage Features Information

Waterbody	Length of Crossing (feet)	Structure Type	Bottom Material	Responsible for Maintenance	Design Flow Rate (cfs)
Los Angeles River – south of Washington Boulevard and north of 26th Street	372	Existing bridge	Concrete	USACE	104,000
Hobart Channel	55	Reinforce concrete box	Concrete	LACFCD	321
Rio Hondo	120	New bridge and modify existing bridge	Concrete	LACFCD	51,650
San Gabriel River	240	New bridge	Earthen	LACFCD	14,700
North Fork Coyote Creek	85	New bridge and modify existing bridge	Concrete	LACFCD	21,000

Waterbody	Length of Crossing (feet)	Structure Type	Bottom Material	Responsible for Maintenance	Design Flow Rate (cfs)
La Mirada Creek	80	Modify existing bridge	Concrete/ earthen	LACFCD	3,600
Coyote Creek	45	Box culvert extension	Concrete	OCFCD	15,000
Brea Creek	50	New bridge/ extension	Concrete	OCFCD	7,390
Balcom Avenue Storm Drain	12	Reinforce concrete box	Concrete	City of Fullerton	N/A[1]
Fullerton Creek	24	Existing Box Culvert	Concrete	City of Fullerton	3,550
Carbon Creek	9	Box Culvert Extension	Concrete	OCFCD	1,000

Sources: Authority 2025b, 2025c, 2024d

[1] The design flow rate of Balcom Avenue Storm Drain is unknown. According to the current Federal Emergency Management Agency flood insurance rate maps and the flood insurance study for Orange County, a floodplain has not been delineated along the Balcom Avenue Storm Drain at the location of the crossing.

cfs = cubic feet per second, LACFCD = Los Angeles County Flood Control District, N/A = not available; OCFCD = Orange County Flood Control District, USACE = U.S. Army Corps of Engineers

Existing conditions for each of the open channels are described below. These include channel geometry; existing floodplain delineation based on the FEMA mapping; and design flow rates.

5.3.2 River

A river is a natural stream of water that empties into another body of water. The rivers discussed below are within the direct RSA.

5.3.2.1 Los Angeles River

The 55-mile-long Los Angeles River originates in the community of Canoga Park in the city of Los Angeles and flows to the Pacific Ocean in the city of Long Beach. The Los Angeles River within the direct RSA is between 244 and 372 feet wide and trapezoidal, with concrete lining. The existing railroad bridge has three pier wall supports within the Los Angeles River with rounded noses. Just upstream of the railroad bridge crossing are various other structures, including two other railroad crossing bridges and a Washington Boulevard crossing.

The Los Angeles River was originally designed to contain and convey a flow of 104,000 cubic feet per second (cfs), based on data from the USACE *Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual* (USACE 1999). USACE prepared a hydrology and hydraulics study as part of the *Los Angeles River Revitalization Feasibility Report*, referencing data from the *Los Angeles County Drainage Area Review Feasibility Report* (USACE 1992), which discusses the current hydraulic capacity of the Los Angeles River. The study indicates that the design flow rate (104,000 cfs) is equivalent to the 83-year storm event. The study also identified the 100-year flow rate in the river as 109,000 cfs at this location (USACE 1992).

5.3.2.2 Hobart Channel

Hobart Channel is near the existing Hobart Yard in Vernon, between 26th Street and Bandini Avenue, and it discharges directly to the Los Angeles River. At the location of the proposed Shared Passenger Track Alternatives crossing, it is an open trapezoidal concrete-lined channel with a bottom width of 16 feet and a height of 5 feet. Hobart Channel was built in 1923 as part of the Union Pacific System. Several years later the LACFCD built DDI-26, a 14-foot-wide by 8.5-foot-high reinforced concrete box parallel to Hobart Channel. LACFCD maintains Hobart Channel,

which has a design rate flow of 321 cfs (Authority 2024d). Several railroad tracks cross a closed section of the system upstream in Hobart Yard.

5.3.2.3 Rio Hondo

Rio Hondo is a tributary of the Los Angeles River and approximately 16.4 miles long. Rio Hondo begins in Irwindale and flows southwest to its confluence in South Gate, passing through several cities (although not the city of Los Angeles). Rio Hondo within the direct RSA is in Pico Rivera; the channel is between 100 and 120 feet wide and trapezoidal, with concrete lining. The existing railroad crossing within Rio Hondo includes one pier wall near the center of the channel, which is approximately 100 feet long. Rio Hondo was built to contain and convey a flow of 51,650 cfs (USACE 1999).

5.3.2.4 San Gabriel River

The San Gabriel River runs approximately 58 miles from the Cogswell Dam in the Angeles National Forest to its terminus at the Pacific Ocean. The San Gabriel River is almost entirely in Los Angeles County, with a portion in Orange County where it borders the east side of the river for approximately 3 miles. The San Gabriel River environment changes dramatically during the 58-mile course. The San Gabriel River within the direct RSA is in Pico Rivera; the channel is approximately 240 feet wide and trapezoidal. The Slauson Avenue bridge within the RSA currently has two pier walls within the San Gabriel River, with additional supports outside of the main channel section near the banks and floodplain. The existing railroad bridge has six pier walls within the channel and along the banks. The river invert (i.e., floor) is earthen, and the side banks are grouted stone. The San Gabriel River was originally designed to contain and convey a flow of 14,700 cfs, based on data from the USACE *Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual* (USACE 1999).

5.3.3 Creek

A creek is a stream, brook, or minor tributary of a river. The creeks discussed below are in the direct RSA.

5.3.3.1 North Fork Coyote Creek

Coyote Creek has three forks—north, central, and southern. Each fork of Coyote Creek combines sections of concrete-lined channels, earthen channels, and underground pipelines. North Fork Coyote Creek, also called “La Canada Verde Creek,” is primarily a concrete-lined trapezoidal channel. Several tributaries flow into North Fork Coyote Creek; the dominant tributary is La Mirada Creek. The North Fork Coyote Creek within the direct RSA is in Santa Fe Springs. The direct RSA is downstream of the Milan Creek confluence. Within the direct RSA, the North Fork Coyote Creek is approximately 85 feet wide and trapezoidal, with concrete lining. A low-flow channel is within the center of the channel; it meanders to avoid the existing bridge structure. The existing bridge structure is supported by a pier wall that is approximately 140 feet long. The pier wall currently supports a pipeline upstream of the railroad crossing. The existing pier wall is parallel to the flow within the creek. North Fork Coyote Creek was originally designed to contain and convey a flow of 21,000 cfs, based on data from the USACE *Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual* (USACE 1999).

5.3.3.2 La Mirada Creek

La Mirada Creek is the dominant tributary to North Fork Coyote Creek. La Mirada Creek within the direct RSA is in La Mirada. Just upstream of the RSA, the creek is 50 feet wide and rectangular, with concrete lining. Just downstream of the RSA, the creek is 80 feet wide and trapezoidal, with concrete lining at the invert and gunite (i.e., a mixture of cement, sand, and water applied through a pressure hose, producing a dense, hard layer of concrete) along the banks. Beneath the existing railroad crossing within the RSA, the channel is soft bottomed and has a wider cross section. La Mirada Creek currently passes under Stage Road in a triple box culvert, with each box being 15 feet wide and 11 feet high. La Mirada Creek daylights for a short distance downstream of Stage Road and upstream of the railroad crossing structure. The existing

railroad crossing structure includes four pier structures within the channel. A second railroad crossing structure exists a little farther downstream; it also includes four in-channel pier structures to support the bridge. Hydraulic calculations suggest the design flow rate is 3,600 cfs (Authority 2024d).

5.3.3.3 Coyote Creek

Coyote Creek is a principal tributary of the San Gabriel River. It drains a land area of roughly 41.3 square miles, covering the cities of Brea, Buena Park, Fullerton, La Habra, and La Palma. Major tributaries of Coyote Creek in this highly urbanized watershed include Brea Creek, Fullerton Creek, and Carbon Creek. Within the RSA, the channel is 45 feet wide and rectangular, with concrete lining. A double box culvert is present at the existing railroad crossing. Each of the existing boxes is 23.75 feet wide and 19.5 feet high, with a separation of 1.5 feet. The divider within the box culvert extends more than 400 feet upstream to the Stage Road crossing. A pipe crossing exists just downstream of the box culvert outlet, and a catwalk structure exists upstream of the culvert inlet. Coyote Creek was originally designed to contain and convey a flow of 15,000 cfs, based on data from the USACE *Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual* (USACE 1999).

5.3.3.4 Brea Creek

Brea Creek is one of four principal tributaries of Coyote Creek, which is a lower tributary of the San Gabriel River. Brea Creek drains parts of Orange, Riverside, and San Bernardino Counties. Brea Creek flows 11.7 miles, from the cities of Brea and Anaheim to Whittier where its mouth is on the left bank of Coyote Creek. Within the RSA, Brea Creek is in Buena Park. Within the direct RSA, the channel is 50 feet wide and rectangular, with concrete lining. A trapezoidal low-flow channel exists within the channel along the centerline. The existing railroad crossing structure through Brea Creek includes two pier walls approximately 40 feet long, parallel to the flow direction. The bottom of the crossing structure is approximately 14.5 feet above the channel invert. Brea Creek is currently designed to contain and convey a 100-year flow rate of 7,390 cfs, based on 1998 design plans (Authority 2024d).

5.3.3.5 Balcom Avenue Storm Drain

Within the direct RSA, there is an existing local open drainage channel near the railroad bridge structure south of the Lawrence Avenue intersection with Santa Fe Avenue in Fullerton. Just upstream of the RSA, the channel is rectangular (12 feet wide and 5 feet high) and concrete lined. Downstream of the RSA, the channel goes underground and discharges into Fullerton Creek less than 2,000 feet downstream. The Balcom Avenue Storm Drain currently transitions from a rectangular open channel to a double rectangular channel so that a railroad bridge pier can be situated beneath the two open channel sections, each 6 feet wide and 5 feet high. The design flow rate is unknown (Authority 2024c).

5.3.3.6 Fullerton Creek

Fullerton Creek is a tributary of Coyote Creek, which is a lower tributary of the San Gabriel River. Fullerton Creek is approximately 10.5 miles long, from Fullerton Dam to Coyote Creek. Within the direct RSA, the creek is in Fullerton; the channel is 24 feet wide and rectangular, with concrete lining. Fullerton Creek transitions to a double box culvert to convey flows under the existing railroad crossing. The transition starts just over 30 feet upstream of the beginning of the box culvert and includes a wall through the center of the channel. Fullerton Creek has adequate capacity to contain and convey a 100-year flow rate of 3,550 cfs, based on a hydrology report prepared in 1996 by the OCFCD (Authority 2024c).

5.3.3.7 Carbon Creek

Carbon Creek is the longest tributary to Coyote Creek. Carbon Creek is a mostly channelized course, beginning almost 10 miles south of Brea and Tonner Canyons. The creek flows west and south into several small flood control basins before resuming its west-southwest course and receiving several small tributaries on either bank. The creek flows into Coyote Creek very near its

mouth at the San Gabriel River. Within the RSA, Carbon Creek is in Anaheim; the channel is just under 9 feet wide and 10 feet high and rectangular, with concrete lining. Carbon Creek has capacity to contain and convey a 100-year flow rate of 1,000 cfs, based on the 1959 design plans (Authority 2024d).

5.3.3.8 Southeast Anaheim Channel

Southeast Anaheim Channel (also referred to as E12) generally parallels State College Boulevard. The channel runs within an enclosed 9-foot by 9-foot reinforced concrete box that discharges into the Santa Ana River north of Chapman Avenue. The drainage channel collects urban runoff from approximately 1,541 acres through various tributary drains in southeast Anaheim. Southeast Anaheim Channel is buried within the right-of-way, and is therefore not considered a surface water feature.

5.4 Surface Water Quality

5.4.1 Surface Water Quality Conditions in the Study Area

Natural flows in river and stream headwaters are generally relatively free of pollutants. As water flows from the headwaters, through mountain streams, and into the valley or basin, streams and rivers tend to accumulate both natural and anthropogenic pollutants. In relation to water quality, pollutant sources typically fall into two broad categories: point sources, such as outfalls or direct discharges, and nonpoint sources, which are sources of pollution diffused across the landscape. As natural flow volumes decrease seasonally during the dry summer months, concentrations of pollutants increase. Stormwater and irrigation runoff enter streams directly as overland subsurface flows, or direct discharges; therefore, surrounding land uses affect surface water quality.

Urban development, industry, wastewater treatment facilities, dams and reservoirs, and many other human activities can have significant impacts on water quality. Urban and irrigation runoff can carry the dissolved or suspended residue of both natural and human land use practices within the watershed. Pollutant sources in urban areas include parking lots and streets; residential, commercial, and industrial development; rooftops; exposed earth at construction sites; unlandscaped and undeveloped areas; and petroleum-fueled railroads.

Water quality conditions in the RSA is also affected by existing rail operations. Metrolink, Amtrak, and BNSF currently use the existing railroad in the project section. Existing petroleum-fueled trains braking on the railroad release brake dust, which consists of particulate metals, primarily iron, but may also include copper, silicon, calcium, manganese, chromium, and barium (Berkhardt et al. 2008; Moreno et al. 2015). Although brake dust from existing trains consists primarily of particulate metals, some of these metals could become dissolved in rainwater. Brake dust is primarily generated in locations where the existing trains must reduce their travel speed, such as approaches to existing stations, turns, and elevation changes, primarily descents. Once released by a train, the pathway that brake dust follows in the environment is determined, in part, by the profile of the railroad. Brake dust emitted from trains traveling on an at-grade or embankment profile can be deposited in the ballast material, or rocks, that supports the tracks. Particulate brake dust deposited in track ballast can be discharged into a surface waterbody, either directly or through a storm drainage system. Some of these metals can dissolve in rainwater and can be mobilized to a storm drain or waterbody, or infiltrate into the ground. Infiltration into the ground can reduce surface water quality impacts, but can potentially affect groundwater quality (discussed in Section 5.5, Groundwater). Where the track is on an elevated structure (bridge), brake dust can be deposited onto the impervious structure. During a storm event, the deposited brake dust can be mobilized to a storm drain system and eventually into a waterbody. Where the rail crosses a waterbody, brake dust can be directly discharged into the waterbody. However, the amount of brake dust that could be discharged into surface waterbodies is unknown. Water quality impairments within the RSA are summarized in Table 5-8.

Within the RSA, the Los Angeles River and some tributaries are impaired by pollutants, mainly because of the watershed's large, dense population and highly urbanized area, and the amount

of impervious ground surface, which prevents large quantities of runoff from infiltrating into the soils (City of Los Angeles 2016). Currently, several applicable TMDLs are in effect in the watershed, including:

- Los Angeles River Metals TMDL
- Los Angeles River Nutrients TMDL
- Los Angeles River Trash TMDL
- Los Angeles River Bacteria TMDL

The RSA is in the middle and lower portions of the San Gabriel River Watershed. Pollutants from dense clusters of residential and commercial activities have impaired water quality in the middle and lower watershed. Tertiary effluent from several sewage treatment plants enters the river in its middle reaches. Reach 2 of the San Gabriel River (Firestone to Whittier Narrows Dam) is the closest of the San Gabriel River reaches to the Shared Passenger Track Alternatives footprint (Figure 5-2, sheet 2 of 4). Reach 2 is listed on the CWA 303(d) list of impaired waterbodies (Table 5-8) with three impairments: temperature, cyanide, and lead (SWRCB 2022). Segments of the San Gabriel River and its tributaries are listed as exceeding water quality objectives for copper, lead, selenium, and zinc (Hunter and Associates 2017). Metal loading to the San Gabriel River has the potential to cause impairments of the beneficial uses as defined in Table 5-4. Within the San Gabriel River and its tributaries, the metals and selenium TMDL found that the MS4 contributes a large percentage of the metals during dry weather because, although flows are typically low, concentrations of metals in urban runoff may be quite high. During wet weather, most of the loading is in particulate form and associated with wet-weather stormwater flow (Hunter and Associates 2017).

Within the RSA of the Santa Ana River Watershed, water quality has improved in recent years because of technological developments and water quality planning (Santa Ana Watershed Project Authority 2018). Most of the native fish of the watershed are adapted to clear, unpolluted water that can support food resources and provide the various habitat conditions necessary to complete their respective life cycles. The chronic effects on aquatic resources of nonlethal forms of pollution can decrease growth, inhibit reproduction, or impair movement (Santa Ana Watershed Project Authority 2018). Chronic elevated water temperatures or high sediment loads are examples of this type of pollution, even though toxic chemicals are not involved. Other examples include elevated but nontoxic levels of ammonia, increases in salinity, and low levels of dissolved oxygen (Santa Ana Watershed Project Authority 2018).

Channel reaches within the RSA ultimately flow to Anaheim Bay-Huntington Harbour. The 303(d) list identifies Anaheim Bay as an impaired water quality segment for dieldrin, nickel, polychlorinated biphenyls, and sediment toxicity. The 303(d) list identifies Huntington Harbour as an impaired water quality segment for chlordane, copper, lead, nickel, polychlorinated biphenyls, pathogens, and sediment toxicity.

5.4.2 Surface Water Beneficial Uses

The water quality of surface water features within the project section is regulated under Basin Plans. To protect these features, the Los Angeles and Santa Ana RWQCBs have established the beneficial uses supported by each feature. The RWQCBs have also established water quality objectives in the Basin Plans. Water quality objectives are levels of pollutants above or below which that pollutant would reasonably expect to impair a beneficial use. When beneficial uses are impaired by a pollutant that chronically exceeds its water quality objective, the RWQCBs place the waterbody and pollutant on the CWA Section 303(d) list of water quality impairments (refer to Section 5.4.4.1, Total Maximum Daily Loads of the Los Angeles River). Once a waterbody is placed on the 303(d) list, the RWQCBs must begin developing a TMDL program that provides a programmatic response to the impairment in order for the waterbody to meet the water quality objective and continue to support its beneficial uses.

The Los Angeles and Santa Ana Basin Plans designate beneficial uses for specific surface water and groundwater resources within the RSA, establish water quality objectives to protect those uses, and set forth policies to guide the implementation of programs to attain the objectives.

Table 5-4 provides the definitions for the beneficial uses applicable to the water resources within the RSA. Table 5-5 summarizes the beneficial uses of waterbodies in the surface water RSA.

Table 5-4 Applicable Beneficial Use Definitions

Beneficial Use	Definition
MUN	Municipal and domestic water supply – uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply.
IND	Industrial service supply – uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.
PROC	Industrial process supply – uses of water for industrial activities that depend primarily on water quality.
GWR	Groundwater recharge – uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
WARM	Warm freshwater habitat – uses of water that support warmwater ecosystems, including, but not limited to, preservation of enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
WILD	Wildlife habitat – uses of water that support terrestrial ecosystems, including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
WET	Wetland habitat – uses of water that support wetland ecosystems, including, but not limited to, preservation or enhancement of wetland habitats, vegetation, fish, shellfish, or wildlife, and unique wetlands functions that enhance water quality, such as providing flood and erosion control, streambank stabilization, and filtration and purification of naturally occurring contaminants.
RARE	Rare, threatened, or endangered species – uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.
REC-1	Water contact recreation – uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
REC-2	Noncontact water recreation – uses of water for recreational activities involving proximity to water but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Source: Los Angeles RWQCB 2024

Table 5-5 Beneficial Uses of Potentially Affected Waterbodies

Potentially Affected Waterbody	MUN[1]	IND	PROC	GWR	WARM	WILD	RARE	WET[2]	REC-1	REC-2
Los Angeles River (Reach 3)[3]	P*	P	--	E	E	E	--	E	E	E[4]

Potentially Affected Waterbody	MUN[1]	IND	PROC	GWR	WARM	WILD	RARE	WET[2]	REC-1	REC-2
Los Angeles River (Reach 2)[5]	P*	P	--	E	E	P	--	--	E[4]	E
Rio Hondo (Reach 2)[6]	P*	--	--	I	P	I	--	--	I[4]	E
Rio Hondo (Reach 1)[7]	P*	--	--	I	P	I	--	--	P[4]	E
San Gabriel River (Reach 2)[8]	P*	P	P	I	I	E	E	--	E[4]	E
North Fork Coyote Creek[9]	P*	P	P	--	P	P	E	--	P[4]	I
La Mirada Creek[9]	P*	P	P	--	P	P	E	--	P[4]	I
Coyote Creek	P*	P	P	--	P	P	E	--	P[4]	I
Brea Creek[9]	P*	P	P	--	P	P	E	--	P[4]	I
Fullerton Creek[9]	P*	P	P	--	P	P	E	--	P[4]	I
Carbon Creek	E/P	E/P	--	--	E/P	E/P	E/P	--	E/P	E/P

Source: Los Angeles RWQCB 2024

[1] The MUN designations are designated under State Water Resources Control Board Resolution No. 88-63 and Los Angeles Regional Water Quality Control Board Resolution No. 89-03, some of which may be considered for exemption at a later date.

[2] May have wetlands habitat associated with only a portion of the waterbody

[3] Los Angeles River (Reach 3) extends from Riverside Drive (upstream) to Figueroa Street (downstream)

[4] Access prohibited by Los Angeles County Flood Control District in the concrete channelized areas

[5] Los Angeles River (Reach 2) extends from Figueroa Street (upstream) to Carson Street (downstream)

[6] Rio Hondo (Reach 2) extends from the Whittier Narrows Dam (upstream) to the Santa Ana Freeway (downstream)

[7] Rio Hondo (Reach 1) extends from the Santa Ana Freeway (upstream) to the Los Angeles River (downstream)

[8] San Gabriel River (Reach 2) extends from Whittier Narrows Dam (upstream) to Firestone Boulevard (downstream)

[9] Beneficial uses not identified in the Basin Plan; therefore, downstream beneficial uses are identified

* Asterisked MUN designations are designated under Senate Bill 88-63 and Resolution Number 89-03, some of which may be considered for exemption at a later date

E = Existing beneficial use; GWR = groundwater recharge; I = Intermittent beneficial use; IND = industrial service supply; MUN = municipal and domestic water supply; P = Potential beneficial use; PROC = industrial process supply; RARE = rare, threatened, or endangered species; REC-1 = water contact recreation; REC-2 = noncontact water recreation; WARM = warm freshwater habitat; WET = wetland habitat; WILD = wildlife habitat

5.4.3 Surface Water Quality Objectives

Surface water quality objectives for inland waters in the Los Angeles region, as documented in the Los Angeles RWQCB Basin Plan, are listed in Table 5-6.

Table 5-6 Surface Water Quality Objectives for Inland Surface Waters for Los Angeles Region

Constituent	Basin Plan Objectives
Ammonia	Shall not be present at levels that when oxidized to nitrate pose a threat to groundwater. Numerical ammonia concentrations for inland surface waters are contained in Table 3-1 through 3-4 of the Los Angeles RWQCB Basin Plan.
Bacterial, Coliform	**REC-1 (fresh waters):** E. coli density geometric mean shall not exceed 126/100 ml. E. coli density in a single sample shall not exceed 235/100 ml. **REC-2 (and not designated REC-1):** Fecal coliform concentration shall not exceed a log mean of 2,000/100 ml (based on a minimum of not less than four samples for any 30-day period), nor shall more than 10% of samples collected during any 30-day period exceed 4,000/100 ml.
Bioaccumulation	Toxic pollutants shall not be present at levels that will bioaccumulate in aquatic life to levels that are harmful to aquatic life or human health.
Biological Oxygen Demand	Waters shall be free of substances that result in increases in the BOD, which adversely affect beneficial uses.
Biostimulatory Substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.
Chemical Constituents	Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use. Waters designated MUN shall not contain concentrations of chemical constituents in excess of the limits specified in Cal. Code Regs. Title 22 and incorporated by reference into Tables 3-8 and 3-9 of the Los Angeles RWQCB Basin Plan.
Chlorine, Total Residual	Chlorine residual shall not be present in surface water discharges at concentrations that exceed 0.1 mg/L and shall not persist in receiving waters at any concentration that causes impairment of beneficial uses.
Color	Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.
Exotic Vegetation	Exotic vegetation shall not be introduced around stream courses to the extent that such growth causes nuisance or adversely affects beneficial uses.
Floating Material	Waters shall not contain floating materials, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
MBAS	Waters shall not have MBAS concentrations greater than 0.5 mg/L in waters designated MUN.
Mineral Quality	Numerical mineral quality objectives for individual inland surface waters are contained in Table 3-10 of the Los Angeles RWQCB Basin Plan.
Nitrogen (Nitrate, Nitrite)	Waters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen, 45 mg/L as nitrate, 10 mg/L as nitrate-nitrogen, or 1 mg/L as nitrite-nitrogen or as otherwise designated in Table 3-10 of the Los Angeles RWQCB Basin Plan.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water that cause nuisance or adversely affect beneficial uses.

Constituent	Basin Plan Objectives
Oxygen, Dissolved	The mean annual dissolved oxygen concentration of all waters shall be greater than 7 mg/L, and no single determination shall be less than 5 mg/L, except when natural conditions cause lesser concentrations. The dissolved oxygen content of all surface waters designated WARM shall not be depressed below 5 mg/L.
Pesticides	No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life. Waters designated MUN shall not contain concentration of pesticides in excess of the limiting concentrations specified in Table 64444-A of Cal. Code Regs. Title 22, Section 64444, which is incorporated by reference into the Los Angeles RWQCB Basin Plan.
pH	Inland water shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.5 unit from natural conditions as a result of waste discharge.
PCBs	Pass-through or uncontrollable discharges to waters, or at locations where the waste can subsequently reach waters, are limited to 70 pg/L (30-day average) for protection of human health and 14 ng/L (daily average) to protect aquatic life in inland fresh waters.
Radioactive Substances	Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. Waters designated MUN shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Cal. Code Regs. Title 22, Section 64443, which is incorporated by reference into Table 3-9 of the Los Angeles RWQCB Basin Plan.
Solid, Suspended, or Settleable Materials	Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.
Tastes and Odors	Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible aquatic resources, cause nuisance, or adversely affect beneficial uses.
Temperature	The natural receiving water temperature of all waters shall not be altered unless it can be demonstrated that such alteration in temperature does not adversely affect beneficial uses. For waters designated WARM, water temperature shall not be altered by more than 5°F above the natural temperature, and shall not exceed 80°F as a result of waste discharges.
Toxicity	All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in, human, plant, animal, or aquatic life.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in natural turbidity attributable to controllable water quality factors shall not exceed the following limits: • Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20%. • Where natural turbidity is greater than 50 NTU, increases shall not exceed 10%.

Source: Los Angeles RWQCB 2024
°F = degrees Fahrenheit; BOD = Biological Oxygen Demand; Cal. Code Regs. = California Code of Regulations; MBAS = Methylene Blue Activated Substances ; mg/L = milligrams per liter; ml = milliliters; MUN = municipal and domestic supply; ng/L = nanograms per liter; NTU = Nephelometric Turbidity Units; PCBs = polychlorinated biphenyls; pg/L = picograms per liter; pH = percentage of hydrogen; REC-1 = water contact recreation; REC-2 = noncontact water recreation; RWQCB = Regional Water Quality Control Board; WARM = warm freshwater habitat

Surface water quality objectives for inland waters in the Orange County region, as documented in the Santa Ana RWQCB Basin Plan, are listed in Table 5-7.

Table 5-7 Surface Water Quality Objectives for Inland Surface Waters for the Orange County Region

Constituent	Basin Plan Objectives
Algae	Waste discharges shall not contribute to excessive algal growth in inland surface receiving waters.
Boron	Boron concentrations shall not exceed 0.75 mg/L in inland surface waters of the region as a result of controllable water quality factors.
Chemical Oxygen Demand	Waste discharges shall not result in increases in COD levels in inland surface waters that exceed the values presented in Table 4-1 of the Santa Ana Basin Plan or adversely affect beneficial uses.
Chloride	The chloride objectives listed in Table 4-1 of the Santa Ana Basin Plan shall not be exceeded as a result of controllable water quality factors.
Chlorine, Residual	To protect aquatic life, the chlorine residual in wastewater discharged to inland surface waters shall not exceed 0.1 mg/L.
Color	Waste discharges shall not result in coloration of the receiving waters that causes a nuisance or adversely affect beneficial uses. The natural color of fish, shellfish, or other inland surface water resources used for human consumption shall not be impaired.
Dissolved Solids, Total (Total Filtrable Residue)	The dissolved mineral content of the waters of the region, as measured by the total dissolved solids test ("Standard Methods for the Examination of Water and Wastewater, 16th ed.," 1985:209B (180˚C), p. 95), shall not exceed the specific objectives listed in Table 4-1 of the Santa Ana Basin Plan as a result of controllable water quality factors.
Floatables	Waste discharges shall not contain floating materials, including solids, liquids, foam or scum, which cause a nuisance or adversely affect beneficial uses.
Fluoride	Fluoride concentrations shall not exceed values specified in the Santa Ana Basin Plan in inland surface waters designated MUN as a result of controllable water quality factors.
Hardness (as $CaCO_3$)	The objectives listed in Table 4-1 of the Santa Ana Basin Plan shall not be exceeded as a result of controllable water quality factors. If no hardness objective is listed in Table 4-1, the hardness of receiving waters used for municipal supply (MUN) shall not be increased as a result of waste discharges to levels that adversely affect beneficial uses.
MBAS	MBAS concentrations shall not exceed 0.05 mg/L I inland surface waters designated MUN as a result of controllable water quality factors.
Nitrate	Nitrate-nitrogen concentrations shall not exceed 45 mg/L (as NO_3) or 10 mg/L (as N) in inland surface waters designated MUN as a result of controllable water quality factors.
Nitrogen, Total Inorganic	The objectives listed in Table 4-1 of the Santa Ana Basin Plan shall not be exceeded as a result of controllable water quality factors.
Oil and Grease	Waste discharges shall not result in deposition of oil, grease, wax, or other material in concentrations that result in a visible film or in coating objects in the water, or cause a nuisance or adversely affect beneficial uses.
Oxygen, Dissolved	The dissolved oxygen content of surface waters shall not be depressed below 5 mg/L for waters designated WARM, or 6 mg/L for waters designated COLD, as a result of controllable water quality factors. In addition, waste discharges shall not cause the median dissolved oxygen concentration to fall below 85% of saturation or the 95th percentile concentration or fall below 75% of saturation within a 30-day period.

Constituent	Basin Plan Objectives
Pathogen Indicator Bacteria	Waste discharges shall not cause or contribute to excessive risk of illness from microorganisms pathogenic to human beings. Pathogen indicator concentrations shall not exceed the values specified in Table 4-1 of the Santa Ana Basin Plan as a result of controllable water quality factors, unless it is demonstrated to the Regional Board's satisfaction that the elevated indicator concentrations do not result in excessive risk of illness among people recreating in or near the water.
pH	The pH of inland surface waters shall not be raised above 8.5 or depressed below 6.5 as a result of controllable water quality factors.
Radioactivity	Radioactivity materials shall not be present in the waters of the region in concentrations that are deleterious to human, plant or animal life. Waters designated MUN shall meet the limits specified in the Cal. Code of Regs. Title 22.
Sodium	The sodium objectives listed in Table 4-1 of the Santa Ana Basin Plan shall not be exceeded as a result of controllable water quality factors.
Solids, Suspended and Settleable	Inland surface waters shall not contain suspended or settleable solids in amounts that cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors.
Sulfate	The objectives listed in Table 4-1 of the Santa Ana Basin Plan shall not be exceeded as a result of controllable water quality factors.
Sulfides	The dissolved sulfide content of inland surface waters shall not be increased as a result of controllable water quality factors.
Surfactants (surface-active agents)	Waste discharges shall not contain concentrations of surfactants that result in foam in the course of flow or use of the receiving water, or adversely affect aquatic life.
Taste and Odor	The inland surface waters of the region shall not contain, as a result of controllable water quality factors, taste- or odor-producing substances at concentrations that cause a nuisance or adversely affect beneficial uses. The natural taste and odor of fish, shellfish, or other regional inland surface water resources used for human consumption shall not be impaired.
Temperature	The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the RWQCB that such alteration in temperature does not adversely affect beneficial uses. The temperature of waters designated COLD shall not be increased by more than 5˚F as a result of controllable water quality factors. The temperature of waters designated WARM shall not be raised above 90˚F June through October or above 78˚F during the rest of the year as a result of controllable water quality factors. Lake temperatures shall not be raised more than 4˚F above established normal values as a result of controllable water quality factors.
Toxic Substances	Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels that are harmful to human health. The concentrations of contaminants in waters that are existing or potential sources of drinking water shall not occur at levels that are harmful to human health. The concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.

Constituent	Basin Plan Objectives
Turbidity	All inland surface waters of the region shall be free of changes in turbidity that adversely affect beneficial uses. Increases in natural turbidity attributable to controllable water quality factors shall not exceed the following limits: • Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20%. • Where natural turbidity is between 50 and 100 NTU, increases shall not exceed 10%. • Where natural turbidity is greater than 100 NTU, increases shall not exceed 10%.

Source: Santa Ana RWQCB 2019
°C = degrees Celsius; °F = degrees Fahrenheit; $CaCO_3$ = calcium carbonate; Cal. Code Regs. = California Code of Regulations; COD = Chemical Oxygen Demand; COLD = Cold Freshwater Habitat; MBAS = Methylene Blue Activated Substances; mg/L = milligrams per liter; ml = milliliters; MUN = municipal and domestic supply; ng/L = nanograms per liter; NO_3 = nitrate ion; NTU = Nephelometric Turbidity Units; pg/L = picograms per liter; pH = percentage of hydrogen; RWQCB = Regional Water Quality Control Board; WARM = warm freshwater habitat

5.4.4 Water Quality Impairments

The SWRCB developed a list of waterbodies (known as 303(d) water-quality-limited waterbodies) that are impaired and do not meet water quality objectives. CWA Section 303(d) specifies the requirements for listing impaired waterbodies. The SWRCB develops TMDLs for constituents on the list over several years to restore the quality of the waterbody. A few of the waterbodies within the RSA are on the Section 303(d) list and require TMDL limits (SWRCB 2022) (Table 5-8).

Table 5-8 Section 303(d) List of Impaired Waters within the Direct Resource Study Area

Waterbody[1]	Impairment	Sources of Impairment	TMDL Date[2] (Expected or Actual)
2020–2022 Integrated Report 303(d) Listings			
Los Angeles River (Reaches 2 and 3)	Ammonia	Nonpoint/point source	3/18/2004
	Indicator bacteria	Source unknown	3/23/2012
	Copper	Source unknown	12/22/2005
	Lead	Nonpoint/point source	12/22/2005
	Nutrients (algae)	Nonpoint/point source	3/18/2004
	Oil	Natural sources	2019
	Trash	Nonpoint source/surface runoff/ urban runoff/storm sewers	7/24/2008
Rio Hondo (Reach 2)	Cyanide	Source unknown	2021
	Coliform bacteria	Source unknown	3/23/2012
Rio Hondo (Reach 1)	Indicator bacteria	Source unknown	3/23/2012
	Copper	Nonpoint/point source	12/22/2005
	Lead	Nonpoint/point source	12/22/2005
	Toxicity	Source unknown	2021
	Trash	Nonpoint/urban runoff/storm sewers	7/24/2008 12/22/2005
	Zinc	Nonpoint/point sources	2004
	pH	Nonpoint/point sources	3/18/2004
San Gabriel River (Reach 2)	Temperature	Source unknown	2027
	Cyanide	Source unknown	2021
	Lead	Nonpoint/point source	3/27/2007

Waterbody[1]	Impairment	Sources of Impairment	TMDL Date[2] (Expected or Actual)
North Fork Coyote Creek	Indicator bacteria	Source unknown	6/14/2016
	Selenium	Source unknown	2021
Coyote Creek	Dissolved copper	Source unknown	3/27/2007
	Indicator bacteria	Source unknown	6/14/2016
	Iron	Source unknown	2027
	Malathion	Source unknown	2027
	pH	Source unknown	2019
	Toxicity	Source unknown	2008

Source: SWRCB 2022
[1] Waterbodies are labeled on Figure 5-2, sheets 1 through 4.
[2] Date listed in the SWRCB 303(d) list. Dates relate to the TMDL requirement status. For additional details refer to the 303(d) list: https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html.
TMDL = total maximum daily load

Currently, five waterbodies are impaired—meaning these waters do not meet water quality standards for one or more constituents. TMDLs identified for the Los Angeles River also apply to its tributaries, including Rio Hondo, because the tributary is named in the TMDLs. TMDLs identified for San Gabriel River may also apply to its tributaries (and their tributaries) if they cause or contribute to the impairment, including North Fork Coyote Creek, La Mirada Creek, Coyote Creek, Brea Creek, Fullerton Creek, and Carbon Creek.

5.4.4.1 Total Maximum Daily Loads of the Los Angeles River

The TMDLs described below have been approved and are being implemented for the Los Angeles River and Rio Hondo.

Trash Total Maximum Daily Load

A trash TMDL per Resolution No. 2001-013 became effective August 28, 2002, and was approved by the Los Angeles RWQCB, SWRCB, the Office of Administrative Law, and USEPA. The City and County of Los Angeles filed petitions and complaints challenging the trash TMDL. In addition, 22 other cities sued the Los Angeles RWQCB and the SWRCB to set aside the TMDL. On June 8, 2006, the Los Angeles RWQCB set aside the trash TMDL per Resolution No. 2006-013. On August 9, 2007, the Los Angeles RWQCB adopted Resolution No R07-0012, an amendment to the Basin Plan establishing a trash TMDL for the Los Angeles River Watershed. The trash TMDL was subsequently approved by the SWRCB, Office of Administrative Law, and USEPA and became effective on September 23, 2008. Stormwater discharges from nonpoint sources (e.g., direct deposition of trash by people or wind) are the major sources of trash in the watershed. A numeric target of zero trash in waterbodies was established by the trash TMDL.

The Los Angeles RWQCB approved a revision to this TMDL on June 11, 2015, through Resolution No. R15-006. Resolution No. R15-006 has subsequently been approved by the SWRCB and Office of Administrative Law and is awaiting approval by USEPA. Revisions include changes to ensure consistency between the Los Angeles River and Ballona Creek trash TMDLs, to provide clarity regarding compliance demonstration, and to improve compliance monitoring and ensure receiving water monitoring.

Metals Total Maximum Daily Load

The Los Angeles River and tributaries metals TMDL became effective on January 11, 2006. Targeted pollutants are total copper, lead, zinc, cadmium, and selenium; however, only copper and lead were on the 303(d) list. On September 6, 2007, the RWQCB readopted the TMDL by Resolution No. 2007-014 in compliance with a writ of mandate issued by the Los Angeles County Superior Court. The readopted TMDL became effective on October 29, 2008, and replaced the previous implementation deadlines with specific dates. On November 3, 2011, an amendment to

revise the TMDL to adjust the numeric target for certain reaches and the corresponding waste load allocations for the publicly owned treatment works based on the 2008 water-effect ration study per Resolution No. 2010-003 became effective. Resolution No. R15-004 was approved by the RWQCB on April 9, 2015. This resolution was adopted by SWRCB on November 17, 2015. The amendment would review the water quality objectives for copper and recalculate the lead acute and chronic water quality objectives.

The water quality targets are expressed in terms of total recoverable metals and are separated for dry and wet weather because hardness values and flow conditions in the Los Angeles River and tributaries differ between dry and wet weather. The regulatory mechanisms used to implement the TMDL would include the Los Angeles MS4 permit, the City of Long Beach MS4 permit, the Caltrans stormwater permit, major NPDES permits, minor NPDES permits, general NPDES permits, general industrial stormwater NPDES permits, and general construction stormwater NPDES permits.

Nutrients Total Maximum Daily Load

The Los Angeles River Nitrogen Compounds and Related Effects TMDL became effective March 23, 2004, per Resolution No. 2003-009. A revision to the amendment to revise interim ammonia effluent limits contained in a TMDL for nitrogen compounds per Resolution No. 2003-016 became effective on September 27, 2004. On December 6, 2012, the Los Angeles RWQCB adopted Resolution No. R12-010, an amendment to the Basin Plan, to revise the TMDL for Nitrogen Compounds and Related Effects in the Los Angeles River Watershed. The Los Angeles RWQCB's goal in amending the TMDL to incorporate site-specific objectives for select reaches and tributaries of the Los Angeles River Watershed was to take into account site-specific conditions in the Los Angeles River that affect the toxicity of ammonia to aquatic life while maintaining protection. The SWRCB approved the amendment on June 4, 2013; the Office of Administrative Law approved the amendment on June 9, 2014; and USEPA approved the amendment August 7, 2014.

Numeric targets to address narrative objectives required to protect warm freshwater and wildlife habitats are intended to implement the narrative objectives and may be revised based on the results of monitoring and studies conducted pursuant to the Implementation Plan. The Implementation Plan includes upgrades to the water reclamation plants discharging to the Los Angeles River for removal of ammonia, nitrate, and nitrite. The Implementation Plan also includes additional studies to evaluate the effectiveness of nitrogen reductions on related effects such as algae growth, odors, and scum. Ammonia and nitrate reductions would be regulated through the effluent limits prescribed in NPDES permits.

Indicator Bacteria Total Maximum Daily Load

On July 9, 2010, the Los Angeles RWQCB adopted Resolution No. R10-007 amending the Basin Plan to incorporate a TMDL for indicator bacteria in the Los Angeles River Watershed. The TMDL for indicator bacteria became effective on March 23, 2012. The TMDL has a multipart numeric target based on the bacteriological water quality objectives for freshwater to protect the water contact recreation use. The Basin Plan objectives and these targets are based on an acceptable health risk for fresh recreational waters of eight illnesses per 1,000 exposed individuals as recommended by USEPA. The regulatory mechanisms used to implement the TMDL would include general NPDES permits, individual NPDES permits, MS4 permits covering jurisdictions within the Los Angeles River Watershed, the Statewide Industrial Stormwater General Permit, the Statewide Construction Activity Stormwater General Permit, the Statewide Stormwater Permit for Caltrans Activities, and the authority contained in Sections 13263 and 13267 of the California Water Code. For each discharger assigned a waste load allocation, the appropriate RWQCB order shall be reopened or amended when the order is reissued, in accordance with applicable laws, to incorporate the applicable waste load allocation as a permit requirement.

5.4.4.2 Total Maximum Daily Loads of the San Gabriel River

The TMDLs below apply to the San Gabriel River and Coyote Creek.

Metals and Selenium Total Maximum Daily Load

The Los Angeles RWQCB found that metals loads in the San Gabriel River Watershed, including Coyote Creek, may be harmful to aquatic life and may impair the water supply. Analysis of storm samples collected by the Los Angeles County Department of Public Works indicated too many exceedances of the copper, lead, and zinc chronic criteria from the California Toxics Rule. Consequently, on July 13, 2006, the Los Angeles RWQCB adopted Resolution No. R06-014 amending the Basin Plan to incorporate a TMDL for metals and selenium in the San Gabriel River and impaired tributaries. The Basin Plan amendment specifies numeric targets for metals and selenium and include wet-weather and dry-weather water quality targets for copper, lead, zinc, and selenium. The Basin Plan amendment establishes wasteload allocations for point source discharges and load allocations for nonpoint source discharges of metals and selenium. However, the Los Angeles RWQCB has no jurisdiction over the Orange County portion of the Coyote Creek Watershed. TMDL provisions in north Orange County Watersheds are enforced by the Orange County Stormwater NPDES Permit issued by the Santa Ana RWQCB. Although the Santa Ana RWQCB has not adopted TMDLs for Coyote Creek, it deferred to the Los Angeles RWQCB and incorporated requirements in the stormwater permit to comply with TMDLs established for Coyote Creek by the Los Angeles RWQCB, including development of a source control plan and monitoring program for copper, lead, and zinc.

5.4.4.3 Indicator Bacteria Total Maximum Daily Load

On June 10, 2015, the Los Angeles RWQCB adopted Resolution No. R15-005, amending the Basin Plan to incorporate a TMDL for indicator bacteria in the San Gabriel River and Coyote Creek. The TMDL for indicator bacteria became effective on June 14, 2016. The Los Angeles RWQCB's goal in establishing the TMDL for indicator bacteria in the San Gabriel River, estuary, and tributaries is to protect beneficial uses in the San Gabriel River watershed related to contact water recreation (REC-1) and noncontact water recreation (REC-2). The San Gabriel River bacteria TMDL has a multi-part numeric target, based on the bacteriological water quality objectives for marine and fresh waters, to protect the REC-1 beneficial use. Both single-sample and geometric-mean limits apply.

5.4.5 Geology, Soils, and Erosion

5.4.5.1 Geology

As discussed in the *Los Angeles to Anaheim Project Section Paleontological Resources Technical Report* (Authority 2025f), the direct RSA is in the Peninsular Ranges Geomorphic Province. The Peninsular Ranges Geomorphic Province extends over 870 miles, from just south of the San Gabriel and Santa Monica Mountains to Mexico where it forms the Baja California peninsula. To the west, the province extends offshore to the continental margin, and the eastern boundary is the west side of the Salton Trough. The Peninsular Ranges Province consists of Mesozoic to Paleozoic plutonic and metamorphic rocks overlain by younger sedimentary geologic units (Hadley and Combs 1974). The province is characterized by a series of northwest-trending mountain ranges and associated valleys. Extensive, active tectonics and seismicity within the province have created the northwest-trending fabric evident throughout the province (Hill 1928; Fenneman 1931; Reed 1933; Jahns 1954a, 1954b, Hinds 1952; Hadley and Combs 1974).

5.4.5.2 Soils

According to the *Los Angeles to Anaheim Project Section Geology, Soils, and Seismicity Technical Report* (Authority 2025c), the soils along the project section in Los Angeles County have formed on Pleistocene to Holocene sedimentary deposits, including alluvial fans, fan remnants, alluvial plains, floodplains, and coastal plains. According to U.S. Natural Resources Conservation Service data, soil horizons along the project section include fine sand, fine sandy loam, loamy sand, loam, silt loam, and clay loam. In addition to the soil horizons summarized above, horizons of stratified sand, very cobbly sand, and gravelly sand have been identified in river channel areas. The soils along the project section in Orange County have formed on Pleistocene to Holocene sedimentary deposits associated with alluvial processes. The typical soil

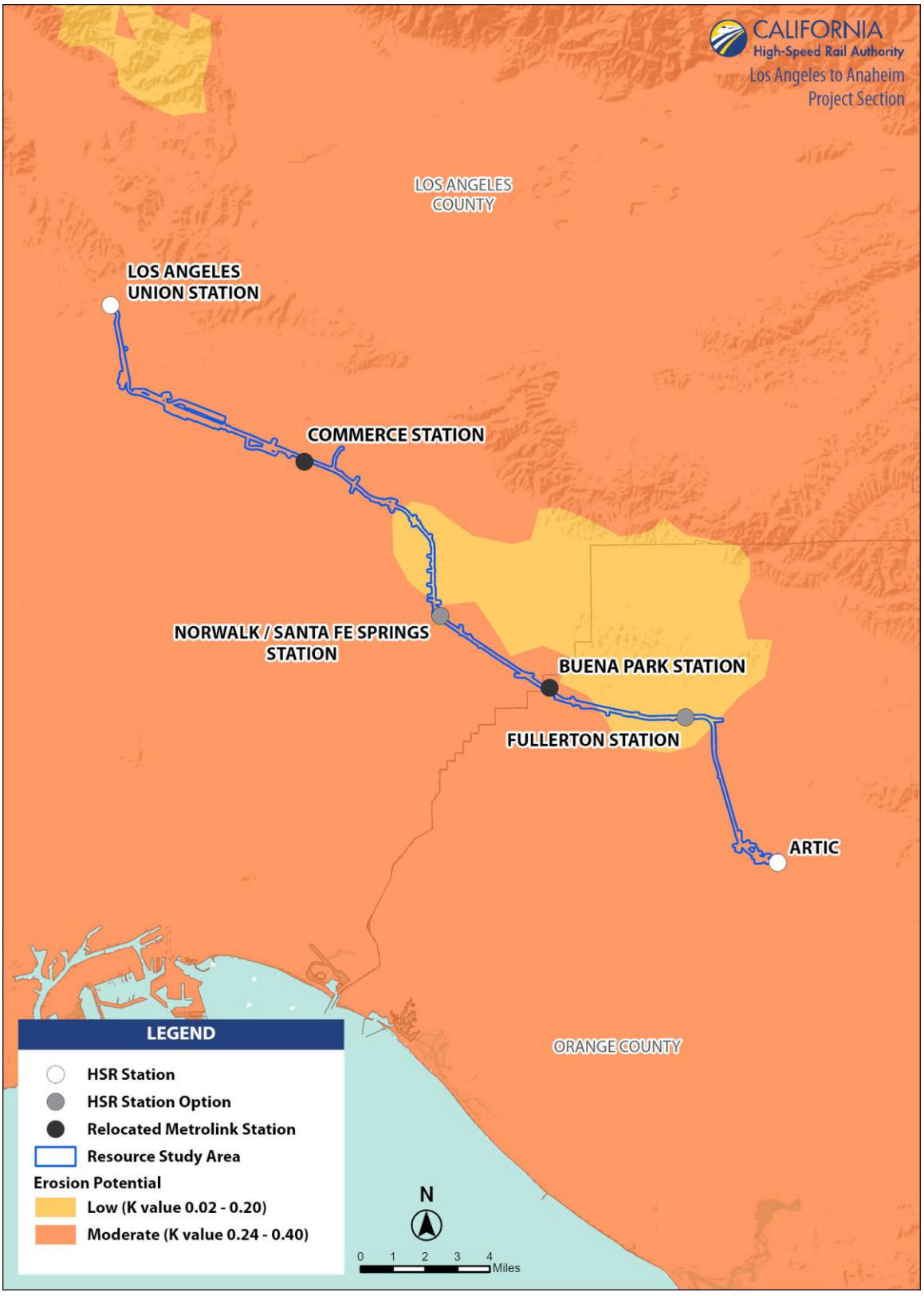
associations include fine sandy loam, loamy sand, silt loam, sandy clay loam, and silty, clay loam. In addition, stratified coarse sand to sandy loam has been identified in river channel areas (Authority 2025c).

5.4.5.3 Erosion

Erosion and sediment are major contributing factors to water quality degradation associated with construction activities that result in soil disturbances. In general, sediment is transported by water as either a suspended load or a bedload. Finer particles, such as silt, are easily suspended by water and are typically transported as a particle suspended in the water column; suspended particles increase turbidity by decreasing the amount of light that penetrates through the water column. Larger erodible particles, such as sand, are often transported as a bedload where the channel substrate slowly moves downslope without becoming suspended. As sediment is transported from steeper terrain into the flatter valley or basin areas, flow velocities slow and sediment is deposited in the channel. Over time, this may cause floodwaters to overtop the channel banks because of reduced conveyance capacity. Additionally, impervious surfaces associated with urban and suburban development can result in hydromodification where increased runoff volumes and velocities erode and scour natural stream channels.

Depending on type, some soils are susceptible to erosion or expansive behavior, while others are more suitable for construction. Erosion is a major contributing factor to the degradation of surface water quality in areas with a combination of erosive soil types and steep slopes. Certain soil types demonstrate a higher potential for erosion by rainfall and runoff than other soil types. This is expressed in the Revised Universal Soil Loss Equation by a factor designated as “K,” the soil erodibility factor. Figure 5-1 illustrates relative soil erodibility factors throughout the direct and indirect RSAs. K is defined as a function of texture, organic matter content and cover, structure size class, and subsoil-saturated hydraulic conductivity. Fine-textured soils, which are high in clay, express low erodibility (K values between 0.02 and 0.2) because the strong adherence between individual particles reduces their ability to detach. Coarse-textured soils also have low erodibility because their ability to rapidly infiltrate water reduces surface runoff rates. Medium-textured soils, such as silt loams, have a moderate potential for erosion (K values between 0.25 and 0.40) because they are susceptible to detachment and produce moderate runoff. Soils with a high silt content have the highest potential for erosion (K values greater than 0.4) because they easily detach, tend to crust, and produce large amounts and rates of runoff.

Most of the direct RSA in both Los Angeles and Orange Counties is in areas with moderate susceptibility to erosion, with a few areas of low susceptibility. Additional information regarding geology, soil type, and erosion can be found in the *Geology, Soils, and Seismicity Technical Report* for the project section (Authority 2025c).



Sources: U.S. Department of Agriculture Natural Resources Conservation Service 2016; ESRI 2024

Figure 5-1 Soils K Factor (Erodibility)

5.5 Groundwater

The RSA overlays two groundwater basins: the Coastal Plain of the Los Angeles Groundwater Basin, Central Subbasin, and the Coastal Plain of the Orange County Groundwater Basin, Main Subbasin (Figure 4-2). Table 5-9 identifies the groundwater subbasins crossed by the project section. The RSA does not overlay a sole-source aquifer.

Table 5-9 Groundwater Subbasins Crossed by the Los Angeles to Anaheim Project Section

Groundwater Subbasin (name)	Groundwater Basin (name)	Total Groundwater Subbasin Area (acres)[1]	Groundwater Storage (AF)[1]	Typical Well Depths (feet)[1]	Designated Sole-Source Aquifer[2]
Central	Coastal Plain of the Los Angeles Groundwater Basin 4-11.04	177,000	13,800,000	98 to 1,680	No
Main	Coastal Plain of the Orange County Groundwater Basin 8-1	224,000	66,000,000	270 to 540	No

Sources: Calculated using ESRI ArcGIS; DWR 2004a, 2004b; USGS 2012b
[1] Basin areas, storage, and well depths are from Bulletin 118 (DWR 2004a, 2004b) and USGS 2012b.
[2] The U.S. Environmental Protection Agency defines a sole- or principal-source aquifer as an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas may have no alternative drinking water source(s) that could physically, legally, and economically supply those who depend on the aquifer for drinking water. For convenience, designated sole- or principal-source aquifers are referred to as "sole-source aquifers."
AF = acre-feet

5.5.1 Coastal Plain of the Los Angeles Groundwater Basin

The Coastal Plain of the Los Angeles Groundwater Basin consists of the Santa Monica, Hollywood, La Habra, West Coast, and Central Subbasins (DWR 2004a; County of Los Angeles Department of Public Works 2016c). The basins are bounded in part by faults, including the Newport-Inglewood fault zone, and filled with Holocene-, Pleistocene-, and Pliocene-age marine and alluvial sediments (USGS 2012a). The Central and West Coast Basins are the two largest basins in the group. Two million residents of the Coastal Plain depend on groundwater that is protected by the barrier facilities for approximately 35 percent of their potable supply (County of Los Angeles Department of Public Works 2016c). The RSA overlays the Central Subbasin.

5.5.1.1 Central Subbasin

The Central Subbasin, commonly referred to as the Central Basin, occupies a large portion of the southeastern part of the Coastal Plain of the Los Angeles Groundwater Basin (DWR 2004a). This subbasin is bounded on the north by a surface divide called the La Brea High and on the northeast and east by emergent, less permeable tertiary rocks of the Elysian, Repetto, Merced, and Puente Hills. The southeastern boundary between the Central Basin and Coastal Plain of the Orange County Groundwater Basin roughly follows Coyote Creek, which is a regional drainage province boundary. The southwestern boundary is formed by the Newport-Inglewood fault system and the associated folded rocks of the Newport-Inglewood uplift. The Los Angeles and San Gabriel Rivers drain inland basins and pass across the surface of the Central Basin on their way to the Pacific Ocean. The Central Basin is divided into forebay and pressure areas. The Los Angeles forebay and the Montebello forebay have unconfined groundwater conditions and relatively interconnected aquifers that extend up to 1,600 feet deep to provide recharge to the aquifer system of this subbasin. The Whittier area contains up to 1,000 feet of freshwater-bearing sediments. The Central Basin pressure area is the largest of the four divisions, and contains many aquifers of permeable sands and gravels separated by semipermeable to impermeable sandy clay to clay, that extend to about 2,200 feet below the surface. Groundwater enters the Central Basin through surface and subsurface flow and by direct percolation of precipitation,

streamflow, and applied water and replenishes the aquifers in the forebay areas where permeable sediments are exposed at ground surface. Natural replenishment of the subbasin's groundwater supply is largely from surface inflow through Whittier Narrows and some underflow from the San Gabriel Valley. Percolation into the Los Angeles forebay area is restricted because of paving and development of the surface of the forebay. Imported water purchased from Metropolitan and recycled water from the Whittier and San José treatment plants is used for artificial recharge in the Montebello forebay at the Rio Hondo and San Gabriel River spreading grounds.

The Central Basin was adjudicated in 1965 and has been managed by the Central Basin Watermaster since June 30, 2014, when the DWR retired as the Watermaster.

5.5.1.2 Groundwater Recharge

Groundwater recharge areas are those areas that replenish groundwater that is stored in a groundwater basin or aquifer. Natural groundwater recharge areas occur without human interference or assistance. Artificial, intentional, or managed groundwater recharge areas can take place where natural recharge occurs or within structures (i.e., recharge basins, spreading basins, or replenishment basins or areas) built for increasing recharge by increasing the rate of infiltration or percolation of surface water into the subsurface. The Los Angeles County Department of Public Works maintains spreading grounds throughout the county to percolate water into groundwater basins for later pumping. These spreading grounds are adjacent to river channels and in soft-bottom (i.e., not concrete) channels where underlying soils are permeable and in hydraulic connection with the underlying aquifer. The Shared Passenger Track Alternatives alignment would cross the Rio Hondo near the existing spreading grounds in Pico Rivera between the Montebello-Pico Rivera city boundary and Paramount Boulevard.

5.5.1.3 Existing Groundwater Quality

Total dissolved solids (TDS) content in the Central Basin ranges from 200 to 2,500 milligrams per liter (mg/L), according to data from 293 public supply wells. The average for these 293 wells is 453 mg/L (DWR 2004a). Groundwater in the Central Basin is degraded by both organic and inorganic pollutants from a variety of sources, such as leaking tanks, leaking sewer lines, and illegal discharges. The quality of the deeper groundwater is threatened by migration of pollutants from the upper aquifers (Los Angeles RWQCB 2024).

5.5.1.4 Existing Groundwater Levels

Water levels in the Central Basin vary but were approximately 25 feet below ground surface between 1961 and 1977. Levels have fluctuated by 5 to 10 feet since 1996 (DWR 2004a).

Based on subsurface data from prior geotechnical investigations and published literature, groundwater depths along the alignment could range from the ground surface adjacent to rivers, percolation basins, and drainages to depths of greater than 100 feet below ground surface. The historical high groundwater along the project section is depicted on Figure 5-5 in the *Geology, Soils, and Seismicity Technical Report* (Authority 2025c). The maps were created by stitching together the groundwater contour maps created by the California Geological Survey for the Los Angeles, South Gate, Whittier, La Habra, Orange, and Anaheim 7.5-minute quadrangles. The shallowest depths are in Norwalk and Santa Fe Springs, and the deeper levels are near the intersection of I-10 and I-5. Historically, groundwater depths have been as shallow as 10 feet below ground surface along portions of the project section, including areas adjacent to the Rio Hondo and San Gabriel River, in the Santa Fe Springs area near the planned Santa Fe Springs Station (CDMG 1997a–c, 1998a–f). The depth to groundwater can vary seasonally, based on precipitation, pumping practices, recharge, and irrigation (Authority 2025c). Groundwater plots from this region indicate that water levels can vary seasonally as much as 35 feet.

5.5.1.5 Groundwater Beneficial Uses

The existing beneficial uses for the Central Basin identified in the Basin Plan, are listed below:

- **MUN:** Waters used for community, military, or individual water supply systems

- **AGR:** Waters used for farming, horticulture, or ranching
- **IND:** Industrial activities that do not depend primarily on water quality (mining)
- **PROC:** Industrial activities that depend primarily on water quality

5.5.1.6 Groundwater Quality Objectives

The groundwater quality objectives for groundwater basins in the Los Angeles region, as designated in the Los Angeles RWQCB Basin Plan, are provided in Table 5-10.

Table 5-10 Basin Plan Objectives

Constituent	Basin Plan Objectives
Bacteria	In groundwaters used for domestic or municipal supply (MUN) the concentration of coliform organisms over any seven-day period shall be less than 1.1/100 ml.
Chemical Constituents and Radioactivity	Groundwaters designated MUN shall not contain concentrations of chemical constituents and radionuclides in excess of the limits specified in Cal. Code Regs. Title 22 and incorporated by reference into the Los Angeles RWQCB Basin Plan. Groundwaters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use.
Nitrogen (Nitrate, Nitrite)	Groundwaters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen, 45 mg/L as nitrate, 10 mg/L as nitrate-nitrogen, or 1 mg/L as nitrite-nitrogen.
Taste and Odor	Groundwaters shall not contain taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

Source: Los Angeles RWQCB 2024
Cal. Code Regs. = California Code of Regulations; mg/L = milligrams per liter; ml = milliliters; MUN = municipal and domestic water supply; RWQCB = Regional Water Quality Control Board

The site-specific numerical mineral groundwater quality objectives for the Central Basin in the direct RSA include:

- TDS: 700 mg/L
- Sulfate: 250 mg/L
- Chloride: 150 mg/L
- Boron: 1.0 mg/L

5.5.2 Coastal Plain of Orange County Groundwater Basin

The Orange County Groundwater Basin underlies a coastal alluvial plain, covering an area of 350 square miles. The basin is bordered by consolidated rocks, which are exposed at the Puente and Chino Hills to the north, the Santa Ana Mountains to the east, and the San Joaquin Hills to the south. The Orange County Groundwater Basin and the Central Basin in Los Angeles County are separated by the county border and Coyote Creek; however, no physical barrier exists between the two basins. The basin aquifers extend to a depth of more than 2,000 feet. Total storage is therefore estimated to be 66 million acre-feet. However, there is a limit to the amount of this volume that can safely be removed without causing physical damage to the basin, including damage from seawater intrusion, upwelling of colored water, and increased potential of subsidence. The Orange County Water District (OCWD) manages the groundwater basin, with a maximum overdraft of 500,000 acre-feet (Orange County Public Works 2011). The Orange County Groundwater Basin can be subdivided into subbasins, and the coastal region can be distinguished by higher and lower elevation areas (OCWD 2015). The subbasins include the Main Basin, Irvine Subbasin, Yorba Linda Subbasin, and La Habra Subbasin (OCWD 2015). The RSA overlies the Main Basin.

The Orange County Groundwater Basin is nonadjudicated. Instead, as established by the 2014 Orange County Water District Act, the OCWD follows a more informal policy to manage the basin's groundwater. Each year, the OCWD assigns the Basin Production Percentage, which is

the percentage of each city's water demand they are allowed to meet with groundwater. It is the OCWD's goal to provide a Basin Production Percentage of 75 percent of the overlying cities' water needs. The OCWD levies a Basin Equity Assessment, a surcharge that makes the cost of groundwater equal to imported water, on city operators that pump more water from the basin than the 75 percent allotted to them by the Basin Production Percentage. The OCWD also compensates those cities that produce less than the Basin Production Percentage with a Replenishment Assessment. City operators must obtain alternative supplies, such as from the Municipal Water District of Orange County, for their remaining 25 percent of water needs. In instances where groundwater quality conditions warrant, the OCWD allows pumping above the Basin Production Percentage without assessing the additional fee from the Basin Equity Assessment (OCWD 2015).

5.5.2.1 Main Subbasin

The Main Subbasin is the largest subbasin of the Coastal Plain of the Orange County Groundwater Basin and is where the majority of groundwater production occurs (OCWD 2015). The Main Subbasin, which is divided vertically into upper, middle, and lower aquifer systems, is managed by the OCWD (Orange County Public Works 2011). The OCWD subdivided the groundwater basin into three major aquifer systems, known as Shallow, Principal, and Deep, which are hydraulically connected because groundwater is able to flow between them (OCWD 2015). More than 90 percent of groundwater production occurs from wells that are screened in the Principal aquifer system at depths between 200 and 1,300 feet (OCWD 2015).

5.5.2.2 Groundwater Recharge

The Shared Passenger Track Alternatives alignment runs adjacent to the existing Raymond Retarding Basin in Anaheim at the intersection of E La Palma Avenue. Raymond Basin is a flood-retarding basin owned by OCFCD. The basin is designed to retard floodflows in Carbon Creek; however, OCFCD allows OCWD to recharge water provided that the inflow matches the percolation rate (i.e., no stored water).

5.5.2.3 Existing Groundwater Quality

Water within the basin is primarily sodium-calcium bicarbonate (DWR 2004a). For example, a water containing 45 percent sodium, 35 percent calcium, and 20 percent magnesium, and 55 percent bicarbonate, 30 percent sulfate, and 15 percent chloride would be classified as a sodium-calcium-bicarbonate-type water[10] (USGS 2002). Water quality in the primary (upper) aquifer system may differ from that in the shallower and deeper parts of the aquifer systems. Inorganic constituents are present at high and moderate concentrations in approximately 6 percent and 26 percent, respectively, of the primary aquifer system. TDS concentrations were high (greater than the upper recommended water quality limit) in about 2 percent of the primary aquifer system, and moderate (between the recommended and upper limits) in about 47 percent of the primary aquifer system. Iron or manganese (or both) were present at high concentrations and moderate concentrations in about 19 percent and 15 percent, respectively, of the primary aquifer system (USGS 2012a). Groundwater impairments include seawater intrusion near the coast, colored water from natural organic materials in the lower aquifer system, increasing salinity, high nitrates, and methyl tert-butyl ether (MTBE) (DWR 2004a).

MTBE was used as an additive in gasoline to reduce air pollution but became a widespread contaminant in groundwater supplies, generally as a result of underground fuel tank releases. MTBE is a synthetic, organic chemical that was added to gasoline to increase octane ratings during the phase-out of leaded gasoline. In the mid-1990s, the percentage of MTBE added to gasoline increased significantly to reduce air pollution. MTBE is a serious threat to groundwater quality because it sorbs weakly to soil and does not readily biodegrade. The State of California

[10] Water classified as a sodium-bicarbonate-type water contains more than 50 percent of the total cation milliequivalents as sodium and more than 50 percent of the total anion milliequivalents as bicarbonates. The dominant dissolved ion must be greater than 50 percent of the total; therefore, the combination of ions in sodium-bicarbonate type water is greater than 100 percent.

banned the use of the additive in 2004 in response to its widespread detection in groundwater throughout the state. The Division of Drinking Water set the primary maximum contaminant level for MTBE in drinking water at 13 micrograms per liter. The secondary maximum contaminant level for MTBE is 5 micrograms per liter. Drinking water wells in the basin are tested annually for MTBE levels (OCWD 2015).

Nitrate is one of the most common and widespread contaminants in groundwater supplies (OCWD 2015). Elevated levels of nitrate in soil and water supplies originate from fertilizer use, animal feedlots, wastewater disposal systems, and other sources. Plants and bacteria break down nitrate, but excess amounts can leach into groundwater; once in the groundwater, nitrate can remain relatively stable for years (OCWD 2015). Management of nitrates is a component of the salinity management program in the Santa Ana River Watershed. Along with TDS objectives, water quality objectives for nitrates are established for the groundwater management zones in the watershed (OCWD 2015). The OCWD conducts an extensive program to protect the groundwater basin from nitrate contamination. The OCWD regularly monitors nitrate levels in groundwater and works with producers to treat individual wells when nitrate concentrations exceed safe levels (OCWD 2015).

5.5.2.4 Existing Groundwater Levels

Based on subsurface data from prior geotechnical investigations and published literature, groundwater depths along the alignment could range from the ground surface adjacent to rivers, percolation basins, and drainages to depths of greater than 100 feet below ground surface. The depth to groundwater can vary seasonally, based on precipitation, pumping practices, recharge, and irrigation (Authority 2025c). The historical high groundwater along the project alignment is depicted on Figure 5-5 in the *Los Angeles to Anaheim Project Section Geology, Soils, and Seismicity Technical Report*. Historically, groundwater depths have been as shallow as 10 feet below ground surface along portions of the project section, including Buena Park and east to the Fullerton area (CDMG 1997a–c, 1998a–f).

5.5.2.5 Groundwater Beneficial Uses

The existing beneficial uses for the Orange County Groundwater Basin identified in the Basin Plan are listed below:

- **MUN:** Waters used for community, military, or individual water supply systems
- **AGR:** Waters used for farming, horticulture, or ranching
- **IND:** Industrial activities that do not depend primarily on water quality (mining)
- **PROC:** Industrial activities that depend primarily on water quality

5.5.2.6 Groundwater Quality Objectives

The groundwater quality objectives for the Orange County Groundwater Basin, as designated in the Santa Ana RWQCB Basin Plan, are provided in Table 5-11.

Table 5-11 Groundwater Quality Objectives

Constituent	Basin Plan Objectives
Arsenic	Arsenic concentrations shall not exceed 0.05 mg/L in groundwater designated MUN as a result of controllable water quality factors.
Bacteria, coliform	Total coliform numbers shall not exceed 2.2 organism/100 mL median over any 7-day period in groundwaters designated MUN as a result of controllable water quality factors.
Barium	Barium concentrations shall not exceed 1.0 mg/L in groundwaters designated MUN as a result of controllable water quality factors.
Boron	Boron concentrations shall not exceed 0.75 mg/L in groundwaters of the region as a result of controllable water quality factors.

Constituent	Basin Plan Objectives
Chloride	Chloride concentrations shall not exceed 500 mg/L in groundwaters of the region designated MUN as a result of controllable water quality factors.
Color	Waste discharges shall not result in coloration of the receiving waters that causes a nuisance or adversely affects beneficial uses.
Cyanide	Cyanide concentrations shall not exceed 0.2 mg/L in groundwaters designated MUN as a result of controllable water quality factors.
Dissolved Solids, Total (Total Filtrable Residue)	The dissolved mineral content of the waters of the region, as measured by the total dissolved solids test ("Standard Methods for the Examination of Water and Wastewater, 20th ed.," 1998: 2540C (180˚C), p. 2–56), shall not exceed the specific objectives listed in Table 4-1 as a result of controllable water quality factors. (Refer also to discussion of management zone TDS and nitrate nitrogen water quality objectives).
Fluoride	Fluoride concentrations shall not exceed 1.0 mg/L in groundwaters designated MUN as a result of controllable water quality factors.
Hardness (as $CaCO_3$)	The hardness of receiving waters used for municipal supply (MUN) shall not be increased as a result of waste discharges to levels that adversely affect beneficial uses.
Metals	Metals concentrations shall not exceed the values listed in the Santa Ana Basin Plan in groundwaters designated MUN as a result of controllable water quality factors.
Methylene Blue-Activated Substances	MBAS concentrations shall not exceed 0.05 mg/L in groundwaters designated MUN as a result of controllable water quality factors.
Nitrate	Nitrate-nitrogen concentrations listed in Table 4-1 of the Santa Ana Basin Plan shall not be exceeded as a result of controllable water quality factors.
Oil and grease	Waste discharges shall not result in deposition of oil, grease, wax or other materials in concentrations that cause a nuisance or adversely affect beneficial uses.
pH	The pH of groundwater shall not be raised above 9 or depressed below 6 as a result of controllable water quality factors.
Radioactivity	Radioactive materials shall not be present in the waters of the region in concentrations that are deleterious to human, plant or animal life. Groundwaters designated MUN shall meet the limits specified in the Cal. Code Regs. Title 22.
Sodium	Sodium concentrations shall not exceed 180 mg/L in groundwaters designated MUN as a result of controllable water quality factors.
Sulfate	Sulfate concentrations shall not exceed 500 mg/L in groundwaters of the region designated MUN as a result of controllable water quality factors.
Taste and Odor	The groundwaters of the region shall not contain, as a result of controllable water quality factors, taste- or odor-producing substances at concentrations that cause a nuisance or adversely affect beneficial uses.
Toxic Substances	All waters of the region shall be maintained free of substances in concentrations that are toxic, or that produce detrimental physiological responses in human, plant, animal or aquatic life.

Source: Santa Ana RWQCB 2019
°C = degrees Celsius; $CaCO_3$ = calcium carbonate; Cal. Code Regs. = California Code of Regulations; MBAS = Methylene Blue Activated Substances; mg/L = milligrams per liter; mL = milliliters; MUN = municipal and domestic supply; TDS = total dissolved solids;

The site-specific groundwater quality objectives for the Orange County Groundwater Basin in the direct RSA include:

- TDS: 580 mg/L

- Nitrate as nitrogen: 3.4 mg/L

5.6 Floodplains

5.6.1 Floodplain Conditions

Flooding is a natural occurrence in riverine and lacustrine systems. Rivers, streams, creeks, and lakes will overtop their banks and periodically flood adjacent low-lying land. These areas, known as floodplains, temporarily store this excess water. Damage associated with flooding occurs when the course of a surface waterbody is altered, areas in the upper watershed are developed, or developments encroach upon, or are built within, a floodplain. The traditional response to flooding issues has been structural protection works, including dams, bypasses, levees, and floodwalls. Despite the tremendous capital expenditures associated with these projects, flood damage has continued to increase annually (FEMA 2009).

FEMA regulates development within identified floodplains through floodplain management. FEMA uses the extent of land that would be inundated by the 100-year flood, or base flood, as its primary management unit. FEMA defines development within the floodplain as the placement of fill material within the base floodplain. Development within the base floodplain cannot increase the water surface elevation (WSE) of the base flood, or BFE, by 1 foot (FEMA 2009).

In addition to the base floodplain, FEMA also regulates development in floodways. A floodway includes the channel of a stream or river and adjacent land area that must be reserved in order to convey the base flood without cumulatively increasing the BFE. The floodway is where streamflow velocities and forces are the greatest and most destructive. FEMA regulations prohibit development within floodways, unless it can be demonstrated that the development would not increase the BFE (FEMA 2009). FEMA determines the extent of floodways through a flood insurance study (FIS), and they are depicted on FIRMs. FEMA has not mapped regulatory floodways along the project section.

5.6.2 Federal Emergency Management Agency Flood Hazard Zones

Table 5-12 includes descriptions of the various flood hazards zones established by FEMA and their associated flood hazards. A number of the floodplains delineated by FEMA on FIRMs are in the direct RSA, as depicted on Figure 5-2, sheets 1 through 4, and listed in Table 5-13.

Table 5-12 Federal Emergency Management Agency Flood Hazard Zones

Zone	Flood Hazard
High Risk Areas	
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are depicted within these zones.
AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are depicted at selected intervals within these zones.
AO	River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are depicted within these zones.

Zone	Flood Hazard
AR	Areas with a temporarily increased flood risk because of the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
Moderate- to Low-Risk Areas	
B and X (shaded)	Area of moderate flood hazard, usually the area between the limits of the 100- year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from the 100-year flood, or shallow flooding areas with average depths of less than 1 foot or drainage areas less than 1 square mile.
C and X (unshaded)	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that do not warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.
Undetermined Risk Areas	
D	Areas with possible but undetermined flood risks. No analysis of flood hazards has been performed in these zones.

Source: FEMA 2009
FIRM = flood insurance rate map

Table 5-13 lists the FEMA flood zone that would be intersected or within the direct RSA, the area of the floodplain intersected, and indicates whether BFEs are available from FEMA in the location of crossing. No FEMA regulatory floodways are within the project section floodplains.

Table 5-13 Federal Emergency Management Agency Floodplains within the Resource Study Area

Floodplain Name or Floodplain Source	City	FEMA Flood Zone	FIRM Map	Existing Water Surface Elevation Range (feet)	Existing Bank Elevation Range (feet)	Approximate Length of Floodplain Crossing (feet)	Approximate Area of Floodplain Impact (acres)
Los Angeles River, south of Washington Boulevard and north of 26th Street	Los Angeles	AE	06037C1636F and 06037C1638F	190–210	209–221	0	0
Rio Hondo	Pico Rivera	A	06037C1830F	157–163	161–169	192	0.02
San Gabriel River	Pico Rivera	AE	06037C1829F	136–137	145–147	334	0.58
Lakeland Road storm drain	Santa Fe Springs	AE/AH	06037C1841F	N/A	N/A	264	0
North Fork Coyote Creek	Santa Fe Springs	AE	06037C1841F and 06037C1843F	78–89	82–93	116	0.02

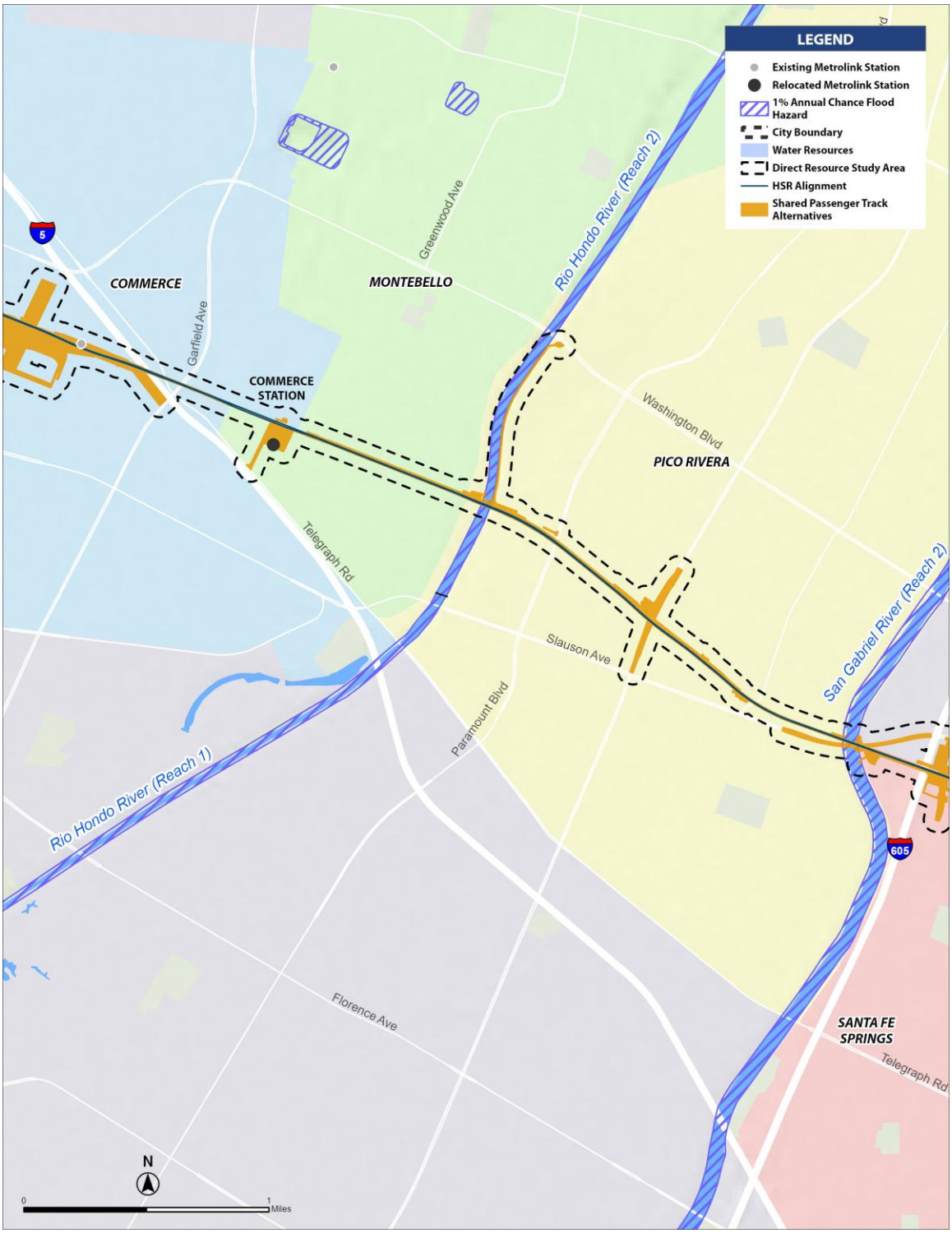
Floodplain Name or Floodplain Source	City	FEMA Flood Zone	FIRM Map	Existing Water Surface Elevation Range (feet)	Existing Bank Elevation Range (feet)	Approximate Length of Floodplain Crossing (feet)	Approximate Area of Floodplain Impact (acres)
Brea Creek	Buena Park	AO	06059C0038J	72–77	77–80	515	0
Lakeside Drive storm drain	Buena Park	AE	06059C0038J and 06059C126J	N/A	N/A	2,323	2.12
Fullerton Creek	Fullerton	AO	06059C0131J	N/A	N/A	307	0
Gilbert Street and Artesia Avenue storm drain	Fullerton	AO	06059C0127J	N/A	N/A	209	1.06
Lawrence Ave	Fullerton	AO	06059C0131J	N/A	N/A	268	0
Yale Ave	Fullerton	AO	06059C0131J	N/A	N/A	252	0
Balcom Avenue storm drain	Fullerton	AO	06059C0131J	N/A	N/A	365	0
Carbon Creek	Anaheim	A/AO	06059C0131J	155–167	147–160	729	0
Southeast Anaheim Channel	Anaheim	AH	06059C0142J	N/A	N/A	96	0

Sources: FEMA 2023; Authority 2024c
FEMA = Federal Emergency Management Agency; FIRM = Flood Insurance Rate Map; N/A = not applicable



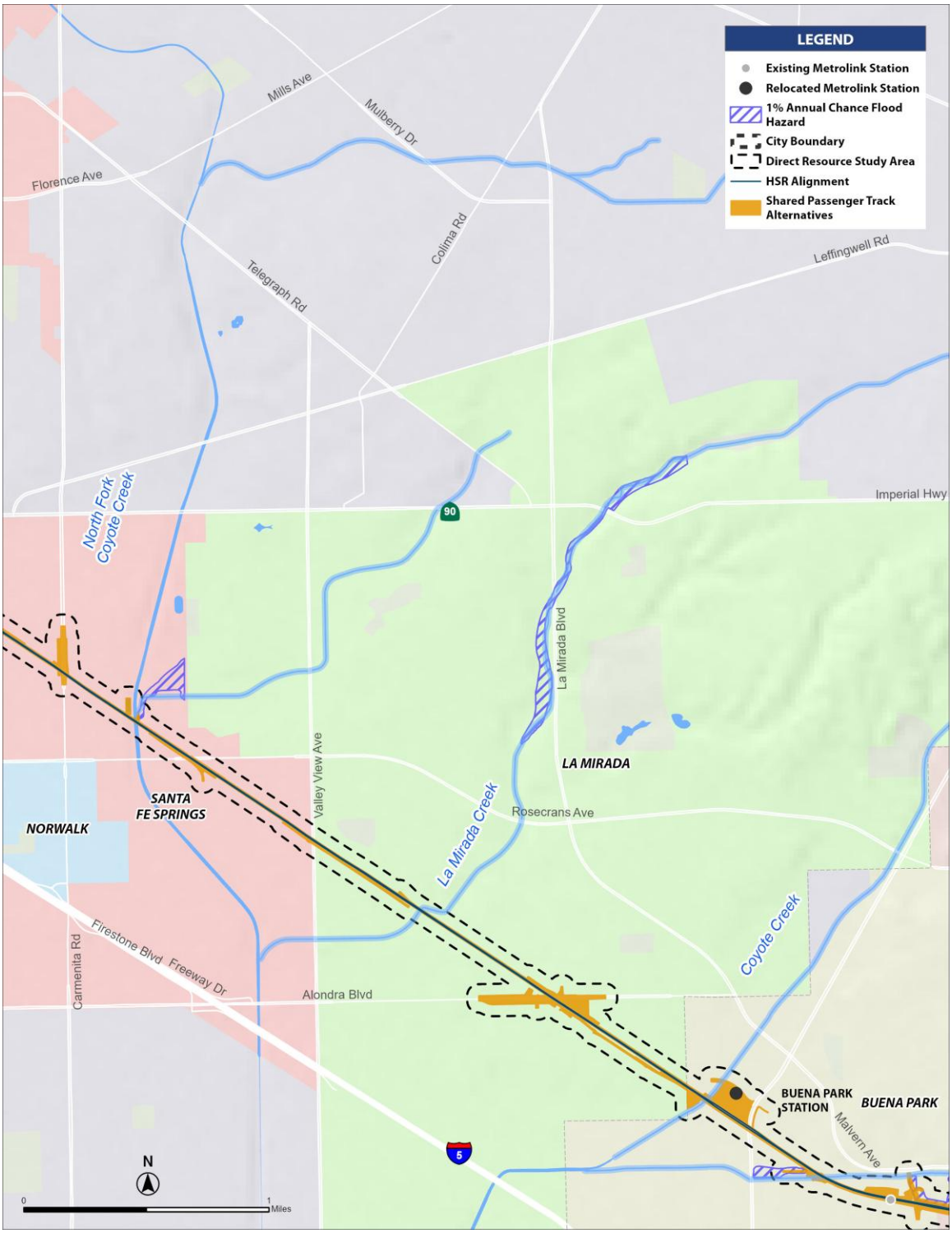
Sources: FEMA 2016; ESRI 2024; Authority 2024e

Figure 5-2 Floodplains Crossed, Sheet 1 of 4



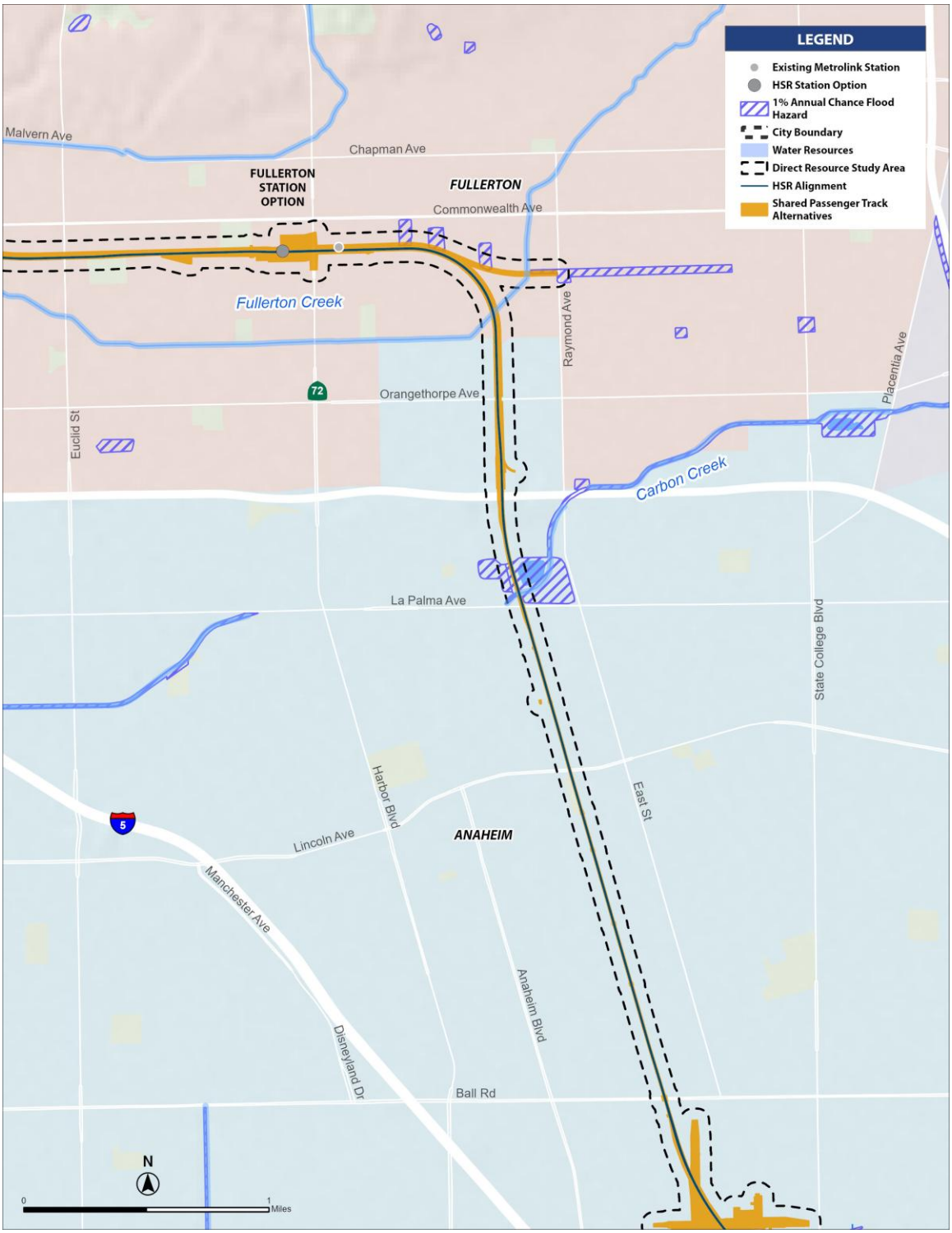
Sources: FEMA 2016; ESRI 2024; Authority 2024e

Figure 5-2 Floodplains Crossed, Sheet 2 of 4



Sources: FEMA 2016; ESRI 2024; Authority 2024e

Figure 5-2 Floodplains Crossed, Sheet 3 of 4



Sources: FEMA 2016; ESRI 2024; Authority 2024e

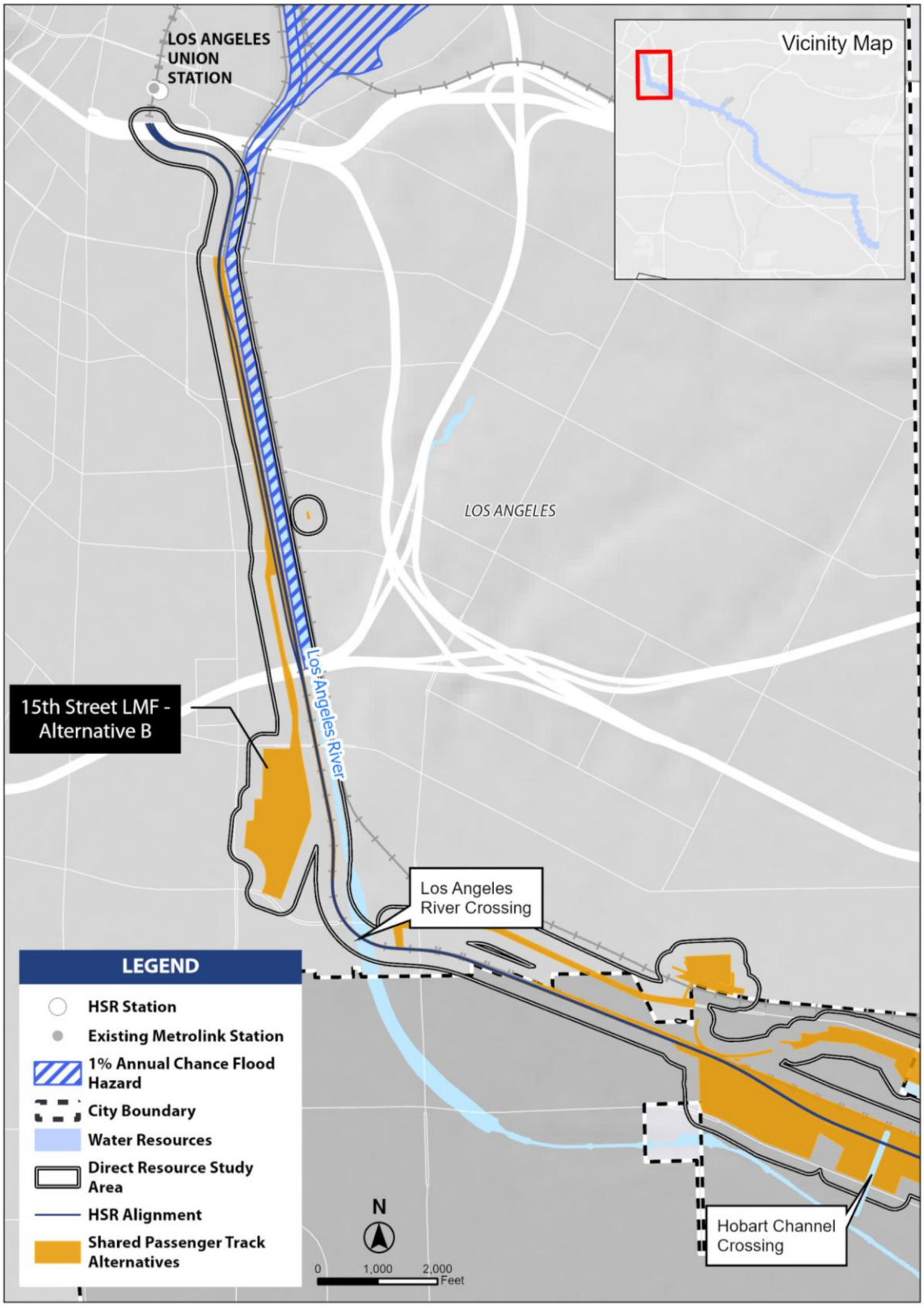
Figure 5-2 Floodplains Crossed, Sheet 4 of 4

5.6.2.1 Los Angeles River

The project section would cross the Los Angeles River in the city of Los Angeles, within and adjacent to a Zone AE floodplain, as delineated in the Los Angeles County and unincorporated areas FIS, revised by FEMA in 2016 (Authority 2020). South of LAUS, the proposed project section would travel along the western bank of the Los Angeles River in the city of Los Angeles, adjacent to a Zone AE floodplain (Figure 5-3), as delineated in the Los Angeles County and unincorporated areas FIS, revised by FEMA in 2016. Zone AE is defined in the FIS as an area that corresponds to a 1 percent annual chance floodplain, as determined using approximate methods. South of LAUS, the project section would cross the Los Angeles River on the existing bridge but would not cross the floodplain because it is upstream of the crossing.

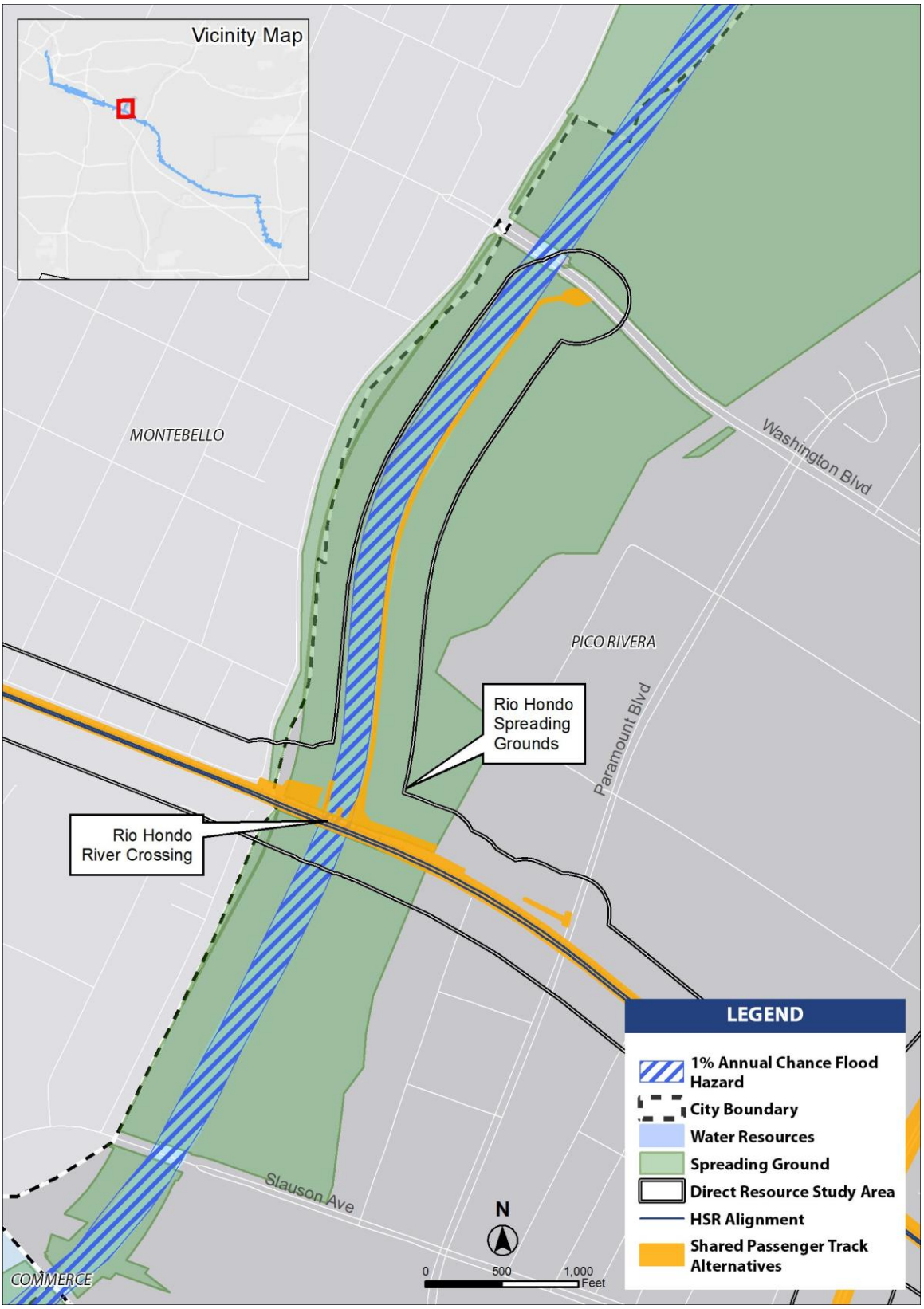
5.6.2.2 Rio Hondo

The project section would cross the Rio Hondo near the existing spreading grounds in Pico Rivera. According to the current FEMA FIRMs and the FIS for Los Angeles County and unincorporated areas, revised by FEMA in 2016, Rio Hondo at the location of the crossing is designated as a Zone A flood zone (Figure 5-4). Zone A is defined in the FIS as an area that corresponds to a 1 percent annual chance floodplain, as determined using approximate methods. The project section would encroach into the floodplain because of modification of the existing bridge, construction of a new bridge, and modification of the access road (Authority 2024c).



Sources: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-3 Los Angeles River Floodplain



Sources: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-4 Rio Hondo Floodplain

5.6.2.3 San Gabriel River

The project section would cross the San Gabriel River near the existing Slauson Avenue overpass, just west of I-605 in Pico Rivera. According to the current FEMA FIRMs and the FIS for Los Angeles County and unincorporated areas, revised by FEMA in 2016, the San Gabriel River at the location of the crossing is designated as a Zone AE flood zone (Figure 5-5). Zone AE is defined in the FIS as an area that corresponds to a 1 percent annual chance floodplain, as determined using approximate methods. The project section would encroach the floodplain because of construction of a new bridge within the San Gabriel River (Authority 2024c).

5.6.2.4 Bond Issue 1214 Storm Drain

The project section would travel adjacent to a floodplain delineated near an 81-inch reinforced concrete pipe (RCP), the Bond Issue 1214 Storm Drain, which travels southerly on Vicki Drive and then westerly on Rivera Road, where it connects with another storm drain on Rivera Road, until it crosses the railroad and continues onto Millergrove Drive in Santa Fe Springs (Authority 2024c). According to the current FEMA FIRMs and the FIS for Los Angeles County and unincorporated areas, revised by FEMA in 2016, the area along the project section near the Bond Issue 1214 Storm Drain is designated as a Zone AH flood zone (Figure 5-5). Zone AH is defined in the FIS as an area that corresponds to a 1 percent annual chance of shallow flooding (usually areas of ponding), with average depths between 1 and 3 feet. The project section would be adjacent to the floodplain and would not encroach into the floodplain (Authority 2024c).

5.6.2.5 Lakeland Road Storm Drain

The project section would run adjacent to a floodplain delineated near an existing storm drain system, which includes a 78-inch RCP, Bloomfield Drain, and a potentially private drainage system for which the existing alignment is unknown but has been noted as a double 48-inch corrugated metal pipe (Authority 2024c). This floodplain is between Lakeland Road and Florence Avenue in Santa Fe Springs (Figure 5-6). According to the current FEMA FIRMs and the FIS for Los Angeles County and unincorporated areas, revised by FEMA in 2016, the area along the project section near Lakeland Road is designated as a Zone AE flood zone on the west side of the alignment and a Zone AH flood zone on the east (Authority 2024c). Zone AE is defined in the FIS as an area that corresponds to a 1 percent annual chance floodplain, as determined using approximate methods. Zone AH is defined as an area that corresponds to a 1 percent annual chance of shallow flooding (usually areas of ponding), with average depths between 1 and 3 feet. The project section would encroach into the existing floodplain because of construction of the proposed viaduct columns (Authority 2024c).



Sources: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-5 San Gabriel River and Bond Issue 1214 Storm Drain Floodplain



Sources: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-6 Lakeland Road Floodplain

5.6.2.6 North Fork Coyote Creek

The project section would cross the North Fork Coyote Creek downstream of the confluence with Milan Creek, in Santa Fe Springs. According to the current FEMA FIRMs and the FIS for Los Angeles County and unincorporated areas, revised by FEMA in 2016, a floodplain has not been delineated along North Fork Coyote Creek at the location of the crossing (Figure 5-7). A Zone AE flood zone is currently mapped near Milan Creek, just upstream of the confluence with North Fork Coyote Creek. Zone AE is defined in the FIS as an area that corresponds to a 1 percent annual chance floodplain, as determined using approximate methods. However, the project section would not encroach into the floodplain because improvements are not proposed within Milan Creek.

5.6.2.7 La Mirada Creek

The project section would cross the La Mirada Creek downstream near Stage Road, in La Mirada. According to the current FEMA FIRMs and the FIS for Los Angeles County and unincorporated areas, revised by FEMA in 2016, a floodplain has not been delineated along La Mirada Creek at the location of the crossing (Figure 5-8).

5.6.2.8 Brea Creek

The project section would cross Brea Creek in Buena Park. According to the current FEMA FIRMs and the FIS for Orange County and unincorporated areas, revised by FEMA in 2009, a floodplain has not been delineated along Brea Creek at the location of the crossing; however, a Zone AO flood zone exists just downstream of the crossing (Figure 5-9). Zone AO corresponds to the area with a 1 percent annual chance of shallow flooding, with average depths between 1 and 3 feet.

5.6.2.9 Lakeside Drive Storm Drain

The project section would travel adjacent to a floodplain delineated near an existing storm drain system, which includes a 55-inch steel pipe, a 54-inch RCP, and an open channel parallel to an existing railroad (Authority 2024c). It is assumed that the drainage system is privately owned by the adjacent community; however, the open channel may be owned by BNSF. The existing floodplain is delineated in the Lakeside community near an existing lake in Buena Park (Figure 5-9). According to the current FEMA FIRMs and the FIS for Orange County and unincorporated areas, revised by FEMA in 2009, the area along the project section near Lakeside Drive is designated as a Zone AE flood zone (Authority 2024c). Zone AE is defined in the FIS as an area that corresponds to a 1 percent annual chance floodplain, as determined using approximate methods. The project section in this area would be surrounded by retaining walls as it transitions to a tunnel. The project section would encroach into the floodplain as a result of construction of the proposed tunnel, relocation and connection to the existing drainage system, construction of the new bridge over Dale Street, and modifications to the Dale Street grade separation (Authority 2024c).



Sources: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-7 North Fork Coyote Creek Floodplain



Sources: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-8 La Mirada Creek Floodplains



Source: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-9 Brea and Lakeside Drive Floodplains

5.6.2.10 Gilbert Street and Artesia Avenue Storm Drain

The project section would travel adjacent to a floodplain delineated near an existing storm drain system, which includes a 60-inch RCP owned and maintained by the City of Fullerton (Authority 2024c). The existing floodplain is delineated on the southern side of an existing railroad at the intersection of Gilbert Street and Artesia Avenue in Fullerton (Figure 5-10). According to the current FEMA FIRMs and the FIS for Orange County and unincorporated areas, revised by FEMA in 2009, the area along the project section near the intersection of Gilbert Street and Artesia Avenue is designated as a Zone AO flood zone. Zone AO corresponds to the area with a 1 percent annual chance of shallow flooding, with average depths between 1 and 3 feet. The project section would encroach into the existing floodplain as a result of construction of the modified grade separation with a new bridge structure (Authority 2024c).

5.6.2.11 Balcom Avenue Storm Drain

The project section would cross Balcom Avenue Storm Drain in Fullerton. According to the current FEMA FIRMs and the FIS for Orange County and unincorporated areas, revised by FEMA in 2009, a floodplain has not been delineated along the Balcom Avenue Storm Drain at the location of the crossing; however, a Zone AO flood zone has been delineated near the crossing (Figure 5-11). Zone AO corresponds to the area with a 1 percent annual chance of shallow flooding, with average depths between 1 and 3 feet. The project section may encroach into the existing floodplain within the right-of-way take areas, depending on the improvements proposed. The City of Fullerton has prepared conceptual plans depicting a drainage system upgrade near the HSR alignment. It is assumed that the city's proposed drainage concept would mitigate flooding issues within this area (Authority 2024c).

5.6.2.12 Carbon Creek

The project section would cross Carbon Creek in Anaheim. According the current FEMA FIRMs and the FIS for Orange County and unincorporated areas, revised by FEMA in 2009, an A flood zone has been delineated adjacent to the Raymond Retarding Basin and Carbon Creek at the location of the crossing (Figure 5-12). A Zone AO flood zone has also been delineated adjacent to the project section. Zone A is defined in the FIS as an area that corresponds to the 1 percent annual chance floodplain, as determined using approximate methods. Zone AO corresponds to the area with a 1 percent annual chance of shallow flooding, with average depths between 1 and 3 feet. The project section would encroach into the existing floodplain as a result of the extension of the box culvert in the creek (Authority 2024c).

5.6.2.13 Southeast Anaheim Channel (Between State College Boulevard and Katella Avenue)

The project section would cross a floodplain along an existing storm drain, including an enclosed 9- by 9-foot reinforced concrete box, commonly referred to as the Southeast Anaheim Channel, which is owned and maintained by the City of Anaheim. The existing floodplain has been delineated within private properties and as crossing the existing railroad alignment between State College Boulevard and Katella Avenue in Anaheim (Figure 5-13) (Authority 2024c). According to the current FEMA FIRMs and the FIS for Orange County and unincorporated areas, revised by FEMA in 2009, the area along the project section between State College Boulevard and Katella Avenue is designated as a Zone AH flood zone. Zone AH is defined as an area that corresponds to a 1 percent annual chance of shallow flooding (usually areas of ponding), with average depths between 1 and 3 feet. The project section would encroach into the existing floodplain as a result of the at-grade crossing (Authority 2024c).



Sources: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-10 Gilbert Street and Artesia Street Floodplain



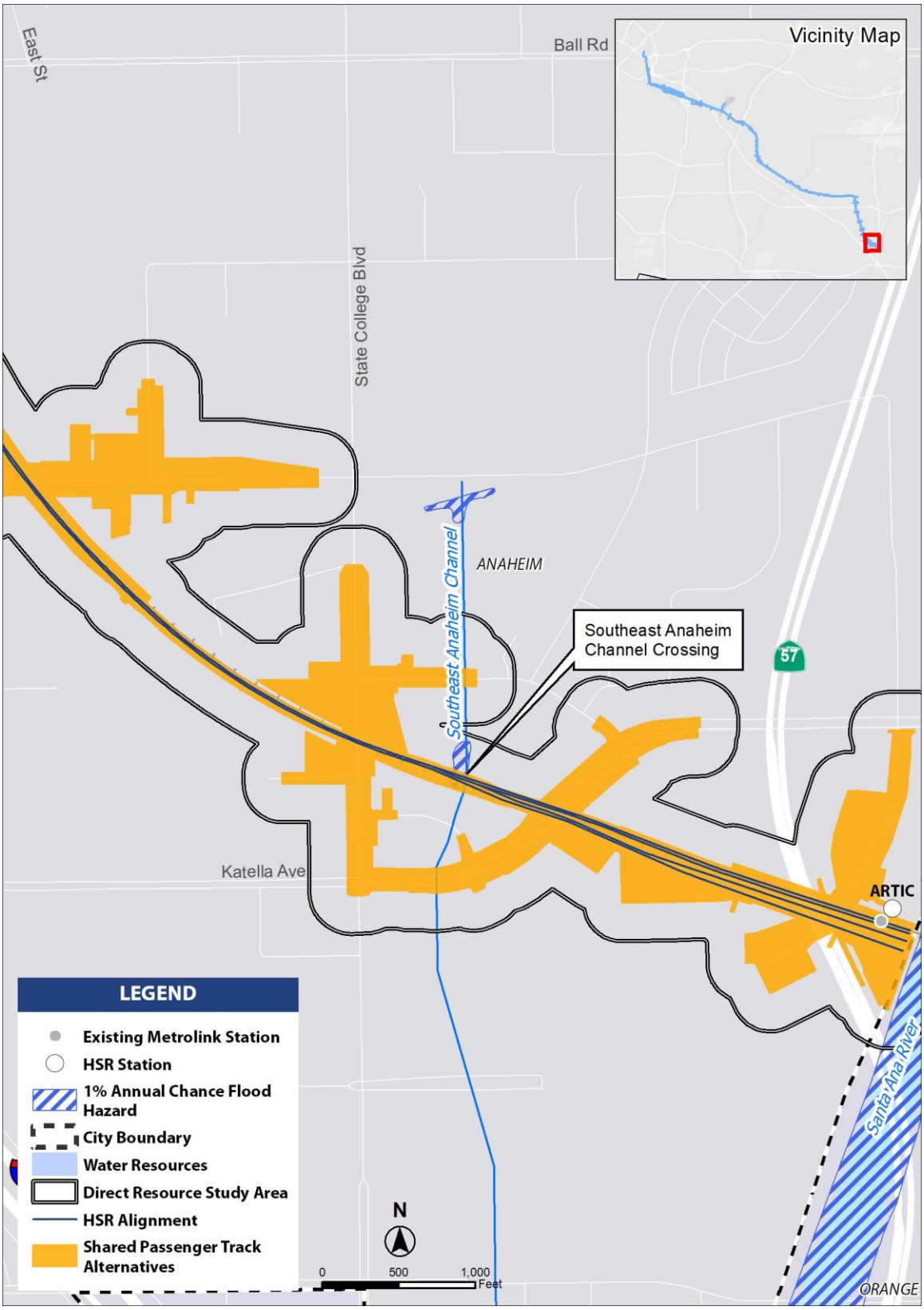
Sources: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-11 Balcom Avenue Storm Drain Floodplain



Sources: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-12 Carbon Creek Floodplain



Sources: FEMA 2023; USGS 2018; STV 2009; Authority 2024e; ESRI/National Geographic 2024

Figure 5-13 Southeast Anaheim Channel Floodplain

5.6.3 Seismically Induced Flooding

The primary risk of dam failure is related to seismic hazards. Two types of primary seismic hazards are present in the project section: surface fault ruptures and ground shaking. If strong ground shaking occurred—from either nearby or distant earthquakes, depending on the combination of earthquake magnitude and distance from the project alignment—a number of secondary seismic hazards may result, including dam failure. Seismically induced flood hazards include the potential for inundation or erosion from flood waters associated with the breach of a dam.

The DWR's Division of Safety of Dams requires that dam owners manage their facilities in line with potential seismic risks. The division annually inspects each dam to ensure the dam is safe, performing as intended, and not developing problems. The Division of Safety of Dams also periodically reviews the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California.

In addition, dam owners are required to prepare inundation maps, which are approximations of the maximum water surface extent resulting from a complete dam breach and draining of the full reservoir. The resultant maps are to be used to identify risk for planning purposes as they represent the worst-case scenario for a total failure of a dam. Inundation maps were found for a few of dams upstream of the project section in Los Angeles and Orange Counties. For a map of the major dams and reservoirs within the RSA, as well as details about size, year of construction, and worst-case inundation pathways, refer to Section 5.4.5, Seismically Induced Flood Hazards, of the *Los Angeles to Anaheim Project Section Geology, Soils, and Seismicity Technical Report* (Authority 2025c). Summary information about major dams and reservoirs is presented in Table 5-14.

Table 5-14 Major Dams and Reservoirs

Dam and Reservoir	Distance to Project Section (miles)
Hansen Dam	24.0
Prado Dam	18.0
Brea Dam	1.5
Garvey Reservoir	4.5
Whittier Narrows Dam	3.0
Fullerton Dam	2.5
Carbon Canyon Dam	7.0

Sources: California Natural Resources Agency 2017; California Governor's Office of Emergency Services 2010, 2018

The dams listed in Table 5-14, with the exception of Garvey Reservoir, are part of USACE's Dam Safety Program. The purpose of the Dam Safety Program is to maintain public safety by making sure dams owned and operated by USACE are safe and the risks to the public are minimized. USACE has performed screening portfolio risk analyses on its dams. Based on the risk analyses performed by USACE, interim risk reduction measures have been implemented for Hansen Dam, Whittier Narrows Dam, Brea Dam, Carbon Canyon Dam, and Prado Dam. These measures include inspection by a special dam inspection team when the reservoir elevations reach a predetermined trigger, updating emergency action plans, coordination with downstream agencies, and other monitoring or specialized investigations.

Based on the level of inspection by various state and federal agencies, as well as the overall awareness of the potential consequences of a dam failure for the area, the risk of dam failure is believed to be low. This low risk suggests that inundation from dam failure should also be considered low along the project section alignment.

The western and eastern portions of the project section are within the mapped dam inundation areas for Hansen Dam and Prado Dam, respectively. In the event of dam failure, there could be flooding in several areas within the floodplain RSA beyond those identified in the current 100-year floodplain. Approximately 6 miles of the western alignment is within the Hansen Dam inundation area (from LAUS to near the project section intersection with I-710). Hansen Dam was built by USACE. It is in the city of Los Angeles at the confluence of the Big and Little Tujunga Washes along the northeastern edge of the San Fernando Valley. Approximately 11 miles of the eastern alignment is within the Prado Dam inundation area (near the project section intersection with Brea Creek to the ARTIC station near Santa Ana River). Prado Dam is in San Bernardino County, approximately 2 miles west of Corona and on the lower Santa Ana River, approximately 30.5 miles upstream from the confluence with the Pacific Ocean.

5.6.4 Tsunami and Seiche

Tsunamis are a series of large-wavelength waves in a waterbody caused by a sudden large displacement of water. Tsunamis are created when water is displaced from oceans and other large bodies of water because of seismic activities. These sudden waves could cause flooding in low-lying areas along shorelines. Tsunami inundation maps for California cover most areas along the state's coastline. The official maps have been developed by tsunami modelers, geologic hazard mapping specialists, and emergency planning scientists from the California Geological Survey, California Office of Emergency Services, and Tsunami Research Center at the University of Southern California for the purpose of local jurisdictional, coastal evacuation planning. The inundation areas depicted on the maps represent the maximum considered tsunami run-up from a number of extreme, yet realistic, tsunami sources. The nearest portion of the RSA to the coast is the southern portion of the project section, which is approximately 10 miles from the coast. The RSA is not within or near the modeled tsunami inundation areas of Southern California and is not susceptible to inundation by a tsunami from the Pacific Ocean because of distance.

Seiches occur in enclosed or partially enclosed waterbodies. They are created when strong winds or rapid changes in atmospheric pressure cause water levels to build up on one side of the waterbody. When the wind stops, the water rushes back toward the opposite side of the enclosed waterbody. There are no large, enclosed waterbodies immediately adjacent to the project section, and there is no immediate risk of seiche in the RSA.

6 EFFECTS ANALYSIS

6.1 Introduction

This section describes the potential effects of implementing the Shared Passenger Track Alternatives on hydrology and water resources in the RSA. The analysis describes construction effects as well as intermittent and continuous operational effects on surface water hydrology, surface water quality, groundwater hydrology and quality, and floodplains.

6.2 No Project Alternative

Under the No Project Alternative, recent development trends within the project section and associated increased traffic and vehicle use are anticipated to continue, leading to ongoing hydrology and water resources impacts. Planned residential, industrial, commercial, and transportation projects could result in the building of new impervious surfaces in the RSA and would result in associated direct and indirect impacts on hydrology and water resources. These impervious surfaces could increase the total volume of runoff generated during storm events, increase the risk of release of pollutants caused by flooding in receiving waterbodies, and potentially result in erosion or sedimentation in receiving waterbodies. The impervious surfaces associated with these developments could accumulate contaminants during the summer (low precipitation periods). In the winter, these contaminants could be discharged to a waterbody as runoff during storms, contributing to increased pollutant loads in the surface water RSA. Increased traffic and vehicle use are expected with the No Project Alternative because it is assumed more cars would be on the roadways compared to what would occur with implementation of the Shared Passenger Track Alternatives. Traffic congestion is likely to worsen, which could result in associated hydrology and water quality impacts, such as increased pollutant concentrations from vehicle use. Planned developments would be required to comply with existing laws and regulations that protect surface water hydrology, including various CWA Section 402 NPDES permits. Likewise, projects would comply with the appropriate water quality objectives for the region and would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

Development trends are anticipated to continue and could affect groundwater quantity as well, because the demand for drinking water would increase as the population grows. Drinking water in the RSA is partly supplied by aquifers within the RSA. Therefore, as the population increases groundwater pumping in the RSA could increase to supply local demand. Land use change under the No Project Alternative could result in indirect impacts on groundwater quality. Planned residential and highway development could result in the expansion of impervious surfaces, including residential roads, roofs on structures, widened roads, and extended roads, which could reduce groundwater recharge area and capacity. These trends of increased population growth and land use change, as well as additional impervious surface areas from planned development, under the No Project Alternative could affect groundwater in the RSA. Planned development would be required to comply with existing laws and regulations, and coordinate or consult with agencies that protect groundwater resources.

Impacts, including temporary changes to drainage patterns, stormwater runoff volumes, runoff quality, and hydraulic capacity caused by ground-disturbing activities, could persist from other current and planned development. These trends are anticipated to continue and could affect hydrology and water resources in the RSA.

Planned development and transportation projects would likely include mitigation to address impacts on surface water hydrology, water quality, groundwater, and floodplains resources.

It is assumed that the development under the No Project Alternative would be evaluated to determine the significance of impacts and mitigation measures would be developed, as needed, to avoid or reduce significant impacts. It would be the affected jurisdictions' responsibility to ensure compliance with established regulations. As such, the other transportation and development projects reasonably foreseeable under the No Project Alternative would undergo

environmental review, and effects on hydrology and water resources would be analyzed and mitigated.

6.3 Shared Passenger Track Alternatives

The following summarizes potential hydrology and water quality impacts of this project section.

6.3.1 Impact HWR-1: Effects on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology)

6.3.1.1 Shared Passenger Track Alternative A Construction

Temporary Construction Effects

Construction of Shared Passenger Track Alternative A would create temporary impacts from demolition, grading, temporary stream diversions, and construction staging areas, and require the use of temporary drainage systems during construction, which could temporarily alter existing drainage patterns and stormwater runoff. Shared Passenger Track Alternative A would disturb up to approximately 891 acres of land. Disturbed soil areas and construction activities would be associated with the proposed track improvements, Commerce and Buena Park Metrolink Station relocations, modifications at the Norwalk/Santa Fe Springs Metrolink Station and Fullerton Metrolink/Amtrak Station, and ARTIC station improvements; five grade separations at Pioneer Boulevard, Norwalk Boulevard, Los Nietos Road, Cerritos Avenue, and State College Boulevard; and the 26th Street LMF. The 26th Street LMF would be built on a developed, industrial site.

Although grading, staging areas, and temporary drainage systems could alter existing drainage patterns and stormwater runoff dynamics, temporary drainage systems would be used to convey potentially erosive run-on away from disturbed soil and work areas and prevent discharging sediment-laden runoff to receiving waters during construction. It may be necessary in some instances to temporarily divert low-flow surface water into a storm drain for work within drainage channels within the Los Angeles River. These effects would be temporary and limited to the construction phase.

Soil's potential to erode is dependent on a number of factors, including the type of soil, the topography, and the amount and type of precipitation. Steeper slopes and greater amounts of precipitation are two factors that increase the potential for erosion. Because the project area lacks soils that are highly erodible and the topography is generally flat, minimal impacts on erosion are anticipated.

The construction activities could redirect and increase the volume and rate of shallow overland flows, increasing the potential for erosion and siltation in areas of exposed soils and along channel banks, unless the SWPPP BMPs (**HYD-IAMF#3, Prepare and Implement a Construction Stormwater Pollution Prevention Plan**; and **BIO-IAMF#11, Maintain Construction Sites and BMP Training**) are implemented to avoid or minimize potential erosion and sedimentation from increased rates and volumes of flows. Temporary drainage systems used for construction of the Shared Passenger Track Alternatives could result in temporary effects on the hydrograph of receiving waters. This potential effect would be a result of increasing the connectivity of a watershed with pipes and conduits. In accordance with **HYD-IAMF#3**, the contractors will be required to develop and apply a SWPPP compliant with the conditions of the Construction General Permit. The contractor's qualified SWPPP developer (QSD) will prepare the SWPPP, which will include temporary drainage design plans, and identify stormwater BMPs to minimize potential hydrology effects of stormwater run-on. QSDs must be trained by Construction General Permit Trainers of Record (who must be certified by the California Stormwater Quality Association to conduct QSD training, which provides assurance to regulators that SWPPPs are prepared according to the requirements of the Construction General Permit. Temporary BMPs (**BIO-IAMF#11**), such as sediment traps, velocity dissipation devices like check dams and outfall protection, and detention/retention/infiltration facilities, will be incorporated into the temporary drainage design plans as necessary to reduce short-term increases in sediment transport and minimize potential temporary hydromodification effects during construction.

The contractor will prepare and apply a SWPPP (**HYD-IAMF#3**) that will involve implementing BMPs. The contractor's qualified SWPPP practitioner (QSP) will be responsible for implementing the SWPPP. Standard BMPs used during construction include measures to provide permeable surfaces or vegetated areas, where feasible, to retain or detain stormwater on site; flow dissipation measures to reduce the rates of stormwater runoff along steep slopes and prevent resulting erosion and sedimentation; and measures for in-water work and dewatering at stream crossings to minimize temporary changes to river and stream hydrology, potentially resulting in erosion or siltation. As part of that responsibility, the effectiveness of construction BMPs must be monitored before, during, and after storm events. Records of these inspections and monitoring results are submitted to the Los Angeles and Santa Ana RWQCBs as part of the annual report required by the Construction General Permit.

As required by the MS4 permits and Construction General Permit, the Shared Passenger Track Alternative A design will maintain preproject hydrology (**HYD-IAMF#3**). This design feature will avoid or minimize increases in stormwater runoff rates and volumes, minimize alterations to existing drainage patterns, and limit off-site flows of drainage waters, reducing potential effects on neighboring properties. Complying with the applicable RWQCB orders and requirements will minimize the extent of alterations. Effects related to runoff and drainage patterns will be minimized.

Implementing measures, design features, and BMPs, part of the impact avoidance and minimization features (IAMF) (**BIO-IAMF#11** and **HYD-IAMF#3**) for Shared Passenger Track Alternative A, will minimize changes in surface water hydrology and prevent exceeding the capacity of existing drainage infrastructure or resulting in erosion or siltation on site or off site.

Permanent Construction Effects

Implementation of Shared Passenger Track Alternative A would result in alteration of the existing drainage patterns as a result of development of the project elements. Shared Passenger Track Alternative A would result in the creation of new and replaced impervious surfaces that would require new or modified drainage systems to prevent flooding or standing water during and after storm events. Introducing new impervious surfaces where they currently do not exist would have the potential to increase the rate and amount of stormwater runoff and cause erosion in areas adjacent to the new impervious surfaces. As presented in Table 6-1, implementation of Shared Passenger Track Alternative A would result in an overall increase of impervious surfaces from approximately 76 percent of the corridor to 83 percent of the corridor—an increase of 7 percent or approximately 53.1 acres of impervious surface across the alignment. The construction of new impervious surfaces could result in effects on the existing hydrographs of receiving waters (i.e., hydromodification), including increases in low flow and peak flow velocity and volume. Altering the hydrograph of a receiving water that is susceptible to hydromodification can result in systemic changes, such as bed and bank form, erosion and sedimentation patterns, and habitat loss. The new or replaced impervious surfaces and their associated drainage systems, as well as new topographical features could alter runoff and drainage patterns as well as result in increased erosion and siltation in the receiving water. To offset on- and off-site hydrology effects associated with new impervious surfaces, the project design will include permanent BMPs required by the applicable CWA Section 402 NPDES MS4 permits, in order to avoid permanent hydromodification effects. Permanent BMPs identified in the stormwater management and treatment plan (as required by **HYD-IAMF#1, Stormwater Management**) would reduce effects from stormwater runoff from new impervious surfaces.

Shared Passenger Track Alternative A would also require the alteration of existing water crossings across natural surface waterbodies and engineered channels through replacement and removal of structures. These modifications could result in permanent effects on hydraulic capacity and connectivity of surface water. Bridge approach embankments, as well as abutments, could also alter the geometry of a drainage channel. These permanent engineered features could result in localized changes to flow characteristics, such as erosion, sedimentation, current, and circulation patterns. As mentioned above, a SWPPP will be applied for construction activities (as required by **HYD-IAMF#3**), which will include construction BMPs to manage the overall amount of

stormwater runoff generated from the construction soil disturbance areas where topography may be permanently modified. These effects would primarily occur along the channel bottom, near the channel banks, and in the direct RSA of new or modified bridges, bridge piers, and culverts. In addition, backwater may constrict the flow at piers, headwalls, inlets, or approach embankments and as a result, may cause a loss in energy and increase the WSE upstream of the structure. The flow passing by the constriction would have an increase in velocity, possibly causing turbulence and scour at the bridge abutments or embankments. Several of the water crossings were discussed under Impact HWR-1: Effect on Floodplains. The project would cross an additional four water crossings with no associated floodplains.

Table 6-2 summarizes the findings from the hydraulic analysis for these four water crossings. For each of the water crossings, the maximum change in the WSE from existing conditions to proposed conditions is identified along with the length of impact.

Table 6-1 Proposed Impervious and Pervious Surface Areas within the Los Angeles to Anaheim Project Section (Shared Passenger Track Alternative A)

Surface Area Type	Existing Acres (%)	Proposed Acres (%)	Change Acres (%)
Impervious surface area	552.3 (76%)	605.4 (83%)	53.1 (7%)
Pervious surface area	178.7 (24%)	125.6 (17%)	-53.1 (-7%)
Total	**731.0 (100%)**	**731.0 (100%)**	**0**

Source: Authority 2024e

Table 6-2 Summary of Hydraulic Analysis of Water Crossings

Waterbody	Maximum Change in WSE (feet)	Existing Bank Elevation	Existing WSE	Proposed WSE	Station	Distance from Crossing[1]	Length of WSE Change (feet) [2]	Structure Type (modifications)
Hobart Channel	0.03	176.97	173.18	173.21	2281.40	+264	0	Box culvert
La Mirada Creek	0.01	91.96	93.72[3]	93.73	1738.19	+541	0	Modify existing bridge
Coyote Creek	0.14[4]	81.37	78.09	78.23	49098.30	-107	256	Box culvert extension
Fullerton Creek	No effect	33.00	29.03	29.03	N/A			Existing box culvert

Sources: Authority 2024b, 2024c
[1] Positive (+) distance = upstream; negative (-) distance = downstream
[2] Length along the centerline of the channel for which the proposed conditions WSE is greater than the existing conditions WSE by more than 0.1 feet.
[3] Although it appears as if the water surface elevation is exceeding the channel banks, this may not be the case. Elevations along the banks and at the crossings have changed since the original as-builts were prepared in 1958. The model uses the data presented in the as-builts for the purpose of assessing changes to the channel hydraulics rather than the potential for flooding to occur.
[4] Along a portion of the creek, the proposed condition WSE decreases up to 0.67 foot or 8 inches.
WSE = water surface elevation

Hobart Channel

The existing open channel would be removed upstream and downstream of the existing culvert. A double 10-foot wide by 4-foot high reinforced concrete block is proposed 170 feet upstream and 70 feet downstream of the existing culvert. Additionally, the E 26th Street realignment would also cross the Hobart Channel. A culvert slab would be placed over the trapezoidal section of Hobart Channel at the realigned E 26th Street. The culvert slab would need to be approved by LACFCD, and it is likely the slab would need to be supported on a new structure as opposed to the existing channel wall. The design flow rate of 321 cfs was used in the model to determine the existing and proposed WSE. The WSE, under proposed conditions, is only slightly greater than existing conditions. Proposed improvements would match the existing level of protection and would not cause conditions within the area to be worse than existing conditions. The maximum increase in WSE is 0.03 foot, approximately 264 feet upstream of the crossing (Authority 2024c).

La Mirada Creek

The two existing railroad bridges at La Mirada Creek would remain, with the northern bridge being modified to support HSR operations. The existing headwall would be demolished and reconstructed because of the modified bridge. The existing box culvert would be protected in place. The bridge modification would extend the existing bridge approximately 42 feet upstream. The maximum increase in WSE would be 0.01 foot approximately 541 feet upstream of the crossing. The existing WSE within La Mirada Creek would be maintained following incorporation of infrastructure improvements and IAMFs (**HYD-IAMF#2, Flood Protection**) proposed to support the project. A short reach of the creek would remain natural downstream of the Stage Road culvert through the area downstream of the second railroad bridge. The maximum increase in WSE from construction of the bridge modification over La Mirada Creek would be approximately 0.01 foot but would not affect a floodplain because there is no floodplain associated with this water crossing. Although it appears as if the flows are exceeding the channel banks, this may not be the case, because it appears that elevations along the banks and at the crossings have changed since the original as-builts were prepared in 1958. The model uses the data presented in the as-builts for the purpose of assessing changes to the channel hydraulics rather than the potential for flooding to occur (Authority 2024c). If existing flows exceed the channel banks and result in localized flooding, the impact of a 0.01-foot rise from the Shared Passenger Track Alternatives would result in a negligible increase in the volume of water and would not result in an increase in substantial flooding.

Coyote Creek

The existing box culvert at the crossing would be extended both upstream and downstream within the channel to accommodate HSR operations. The box culvert would be extended just over 10 feet upstream and just over 21 feet downstream. Because of extensions of the box culvert within Coyote Creek, the project would encroach into the channel; however, the maximum rise in the WSE that would result from implementation would be 0.14 feet, or just under 2 inches. Along a portion of the channel, the WSE would decrease up to 0.67 feet, or 8 inches (Authority 2024d). The WSE increase would not exceed the channel walls (Authority 2024c). The culvert extension would cause the WSE to drop and flow velocities to increase on the upstream side. Minimal changes are expected because the channel includes a wall in the center under existing conditions, and the proposed conditions would involve only adding a cover. The maximum increase in WSE from construction of the proposed box culvert extension over Coyote Creek would be approximately 0.14 foot and does not increase the BFE by greater than 1 foot.

Fullerton Creek

The existing box culvert would remain as is without structural modifications. The railroad tracks would be reconfigured, while the structure would remain the same. As such, no impacts on changes in WSE conditions would occur (Authority 2024c).

Shared Passenger Track Alternative A would also require the alteration of the existing track drainage through replacement and removal of structures. The rail corridor already exists, and construction of the project section would mostly involve adding new tracks and shifting the

existing tracks. However, certain infrastructure may require modifying topography in specific areas for the track and roadway crossings, including roadway embankments for overcrossings, roadway underpasses, at-grade tracks, and bridge and viaduct approaches. Introducing new topographical features to a landscape could result in permanent, localized effects on existing drainage patterns through the introduction of new slopes and drainage systems.

The track drainage would not result in a significant increase in impervious surfaces because the ballast is gravel and considered pervious. However, gravel included in the subballast would be considered impervious. Furthermore, soils beneath the track would be compacted with a gravel surface layer, which would result in slightly reduced infiltration relative to existing soil conditions. Extending or widening the track ballast may affect the drainage patterns in the direct RSA; however, track drainage would be a very small component of the overall drainage area and would not substantially affect the rates and volumes of stormwater runoff in the area (to be confirmed with subsequent engineering studies). Overall, the proposed drainage system would collect, convey, and discharge surface water runoff from the track right-of-way to the existing storm drain system while maintaining the existing drainage pattern to the maximum extent practicable. The existing drainage systems would not be modified as part of drainage improvements, except where the right-of-way would be expanded to accommodate HSR. Additional runoff would be retained on site until the existing system can adequately convey discharge.

Modifications are required at Hobart Yard (Vernon and Commerce) and Commerce Yard (Commerce and Bell) in order to accommodate the tracks. The track relocations at Hobart Yard and Commerce Yard could also redirect and increase the volume and rate of shallow overland flows, increasing the potential for erosion and siltation in areas of exposed soils. However, because these areas are largely impervious surfaces, increases in runoff are anticipated to be nominal compared to existing conditions and proposed modifications would maintain the existing drainage pattern to the maximum extent practicable.

Along the project section, some of the track in the flood-prone areas would be on aerial structures, with only support piers exposed to flow. For aerial structures, it is anticipated that drainage would be captured between the tracks and piped down the columns to existing drainage infrastructure.

The project section includes one trench section between Dale Street and Gilbert Street in Fullerton adjacent to the Fullerton Municipal Airport. Drainage within this segment along the HSR tracks would run toward a low point in the middle of the track and conveyed parallel to the tracks to a sump. Flows collected would be pumped out of the below-grade section and discharge to a proposed detention basin before flows are conveyed to a local existing storm drain (Authority 2024b).

Drainage of the tracks within the at-grade sections would be handled with storm drain piping down grade of the ballast or by allowing the water to infiltrate back into the ground adjacent to the tracks in the open drainage condition. Bioswales are proposed along some at-grade sections when feasible to transport flows on the surface prior to discharging into a storm drain (existing or proposed). Retention basins are also proposed in some locations along the project section. The proposed drainage conditions would closely mimic the existing drainage conditions such that the downstream drainage facilities can support the proposed conditions (Authority 2024b).

The project section crosses 58 roads, most of which are or would be grade separated. Each of the proposed grade separations would trigger LID/green street requirements, because more than 5,000 square feet of impervious area would be replaced. The existing grade separations that do not include road improvements may or may not trigger LID requirements depending on the extent of the work and the impervious area being added or replaced. A LID Plan, Standard Urban Stormwater Mitigation Plan, or Water Quality Management Plan would need to be prepared documenting the LID features incorporated based on the requirements of the local jurisdiction. The runoff volume associated with the 85th percentile, 24-hour storm event would be calculated during final design for the areas included in the grade separation project boundary. For Shared Passenger Track Alternative A improvements within the Caltrans right-of-way, the Authority will comply with the Caltrans MS4 stormwater permit requirements. To offset the potential hydrology

effects associated with new impervious surfaces, the project design will include permanent BMPs required by the applicable CWA Section 402 NPDES MS4 permits, including the Construction General Permit, to avoid potential permanent hydromodification effects consistent with **HYD-IAMF#1** (Authority 2024b).

The Authority has established **HYD-IAMF#1** to reduce potential impacts on hydrology and water quality by requiring the preparation of a stormwater management and treatment plan (SWMTP) for areas of newly acquired right-of-way. These IAMFs will be incorporated into portions of the existing right-of-way that do not currently have stormwater treatment. Implementation of the SWMTP reduces potential stormwater management impacts by evaluating each receiving stormwater system's capacity to accommodate project runoff and identifying stormwater management designed to capture runoff and provide treatment prior to discharge of pollutant-generating surfaces. Such surfaces include access roads, new road over- and underpasses, reconstructed interchanges, and new or relocated roads and highways. Potential structural BMPs include surface infiltration basin, underground cistern, subsurface infiltration system, extended retention wetland, seasonal dry detention pond, built/subsurface flow wetland; low flow diversion pump; sand and media filter, bioretention planter, infiltration pit/drywell, infiltration trench, porous pavement, green street, and hydrodynamic separation device (Authority 2024b). If needed, stormwater infiltration or detention facilities for areas of newly acquired right-of-way will be built in compliance with design standards. Drainage alternatives will be evaluated as more information becomes available. If it is determined that the subdrainage system within the direct RSA would support infiltration to reduce the velocity and volume of runoff, then infiltration devices will be incorporated and would connect to the existing drainage system. Another alternative would be to provide storage systems that will control the discharge of stormwater runoff from Shared Passenger Track Alternative A to maintain the current design capacity.

Furthermore, Shared Passenger Track Alternative A could affect drainage and hydrology by altering the course of a river or stream, unless designed to not impede floodflows (**HYD-IAMF#2**) and accommodate project runoff. The contractor will design piers to minimize backwater effects and local scouring and design the shape and alignment of the piers to minimize negative hydraulic effects. The placement of columns, fill, or other structures, such as wingwalls or abutments, in the floodplain or within channels has the potential to alter drainage patterns and cause localized scour. Erosion control measures will be implemented at the columns and bridge structures to minimize scour and siltation.

The design of bridges and culverts will follow the Authority's *Hydraulic and Hydrology Design Guidelines*. These guidelines represent a compilation of design standards from existing manuals, including: Caltrans Highway Design Manual (2009), American Railway Engineering Maintenance-of-Way Association Manual for Railway Engineering (2008), Southern California Regional Rail Authority (Metrolink) Grade Separation Guidelines (2005), Caltrain Design Criteria (2007), and Federal Highway Administration HEC-14: Hydraulic Design of Energy Dissipaters for Culverts and Channels (2000), HEC-18: Evaluating Scour at Bridges (2001a), HEC-23: Bridge Scour and Stream Stability at Highway Structures (2001b), and HEC-25: Tidal Hydrology, Hydraulics, and Scour at Bridges (2004). The goal of these guidelines is to protect the track and associated infrastructure and facilities from stormwater damage, eliminate nuisance stormwater run-on and runoff, expedite drainage flow, and maintain hydraulic capacity and maintenance and pedestrian access. In addition, **HYD-IAMF#2** establishes design standards that minimize the effects of waterbody crossing structures on surface water hydrology. These design standards include provisions to design site crossings to be as nearly perpendicular to the channel as feasible to minimize bridge length; orient piers to be parallel to the flow direction to minimize flow disturbance; provide adequate clearance for floating debris; analyze potential scour depths to evaluate the depth for burying the bridge piers and abutments; implement scour-control measures to reduce erosion potential; use natural materials like rock stabilized with riparian plantings for erosion control along rivers and streams; and place bedding materials under the stone protection at locations where the underlying soils require stabilization as a result of streamflow velocity. The design standards required by **HYD-IAMF#2** will minimize potential effects on hydraulic capacity and surface water connectivity at each waterbody crossing through design optimization.

Implementing measures, design features, and BMPs, as part of the IAMFs (**HYD-IAMF#1**, **HYD-IAMF#2**, and **HYD-IAMF#3**) for Shared Passenger Track Alternative A, will minimize changes in surface water hydrology.

Operation

Intermittent Permanent Effects

Routine maintenance activities, such as repairing overcrossings or bridges, drainage channels or drainage infrastructure, would temporarily affect drainage patterns and streamflows, and cause temporary increases of suspended sediment and turbidity within a surface waterbody. Specifically, this could occur during activities requiring temporary stream diversion or coffer dams, or other activities conducted in or near surface waters. These activities are anticipated to be performed intermittently during operation. Maintenance and repair of drainages or drainage infrastructure could temporarily affect existing drainage patterns, resulting in a short-term increase in localized erosion or siltation. Maintenance or repair crews would temporarily divert surface flows, if necessary, to a nearby storm drain(s) to maintain proper drainage and implement BMPs to minimize the potential for erosion and siltation.

Operations could result in an intermittent change and increase sediment loads in surface waters. The Authority will apply design features and measures to prevent or minimize these effects, such as stormwater management and treatment (**BIO-IAMF#11**). **BIO-IAMF#11** includes standard construction sites housekeeping practices required to be implemented by maintenance personnel. Stormwater management measures may include infiltration and retention of stormwater runoff, where appropriate, or selected upgrades to the receiving system to provide adequate capacity. Implementing measures, design features, and BMPs, as part of the IAMFs (**HYD-IAMF#1** and **BIO-IAMF#11**) for Shared Passenger Track Alternative A, will minimize changes in surface water hydrology.

6.3.1.2 Shared Passenger Track Alternative B

Effects on drainage patterns, stormwater runoff, and hydraulic capacity would be similar to those of Shared Passenger Track Alternative A, with the exception of the area of temporary disturbance. Up to approximately 939 acres of land would be disturbed, representing a larger distribution of the types of impacts compared to Shared Passenger Track Alternative A. However, the proposed 15th Street LMF included under Shared Passenger Track Alternative B would be built on an area that, under existing conditions, is completely impervious. The proposed 15th Street LMF requires 63.1 more acres than Shared Passenger Track Alternative A.[11] Existing impervious surfaces within the project section cover approximately 75 percent, and the impervious surfaces resulting from construction of Shared Passenger Track Alternative B would cover 83 percent of the area within the project section. Under this alternative, there would be an increase of approximately 8 percent in impervious surface area, or 61.5 acres (Table 6-3). The proposed impervious surface area would represent a greater area of impervious cover and distribution of impacts than Shared Passenger Track Alternative A (605.4 acres), although the types of impacts would be similar. The Authority will comply with the Construction General Permit and prepare a SWPPP for construction activities (as required by **HYD-IAMF#3**), which will include construction BMPs to manage the overall amount of stormwater runoff generated from the construction soil disturbance areas. In addition, the proposed impervious surface area changes represent a greater distribution of similar types of impacts. The project includes design measures to not impede floodflows (as detailed in **HYD-IAMF#2**) and to accommodate project runoff (as detailed in **HYD-IAMF#1**). Furthermore, effects on drainage patterns, stormwater runoff, and hydraulic capacity during operation of Shared Passenger Track Alternative B would result in similar types of impacts as those of Shared Passenger Track Alternative A because similar types of maintenance activities would occur. Standard stormwater housekeeping BMPs will be applied

[11] The 26th Street LMF included as part of Shared Passenger Track Alternative A would be built within an area common between both Shared Passenger Track Alternative A and Shared Passenger Track Alternative B. Even if the 26th Street LMF was not built, the impervious area associated with its location would still be included within the Shared Passenger Track B footprint.

by maintenance personnel to reduce the discharge of pollutants from maintenance areas (**BIO-IAMF#11**). Implementation of an SWMTP will manage the quantity of runoff, as required by the applicable MS4 permits (**HYD-IAMF#1**).

Table 6-3 Proposed Impervious and Pervious Surface Areas within the Los Angeles to Anaheim Project Section (Shared Passenger Track Alternative B)

Surface Area Type	Existing Acres (%)	Proposed Acres (%)	Change Acres (%)
Impervious surface area	588.0 (75%)	649.5 (83%)	61.5 (8%)
Pervious surface area	191.4 (25%)	129.9 (17%)	-61 (-8%)
Total	**779.4 (100%)**	**779.4 (100%)**	**0**

Source: Authority 2024e

6.3.2 Impact HWR-2: Effects on Surface Water Quality

6.3.2.1 Shared Passenger Track Alternative A

Construction

Temporary Construction Effects

The Los Angeles River is currently impaired for bacteria, metals, nutrients, oil, and trash, which could be exacerbated by construction activities associated with Shared Passenger Track Alternative A. Rio Hondo is impaired for bacteria, metals, toxics, trash, and pH, which could be exacerbated by construction activities. San Gabriel River and North Fork Coyote Creek are currently impaired for bacteria and metals, which could be exacerbated by construction activities associated with Shared Passenger Track Alternative A. Coyote Creek is currently impaired for bacteria, metals, toxicity, and pH, which could be exacerbated by construction activities associated with the project.

Construction would involve ground disturbance, including handling, storing, excavating, and placing fill; possible pile driving; aerial structure construction; bridge construction; station relocations, proposed LMF, electrical facilities improvements, and concrete track bed construction. Construction activities such as grading that remove vegetation and expose soil to erosion can also contribute to accelerated erosion rates, which can result in runoff containing sediment that ultimately flows into surface waters. In addition, potentially erosive conditions occur in areas that have a combination of erosive soil types and steep slopes. Soil-disturbing activity during construction (i.e., excavation and grading) can lead to erosion and sedimentation resulting from the exposure of bare soils to stormwater; up to approximately 891 acres could be disturbed. Bare soils are more likely to erode than vegetated areas that provide infiltration and retention. Construction would clear areas of vegetation or otherwise physically disturb them. Surface water quality could be affected by water contaminants generated or inadvertently released during construction (e.g., bacteria from porta potties and trash; metals from construction equipment; nutrients from vegetation; sediments, fuel, and oil from construction equipment and storage; concrete wastes, which may impair pH levels). In addition to potential pollutant contributions from disturbed areas, the delivery, handling, and storage of construction materials and wastes, as well as the use of construction equipment, could introduce a risk for stormwater contamination that could affect water quality. Spills or leaks from heavy equipment and machinery can result in oil and grease contamination. Some hydrocarbon compound pollution associated with oil and grease can be toxic to aquatic organisms at low concentrations. Staging areas or building sites can also be the source of pollution because of the use and temporary storage of paints, solvents, cleaning agents, and metals during construction. Materials from the demolition of existing structures and soil excavation could contain hazardous materials that could be exposed to stormwater. Larger pollutants, such as trash, debris, and organic matter, are also associated with construction activities. Furthermore, concrete, for structures and footings, and other paving materials would be used, which could be potential sources of water quality pollution if these materials were spilled or

deposited on unprotected surfaces. Other potential effects include health hazards and aquatic ecosystem damage associated with the introduction of bacteria, viruses, and vectors if waste management is not adequately implemented.

Construction would temporarily disturb stream channels at water crossings identified in Table 6-5. Some of these crossings would require in-water work for the construction of supporting piers. Stream crossings would be particularly vulnerable to degraded water quality because construction would occur in the stream channel, and contaminants would have a direct path to surface water. Bridge supports in areas of high groundwater or in surface water would require excavation in the stream channel and dewatering of the project footprint. The proximity of flowing water to active construction could provide a direct path for construction-related contaminants to reach surface water. To the extent that construction occurs in a stream channel with flowing water, there could be an increase in silt or sediment in the river during construction.

Shared Passenger Track Alternative A will incorporate erosion and sedimentation controls to stabilize disturbed soils and prevent erosion from occurring along slopes or sediments from entering nearby storm drains and waterbodies (**HYD-IAMF#3** and **GEO-IAMF#1D, Water and Wind Erosion**). Good housekeeping practices will also be incorporated, along with plans regarding spill prevention and response, to prevent discharge of trash, hazardous materials, or other materials to waters (**HYD-IAMF#3** and **BIO-IAMF#11**). Waste management and materials pollution controls (**HMW-IAMF#7, Storage and Transport of Materials**, and **BIO-IAMF#9, Dispose of Construction Spoils and Waste**) will also be included to ensure trash is properly disposed of on a daily basis. The contractor will prepare a SWPPP and will include BMPs, such as coffer dams to temporarily divert flows during in-channel work (**HYD-IAMF#3**). In addition, **HYD-IAMF#3** requires construction activities that involve in-water work to be limited, where feasible, to dry periods when flows in waterbodies are low or absent. These efforts will minimize changes, and overall water quality would remain close to existing conditions within stream channels. Construction would not contribute to a violation of regulatory standards or waste discharge requirements.

Good housekeeping practice BMPs (which include proper handling and managing of construction materials) will also be incorporated, along with plans regarding spill prevention and response, to prevent discharge of trash, hazardous materials, or other materials to waters (as detailed in **BIO-IAMF#11**). BMPs to prevent hazardous material releases and ensure cleanup of hazardous material releases will be required (**HMW-IAMF#6, Spill Prevention**). The implementation entity will also apply Environmental Management System and hazardous materials monitoring plans to limit the potential for spills, and establish cleanup protocols and trained personnel to prevent accidental spills of hazardous materials (as specified in **HMW-IAMF#9, Environmental Management System**, and **HMW-IAMF#10, Hazardous Materials Plans**) during construction. A spill prevention and emergency response plan (**HYD-IAMF#3**) will be implemented to handle potential fuel or hazardous material spills. With proper handling of hazardous materials and proper cleanup of accidental spills, Shared Passenger Track Alternative A will not risk release of pollutants during inundation. Construction will include measures to minimize the potential for impacts on surface and groundwater resources and address necessary cleanup or disposal from undocumented contamination (e.g., previously contaminated soil or other materials), pursuant to **HMW-IAMF#3, Work and Vapor Barriers**, and **HMW-IAMF#4, Known, Suspected, and Unanticipated Environmental Contamination**.

The latest edition of Caltrans' *Project Planning and Design Guide* and *Construction Site BMP Manual* will be used to evaluate, select, and design temporary construction site BMPs for Shared Passenger Track Alternative A. The temporary BMPs selected by the QSD for implementation will be consistent with the practices required under the Construction General Permit (**HMW-IAMF#8, Permit Conditions**) and achieve compliance with its requirements. Compliance with the requirements of the Construction General Permit will reduce or avoid potentially significant construction-related effects on water quality. Further evaluation of the BMPs necessary to comply with the Construction General Permit and minimize potential water quality effects during construction will be detailed during the design phase. The SWPPP is intended to address construction-phase water quality effects, and include, at a minimum, the following elements:

- **Project Description:** The project description includes maps and other information related to construction activities and potential sources of pollutants.
- **Minimum Construction Control Measures:** These measures may include limiting construction access routes, stabilization of areas denuded by construction, and using sediment controls and filtration.
- **Erosion and Sediment Control:** The SWPPP is required to contain a description of soil stabilization practices, control measures to prevent a net increase in sediment load in stormwater, controls to reduce tracking sediment onto roads, and controls to reduce wind erosion.
- **Nonstormwater Management:** The SWPPP includes provisions to reduce and control discharges other than stormwater, such as dewatering.
- **Post-Construction Stormwater Management:** The SWPPP includes a list of stormwater control measures that provide ongoing (permanent) protection for water resources.
- **Waste Management and Disposal:** The SWPPP includes a waste management section regulating equipment maintenance, waste, used oil, batteries, and other wastes. Waste must be disposed of as required by state and federal law. Dumping into surface waters is not permitted.
- **Maintenance, Inspection, and Repair:** The SWPPP requires an ongoing program to maintain, inspect, and repair implemented stormwater management controls.
- **Monitoring:** This provision requires documented inspections of the control measures.
- **Reports:** The contractor's QSP will prepare an annual report on the construction project and submit this report on July 15 each year.
- **Training:** The SWPPP provides documentation on the training and qualifications of the designated QSD and QSP. Trained personnel must do inspections, maintenance, and repair of construction site BMPs.
- **Construction Site Monitoring Program:** The SWPPP includes a Construction Site Monitoring Program detailing the procedures and methods related to the visual monitoring and sampling and analysis plans for nonvisible pollutants, sediment and turbidity, and pH.

Effects on surface water quality would be minimized because construction would not result in changes to surface water quality that would contribute to a violation of regulatory standards or waste discharge requirements, would not create or contribute runoff water that would provide substantial additional sources of polluted runoff, otherwise substantially degrade water quality, or conflict with or obstruct implementation of a water quality control plan.

Permanent Construction Effects

Implementation of Shared Passenger Track Alternative A would result in an overall increase of impervious surfaces from approximately 76 percent of the project site to 83 percent of the project site—an increase of 7 percent or approximately 53 acres of impervious surfaces. New and replaced impervious surfaces collect pollutants from project operations, including sediment, oil and grease, hydrocarbons (e.g., fuels, solvents), heavy metals, organic fertilizers and pesticides, pathogens, nutrients, and debris. These pollutants are mobilized by runoff during storm events and conveyed into surface water either directly or through drainage systems. Therefore, the Shared Passenger Track Alternatives could result in permanent effects on surface water quality.

The change in impervious area of the project section, as well as alteration of other hydrologic characteristics of a watershed (e.g., vegetation removal, contouring) can result in the modification of receiving waterbody hydrographs by increasing the peak flow volumes and rates and peak durations (i.e., hydromodification). Hydromodification typically presents itself as systematic changes to a surface waterbody, including increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding in downstream receiving waters. **HYD-IAMF#1** requires preparation of an SWMTP. Implementation of the SWMTP

reduces potential stormwater management impacts by evaluating each receiving stormwater system's capacity to accommodate project runoff and identifying stormwater management practices to capture runoff and provide treatment for the specific pollutants and impairments prior to discharge. A LID Plan, Standard Urban Stormwater Mitigation Plan, or Water Quality Management Plan will need to be prepared documenting the LID features incorporated based on the requirements of the local jurisdiction (Authority 2024b). For Shared Passenger Track Alternative A improvements within the Caltrans right-of-way, the contractor will comply with the Caltrans MS4 stormwater permit requirements. The use of bioswales and retention basins has been identified for implementation within the project section and both BMPs promote pollutant removal by filtration. Bioswales are effective for reducing runoff volume and total suspended solids, trash, organics, bacteria, nutrients, heavy metals, and oil and grease. Retention basins similarly provide runoff volume control and water quality improvement. Other potential structural BMPs include surface infiltration basin, underground cistern, subsurface infiltration system, extended retention wetland, seasonal dry detention pond, built/subsurface flow wetland, low flow diversion pump, sand and media filter, bioretention planter, infiltration pit/drywell, infiltration trench, porous pavement, green street, and hydrodynamic separation device (Authority 2024b).

Shared Passenger Track Alternative A would modify BNSF's two yards (Commerce and Hobart), several interchanges and build new grade-separated roads at a number of project rail crossings in the project area. The new sources of road runoff from the new crossings, modified BNSF yards, highways, or frontage roads could negatively affect water quality. Therefore, Shared Passenger Track Alternative A will not contribute to a violation of regulatory standards or conflict with or obstruct implementation of a water quality control plan.

Operation

Intermittent Permanent Effects

During operation, the trains and tracks would not be expected to be major pollutant sources. Because the HSR corridor would run parallel to the existing railroad corridor and potential pollutant types would be similar to those of existing railroads, Shared Passenger Track Alternative A would not be expected to introduce new types of pollutants to the Los Angeles and Santa Ana basins in areas near the existing railroad. The presence of Shared Passenger Track Alternative A could increase the amount of the pollutants associated with rail operations (pollutants that may already exist in the watershed) because of increased rail service. The electrically powered trains would use regenerative braking technology, resulting in reduced physical braking and associated wear. The at-grade tracks and elevated guideways would have a minimal amount of pollutant-generating surfaces. Additional pollutant sources, such as residual debris from track wear and trash, would be minimal.

The technology proposed for the California HSR System does not require large amounts of lubricants or hazardous materials for operation compared to the technology for diesel locomotives. However, Shared Passenger Track Alternative A would require maintenance activities and the storage of oil and other materials for equipment maintenance. The majority of materials used for maintenance would be nontoxic and would be stored in covered areas. State and federal laws regulate the storage of hazardous materials; regulated materials will be in maintenance areas with secondary containment to prevent spills, in compliance with good housekeeping practices (**HMW-IAMF#6** and **HMW-IAMF#10**). The contractor will limit the amount of hazardous materials used for HSR operations and have specific cleanup protocols and trained personnel to prevent accidental spills of hazardous materials from reaching surface waterbodies.

Routine vegetation removal along the tracks and associated infrastructure may require land disturbance resulting in increased susceptibility to erosion and sedimentation along slopes. The Authority or its contractors may use herbicides and pesticides along the HSR right-of-way to control weeds and vermin, as required by state and federal regulations. Applicators will apply herbicides and pesticides in a manner that minimizes negative effects on the environment (**HMW-IAMF#6** and **HMW-IAMF#10**).

Applicators will take the following precautions:

- The Authority or its contractors will implement herbicide spraying consistent with the pest control recommendations prepared by a licensed pest control advisor.
- Applicators will follow the requirements on the herbicide label and refer to BMPs regarding mandatory measures to protect sensitive resources as well as employee and public health during herbicide application.
- Herbicide applicators will work under the direction of a person with a qualified applicator license or qualified applicator certificate.
- Storage, loading, and mixing of herbicides will be set back from aquatic features or special-status species or their habitat or sensitive natural communities.
- Application will not occur when weather parameters exceed label specifications (e.g., when wind exceeds a specified speed or when precipitation occurs or is forecast within a specified period) to prevent sediment and herbicides from entering the water resources through surface runoff.

Applicators will follow appropriate laws and regulations pertaining to the use of herbicides and safety standards for employees and the public, as established by USEPA, the California Department of Pesticide Regulation, and local jurisdictions. Applications will adhere to label directions for application rates and methods, storage, transportation, mixing, and container disposal. The contractor will retain state-licensed applicators appropriate for the type of application. Where possible, the contractor will use nontoxic pesticides for vegetation control.

The SWRCB identifies TMDLs for waterbodies that contain high levels of specific pollutants. TMDLs have been identified for several of the surface-water features near the project section (Table 5-5). The Los Angeles River is currently impaired for copper, lead, nutrients, oil, and trash, which could be exacerbated by operational activities associated with Shared Passenger Track Alternative A. Rio Hondo is impaired for copper, lead, toxicity, trash, and zinc, which could be exacerbated by operational activities associated with the Shared Passenger Track Alternatives. Coyote Creek is currently impaired for dissolved copper, iron, pH, and toxicity, which could be exacerbated by operational activities associated with Shared Passenger Track Alternative A. With respect to the pollutants listed on the 303(d) list, the project could contribute additional pollutants to the waterbodies, including copper, lead, oil, and trash. However, because operational activities associated with Shared Passenger Track Alternative A will conform to **HYD-IAMF#1**, the introduction of substantial quantities of these pollutants, including pollutants that would increase existing 303(d)-listed impairments, is not anticipated. **HYD-IAMF#1** requires the preparation of an SWMTP. Implementation of the SWMTP reduces potential stormwater management impacts by evaluating each receiving stormwater system's capacity to accommodate project runoff and identifying stormwater management designed to capture runoff and provide treatment consistent with the applicable MS4 permit requirements. The MS4 permit requires controls to reduce pollutants from the MS4 to the maximum extent practicable. Maximum extent practicable emphasizes pollutant reduction and source control BMPs to prevent pollutants from entering stormwater runoff. Maximum extent practicable may require treatment of the stormwater runoff if it contains pollutants. The maximum extent practicable standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As a result, operation would not contribute to a violation of regulatory standards or waste discharge requirements, create or contribute substantial runoff water that would provide substantial sources of polluted runoff, or otherwise substantially degrade water quality.

Continuous Permanent Effects

Operations could result in increases in the potential for discharges of pollutants into surface waters. The contractor will apply post-construction BMPs to reduce impacts on water quality, as required by the MS4 permit, prior to discharge to the existing storm drain system. Post-construction BMPs include structural and nonstructural BMPs. The types of structural and nonstructural BMPs will be determined during final design based on which BMPs would be the most effective and efficient for the site. Potential structural BMPs include surface infiltration basins, subsurface infiltration systems, seasonal dry detention ponds, sand and media filters, and

infiltration trenches. Nonstructural BMPs are incorporated into the project design and mostly consist of preventive measures such as conserving natural areas, protecting slopes and channels, storm drain stenciling and signage, and vehicle/equipment cleaning. Potential LID measures could include biofiltration and bioretention systems, wet ponds, organic mulch layers, planting soil beds, and vegetated biofilters. With implementation of permanent stormwater BMPs, stormwater runoff will be collected, treated, and discharged in a manner that would not produce excessive erosion or come into contact with pollutant-generating activities. Potential sources of pollutants will be controlled and managed to prevent exposure to stormwater.

The contractor will use pesticides and herbicides in a manner that follows listed precautions and regulatory requirements to prevent sediment and pesticides and herbicides from entering surface waters through surface runoff. In addition, the contractor will apply **HMW-IAMF#6** and **HMW-IAMF#10** and limit the potential for spills, limit the amount of hazardous materials used for HSR operations, and have specific cleanup protocols and trained personnel to prevent accidental spills of hazardous materials and other pollutants from reaching surface waterbodies during operation. As a result of these measures, Shared Passenger Track Alternative A will not contribute to a violation of regulatory standards or waste discharge requirements, would not create or contribute substantial runoff water that would provide substantial additional sources of polluted runoff, or otherwise substantially degrade water quality.

Within the new project section right-of-way, applicable site design, source control, LID design standards, stormwater treatment, and hydromodification management measures will be implemented according to Section F of the Authority's Phase II MS4 permit (**HYD-IAMF#1**). However, the Authority has not yet developed a Stormwater Management Plan or post-construction design standards to comply with the Phase II MS4 permit. The Authority has directed designers to use Caltrans' *Project Planning and Design Guide* for the selection, evaluation, and design of permanent stormwater BMPs. For project improvements within the Caltrans right-of-way, the contractor will comply with the Caltrans MS4 stormwater permit requirements.

The Caltrans *Project Planning and Design Guide* was developed with the intention to reduce, to the maximum extent practicable, pollutant loadings from a project site after construction, and to comply with the Caltrans NPDES permit and Construction General Permit. Permanent stormwater BMPs reduce suspended particulate loads in runoff, and thus pollutants associated with the particles (e.g., certain metals) from entering waterways. The Caltrans *Project Planning and Design Guide* contains guidance on the selection and implementation of many of the Phase II MS4 permit's requirements, such as site design measures, stormwater treatment, and hydromodification management BMPs. Where guidelines for the selection and design of BMPs are not provided in the *Project Planning and Design Guide*, the appropriate RWQCB will be contacted or referenced for guidance.

The HSR system would be electrically powered and would not emit petroleum hydrocarbons or byproducts of internal combustion engines. However, dust generated by braking would be continuously generated and released by trains. Although brake dust would be released into the environment during operations, electric trains use a regenerative braking technology that results in reduced physical braking and associated wear and brake dust compared to conventional petroleum-fueled railroads. In consideration of the potential for brake-pad particles to be emitted into surface waters, the contractor will prepare a SWMTP that complies with applicable MS4 permits prior to construction (**HYD-IAMF#1**). The plan will include stormwater treatment BMPs that reduce the quantity and improve the quality of stormwater runoff before runoff is discharged into a surface waterbody. Potential treatment BMPs installed within the project extent could include infiltration areas, infiltration devices, biofiltration systems, detention devices, media filters, and wet basins. Of these potential treatment BMPs, all are capable of reducing particulate metal concentrations in runoff while only infiltration areas, infiltration devices, biofiltration systems, and media filters can reduce dissolved metals concentrations in runoff (Caltrans 2017). Because stormwater treatment BMPs, including those discussed above, will be provided for new and replaced impervious surfaces, the project extent will minimize potential continuous impacts from brake dust deposited on impervious surfaces by capturing runoff and improving the quality of runoff prior to discharge into waterbodies. Along at-grade and embankment profiles, brake dust is

generally anticipated to be retained in track ballast. Accordingly, permanent stormwater treatment BMPs will minimize potential continuous impacts from brake dust deposited on impervious surfaces by capturing and improving the quality of runoff prior to discharge into waterbodies.

Although not quantifiable at this time, the amount of brake dust that could be discharged into surface waterbodies is not anticipated to be sufficient to substantially alter water quality. Even though certain heavy metals have the potential to bioaccumulate within the aquatic environment or stimulate the growth of microbes, such as algae, resulting in adverse effects on aquatic life, the discharge of metals into surface waterbodies is not likely to cause a violation of the water quality objectives for bioaccumulation and biostimulatory substances. Considering that the project extent will use treatment BMPs to reduce the quantity and improve the quality of runoff generated on new and replaced impervious surfaces, the project extent will minimize potential water quality impacts from brake dust to the maximum extent practicable using the best available technology.

On-site stormwater treatment BMPs will capture runoff and improve the quality of runoff prior to discharge. The implementation of these permanent BMPs will reduce the discharge of sediment and sediment-bound pollutants into surface waters and minimize the exposure of toxic materials (e.g., metals, petroleum hydrocarbons) to surface waters. As a result, construction will not contribute to a violation of regulatory standards or waste discharge requirements, create or contribute substantial runoff water that would provide substantial sources of polluted runoff, or otherwise substantially degrade water quality.

6.3.2.2 Shared Passenger Track Alternative B

Temporary and permanent construction effects on water quality for Shared Passenger Track Alternative B would be similar to those of Shared Passenger Track Alternative A because both would have similar types of improvements. Shared Passenger Track Alternative B would disturb up to approximately 939 acres of land and increase impervious surfaces by approximately 8 percent, or 61.5 acres. However, the proposed impervious surface area would represent a greater area of impervious cover (649.5 acres) and distribution of impacts than Shared Passenger Track Alternative A (605.4 acres), although the types of impacts would be similar. The Authority will implement good housekeeping BMPs and plans regarding spill prevention and response to prevent discharge of trash, hazardous materials, or other materials to waters (as detailed in **BIO-IAMF#11**). Waste management and materials pollution controls (as detailed in **BIO-IAMF#9**, **HMW-IAMF#7**, and **HMW-IAMF#8**) are also included to ensure trash is properly disposed of on a daily basis and materials are transported properly to minimize effects on water quality. Methods will be applied for controlling water and wind erosion of soils per **HYD-IAMF#3** and **GEO-IAMF#1D** to prevent sediments from entering nearby storm drains and waterbodies. BMPs to prevent hazardous material releases and ensure cleanup of hazardous material releases will be required (**HMW-IAMF#6**, **HMW-IAMF#9**, and **HMW-IAMF#10**). Construction will also include measures to minimize impacts on surface water resources and address necessary cleanup or disposal of undocumented contaminants (e.g., previously contaminated soil or other materials), pursuant to **HMW-IAMF#3** and **HMW-IAMF#4**. Preparation and implementation of an SWMTP to accommodate project runoff and identify stormwater management designs that capture runoff and provide treatment prior to discharge of pollutant-generating surfaces would be required (**HYD-IAMF#1**). Furthermore, preparation of a Construction Management Plan will control groundwater withdrawals (as required by **GEO-IAMF#1, Geologic Hazards**). The project includes design measures to avoid or minimize the potential for temporary water quality effects.

Intermittent permanent and continuous permanent operational effects on water quality for Shared Passenger Track Alternative B would be similar to those of Shared Passenger Track Alternative A because both would have similar types of operations. Shared Passenger Track Alternative B would require maintenance activities and the storage of oil and other materials. The majority of materials used for maintenance would be nontoxic and would be stored in covered areas. State and federal laws regulate the storage of hazardous materials; regulated materials will be in maintenance areas with secondary containment to prevent spills, in compliance with good housekeeping practices (**HMW-IAMF#6** and **HMW-IAMF#10**). The Authority or its contractors may use herbicides and pesticides along the HSR right-of-way to control weeds and vermin, as

required by state and federal regulations. Applicators will apply herbicides and pesticides in a manner that minimizes negative effects on the environment (**HMW-IAMF#6** and **HMW-IAMF#10**). Operations could result in increases in the potential for discharges of pollutants into surface waters. The contractor will prepare an SWMTP that complies with applicable MS4 permits prior to construction (**HYD-IAMF#1**). The contractor will apply post-construction BMPs to reduce impacts on water quality, as required by the MS4 permit, prior to discharge to the existing storm drain system. With implementation of permanent stormwater BMPs, stormwater runoff will be collected, treated, and discharged in a manner that would not produce excessive erosion or come into contact with pollutant-generating activities.

6.3.3 Impact HWR-3: Effects on Groundwater Volume, Quality, and Recharge

6.3.3.1 Shared Passenger Track Alternative A

Construction

Temporary Construction Effects

Construction of the project section would require excavations and work in stream channels that may encounter groundwater and could result in temporary effects on groundwater quality and volume. Construction or modification of bridges or culverts (where groundwater levels may be locally higher) could require dewatering. In addition, three grade separations, Norwalk Boulevard, Los Nietos Road, and Pioneer Boulevard, may encounter groundwater during construction of the grade separations approximately 20 to 25 feet below existing grade because the historical high groundwater level is approximately 10 to 20 feet below ground surface. However, the existing groundwater depth is higher than historical depths and below the anticipated excavation depths. If groundwater is encountered during excavation, the quality of the groundwater may be affected during dewatering activities. Based on subsurface data from prior geotechnical investigations and published literature, groundwater depths along the project footprint could range from the ground surface adjacent to rivers, percolation basins, and drainages to depths of greater than 100 feet below ground surface. The shallowest depths are in Norwalk and Santa Fe Springs; the deeper levels are near the I-5 and I-10 intersection. The depth to groundwater can vary seasonally, based on precipitation, pumping practices, recharge, and irrigation (Authority 2025c). Shallow groundwater (less than 50 feet below ground surface) occurs within the direct RSA, especially in locations where the direct RSA is adjacent to surface water features. Groundwater was detected approximately 25 feet below ground surface near the Los Angeles River (Authority 2020). Because depth to groundwater varies across the project section, the amount of dewatering and quality of discharge would depend on the specific location and depth of excavation activities. The amount of dewatering is likely to be relatively small and done in widely spaced locations, and effects from groundwater dewatering would be temporary, because dewatering would cease once construction has been completed.

Specific excavations have a high potential for encountering groundwater, such as building bridge or aerial structure supports (concrete piers), especially in a channel or nearby a surface water feature where groundwater levels may be locally shallower. Dewatering activating can be expected to occur adjacent to surface water features. In addition, certain types of excavations into the groundwater table could degrade groundwater quality and surface water quality if discharged without implementation of appropriate IAMFs. For example, construction of bridge or aerial structure support piers may require drilling that uses a slurry or generate alkaline groundwater that requires dewatering.

To manage groundwater in excavations and temporarily diverted stream channels, the contractor would conduct dewatering activities according to the Los Angeles and Santa Ana RWQCB's dewatering requirements, Construction General Permit, and the Caltrans *Field Guide to Construction Dewatering* to minimize potential effects on groundwater quantity and quality and surface water hydrology and quality. Staging and construction activities could inadvertently disturb sites with previously undocumented contamination or affect previously identified sites with contaminated soil and groundwater, of which there are more than 200 relatively close to the project alignment (Authority 2025e). To the extent feasible, project designs would avoid known

sites (e.g., by elevating segments of the rail line). Where avoidance is not possible, the Authority would coordinate with regulatory entities, develop response plans, provide monitors, or implement other measures, as appropriate (Authority 2025e). Generally, this would consist of treating the water prior to discharge, if required, so discharges do not contain significant quantities of pollutants or hauling the water off site to a treatment facility. Groundwater that meets surface water quality standards may be discharged into a surface waterbody in accordance with applicable dewatering permits. Most dewatering is anticipated to encounter minimal amount of groundwater that, if discharged into a surface waterbody, would cause negligible effects on surface water hydrology.

Groundwater levels in the project section are generally deeper than anticipated excavation depths, except areas adjacent to surface water features. Excavation activities, such as pile driving and utility improvements, could require dewatering, thereby affecting groundwater supplies and quality if construction crews encounter groundwater. Construction activities could result in accidental releases of construction-related hazardous materials that might affect groundwater. Excavations could provide a direct path for construction-related contaminants to reach groundwater. Excavation could disturb both known and undocumented soil or groundwater contamination, resulting in the migration of contaminated groundwater farther into the groundwater table, with the potential for inadvertent contamination of groundwater.

Excavation activities could encounter documented or undocumented soil or groundwater contamination. Contaminated soil could be mobilized by runoff and enter a surface water feature, or contaminated groundwater could be discharged into a surface water through a dewatering system. The contractor will apply erosion control and stormwater BMPs consistent with the Construction General Permit to minimize the potential for sediment-laden runoff to enter surface water features (**HYD-IAMF#3**). In addition, the contractor will undertake studies to document the locations of known soil and groundwater contamination and conduct soil and groundwater sampling in areas of concern to minimize potential effects from subsurface contamination. If undocumented subsurface contamination is discovered during construction, construction will cease, and remedial actions will be coordinated with the jurisdictional groundwater management agency and RWQCB, or other agencies, as needed, to minimize potential effects. Resolution may involve conducting a site investigation, implementing remediation activities, or properly disposing of contaminated materials.

Because of the overall depth to groundwater (more than 50 feet) along the majority of the alignment, the amount of dewatering is likely to be relatively minor. Areas where dewatering is anticipated would be within or adjacent to surface waterbodies. For example, piers, which could be either drilled or driven, would support the overhead structures of the railroad. Bridge supports in areas of shallow groundwater or in surface water could require dewatering during pile driving. Effects from groundwater dewatering would be temporary, because once construction is completed, dewatering would cease.

The contractor would conduct dewatering activities according to Los Angeles and Santa Ana RWQCB dewatering requirements by treating the water prior to discharge so that discharges would not contain significant quantities of pollutants or hauling the water to a treatment facility, in accordance with the Caltrans *Field Guide to Construction Dewatering* (Caltrans 2014). In addition, the contractor will control the amount of groundwater withdrawal, re-inject groundwater at specific locations if necessary, or use alternate foundation designs to offset the potential for groundwater overdraft (**GEO-IAMF#1A, Groundwater Withdrawal**). The contractor will apply measures during construction activities to avoid or minimize groundwater overdraft that are, to the extent feasible, consistent with local groundwater requirements. Methods will be applied to mitigate for the risk of ground failure, such as replacement with competent soils, strengthening with geosynthetics, stone columns and similar approaches, and vertical drains (**GEO-IAMF#1B, Unstable Soils**). The contractor will apply IAMFs to control stormwater runoff and potential infiltration and manage on-site use of hazardous materials, thereby reducing potential effects on groundwater quality. The contractor will apply erosion and sedimentation controls (**HYD-IAMF#1**) as well as waste management and material pollution controls to protect groundwater levels and quality during dewatering activities. In addition, during construction, the contractor will apply

measures to comply with waste discharge requirements during construction dewatering. Therefore, Shared Passenger Track Alternative A will not conflict with or obstruct implementation of a sustainable groundwater management plan.

Permanent Construction Effects

Although the Rio Hondo Spreading Grounds and Raymond Retarding Basin is adjacent to the alignment and used for recharge purposes, no portion of the Spreading Grounds or Raymond Basin would be modified by Shared Passenger Track Alternative A. No portions of the direct groundwater RSA serve as recharge areas; operations would still allow for drainage and infiltration along the alignment, similar to existing conditions. However, Shared Passenger Track Alternative A could affect groundwater recharge through the placement of new or replaced impervious surfaces. Overall, implementation of Shared Passenger Track Alternative A would result in an overall increase of impervious surfaces and could affect recharge through the placement of new impervious surfaces. As presented in Table 6-1, implementation of Shared Passenger Track Alternative A would result in an overall slight increase of impervious surface area (7 percent or approximately 53 acres) across the alignment, relative to the size of the groundwater RSA. The change in impervious cover would result in a negligible change from the existing groundwater recharge capabilities and would not interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table. Furthermore, the project will include project-specific stormwater BMPs, such as infiltration basins to promote surface water infiltration on site. To the extant feasible, vegetated areas will be incorporated into the design to provide for soil infiltration (**HYD-IAMF#1**). Potential effects on groundwater recharge would be minimal. Construction and operation would have a negligible effect on groundwater volume, quality, and recharge because of the likely minimal need for dewatering, minimal change in impervious surface area to interfere with groundwater recharge, and the lack of an ongoing need for groundwater supplies or dewatering during operations. As a result, the changes would be negligible relative to existing conditions.

Operation

Continuous Operational Effects

Because Shared Passenger Track Alternative A would be electrically powered, the track runoff would carry few pollutants. One such pollutant would be brake-pad particles released from the project operation, which could infiltrate groundwater by surface runoff to pervious areas and during storm events. However, even in areas with infiltrative soils, stormwater could percolate into the natural and landscaped areas without affecting groundwater quality. Furthermore, electric trains use a regenerative braking technology that results in reduced physical braking and associated wear and brake dust compared to conventional petroleum-fueled railroads. The contractor will prepare a SWMTP that includes permanent stormwater BMPs that have the capacity to filter particulate and dissolved metals from runoff (**HYD-IAMF#1**). In particular, existing pervious areas used for infiltration, biofiltration devices, infiltration devices, and media filters are BMPs that are capable of removing both particulate and dissolved metals from runoff (Caltrans 2017). Stormwater treatment facilities will be provided for impervious surfaces. Because pervious areas (i.e., soil) can filter both particulate and dissolved metals from runoff, these earthen drainage ditches will provide filtration of metals for runoff that infiltrates into the subsurface in these ditches. Therefore, permanent stormwater BMPs and earthen drainage ditches will minimize potential continuous effects on groundwater quality from brake dust. Although not quantifiable at this time, the amount of brake dust that could enter the groundwater table is not anticipated to be sufficient to substantially alter groundwater quality or violate the groundwater quality objectives for inorganic chemicals, which includes metals. Earthen drainage ditches will provide filtration of metallic brake dust along at-grade and embankment profiles and the Shared Passenger Track Alternatives will incorporate stormwater treatment BMPs to filter runoff from new and replaced impervious surfaces before it percolates into the groundwater table. Thus, the project will minimize potential groundwater quality impacts from brake dust to the maximum extent practicable using the best available technology.

Current water use along this project footprint would not change because no water would be needed for operations. Stormwater management measures such as bioswales and retention basins will be incorporated into the design to allow for infiltration (**HYD-IAMF#1**), which will avoid or minimize potential effects on groundwater recharge. Operations would not involve excavation or other activities that would expose potential pollutants to underlying groundwater aquifers.

6.3.3.2 Shared Passenger Track Alternative B

Temporary permanent and continuous permanent effects on groundwater volume, quality, and recharge during construction for Shared Passenger Track Alternative B would result be similar to those of Shared Passenger Track Alternative A because both would have similar types of construction activities and improvements. Shared Passenger Track Alternative B would result in an increase of approximately 8 percent, or 61 acres, of impervious surfaces. However, the proposed impervious surface area would represent a greater area of impervious cover (649.5 acres) than Shared Passenger Track Alternative A (605.4 acres), representing a greater distribution of the types of groundwater impacts compared to Shared Passenger Track Alternative A. Erosion control and stormwater BMPs will be applied consistent with the Construction General Permit to minimize the potential for sediment-laden runoff to enter surface water features (**HYD-IAMF#3**). The amount of groundwater withdrawal will be controlled (**GEO-IAMF#1** and **GEO-IAMF#1A**) and methods will be applied to mitigate for the risk of ground failure, such as replacement with competent soils, strengthening with geosynthetics, stone columns and similar approaches, and vertical drains (**GEO-IAMF#1B**). Intermittent permanent and continuous permanent effects on groundwater volume, quality, and recharge for Shared Passenger Track Alternative B would be similar to those of Shared Passenger Track Alternative A because both would have similar types of operations. Similar types of operation and associated train brake dust and petroleum-related pollutants would occur that could impair groundwater basins. Preparation of an SWMTP that includes permanent stormwater BMPs that have the capacity to filter particulate and dissolved metals from runoff would be required (**HYD-IAMF#1**). The project includes design measures, such as project-specific stormwater BMPs including infiltration basins, to allow surface water infiltration on site (**HYD-IAMF#1**). Surface water infiltration on site would improve runoff quality from new or replaced impervious surfaces and avoid or minimize the potential for effects on groundwater resources.

6.3.4 Impact HWR-4: Effect on Floodplains and the Risk of Release of Pollutants

6.3.4.1 Shared Passenger Track Alternative A

Shared Passenger Track Alternative A would cross several waterbodies, many of which are vulnerable to flooding. Table 6-4 identifies the major waterbodies and associated floodplains that would be crossed by the project section, none of which include FEMA-mapped regulatory floodways. Shared Passenger Track Alternative A could result in changes to the hydrology, hydraulics, and connectivity of the waterbodies and associated floodplains. Redirecting or impeding floodflows has the potential to redefine flood hazard areas and cause flooding in areas previously not at risk to the 100-year flood. No tsunami or seiche hazard is anticipated because of the location of the project.

Table 6-4 Floodplains Crossed within Resource Study Area

Waterbody/Floodplain	Bottom Material	Responsible for Maintenance	Crossing Type	FEMA Flood Zone	FIRM Map	Approximate Length of Floodplain Crossed (feet)[1]	Approximate Area of Floodplain Impact (acre)[2]
Los Angeles River	Concrete	LACFCD	On existing bridge	A	06037C1636G	0	0
Rio Hondo	Concrete	LACFCD	New bridge and modify existing bridge	A	06037C1830F	192	0.02
San Gabriel River	Earthen	LACFCD	New bridge	AE	06037C1829F	334	0.58
Lakeland Road storm drain	Storm drain	City of Santa Fe Springs	Adjacent – viaduct structure and multiple columns	AE/AH	06037C1841F	264	0
North Fork Coyote Creek	Concrete	LACFCD	New bridge and modify existing bridge	AE	06037C1841F and 06037C1843F	116	0.02
Brea Creek	Concrete	OCFCD	New bridge/extension	AO	06059C0038J	515	0
Lakeside Drive storm drain	Storm drain	City of Buena Park	Adjacent – underpass	AE	06059C0038J and 06059C126J	2,323	2.12
Fullerton Creek	Storm drain	City of Fullerton	Adjacent/at grade	AO	06059C0127J	307	0
Gilbert Street and Artesia Avenue storm drain	Storm drain	City of Fullerton	Extension of box culvert	AO	06059C0127J	209	1.06
Lawrence Ave	Storm drain	City of Fullerton	Adjacent/at grade	AO	06059C0131J	268	0
Yale Ave	Storm drain	City of Fullerton	Adjacent/at grade	AO	06059C0131J	252	0
Balcom Avenue storm drain	Storm drain	City of Fullerton	Extension of box culvert	AO	06059C0131J	365	0
Carbon Creek	Concrete	OCFCD	Box culvert	A/AO	06059C0131J	729	0
Southeast Anaheim Channel	Concrete	City of Anaheim	Reinforced concrete box	AH	06059C0142J	96	0

Sources: FEMA 2023; Authority 2024c

[1] Crossing lengths estimated using GIS, based on FEMA FIRMs and the alignment centerline, which may be elevated and outside the floodplain. Shared Passenger Track Alternative A and Shared Passenger Track Alternative B have the same length of floodplain crossed.

[2] Area of floodplain impact estimated using GIS, based on FEMA FIRMs and the temporary level of disturbance, resulting in temporary impacts. Shared Passenger Track Alternative A and Shared Passenger Track Alternative B have the same area of temporary floodplain impacts.

FEMA = Federal Emergency Management Agency; FIRM = Flood Insurance Rate Map; GIS = geographic information system; LACFCD = Los Angeles County Flood Control District; OCFCD = Orange County Flood Control District; USACE = U.S. Army Corps of Engineers

Construction

Temporary Construction Effects

Construction of the project section would require temporary fill inside of 100-year floodplains regulated by FEMA, which could result in temporary effects on the vertical profile and horizontal extent of existing 100-year floodplains. Construction activity could also result in temporary effects on the existing beneficial floodplain values. Temporary fill within floodplains during construction could include temporary structures such as formworks (temporary molds for new concrete structures), falseworks (temporary supports for new structures), trestles (temporary elevated working surfaces), and cofferdams (temporary structures to isolate work from receiving waters); construction equipment, including excavators and pumps; and construction materials, as well as contractors. Temporary fill could reduce the storage capacity of the floodplain, resulting in localized changes in WSE, flow velocity, or extents of the floodplain to areas that may not have previously experienced flooding. The severity of the effect would be directly related to the volume of temporary fill, because the volume of temporary fill would displace an equal volume of floodwaters and how much rain the Shared Passenger Track Alternative A disturbance area receives. The volume of temporary fill will be determined during construction.

Construction in a floodplain could temporarily impede or redirect floodflows or risk release of pollutants from inundation because of the presence of construction equipment and materials in the floodplain, depending on the activity occurring within a specific area. The proposed design may include construction staging areas in the floodplains that the project section would cross. Although construction activities would be temporary, a construction staging area may be active for several months. Structures stored within staging areas would be small compared to the surrounding areas and would not result in a large obstruction to surface flows. The contractor will prepare a SWPPP for construction activities (**HYD-IAMF#3**), which will include BMPs to manage the overall amount of stormwater runoff and associated pollutants. Consistent with typical SWPPP requirements, weather conditions will be monitored for heavy storms (and potential floodflows) so that construction workers will be notified to relocate construction equipment and minimize the potential flood risk.

Construction could result in a short-term increase in the potential for flooding because materials or structures could temporarily impede or obstruct waters during a storm event or risk release of pollutants during inundation. Implementing flood protection measures during construction, such as storm monitoring and efficiently moving construction equipment out of the floodplain prior to heavy storms (**HYD-IAMF#3**), will prevent Shared Passenger Track Alternative A from impeding or redirecting floodflows during construction. Construction conditions would be similar to existing conditions.

Shared Passenger Track Alternative A would incorporate erosion and sedimentation controls to stabilize disturbed soils and prevent sediments from entering nearby storm drains and waterbodies. Control measures and BMPs can include installing erosion control measures such as silt fences, staked straw bales/wattles, silt/sediment basins and traps, check dams, geofabric, and sandbag dikes to prevent silt runoff to public roadways, storm drains, or waterways and control the release of pollutants. Additional good housekeeping practice BMPs (which include proper handling and managing of construction materials) will also be incorporated, along with plans regarding spill prevention and response, to prevent discharge of trash, hazardous materials, or other materials to waters (as detailed in **BIO-IAMF#11** and **HMW-IAMF#6**).

Environmental Management System and hazardous materials monitoring plans will be implemented to limit the potential for spills and establish cleanup protocols and trained personnel to prevent accidental spills of hazardous materials (as specified in **HMW-IAMF#9** and **HMW-IAMF#10**) during construction. In addition, **HYD-IAMF#3** requires development and application of a spill prevention and emergency response plan to handle potential fuel or hazardous material spills. With proper handling of hazardous materials and proper cleanup of accidental spills, Shared Passenger Track Alternative A would not risk release of pollutants during inundation.

HYD-IAMF#3, **BIO-IAMF#11**, **HMW-IAMF#9**, and **HMW-IAMF#10** will minimize temporary effects on flood-hazard zones resulting in the risk of release of pollutants associated with construction activities. Project features would avoid construction activities in waterbodies when the risk of flooding is greatest and would require the Authority to monitor weather forecasts and relocate equipment and materials temporarily stored in floodplains to minimize risk of pollutant release. Therefore, IAMFs would minimize temporary effects from risk of pollutants in a flood hazard that could otherwise be substantial.

Permanent Construction Effects

Construction of Shared Passenger Track Alternative A would install new bridge and culvert structures or widen existing bridge and culvert structures, as discussed in Table 6-1. Where bridge approaches, abutments, and the structures themselves are in 100-year floodplains regulated by FEMA, the engineered features would be considered fill in floodplains. Shared Passenger Track Alternative A would increase the extent of impervious surface by 14 percent (106 acres) as presented in Table 6-1, and require the replacement, widening, and removal of existing bridge and culvert structures. These potential permanent construction effects could result in the inundation of areas that may not have previously experienced flooding and risk release of pollutants. Shared Passenger Track Alternative A would place permanent fill inside the existing 100-year floodplain. Permanent fill in floodplains is generally associated with grading creek banks, channels, and overbank areas that receive spill flow. In addition, adding new structures or altering existing structures in waterways that are classified as floodplains to accommodate the proposed project structures could include the placement of fill inside a floodplain. Permanent fill in creeks and their overbank areas that are classified as floodplains would reduce the existing storage capacity of the floodflow and the limits of the floodplain would expand to areas that may not have previously experienced flooding to maintain the same storage capacity.

Within the new right-of-way, applicable site design, source control, LID design standards, stormwater treatment, and hydromodification management measures will be implemented according to Section F of the Authority's Phase II MS4 permit. Project-specific BMPs, such as bioswales or infiltration basins, will be developed and implemented to treat runoff and floodflows from areas of new impervious surfaces before entering the stormwater drainage system or recharge basins. The Shared Passenger Track Alternative A stormwater system will direct runoff from new impervious areas in newly acquired rights-of-way to treatment BMPs. Construction associated with the stations will conform to **HYD-IAMF#1**; therefore, the introduction of substantial quantities of pollutants is not anticipated. **HYD-IAMF#1** requires preparation of an SWMTP. Implementation of the SWMTP will reduce potential effects from risk of pollutants in a flood hazard by identifying stormwater management designs that capture runoff and provide treatment prior to discharge of pollutant-generating surfaces.

Environmental Management System and hazardous materials monitoring plans would be applied to limit the potential for spills and establish cleanup protocols and trained personnel to prevent accidental spills of hazardous materials (as specified in **HMW-IAMF#9** and **HMW-IAMF#10**) during construction. A spill prevention and emergency response plan (**HYD-IAMF#3**) will be applied to handle potential fuel or hazardous material spills. With proper handling of hazardous materials and proper cleanup of accidental spills, the project would not risk release of pollutants during inundation. Shared Passenger Track Alternative A would include requirements to conduct preliminary hazards analyses during design and construction. These analyses will determine and address facility hazards and vulnerabilities, thereby preventing impacts, such as risks of flooding, that may occur during operations (**SS-IAMF#3, Hazard Analyses**). With incorporation of these measures into the design of Shared Passenger Track Alternative A, it is not anticipated that there would be a risk of pollutant release from inundation.

Elevated crossings would require support piers in the water channel, and at-grade crossings of stream channels would require bridge abutments on banks and support piers in the water channel. Bridge components would obstruct the ability of the waterbody to convey peak flows by reducing its channel capacity and possibly raising flood elevations locally. Table 6-5 summarizes the major findings from the hydraulic analysis. For each of the floodplain and water crossings, the

maximum change in the WSE from existing conditions to proposed conditions is identified along with the length of impact. The length of impact is the length along the centerline of the channel for which the existing and proposed-conditions WSE are not equal.

The contractor will incorporate design standards for flood protection (**HYD-IAMF#2**) into Shared Passenger Track Alternative A and maintain hydraulic capacity. The following design standards will prevent effects on hydrology and floodplains as a result of modifying existing structures or installing new structures. As part of the design, to the extent practicable, the underside of bridges, or soffits, will be set above the estimated 100-year flood level, and the total width of openings in the embankment will pass the 100-year floodflows without increasing the WSE in the floodway and without increasing the WSE in the floodplain by more than 1 foot, or as required by state or local agencies. Local city or county FEMA-approved floodplain development regulations may have a more stringent WSE increase limit. The Authority will design and place piers to minimize backwater effects and local scouring. Additionally, the Authority will design the shape and alignment of the piers to minimize adverse hydraulic effects. Water crossings will meet the provisions of California Code of Regulations title 23, division 1, which requires that crossings maintain channel flow capacity through measures such as perpendicular crossings (where practical), in-line piers, adequate streambank heights (freeboard), and protection against streambank and channel erosion. With implementation of these design elements (**HYD-IAMF#2**), effects on hydraulic capacity at water crossings will be minimized because a measurable change would not result in an exceedance of the existing capacity of these structures.

Where bridge replacement or modification occurs within a floodplain regulated by FEMA, additional hydraulic studies must occur during the design phase to document the hydraulic performance of the bridge, reduce scour and erosion, identify scour and erosion countermeasures to protect the structure and channel during high flows, and identify and reduce potential effects on floodplain hydraulics. These standards would elevate tracks and orient piers and crossings to maintain river channel capacity at proposed water crossings, thereby minimizing and avoiding impediments to floodflows within floodplains and creek channels as well as the resulting increased flood risks.

The project would require review from USACE under Section 408 where the project would include modifications or alterations of any federal flood control facility built to ensure that its usefulness is not impaired. Section 408 provides that USACE may grant permission for another party to alter a USACE flood control facility upon a determination that the alteration proposed will not be injurious to the public interest and will not impair the usefulness of the facility. Section 408 review would be required for the Rio Hondo, San Gabriel River, North Fork Coyote Creek, and Coyote Creek.[12] Ongoing coordination with LACFCD and USACE would occur for other crossings, as needed.

Shared Passenger Track Alternative A will minimize temporary and permanent effects related to flooding because the contractor will apply measures for flood protection during construction (**HYD-IAMF#1** and **HYD-IAMF#2**), and construction and operational activities will not exceed the capacity of existing facilities (**HYD-IAMF#1**). These measures will minimize increases to the rate or amount of surface runoff in a manner that would result in flooding on or off site, minimize the placement of structures within a 100-year flood-hazard area that would impede or redirect floodflows, and avoid exposure of people or structures to loss, injury, or death involving flooding.

Each of the water crossings and the findings of effects on floodplains from the hydraulic analysis are described further below.

[12] The Los Angeles River and the Santa Ana River are also Section 408 facilities in the project section, but these facilities would not be altered by the project. The Los Angeles River would be crossed on an existing bridge, but the river would not be modified.

Table 6-5 Summary of Hydraulic Analysis within Floodplains

Waterbody	Maximum Change in WSE (feet)	Existing Bank Elevation	Existing WSE	Proposed WSE	Station	Distance from Crossing[1]	Length of WSE Change (feet) [2]	Structure Type (modifications)
Los Angeles River – south of Washington Blvd and north of 26th St	No effect	219.17	209.14	209.14	N/A			Existing bridge – no in-channel work; electrified tracks
Rio Hondo	0.48[3]	164.35	161.00	161.48	27144.00	+269	640	Modify existing bridge
San Gabriel River	0.02	145.78	136.31	136.33	88525.00	+145	0	New bridge
Bond Issue 1214 storm drain	No effect	N/A	N/A	N/A	N/A			Adjacent – existing
Lakeland Road storm drain	No effect	N/A	N/A	N/A	N/A			Adjacent – viaduct structure and multiple columns
North Fork Coyote Creek	No effect	87.13	83.52	83.52	N/A			New and modify existing bridge
Brea Creek	0.10	78.52	76.18	76.28	5220.00	0	165	New bridge/extension
Lakeside Dr	No effect	N/A	N/A	N/A	N/A			Adjacent – underpass
Gilbert St and Artesia Ave	No effect	N/A	N/A	N/A	N/A			Box culvert extension
Balcom Ave storm drain	No effect	N/A	N/A	N/A	N/A			Box culvert extension
Carbon Creek	-2.71	173.33	164.34	161.64	13860.00	+6	0	Box culvert extension
Southeast Anaheim Channel (between State College Blvd and Katella Ave)	No effect	N/A	N/A	N/A	N/A			At grade

Sources: Authority 2024d

[1] Positive (+) distance = upstream; negative (-) distance = downstream

[2] Length along the centerline of the channel for which the proposed conditions WSE is greater than the existing conditions WSE by more than 0.1 feet.

[3] Along a portion of the channel, the proposed condition WSE decreases up to 1.25 feet. The maximum increase in WSE is 0.48 foot, or just under 6 inches, approximately 269 feet upstream of the crossing, while the maximum change in the WSE is 1.27 feet (decrease), or just over 15 inches at the crossing.

In instances when the maximum change in WSE occurred in multiple places, the station closest to the improvements was identified.

N/A = Not applicable/no encroachment; WSE = water surface elevation

Los Angeles River

The project section would travel along the western bank of the Los Angeles River in the city of Los Angeles, adjacent to a Zone AE floodplain, as delineated in the Los Angeles County and Unincorporated Areas FIS, revised by FEMA in 2016 (Authority 2024c). As part of the project, the existing railroad tracks would be shifted and new tracks would be installed to support HSR operations without structural modifications to the existing bridge. No encroachment upon the existing floodplain would occur, and there would be no effect on the floodplain (Authority 2024c). As such, floodplain conditions would remain unchanged from existing conditions.

Rio Hondo

The project section would cross Rio Hondo near the existing spreading grounds in Pico Rivera, between the Montebello/Pico Rivera city boundary and Paramount Boulevard (Authority 2024d). The existing USACE HEC-RAS model served as the basis for modeling the existing and proposed conditions (Authority 2024c). As part of Shared Passenger Track Alternative A, the existing bridge would be modified by removing a portion of a pier wall. A new bridge would be built with a pier in line with the existing pier wall. Because of extensions of the pier wall within Rio Hondo and modified access roads, the project would encroach upon the floodplain; however, the maximum rise in the WSE that would result from implementation would be 0.48 foot, or less than 1 foot, as required by state or local agencies. Along a portion of the channel, the WSE decreases up to 1.25 feet (Authority 2024c). The WSE, under proposed conditions, is only slightly greater than existing conditions both upstream and downstream of the proposed bridge extension. The maximum increase in WSE is 0.48 foot, or just under 6 inches, approximately 269 feet upstream of the crossing, while the maximum change in the WSE at the crossing is a decrease of 1.27 feet or approximately 15 inches. The 0.48-foot WSE increase does not exceed the channel walls (Authority 2024c). The maximum increase in WSE from construction of the proposed new bridge over Rio Hondo would be approximately 0.48 foot. This would be in compliance with the requirements set forth in USEO 11988 and the FEMA regulations, which prevent projects from increasing the BFE by greater than 1 foot or substantially changing the floodplain limits (**HYD-IAMF#2**).

San Gabriel River

The project section would cross the San Gabriel River adjacent to and south of the existing railroad bridge near the Slauson Avenue overpass, just west of I-605 in Pico Rivera (Authority 2024c). As part of HSR implementation, a new HSR bridge would be built over the San Gabriel River between the existing railroad bridge and the Slauson Avenue crossing. The proposed improvements would result in a total of three pier walls within the San Gabriel River. A new pier wall would be built to support the HSR bridge over the San Gabriel River, adjacent to the existing structure; it is anticipated to be slightly more than 13 feet long. The piers would be configured within the river. An additional pier wall that would be modified is along the channel banks but would not significantly affect the river (Authority 2024c). The project would encroach upon the floodplain because of the construction of a pier wall within the San Gabriel River; however, the maximum rise in the WSE that would result from implementation would not be greater than 1 foot, or as required by state or local agencies. The maximum increase in WSE is 0.02 foot. The 0.02-foot WSE increase does not exceed the channel walls (Authority 2024d). The proposed improvements would most likely create turbulent areas in the flow between the proposed piers and the downstream piers for Slauson Avenue bridge. Scour may result between the existing bridge, proposed bridge, and Slauson Avenue crossing from upstream flows nearer to the Slauson Avenue piers. Two-dimensional modeling is recommended to be used during the final design to assess these conditions because a one-dimensional model does not assess intricate flow characteristics, but assumes average flow conditions. The one-dimensional model indicates that the WSE under the proposed conditions is the same as the existing conditions both upstream and downstream of the proposed bridge extension. The maximum increase in WSE is 0.02 foot approximately 145 feet upstream of the crossing. The increase in WSE does not exceed the channel walls (Authority 2024d). The Authority will design the water crossings to maintain existing hydraulic capacity and connectivity and minimize increases in 100-year flood elevations (**HYD-IAMF#2**). These design features will prevent operational effects on hydrology and floodplains.

Bond Issue 1214 Storm Drain

The project section would travel adjacent to a floodplain delineated near an 81-inch RCP, the Bond Issue 1214 Storm Drain, which travels southerly on Vicki Drive and then westerly on Rivera Road where it connects with another storm drain on Rivera Road until it crosses the railroad and continues onto Millergrove Drive in Santa Fe Springs (Authority 2024c). Hydraulic analyses are performed to derive whole-foot BFEs. The project section would not encroach onto the floodplain, and there would be no effect on the floodplain (Authority 2024c). As such, floodplain conditions would remain unchanged from existing conditions. There would be no effect on the floodplain, which is in compliance with the requirements set forth in USEO 11988 and the FEMA regulations (**HYD-IAMF#2**).

Lakeland Road

The project section would run adjacent to a floodplain delineated near an existing storm drain system, which includes a 78-inch RCP, Bloomfield Drain, and a private drainage system for which the existing alignment is unknown but has been noted as a double 48-inch corrugated metal pipe, possibly owned by BNSF (Authority 2024c). This floodplain is between Lakeland Road and Florence Avenue in Santa Fe Springs. Hydraulic analyses were performed for this area; therefore, BFEs were identified. Shared Passenger Track Alternative A in this area would be built on a viaduct structure, and multiple columns are proposed. It is also proposed that the double 48-inch corrugated metal pipe would be relocated to avoid one of the proposed viaduct columns. Where the floodplain is a result of flooding experienced in the local storm drain, HSR implementation would encroach upon the existing floodplain with construction of the viaduct columns. However, it would not result in a WSE increase because there is no defined channel. Therefore, models are not necessary for this area. The Authority will design the viaduct columns to maintain existing hydraulic capacity and connectivity (**HYD-IAMF#2**). These design features will prevent operational effects on hydrology and floodplains. The drainage conveyed by these storm drains would not change as a result of implementation of the project. Therefore, there would be no impact on the floodplain.

North Fork Coyote Creek

The project section would cross North Fork Coyote Creek downstream of the confluence with Milan Creek, adjacent to and north of the existing railroad bridge northwest of the Marquart Avenue and Rosecrans Avenue intersection in Santa Fe Springs (Authority 2024c). The proposed project would not encroach on the floodplain because no improvements are proposed within Milan Creek. Hydraulic analyses were performed for the North Fork Coyote Creek area; therefore, BFEs were identified. The existing railroad bridge over North Fork Coyote Creek would be modified, and a new HSR bridge would be built adjacent to and north of the railroad bridge. The existing pier wall and channel would be modified within North Fork Coyote Creek but outside the floodplain (Authority 2024c). The existing-condition WSE would remain the same once the proposed improvements are built because the pier wall structure would not change with respect to flow obstruction, length, width, or configuration. There would be no change in WSE, which complies with the requirements set forth in USEO 11988 and the FEMA regulations that prevent projects from increasing the BFE by greater than 1 foot or substantially changing the floodplain limits (**HYD-IAMF#2**).

Brea Creek

The project section would cross Brea Creek near the existing railroad bridge east of the Darlington Avenue and Franklin Street intersection in Buena Park (Authority 2024c). The existing railroad bridge over Brea Creek would remain, and a new HSR bridge would be built adjacent to and south of the railroad bridge. Two existing pier walls would be modified within Brea Creek. With modification of two pier walls within Brea Creek, the project would affect the existing floodplain; however, the maximum rise in the WSE that would result from implementation would be 0.10 foot, or less than 1 foot, as required by state or local agencies. The WSE in Brea Creek would increase only marginally with the bridge extension, resulting in the pier wall being extended approximately 42 feet (Authority and FRA 2017). The project section would not directly cross the floodplain but may result in additional floodplain inundation downstream of the crossing as a result of the 0.10-foot WSE rise. The maximum increase in the WSE is 0.10 feet, or just over 1 inch, which occurs at various locations within the creek upstream of the improvements (Authority

2024d). The proposed conditions WSE matches the existing WSE downstream of the improvements (Authority 2024d). This would be in compliance with the requirements set forth in USEO 11988 and the FEMA regulations that prevent projects from increasing the BFE by greater than 1 foot or substantially changing the floodplain limits (**HYD-IAMF#2**).

Lakeside Drive

The project section would travel adjacent to a floodplain delineated near an existing storm drain system, which includes a 55-inch steel pipe, a 54-inch RCP, and an open channel parallel to the existing railroad (Authority 2024c). The existing floodplain has been delineated in the Lakeside community near an existing lake in Buena Park. Shared Passenger Track Alternative A in this area would be surrounded by retaining walls as it transitions to a tunnel. Shared Passenger Track Alternative A drainage would connect to the storm drain on Dale Street. The existing open channel along the railroad would be relocated. The grade separation at Dale Street would be modified with a new bridge structure; the road alignment and grade are anticipated to remain the same. Where the floodplain is a result of flooding experienced in the local storm drain, HSR implementation would encroach upon the existing floodplain because of construction of the tunnel, relocation and connection to the existing drainage system, construction of the new railroad bridges over Dale Street, and modifications to the Dale Street grade separation. However, it would not result in a WSE increase because there is no defined channel and models are not necessary for this area. The drainage conveyed by the storm drain would not change as a result of project implementation; therefore, there would be no impact on the floodplain. The Authority will design the water crossings to maintain existing hydraulic capacity and connectivity and minimize increases in 100-year flood elevations (**HYD-IAMF#2**). These design features will prevent operational effects on hydrology and floodplains.

Gilbert Street and Artesia Avenue

The project section would travel adjacent to a floodplain delineated near an existing storm drain system, which includes a 60-inch RCP that is owned and maintained by the City of Fullerton (Authority 2024c). The existing floodplain is delineated on the south side of the existing railroad, at the intersection of Gilbert Street and Artesia Avenue in Fullerton (Authority 2024c). Shared Passenger Track Alternative A in this area would be built on a fill section. Shared Passenger Track Alternative A drainage would connect to the existing 60-inch RCP along Raymer Avenue on the north side of the railroad. The existing grade separation at Gilbert Street would be modified with a new bridge structure to support HSR operations; the road alignment and grade are anticipated to remain the same. HSR implementation would encroach upon the existing floodplain, but only where the floodplain is a result of flooding experienced in the local storm drain. It would not result in a WSE increase because there is no defined channel and models are not necessary for this area. The drainage conveyed by these storm drains would not change as a result of project implementation (Authority 2024c); therefore, there would be no impact on the floodplain. The Authority will design the water crossings to maintain existing hydraulic capacity and connectivity and minimize increases in 100-year flood elevations (**HYD-IAMF#2**). These design features will prevent operational effects on hydrology and floodplains.

Balcom Avenue Storm Drain

The project section would cross Balcom Avenue Storm Drain near the existing railroad bridge structure south of Lawrence Avenue, south of its intersection with Santa Fe Avenue in Fullerton (Authority 2024c). The existing drainage system consists of a 6- by 3-foot reinforced concrete box upstream along Balcom Avenue; it transitions to an open channel, approximately 5 feet high and 8 feet wide, just upstream of the existing crossing. A culvert is currently used to cross the existing railroad. An 18-inch RCP on Lawrence Avenue joins the open channel just before the system crosses the railroad. Shared Passenger Track Alternative A would demolish the existing open channel, and the box culvert under the railroad would be extended by approximately 41 feet. The HSR drainage would connect to the existing 6- by 3-foot reinforced concrete box on Balcom Avenue; an additional right-of-way may be taken to the north. The HSR implementation may encroach upon the existing floodplains within the right-of-way take areas, depending on the improvements proposed (Authority 2024c). A model was not used to assess the changes in WSE that may occur between the existing and proposed conditions. Under the existing conditions, the existing system restricts flow. During larger storm events, the open channels under the railroad

spill over the channel walls under the railroad alignment and the WSE increases, resulting in flooding (Authority 2024d). The City of Fullerton has prepared conceptual plans depicting a drainage system upgrade near the HSR alignment. It is assumed that the city's drainage improvements would mitigate the existing flooding conditions. Should the City of Fullerton implement the drainage upgrades prior to project implementation, then the drainage system would not experience additional flooding. If Shared Passenger Track Alternative A is built prior to the city's drainage upgrades, then the floodplain would be encroached and the impact of that encroachment would need to be further assessed (Authority 2024c). Proposed conditions include widening the existing rail bridge approximately 7 to 8 feet to accommodate a track as part of the Fullerton Interlocker Project. It is anticipated that the WSE would not be substantially affected, based on the improvements that would be necessary to allow the HSR to cross the existing drainage infrastructure (Authority 2024c). Additional improvements may be necessary and could include covering the existing boxes while maintaining the same size, alignment, and material. The Authority will design the water crossings to maintain existing hydraulic capacity and connectivity and minimize increases in 100-year flood elevations (**HYD-IAMF#2**). These design features will prevent operational effects on hydrology and floodplains.

Carbon Creek

The project section would cross Carbon Creek near the existing railroad bridge, just north of the railroad's intersection with La Palma Avenue in Anaheim (Authority 2024c). Hydraulic analyses were not performed for this area; therefore, BFEs were not identified. An existing-conditions model was developed for Carbon Creek, based on available topographic data, design plans, and hydrologic/hydraulic Water Surface Pressure Gradient data. The existing box culvert under the existing railroad would remain as is with no impacts. Carbon Creek would be realigned downstream of the crossing because of the grade separation proposed at La Palma Avenue. However, the WSE is anticipated to drop by much as 2.7 feet at the crossing location; there would be no change downstream of the realignment (Authority 2024c). The extension of the box culvert would not result in an increase in WSE and would result in flood improvements with the decrease in WSE. This would be in compliance with the requirements set forth in USEO 11988 and the FEMA regulations that prevent projects from increasing the BFE by greater than 1 foot or substantially changing the floodplain limits (**HYD-IAMF#2**).

Southeast Anaheim Channel (Between State College Boulevard and Katella Avenue)

The project section would cross a floodplain along an existing storm drain, which includes a 9- by 9-foot reinforced concrete box, commonly referred to as the Southeast Anaheim Channel, which is owned and maintained by the City of Anaheim. HSR implementation would encroach upon the existing floodplain because the alignment would cross where the floodplain is a result of flooding experienced in the local storm drain. However, the drainage conveyed by these storm drains would not change as a result of project implementation (Authority 2024c). Therefore, there would be no impact on the floodplain. The Authority will design the water crossings to maintain existing hydraulic capacity and connectivity and minimize increases in 100-year flood elevations (**HYD-IAMF#2**). These design features will prevent operational effects on hydrology and floodplains.

Operation

Intermittent Effects from Permanent Facility Maintenance

Intermittent effects on flooding could occur during in-water bridge maintenance activities, such as those requiring temporary coffer dams or other activities conducted in or near waters. Operations and maintenance activities could result in increases in the potential for flooding from the impedance of materials or structures during a storm event. The maintenance contractors will avoid effects on floodflows by implementing flood protection measures during maintenance-related activities; not conducting work during a storm event, including storm monitoring; and maintaining the ability to efficiently move maintenance equipment out of the floodplain. This will prevent conditions within the floodplain that would exceed the capacity of the flood control and drainage systems. In addition, operation and maintenance activities will not place structures that would impede or redirect floodflows within the 100-year flood hazard area. During maintenance activities, the maintenance contractors will monitor weather conditions for heavy storms (and

potential floodflows) so that maintenance crews would be able to relocate construction equipment, which could impede flows and increase flood risks, thereby minimizing the potential flood risk. Train operation would cease in the event of dam failure and inundation that would endanger train and public safety. Shared Passenger Track Alternative A will include requirements to conduct a preliminary hazards analysis during design to determine and address facility hazards and vulnerabilities, thereby preventing impacts—such as risks of flooding and associated release of pollutants—that may occur during operations (as detailed in **SS-IAMF#3**).

Within the new project right-of-way, applicable site design, source control, LID design standards, stormwater treatment, and hydromodification management measures would be applied. Project-specific BMPs, such as bioswales or infiltration basins, would be developed and applied to treat a portion of floodflows before it enters the stormwater drainage system or recharge basins. The Authority will prepare an SWMTP that complies with applicable MS4 permits (as detailed in **HYD-IAMF#1**). The Authority will also implement Environmental Management System and hazardous materials monitoring plans to limit the potential for spills, limit the amount of hazardous materials used for operations, and establish cleanup protocols and trained personnel to prevent accidental spills of hazardous materials (as specified in **HMW-IAMF#9** and **HMW-IAMF#10**). In addition, **HYD-IAMF#3** requires application of a spill prevention and emergency response plan to handle potential fuel or hazardous material spills. With proper handling and storage of hazardous materials and proper cleanup of accidental spills, Shared Passenger Track Alternative A would not increase the risk of release of pollutants during inundation.

6.3.4.2 Shared Passenger Track Alternative B

Shared Passenger Track Alternative B would cross or encroach on 14 floodplain areas, the same crossings as Shared Passenger Track Alternative A Effects on resulting in risk of release of pollutants because of inundation during construction for Shared Passenger Track Alternative B would be similar types of temporary impacts as those of Shared Passenger Track Alternative A because both would have similar types of construction activities within the floodplain. Shared Passenger Track Alternative B would temporarily disturb the same floodplains as Shared Passenger Track Alternative A. However, Shared Passenger Track Alternative B would disturb 939 acres, resulting in a greater area of temporary disturbance (48 acres) than Shared Passenger Track Alternative A (891 acres). Preparation of a SWPPP (as required by **HYD-IAMF#3**) will manage the overall amount of stormwater runoff and associated release of pollutants during construction. Good housekeeping practice BMPs and plans regarding spill prevention and response will also be incorporated to prevent discharge of trash, hazardous materials, or other materials to waters (**BIO-IAMF#11** and **HMW-IAMF#6**). Permanent BMPs identified by **HYD-IAMF#1** will be implemented to reduce effects from stormwater runoff from new impervious surfaces. Implementation of an Environmental Management System and hazardous materials monitoring plans would limit the potential for spills and establish cleanup protocols to prevent accidental spills of hazardous materials (**HMW-IAMF#9** and **HMW-IAMF#10**) during construction. The project includes **HYD-IAMF#3**, **BIO-IAMF#11**, **HMW-IAMF#6**, **HMW-IAMF#9**, and **HMW-IAMF#10** to avoid or minimize the potential for temporary effects resulting in risk of release of pollutants because of inundation. Temporary impacts (areas of disturbance) within the floodplain would be same as those of Shared Passenger Track Alternative A. There would be no permanent impacts within the floodplain. The Authority will design the water crossings to maintain existing hydraulic capacity and connectivity and minimize increases in 100-year flood elevations (**HYD-IAMF#2**). A preliminary hazards analysis will be conducted to address facility hazards and vulnerabilities to prevent the risks of flooding and associated release of pollutants that may occur during operations (**SS-IAMF#3**). During maintenance activities, equipment will be relocated to minimize the potential flood risk or impeded flows (**BIO-IAMF#11**).

6.4 Station Site(s)

As described in Section 2.2.1, Shared Passenger Track Alternative A, the project section would include up to two HSR station facilities at LAUS and ARTIC. LAUS was environmentally cleared as a part of HSR's Burbank to Los Angeles Project Section. This project section would not modify the proposed changes cleared by HSR's Burbank to Los Angeles Project Section. Although the

project would connect to this station, the Draft EIR/EIS and technical reports do not include the LAUS HSR station in the environmental analysis.

The project section additionally includes the option for an intermediate HSR station in either Norwalk/Santa Fe Springs or Fullerton. Only one of the HSR station options, if any, could be approved and would be in addition to the Shared Passenger Track Alternative components. The Norwalk/Santa Fe Springs HSR Station Option would be partially within the existing Norwalk/Santa Fe Springs Transportation Center at 12700 Imperial Highway, on the border of Norwalk and Santa Fe Springs. The Fullerton HSR Station Option would be built directly west of the existing Fullerton Transportation Center at 120 E Santa Fe Avenue in Fullerton. Additional details regarding these station options are provided in Section 2.2.1. The proposed HSR platform and station facilities at ARTIC and intermediate station options for Shared Passenger Track Alternative B would be the same as those for Shared Passenger Track Alternative A.

6.4.1 Impact HWR-1: Effects on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology)

Construction

Temporary Construction Effects

The additional station facilities at the Norwalk/Santa Fe Springs or Fullerton HSR Station Option, such as platforms, station buildings, parking areas, loading areas, and substation areas, could affect existing drainage patterns as well as receiving stormwater distribution systems. Construction staging areas would temporarily disturb soil and landscape vegetation and could require minor grading to create a level working surface. Construction activities associated with the proposed station improvements could result in increased polluted stormwater runoff from demolition of existing structures, grading and excavation, filling and compaction, pavement removal, repaving, track installation, trenching for utility infrastructure protection/relocation, and construction of new structures. The station improvements could redirect and increase the volume and rate of shallow overland flows, increasing the potential for erosion and siltation in areas of exposed soils.

The temporary station construction activities could result in a short-term change in drainage patterns or an increase in sediment loads in nearby surface waters following land disturbance or other construction activities. Effects on surface water hydrology will be reduced because the contractor will maintain preproject runoff volume and rates (as required by the Construction General Permit) and implement measures to minimize associated erosion and sedimentation, consistent with **HYD-IAMF#3**. The contractor's QSD will prepare the SWPPP, which will include temporary drainage design plans, and identify stormwater BMPs to minimize effects related to stormwater runoff, erosion, and sedimentation. Standard BMPs used during construction include measures to provide permeable surfaces or vegetated areas, where feasible, to retain or detain stormwater on site; flow dissipation measures to reduce the rates of stormwater runoff along steep slopes and prevent resulting erosion and sedimentation; and measures for in-water work and dewatering at stream crossings to minimize temporary changes to creek and stream hydrology, potentially resulting in erosion or siltation. Temporary and permanent BMPs, such as sediment traps; velocity dissipation devices, such as check dams and outfall protection features; and detention/retention/infiltration facilities, will be incorporated into the temporary drainage design plans as necessary to reduce short-term increases in sediment transport and minimize potential temporary hydrology effects during construction. The contractor's QSP will be responsible for implementing the SWPPP, as required by **HYD-IAMF#3**.

Construction of the operational HSR station facilities will incorporate erosion and sedimentation controls to stabilize disturbed soils and prevent erosion from occurring along slopes or sediments from entering nearby storm drains and waterbodies. Good housekeeping practices will also be incorporated, along with plans regarding spill prevention and response, to prevent discharge of trash, hazardous materials, or other materials to waters, as required by **HYD-IAMF#3**. Waste management and material pollution controls will also be included. The contractor will apply measures and BMPs and comply with permit requirements to minimize the potential effects on

water quality during construction. These efforts will minimize changes, and overall water quality would remain close to existing conditions within stream channels. Construction would not contribute to a violation of regulatory standards or waste discharge requirements.

Permanent Construction Effects

The station facilities for the Norwalk/Santa Fe Springs or Fullerton HSR Station Option would be in addition to the Shared Passenger Track Alternatives. In addition, the Shared Passenger Track Alternatives would include HSR station facilities at ARTIC and relocate the Commerce and Buena Park Metrolink Stations. The stations would consist primarily of impermeable surfaces such as roofs, platforms, ramps, stairs, buildings, parking areas, and other hard structures. The additional station facilities at the Norwalk/Santa Fe Springs or Fullerton HSR Station Option sites, as well as facilities at ARTIC—such as platforms, station buildings, parking areas, loading areas, and substation areas—could affect existing drainage patterns as well as stormwater distribution systems. Introducing impervious surfaces where they currently do not exist would have the potential to increase the rate and amount of stormwater runoff and cause erosion in areas adjacent to the new impervious surface. The expansions/reconstruction for the HSR stations and Metrolink station relocations occur on already developed sites with high impervious surface percentages. It is assumed that the new stations would be approximately 100 percent impervious, which is consistent with existing conditions (Authority 2024e). All of the proposed improvements to the stations would occur in areas that already include impervious surfaces. The Shared Passenger Track Alternatives would comply with local MS4 permit drainage requirements. The stations would be required to implement stormwater design features and BMPs that would reduce the volume and rate of stormwater runoff draining to the stormwater system. Construction of new impervious surfaces would increase runoff, unless stormwater management and treatment measures are implemented. Potential structural BMPs include surface infiltration basin, underground cistern, subsurface infiltration system, extended retention wetland, seasonal dry detention pond, built/subsurface flow wetland, low flow diversion pump, sand and media filter, bioretention planter, infiltration pit/drywell, infiltration trench, porous pavement, green street, and hydrodynamic separation device (Authority 2024b).

High-Speed Rail Station Options

High-Speed Rail Station Option: Norwalk/Santa Fe Springs

The Norwalk/Santa Fe Springs HSR Station Option would result in the same types of temporary impacts on drainage patterns, stormwater runoff, and hydraulic capacity as those of the Shared Passenger Track Alternatives. The types of temporary impacts would be similar in nature, and construction of the HSR station platform, facilities, and parking would occur within the same footprint area that would be modified under the Shared Passenger Track Alternatives. Overall, the area of temporary disturbance associated with construction of the Norwalk/Santa Fe Springs HSR Station Option would be up to approximately 28.07 acres of land, with similar types of impacts as described above. Introducing new impervious surfaces where they currently do not exist would increase the rate and amount of stormwater runoff in areas adjacent to the new impervious surfaces and in new or existing drainage channels. The construction of the Norwalk/Santa Fe Springs HSR Station Option would occur on an area already covered by impervious surfaces totaling 28.06 acres or 99.96 percent (pervious area encompasses 0.01 acre). As a result, runoff volumes and rates conveyed to storm drains would remain similar to existing conditions. Disturbed soil areas and construction activities would be associated with the proposed station and tracks. The Authority will apply a SWPPP (**HYD-IAMF#3**) and construction BMPs (**BIO-IAMF#11**) to avoid or minimize erosion and sedimentation from increased rates and volumes of flows. Application of an SWMTP (**HYD-IAMF#1**) will reduce stormwater management effects, identify stormwater management BMPs designed to capture runoff, and provide treatment prior to discharge from pollutant-generating surfaces. The project will incorporate design measures **HYD-IAMF#3** and **BIO-IAMF#11** to avoid or minimize the potential for surface water hydrology effects.

High-Speed Rail Station Option: Fullerton

The Fullerton HSR Station Option would result in overall similar types of temporary impacts on drainage patterns, stormwater runoff, and hydraulic capacity as those of the Shared Passenger

Track Alternatives. Although the types of temporary impacts would be similar in nature, the area of temporary disturbance would be up to approximately 20.41 acres of land, with similar types of impacts as described above. Disturbed soil areas and construction activities would be associated with the proposed station and tracks. Introducing new impervious surfaces where they currently do not exist would increase the rate and amount of stormwater runoff in areas adjacent to the new impervious surfaces and in new or existing drainage channels. The construction of an Fullerton HSR Station Option would occur over 9.77 acres on an area generally already covered by impervious surfaces, and would result in an additional 8.9 acres of impervious surface cover. As a result, runoff volumes and rates conveyed to storm drains would remain similar to existing conditions. Application of an SWMTP (**HYD-IAMF#1**) will reduce stormwater management effects, identify stormwater management BMPs designed to capture runoff, and provide treatment prior to discharge from pollutant-generating surfaces. The project will incorporate design measures **HYD-IAMF#3** and **BIO-IAMF#11** to avoid or minimize the potential for temporary surface water hydrology impacts.

6.4.1.1 Operation

The contractor will reduce effects on surface water hydrology during design by implementing stormwater management and treatment measures identified in **HYD-IAMF#1**, such as stormwater infiltration or detention facilities at each of the stations. **HYD-IAMF#1** requires preparation of an SWMTP and identification of the applicable stormwater management and treatment measures. Implementation of the SWMTP will reduce potential stormwater management impacts by evaluating each receiving stormwater system's capacity to accommodate project runoff and identifying stormwater management designs that capture runoff and provide treatment prior to discharge of pollutant-generating surfaces. Drainage under proposed conditions would closely mimic drainage under existing conditions drainage so that downstream drainage facilities would be able to support the proposed conditions. Other measures will include upgrading the existing storm drain system and incorporating LID measures within areas of new impervious surfaces to prevent stormwater runoff rates and volumes from exceeding the receiving stormwater system's capacity. The Norwalk/Santa Fe Springs HSR Station Option and the relocated Commerce Metrolink Station will comply with the LID requirements set forth by the County of Los Angeles and local jurisdictions, while the Fullerton HSR Station Option and proposed HSR station platform and facilities at ARTIC and the relocated Buena Park Metrolink Station will comply with the Water Quality Management Plan requirements set forth by the County of Orange and local jurisdictions. Runoff generated by the 85th percentile 24-hour storm event will be required to be mitigated using infiltration or capture as well as BMPs, if feasible. The contractor will apply stormwater management and treatment plans to manage and treat stormwater flows, as required by the applicable MS4 permit, and maintain preproject hydrology.

With implementation of **HYD-IAMF#1**, the stations will not contribute to a violation of regulatory standards or waste discharge requirements.

High-Speed Rail Station Options

High-Speed Rail Station Option: Norwalk/Santa Fe Springs

The Norwalk/Santa Fe Springs HSR Station Option would result in the same types of effects on surface water quality as the Shared Passenger Track Alternatives. Pollutants associated with railroad operations include brake dust, which would be generated mostly in areas where the trains must reduce their speed, such as approaches to stations. Existing pervious areas, biofiltration devices, infiltration devices, and media filters are permanent BMPs capable of removing both particulate and dissolved metals from runoff. Brake dust that flows through these stormwater treatment measures would be filtered out before being discharged into a waterbody or storm drainage system, reducing intermittent permanent impacts on surface water quality. The project includes design measures **HYD-IAMF#1** and **BIO-IAMF#11** to avoid or minimize the potential for effects on surface water quality. The Norwalk/Santa Fe Springs HSR Station Option will comply with the LID requirements set forth by the County of Los Angeles and local jurisdictions.

High-Speed Rail Station Option: Fullerton

The Fullerton HSR Station Option would result in the same types of effects on surface water quality as the Shared Passenger Track Alternatives. Pollutants associated with railroad operations include brake dust, which would be generated mostly in areas where the trains must reduce their speed, such as approaches to stations. Existing pervious areas, biofiltration devices, infiltration devices, and media filters are permanent BMPs capable of removing both particulate and dissolved metals from runoff. Brake dust that flows through these stormwater treatment measures would be filtered out before being discharged into a waterbody or storm drainage system, reducing effects on surface water quality. The project includes design measures **HYD-IAMF#1** and **BIO-IAMF#11** to avoid or minimize the potential for intermittent and continuous permanent impacts on surface water quality. The Fullerton HSR Station Option will comply with the Water Quality Management Plan requirements set forth by the County of Orange and local jurisdictions.

6.4.2 Impact HWR-2: Effects on Surface Water Quality

Temporary Construction Effects

Construction activities for station facilities at the Norwalk/Santa Fe Springs or Fullerton HSR Station Option sites and the proposed components at ARTIC would involve ground disturbance, including handling, storing, excavating, and placing fill. Soil-disturbing activity during construction (i.e., excavation and grading) can lead to erosion and sedimentation resulting from the exposure of bare soils to stormwater. Bare soils are more likely to erode than vegetated areas that provide infiltration and retention d. Surface water quality could be affected by water contaminants generated or inadvertently released during construction (e.g., sediments, fuel, oil, concrete). In addition to potential pollutant contributions from disturbed areas, the delivery, handling, and storage of construction materials and wastes, as well as the use of construction equipment, could introduce a risk for stormwater contamination that could affect water quality. Spills or leaks from heavy equipment and machinery can result in oil and grease contamination. Some hydrocarbon compound pollution associated with oil and grease can be toxic to aquatic organisms at low concentrations. Staging areas can also be the source of pollution because of the use and temporary storage of paints, solvents, cleaning agents, and metals during construction. Materials from the demolition of existing structures and soil excavation could contain hazardous materials that could be exposed to stormwater. Larger pollutants, such as trash, debris, and organic matter, are also associated with construction activities. Furthermore, concrete, for structures and footings, and other paving materials would be used, which could be potential sources of water quality pollution if these materials were spilled or deposited on unprotected surfaces. Other potential effects include health hazards and aquatic ecosystem damage associated with the introduction of bacteria, viruses, and vectors if waste management is not adequately implemented.

The Norwalk/Santa Fe Springs HSR Station Option, Fullerton HSR Station Option, and ARTIC will incorporate erosion and sedimentation controls to stabilize disturbed soils and prevent erosion from occurring along slopes or sediments from entering nearby storm drains. Good housekeeping practices will also be incorporated, along with plans regarding spill prevention and response, to prevent discharge of trash, hazardous materials, or other materials to waters, as detailed in **HYD-IAMF#3**. Waste management and materials pollution controls will also be included. The contractor will prepare a SWPPP that will include BMPs to protect water quality. The contractor will apply measures and BMPs and comply with permit requirements and would not conflict with or obstruct implementation of a water quality control plan to minimize the potential effects on water quality during construction.

Permanent Construction Effects

The Norwalk/Santa Fe Springs HSR Station Option, Fullerton HSR Station Option, and ARTIC improvements would include platforms, station buildings, parking areas, loading areas, and substation areas. The additional platforms, station buildings, loading areas, and parking areas could be additional sources of polluted runoff, potentially generating pathogens, heavy metals,

nutrients, pesticides, organic compounds, sediments, trash, debris, and oil and grease. Project-specific BMPs, such as infiltration type BMPs, capture and use BMPs, or biofiltration BMPs, would be developed and implemented to treat runoff from the new impervious surfaces before entering the stormwater drainage system or recharge basins. Potential structural BMPs include surface infiltration basin, underground cistern, subsurface infiltration system, extended retention wetland, seasonal dry detention pond, built/subsurface flow wetland, low flow diversion pump, sand and media filter, bioretention planter, infiltration pit/drywell, infiltration trench, porous pavement, green street, and hydrodynamic separation device (Authority 2024b). The stormwater system design for the stations would accommodate runoff and provide stormwater quality treatment for new impervious areas of acquired right-of-way. The station stormwater system would direct runoff from new impervious areas in newly acquired rights-of-way to treatment BMPs.

High-Speed Rail Station Options

High-Speed Rail Station Option: Norwalk/Santa Fe Springs

The Norwalk/Santa Fe Springs HSR Station Option would result in the same types of water quality effects as those of the Shared Passenger Track Alternatives. Construction of the Norwalk/Santa Fe Springs HSR Station Option would disturb approximately 28.07 acres of land. The types of temporary impacts would be similar in nature as described above; however, no waterbodies would be crossed for construction of the Norwalk/Santa Fe Springs HSR Station Option. The project includes design measures **BIO-IAMF#11**, **BIO-IAMF#9**, **HMW-IAMF#7**, **HMW-IAMF#8**, **HYD-IAMF#3**, **GEO-IAMF#1D**, **HMW-IAMF#6**, **HMW-IAMF#9**, and **HMW-IAMF#10** to minimize effects on water quality including erosion and to prevent hazardous materials release. Construction will also include measures to minimize impacts on surface water resources and address necessary cleanup or disposal of undocumented contaminants (**HMW-IAMF#3** and **HMW-IAMF#4**) and requirements related to groundwater resources (**GEO-IAMF#1**). These measures will avoid or minimize the potential for water quality effects.

High-Speed Rail Station Option: Fullerton

The Fullerton HSR Station Option would result in overall similar types of surface water quality effects as those of the Shared Passenger Track Alternatives. Construction of the Fullerton HSR Station Option would disturb approximately 20.41 acres of land. The types of temporary impacts would be similar in nature; however, no waterbodies would be crossed for construction of the Fullerton HSR Station Option. The project incorporates design measures **BIO-IAMF#11**, **BIO-IAMF#9**, **HMW-IAMF#7**, **HMW-IAMF#8**, **HYD-IAMF#3**, **GEO-IAMF#1D**, **HMW-IAMF#6**, **HMW-IAMF#3**, **HMW-IAMF#4**, **HMW-IAMF#9**, **HMW-IAMF#10**, and **GEO-IAMF#1** to avoid or minimize the potential for water quality effects.

6.4.2.1 Operation

Operation and maintenance of the additional platforms, station buildings, loading areas, and parking areas could contribute to additional sources of polluted runoff, potentially generating pathogens, heavy metals, nutrients, pesticides, organic compounds, sediments, trash, debris, and oil and grease. Project-specific BMPs, such as infiltration type BMPs, capture and use BMPs, or biofiltration BMPs, would be developed and implemented to treat runoff before it enters the stormwater drainage system or recharge basins. The station stormwater system would direct runoff to treatment BMPs. It would not result in water quality changes in local waterbodies. However, because operational activities associated with the stations will conform to **HYD-IAMF#1**, the introduction of substantial quantities of pollutants, including pollutants that would increase existing CWA 303(d)-listed impairments, is not anticipated. **HYD-IAMF#1** requires preparation of an SWMTP. Implementation of the SWMTP will reduce potential stormwater management impacts by evaluating each receiving stormwater system's capacity to accommodate project runoff and identifying stormwater management designs that capture runoff and provide treatment prior to discharge of pollutant-generating surfaces.

High-Speed Rail Station Options

High-Speed Rail Station Option: Norwalk/Santa Fe Springs

The Norwalk/Santa Fe Springs HSR Station Option would result in overall similar types of effects on surface water quality as the Shared Passenger Track Alternatives. Pollutants associated with railroad operations include brake dust, which would be generated mostly in areas where the trains must reduce their speed, such as approaches to stations. Existing pervious areas, biofiltration devices, infiltration devices, and media filters are permanent BMPs capable of removing both particulate and dissolved metals from runoff. Brake dust that flows through these stormwater treatment measures would be filtered out before being discharged into a waterbody or storm drainage system, reducing intermittent permanent impacts on surface water quality. The project includes design measures **HYD-IAMF#1**, **HMW-IAMF#6**, and **HMW-IAMF#10** to avoid or minimize the potential for effects on surface water quality.

High-Speed Rail Station Option: Fullerton

The Fullerton HSR Station Option would result in overall similar types of effects on surface water quality as the Shared Passenger Track Alternatives. Pollutants associated with railroad operations include brake dust, which would be generated mostly in areas where the trains must reduce their speed, such as approaches to stations. Existing pervious areas, biofiltration devices, infiltration devices, and media filters are permanent BMPs capable of removing both particulate and dissolved metals from runoff. Brake dust that flows through these stormwater treatment measures would be filtered out before being discharged into a waterbody or storm drainage system, reducing intermittent permanent impacts on surface water quality. The project includes design measures **HYD-IAMF#1**, **HMW-IAMF#6**, and **HMW-IAMF#10** to avoid or minimize the potential for effects on surface water quality.

6.4.3 Impact HWR-3: Effects on Groundwater Volume, Quality, and Recharge

6.4.3.1 Construction

Because of the overall depth to groundwater (more than 50 feet) at the HSR (ARTIC) and Metrolink stations, the amount of dewatering is likely to be relatively minor, if any. Effects from groundwater dewatering would be temporary because once construction is completed, dewatering would cease. The contractor will conduct dewatering activities according to Los Angeles and Santa Ana RWQCB dewatering requirements by treating the water prior to discharge so that discharges would not contain significant quantities of pollutants or hauling the water to a treatment facility, in accordance with the Caltrans *Field Guide to Construction Dewatering* (Caltrans 2014). The Authority or its contractor will implement measures during construction activities to avoid or minimize groundwater overdraft that are, to the extent feasible, consistent with local groundwater requirements. The amount of groundwater withdrawal will be controlled, pursuant to **GEO-IAMF#1A**. In addition, the Authority will control the amount of re-inject groundwater at specific locations if necessary, or use alternate foundation designs to offset the potential for groundwater overdraft (as detailed in **GEO-IAMF#1**). Methods will be applied to mitigate for the risk of ground failure, such as replacement with competent soils, strengthening with geosynthetics, stone columns and similar approaches, and vertical drains (**GEO-IAMF#1B**). The contractor will apply IAMFs to control stormwater runoff and manage on-site use of hazardous materials, thereby reducing potential effects on groundwater quality. The contractor will apply erosion and sedimentation controls, as detailed in **HYD-IAMF#3**, as well as waste management and material pollution controls to protect groundwater levels and quality during dewatering activities. In addition, during construction, the contractor will apply measures to comply with waste discharge requirements during construction dewatering and will not conflict with or obstruct implementation of a sustainable groundwater management plan.

The Shared Passenger Track Alternatives could affect groundwater recharge through the placement of new impervious surfaces and creation of a new and continuous source of pollutants that could affect groundwater quality. The Shared Passenger Track Alternatives could result in permanent effects on groundwater quality and quantity. Construction of new impervious surfaces,

including modified roadways and parking lots may reduce pervious areas available for infiltration and groundwater recharge. In addition, impervious surfaces collect pollutants, such as sediment, oil and grease, hydrocarbons (e.g., fuels, solvents), heavy metals, organic fertilizers and pesticides, pathogens, nutrients, and debris. These pollutants are mobilized by runoff during storm events and could percolate into the groundwater table. Therefore, the Shared Passenger Track Alternatives could result in permanent effects on groundwater quality and quantity. Overall, relative to the size of the groundwater RSA, the Shared Passenger Track Alternatives would not result in a large area of new impervious surfaces and would not affect existing recharge areas. The drainage systems will direct stormwater runoff from the station facilities into stormwater management features that promote treatment, infiltration, and groundwater recharge, as required by applicable MS4 permits, as detailed in **HYD-IAMF#1**. Furthermore, to the extent feasible, vegetated areas will be incorporated into the design to provide for soil infiltration from new impervious surfaces to minimize the effects from an overall increase in impervious surfaces.

The stormwater management and treatment plan required by **HYD-IAMF#1** will include permanent stormwater BMPs that manage the quantity and quality of runoff from impervious surfaces. Within the right-of-way, applicable site design, source control, LID design standards, stormwater treatment, and hydromodification management measures will be implemented. Potential LID measures could include built wetland systems, biofiltration and bioretention systems, organic mulch layers, soil beds, and vegetated biofilters.

High-Speed Rail Station Options

High-Speed Rail Station Option: Norwalk/Santa Fe Springs

The Norwalk/Santa Fe Springs HSR Station Option would result in the same types of effects on groundwater volume, quality, and recharge as those of the Shared Passenger Track Alternatives. The project includes design measures **HYD-IAMF#3**, **GEO-IAMF#1A**, **GEO-IAMF#1B**, and **GEO-IAMF#1** to minimize impacts on groundwater quality and volume during construction including compliance with dewatering requirements. The project includes design measures such as infiltration basins to promote surface water infiltration on site, as required by **HYD-IAMF#1**. Infiltration basins would also improve runoff quality from new or replaced impervious surfaces and avoid or minimize the potential for effects on groundwater resources.

High-Speed Rail Station Option: Fullerton

The Fullerton HSR Station Option would result in overall similar types of effects on groundwater volume, quality, and recharge as those of the Shared Passenger Track Alternatives. The project includes design measures to reduce groundwater quality impacts including sediment through preparation of a dewatering plan (**HYD-IAMF#3**) and will manage groundwater withdrawals and resources (**GEO-IAMF#1**, **GEO-IAMF#1A**, and **GEO-IAMF#1B**) to avoid or minimize the potential for temporary groundwater impacts. The project includes design measures such as project-specific stormwater BMPs to improve runoff quality from new or replaced impervious surfaces (**HYD-IAMF#1**) and avoid or minimize the potential for effects on groundwater resources.

6.4.3.2 Operation

No portions of the station facility improvements for HSR or Metrolink stations serve as recharge areas; operations would still allow for drainage and infiltration within the station area, similar to existing conditions.

Stormwater BMPs will reduce, to the maximum extent practicable, pollutant loadings from a project site after construction. Potential LID measures could include built wetland systems, biofiltration and bioretention systems, organic mulch layers, soil beds, and vegetated biofilters. Permanent stormwater BMPs reduce suspended particulate loads in runoff and thus prevent pollutants associated with the particles (e.g., certain metals) from entering waterways, including some dissolved contaminants that could percolate into a groundwater aquifer and degrade groundwater quality. Station facilities will be designed to minimize exposure of pollutants to runoff and subsequent percolation into groundwater aquifers. Potential effects on groundwater recharge would be minimal.

High-Speed Rail Station Options

High-Speed Rail Station Option: Norwalk/Santa Fe Springs

The Norwalk/Santa Fe Springs HSR Station Option would result in overall similar types of effects on groundwater volume, quality, and recharge as the Shared Passenger Track Alternatives. Pollutants associated with railroad operations include brake dust, which would be generated mostly in areas where the trains must reduce their speed, such as approaches to stations. Stormwater treatment measures would filter particulate and dissolved metals associated with brake dust before being discharged into a waterbody or storm drainage system, reducing intermittent and continuous permanent impacts on groundwater. The Authority will implement permanent stormwater BMPs that have the capacity to filter particulate and dissolved metals from runoff (**HYD-IAMF#1**). The project includes design measures to avoid or minimize the potential for effects on groundwater resources.

High-Speed Rail Station Option: Fullerton

The Fullerton HSR Station Option would result in overall similar types of effects on groundwater volume, quality, and recharge as the Shared Passenger Track Alternatives. Pollutants associated with railroad operations include brake dust, which would be generated mostly in areas where the trains must reduce their speed, such as approaches to stations. Stormwater treatment measures would filter particulate and dissolved metals associated with brake dust before being discharged into a waterbody or storm drainage system, reducing intermittent and continuous permanent impacts on groundwater. The Authority will implement permanent stormwater BMPs that have the capacity to filter particulate and dissolved metals from runoff (**HYD-IAMF#1**). The project includes design measures to avoid or minimize the potential for effects on groundwater resources.

6.4.4 Impact HWR-4: Effects on Floodplains and the Risk of Release of Pollutants

6.4.4.1 Construction

The project alignment would cross or encroach on 14 floodplain areas. No stations are in the flood zone. There would be no impacts on floodplains or risk of release of pollutants from construction activities at the stations. To avoid or minimize the potential for the risk of release of pollutants in a flood-hazard zone, a SWPPP (as required by **HYD-IAMF#3**) will be prepared to manage the overall amount of stormwater runoff and associated release of pollutants generated from the construction soil disturbance areas. Also, construction associated with ARTIC will conform to **HYD-IAMF#1**; therefore, the introduction of substantial quantities of pollutants is not anticipated. **HYD-IAMF#1** requires preparation of an SWMTP. Additional good housekeeping practice BMPs (which include proper handling and managing of construction materials) will also be incorporated, along with plans regarding spill prevention and response, to prevent discharge of trash, hazardous materials, or other materials to waters (as detailed in **BIO-IAMF#11** and **HMW-IAMF#6**). Implementation of an Environmental Management System and hazardous materials monitoring plans would limit the potential for spills and establish cleanup protocols to prevent accidental spills of hazardous materials (**HMW-IAMF#9** and **HMW-IAMF#10**) during construction. Permanent BMPs identified by **HYD-IAMF#1** will be implemented to reduce effects from stormwater runoff from new impervious surfaces. With design measures, the potential for construction activity impacts related to floodplains would be avoided or minimized. No tsunami or seiche hazard is anticipated because of the location of the project.

High-Speed Rail Station Options

High-Speed Rail Station Option: Norwalk/Santa Fe Springs

The Authority will apply Environmental Management System, hazardous materials monitoring plans, and a spill prevention and emergency response plan to limit the potential for spills and establish cleanup protocols to prevent accidental spills of hazardous materials during construction (**BIO-IAMF#11**, **HMW-IAMF#6**, **HMW-IAMF#9**, **HMW-IAMF#10**, **HYD-IAMF#1**, and **HYD-**

IAMF#3). The project includes design measures to avoid or minimize the potential for effects resulting in risk of release of pollutants because of inundation.

High-Speed Rail Station Option: Fullerton

An Environmental Management System, hazardous materials monitoring plans, and a spill prevention and emergency response plan would be implemented to limit the potential for spills and establish cleanup protocols of hazardous materials during construction (**BIO-IAMF#11**, **HMW-IAMF#6**, **HMW-IAMF#9**, **HMW-IAMF#10**, **HYD-IAMF#1**, and **HYD-IAMF#3**). The project includes design measures to avoid or minimize the potential for effects resulting in risk of release of pollutants because of inundation.

6.4.4.2 Operation

The project would cross thirteen 100-year floodplains. Effects on flooding could occur during in-water bridge maintenance activities, such as those requiring temporary coffer dams or other activities conducted in or near waters or drainages. Project operations and maintenance activities could result in increases in the potential for flooding from the impedance of materials or structures during a storm event. The Authority would avoid effects on floodflows by applying flood protection measures during maintenance-related activities; not conducting work during a storm event; and maintaining the ability to efficiently move maintenance equipment out of the floodplain. This would prevent conditions within the floodplain from exceeding the capacity of the flood control and drainage systems. Stream crossings would meet the provisions of California Code of Regulations title 23, division 1, which requires that crossings maintain stream channel flow capacity. A preliminary hazards analyses will determine and address facility hazards and vulnerabilities to prevent risks of flooding that may occur during operations (**SS-IAMF#3**). A spill prevention and emergency response plan (**HYD-IAMF#3**) will also be applied to handle potential fuel or hazardous material spills. The project includes **HYD-IAMF#1**, **HYD-IAMF#3**, **HMW-IAMF#9**, **HMW-IAMF#10**, and **SS-IAMF#3** to avoid or minimize permanent impacts resulting from risk of release of pollutants because of inundation. No tsunami or seiche hazard is anticipated because of the location of the project.

No station sites would be located within the floodplain; therefore, operation of the associated HSR improvements in the floodplain would be similar to existing conditions. There would be no impacts on floodplains or risk of pollutant release from operational activities at the stations.

High-Speed Rail Station Options

High-Speed Rail Station Option: Norwalk/Santa Fe Springs

An SWMTP will be prepared that identifies project-specific BMPs, such as bioswales or infiltration basins, which will treat a portion of floodflows before they enter the stormwater drainage system in the event of a flood hazard (**HYD-IAMF#1**). In addition, **HMW-IAMF#9**, **HMW-IAMF#10**, and **HYD-IAMF#3** require the Authority to implement system and hazardous materials monitoring plans to limit the potential for spills and the amount of hazardous materials used for operations. The project includes **SS-IAMF#3**, **HYD-IAMF#1**, **HMW-IAMF#9**, **HMW-IAMF#10**, and **HYD-IAMF#3** to avoid or minimize the potential for effects from risk of release of pollutants because of inundation.

High-Speed Rail Station Option: Fullerton

An SWMTP will be prepared that identifies project-specific BMPs, which will treat a portion of floodflows before they enter the stormwater drainage system in the event of a flood hazard (**HYD-IAMF#1**). In addition, **HMW-IAMF#9**, **HMW-IAMF#10**, and **HYD-IAMF#3** require the Authority to implement system and hazardous materials monitoring plans to limit the potential for spills and the amount of hazardous materials used for operations. The project includes **SS-IAMF#3**, **HYD-IAMF#1**, **HMW-IAMF#9**, **HMW-IAMF#10**, and **HYD-IAMF#3** to avoid or minimize the potential for effects from risk of release of pollutants because of inundation. As a result, the project would avoid or minimize the potential for effects on floodplains.

6.5 Maintenance Facility

Based on the project footprint at the time of this report, the LMF would be in one of two locations in the cities of Los Angeles and Vernon. The first LMF, for Shared Passenger Track Alternative A, would be a 50-acre Level III facility at 26th Street near Hobart Yard in Vernon. This LMF would hold 24 single trainsets, with a shop building and six tracks, and would require the restriping of BNSF Lot 11 to maintain BNSF operations.

The LMF for Shared Passenger Track Alternative B would be a Level III facility at 15th Street, which would have an overall size of 52 acres along the west bank of the Los Angeles River in Los Angeles. The facility would be sited where the current BNSF storage tracks are located, thereby requiring their relocation. This LMF would hold 20 single trainsets, with four shop tracks and two shop buildings, and would be built to the west of Amtrak's current Eighth Street Yard. Only one LMF would ultimately be needed; however, both alternatives are evaluated below.

6.5.1 Impact HWR-1: Effects on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology)

6.5.1.1 Construction

Construction of the LMF could affect existing drainage patterns and stormwater distribution systems, similar to the stations. Construction activities associated with the proposed LMF could result in increased polluted stormwater runoff from demolition of existing structures, grading and excavation, filling and compaction, pavement removal, repaving, track installation, trenching for utility infrastructure protection/relocation, and construction of new structures. The LMF could redirect and increase the volume and rate of shallow overland flows, increasing the potential for erosion and siltation in areas of exposed soils.

Construction of the LMFs could result in similar short-term change in drainage patterns or an increase in sediment loads in surface waters following land disturbance or other construction activities. However, construction of the 15th Street LMF would require deeper excavation depths than construction of the 26th Street LMFs. Greater excavation depths would result in increased soil disturbance and potential erosion. Effects on surface water hydrology will be reduced because the contractor will maintain preproject runoff volume and rates (as required by the Construction General Permit) and implement measures to minimize associated erosion and sedimentation (**HYD-IAMF#3**). The contractor will prepare and apply a SWPPP, which will involve implementing erosion control, sediment control, and waste management BMPs to minimize pollutant loading. Standard BMPs used during construction include measures to provide permeable surfaces or vegetated areas, where feasible, to retain or detain stormwater on site; flow dissipation measures to reduce the rates of stormwater runoff along steep slopes and prevent resulting erosion and sedimentation; and measures for in-water work and dewatering at stream crossings to minimize temporary changes to creek and stream hydrology, potentially resulting in erosion or siltation.

The LMF will incorporate erosion and sedimentation controls to stabilize disturbed soils and prevent erosion from occurring along slopes or sediments from entering nearby storm drains and waterbodies (**HYD-IAMF#3**). Good housekeeping practices will also be incorporated, along with plans regarding spill prevention and response, to prevent discharge of trash, hazardous materials, or other materials to waters (**HYD-IAMF#3**). Waste management and materials pollution controls will also be included. The contractor will apply measures and BMPs and comply with permit requirements to minimize the potential effects on surface water hydrology during construction.

As with the HSR and Metrolink stations, the areas to be used for maintenance are already developed with high impervious percentages. The proposed expansions and improvements are assumed to be 100 percent impervious. Introducing impervious surfaces where they currently do not exist would have the potential to increase the rate and amount of stormwater runoff into the receiving waters. Construction of new impervious surfaces would increase runoff, unless stormwater management and treatment measures (**HYD-IAMF#1**) are implemented. The LMF

could redirect and increase the volume and rate of shallow overland flows, increasing the potential for erosion and siltation in areas of exposed soils. The contractor will ensure that the effects on surface water hydrology are reduced during project design by applying stormwater management and treatment measures (**HYD-IAMF#1**) such as stormwater infiltration or detention facilities. **HYD-IAMF#1** requires the preparation of an SWMTP. Implementation of the SWMTP will reduce potential stormwater management impacts by evaluating each receiving stormwater system's capacity to accommodate project runoff and identifying stormwater management designs that capture runoff and provide treatment prior to discharge of pollutant-generating surfaces. Other measures will include upgrading the existing storm drain system and incorporating LID measures within areas of new impervious surfaces to prevent stormwater runoff rates and volumes from exceeding the receiving stormwater system's capacity.

6.5.1.2 Operation

Level III LMF activities include storage, daily inspections, and predeparture cleaning and testing. Operation of the LMF could affect existing drainage patterns and stormwater distribution systems. Implementation of the SWMTP will reduce potential stormwater management impacts by evaluating each receiving stormwater system's capacity to accommodate project runoff and identifying stormwater management designs that capture runoff and provide treatment prior to discharge of pollutant-generating surfaces. Other measures will include upgrading the existing storm drain system and incorporating LID measures to prevent stormwater runoff rates and volumes from exceeding the receiving stormwater system's capacity. The contractor will apply stormwater management and treatment plans to manage and treat stormwater flows, as required by the MS4 permit, and maintain preproject hydrology.

The contractor will implement measures (as detailed in **BIO-IAMF#11**) during maintenance activities to avoid or minimize impacts on drainage patterns, stormwater runoff, hydraulic capacity, or additional sources of polluted runoff. **BIO-IAMF#11** includes standard stormwater housekeeping BMPs required to be applied by maintenance personnel to reduce the discharge of pollutants from maintenance areas. The Authority will implement an SWMTP such that operational activities associated with the LMF will comply with applicable MS4 permits to manage the quality and quantity of runoff (**HYD-IAMF#1**). Therefore, stormwater and overland flows could percolate into natural and landscaped areas without significantly affecting hydrology and water quality.

6.5.2 Impact HWR-2: Effects on Surface Water Quality

6.5.2.1 Construction

Construction of the LMFs would involve ground disturbance, including handling, storing, excavating, and placing fill, and bridge construction. Construction of the 15th Street LMF would require deeper excavation, which would result in increased soil disturbance and potential erosion compared to construction of the 26th Street LMFs. Soil-disturbing activity during construction (i.e., excavation and grading) can lead to erosion and sedimentation resulting from the exposure of bare soils to stormwater. Bare soils are more likely to erode than vegetated areas that provide infiltration and retention. Surface water quality could be affected by water contaminants generated or inadvertently released during construction (e.g., sediments, fuel, oil, concrete). In addition to potential pollutant contributions from disturbed areas, the delivery, handling, and storage of construction materials and wastes, as well as the use of construction equipment, could introduce a risk for stormwater contamination that could affect water quality. Spills or leaks from heavy equipment and machinery can result in oil and grease contamination. Some hydrocarbon compound pollution associated with oil and grease can be toxic to aquatic organisms at low concentrations. Staging areas can also be the source of pollution because of the use and temporary storage of paints, solvents, cleaning agents, and metals during construction. Materials from the demolition of existing structures and soil excavation could contain hazardous materials that could be exposed to stormwater. Larger pollutants, such as trash, debris, and organic matter, are also associated with construction activities. Furthermore, concrete, for structures and footings, and other paving materials would be used, which could be potential sources of water

quality pollution if these materials were spilled or deposited on unprotected surfaces. Other potential effects include health hazards and aquatic ecosystem damage associated with the introduction of bacteria, viruses, and vectors if waste management is not adequately implemented.

The LMF will incorporate erosion and sedimentation controls to stabilize disturbed soils and prevent erosion from occurring along slopes or sediments from entering nearby storm drains. Good housekeeping practices will also be incorporated, along with plans regarding spill prevention and response, to prevent discharge of trash, hazardous materials, or other materials to waters (**HYD-IAMF#3**). Waste management and materials pollution controls will also be included. The contractor will prepare a SWPPP that will include BMPs to protect water quality. The contractor will apply measures and BMPs and comply with permit requirements and would not conflict with or obstruct implementation of a water quality control plan to minimize the potential effects on water quality during construction.

6.5.2.2 Operation

The stormwater system design for the LMF will accommodate runoff and provide stormwater quality treatment for new areas of acquired right-of-way (**HYD-IAMF#1**). The stormwater system will direct runoff from new impervious areas in newly acquired rights-of-way to treatment BMPs. It would not result in water quality changes in local waterbodies.

The LMF would allow maintenance activities to occur along with the storage of oil and other materials for equipment maintenance. The majority of materials used for maintenance would be nontoxic and stored in covered areas. State and federal laws regulate the storage of hazardous materials; regulated materials would be in maintenance areas with secondary containment to prevent spills, in compliance with good housekeeping practices. The contractor would limit the amount of hazardous materials used for operations and have specific cleanup protocols and trained personnel to prevent accidental spills of hazardous materials from reaching surface waterbodies. However, LMF operation and maintenance would require use of materials that could affect surface water quality if IAMFs are not implemented. In general, the LMF is anticipated to have lubricants, fuels, metal filings, hydraulic fluids, paints, cleaning products, and other refuse stored on site. Right-of-way maintenance activities are anticipated to require pesticides, fertilizers, and other materials. Impervious surfaces, such as parking lots and access roads, could collect these materials, as well as combustion byproducts and brake-pad particles, which could be conveyed to surface waters.

The contractor will apply IAMFs at the LMF to control materials required for operations and maintenance activities and prevent them from posing a risk to surface water quality. In general, this will consist of conducting maintenance activities under a canopy or garage whenever possible and storing hazardous materials indoors. Prior to operation, the contractor will prepare a SWPPP for the LMF with Standard Industrial Codes regulated by the Industrial General Permit (**HYD-IAMF#4**) to minimize the potential for contaminated surface runoff, if applicable. The Industrial General Permit requires dischargers to implement BMPs that comply with Best Available Technology/Best Conventional Pollutant Control Technology requirements to reduce or prevent discharges of pollutants in their stormwater discharge in a manner that reflects best industry practice, considering technological availability and economic practicability and achievability. The Industrial General Permit SWPPP will document BMPs implemented at the facility to manage the quality of stormwater runoff. The Industrial General Permit SWPPP will identify and evaluate sources of pollutants that may affect the quality of industrial stormwater discharges. The Industrial General Permit SWPPP will identify and describe the minimum BMPs and advanced BMPs implemented to reduce or prevent pollutants in industrial stormwater discharges. The LMF will be required to adhere to water quality performance standards for site runoff. Thus, post-construction stormwater BMPs will be implemented at the site so that runoff would consistently meet water quality performance standards for runoff. Therefore, stormwater and overland flows could percolate into natural and landscaped areas without significantly affecting water quality. LMF design will result in minimal net new impervious area, and stormwater management measures will be incorporated into the design to minimize potential

reductions in infiltrative capacity (**HYD-IAMF#1** and **HYD-IAMF#4**), which will avoid or minimize potential effects on surface water quality.

6.5.3 Impact HWR-3: Effects on Groundwater Volume, Quality, and Recharge

6.5.3.1 Construction

Because of the overall depth to groundwater (more than 50 feet) at the proposed LMF, the amount of dewatering is likely to be relatively minor, if any. Effects from groundwater dewatering would be temporary because once construction is completed, dewatering would cease. The contractor would conduct dewatering activities according to Los Angeles and Santa Ana RWQCB dewatering requirements by treating the water prior to discharge so that discharges would not contain significant quantities of pollutants or hauling the water to a treatment facility, in accordance with the Caltrans *Field Guide to Construction Dewatering* (Caltrans 2014). The contractor or its contractor will apply measures during construction activities to avoid or minimize groundwater overdraft that are, to the extent feasible, consistent with local groundwater requirements. The contractor will apply IAMFs to control stormwater runoff and manage on-site use of hazardous materials, thereby reducing potential effects on groundwater quality. The contractor will apply erosion and sedimentation controls (**HYD-IAMF#3**) as well as waste management and material pollution controls to protect groundwater levels and quality during dewatering activities. In addition, during construction, the contractor will apply measures to comply with waste discharge requirements during construction dewatering, and would not conflict with or obstruct implementation of a sustainable groundwater management plan. The Shared Passenger Track Alternatives could affect groundwater recharge through the placement of new impervious surfaces and a new and continuous source of pollutants that could affect groundwater quality. Impervious surfaces, such as parking lots and access roads, could collect lubricants, fuels, and other materials, which could be conveyed to surface waters. Surface runoff to pervious areas could allow these materials to infiltrate to groundwater.

6.5.3.2 Operation

No portions of the proposed LMF serve as recharge areas; operations would still allow for drainage and infiltration within the project footprint, similar to existing conditions. The technology proposed for the electric HSR system does not require large amounts of lubricants or hazardous materials for operation that could seep into groundwater aquifers. However, maintenance facility operation and maintenance activities would require the use materials that could affect groundwater quality if IAMFs are not implemented. In general, the LMF is anticipated to have lubricants, fuels, metal filings, hydraulic fluids, paints, cleaning products, and other refuse stored on site. Right-of-way maintenance activities are anticipated to require pesticides, fertilizers, and other materials. Impervious surfaces, such as parking lots and access roads, could collect these materials, as well as combustion byproducts and brake-pad particles, which could be conveyed to surface waters. Surface runoff to pervious areas could allow these materials to infiltrate to groundwater.

The contractor will apply IAMFs to control materials required for operations and maintenance activities and prevent them from posing a risk to groundwater quality. In general, this will consist of conducting maintenance activities under a canopy or garage whenever possible and storing hazardous materials indoors. The Authority will prepare an SWMTP that includes permanent stormwater BMPs that have the capacity to filter particulate and dissolved metals from runoff (**HYD-IAMF#1**). The LMF will be required to adhere to water quality performance standards for site runoff. Thus, post-construction stormwater BMPs will be implemented at the site so that runoff would consistently meet water quality performance standards for runoff. Therefore, stormwater and overland flows could percolate into natural and landscaped areas without significantly affecting groundwater quality. The design of the Shared Passenger Track Alternatives will result in minimal net new impervious area, and stormwater management measures will be incorporated into the design to minimize potential reductions in infiltrative capacity (**HYD-IAMF#1**), which will avoid or minimize potential effects on groundwater recharge.

Overall, relative to the size of the groundwater RSA, the Shared Passenger Track Alternatives would not result in a large area of new impervious surfaces and would not affect existing recharge areas. Potential effects on groundwater recharge would be minimal.

6.5.4 Impact HWR-4: Effects on Floodplains and the Risk of Release of Pollutants

The location of the proposed LMFs are not within a floodplain. There would be no impacts on floodplains from construction and operation at the proposed LMF. No tsunami or seiche hazard is anticipated because of the location of the project.

6.6 Electric Power Utility Improvements

Power for operation of the system would be provided by the local utility service or from the TPSS. Network upgrades could include modifications to existing infrastructure such as expansion of existing substations and reconductoring of existing electrical lines (i.e., replacement of power structures and electrical conductors with taller structures and more efficient electrical wires or new electrical lines). Refer to the Authority's Draft Utility Report for additional details (Authority and FRA 2017).

6.6.1 Impact HWR-1: Effects on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology)

6.6.1.1 Construction

Construction activities would include pavement removal, utility relocation, excavation, and construction of the two TPSSs, one switching station, and two paralleling stations. Table 2-3 lists the locations of the proposed TPSSs, switching stations, and paralleling stations. Construction activities with the potential to affect hydrology include soil-disturbing activity (e.g., excavation, grading, fills), which can lead to erosion and sedimentation. Grading activities for construction of the two TPSSs, one switching station, and two paralleling stations would be minimal in most areas of the corridor and would have limited potential for soil erosion.

Nonetheless, the Shared Passenger Track Alternatives could redirect and increase the volume and rate of shallow overland flows, increasing the potential for erosion and siltation in areas of exposed soils and along channel banks, and risk release of pollutants, unless the SWPPP BMPs (**HYD-IAMF#3**) and stormwater management and treatment measures (**HYD-IAMF#1**) are implemented to avoid or minimize potential erosion and sedimentation from increased rates and volumes of flows. The Authority will ensure that measures as part of IAMFs are incorporated to minimize effects on hydrology and water resources.

The contractor will prepare and apply a SWPPP (**HYD-IAMF#3**), which will involve implementing construction BMPs. Standard BMPs used during construction include providing permeable surfaces or vegetated areas, where feasible; retaining or detaining stormwater on site; or implementing flow dissipation measures to reduce the rates of stormwater runoff along steep slopes and the resulting erosion and sedimentation.

The proposed project would use impervious and pervious surfaces within the existing right-of-way to incorporate the proposed TPSSs, switching stations, and paralleling stations. The proposed TPSSs, switching stations, and paralleling stations would not add a substantial amount of the impervious surfaces proposed

6.6.1.2 Operation

Operational effects from electric power utility improvements on surface water hydrology are not anticipated. Because the electric power utility improvements are included in the project footprint, these improvements are included in the calculations and analysis in Section 6.3, Shared Passenger Track Alternatives. Therefore, no further analysis of electric power utility improvements is included in this technical report.

6.6.2 Impact HWR-2: Effects on Surface Water Quality

6.6.2.1 Construction

Construction activities would include pavement removal, utility relocation, excavation, and construction of the TPSSs, switching stations, and paralleling stations. Construction activities with the potential to affect water quality include soil-disturbing activity (e.g., excavation, grading, fills), which can lead to erosion and sedimentation; the use of construction-related hazardous materials, which can result in spills that affect surface waters and infiltrate to groundwater aquifers; the generation of pollutants of concern during construction, such as sediment, trash, sanitary waste, dry and wet concrete waste, and chemicals, which could degrade water quality; and excavation in areas with high groundwater, which could result in impacts that affect groundwater quality or quantity from dewatering activities and direct exposure of groundwater to sediment and other contaminants. Erosion and sedimentation affect water quality through interference with photosynthesis, oxygen exchange, and the respiration, growth, and reproduction of aquatic species. Additionally, other pollutants, such as nutrients, trace metals, and hydrocarbons, can attach to sediment and be transported downstream, which could contribute to degradation of water quality. Grading activities for the construction of the TPSSs, switching stations, and paralleling stations would be minimal in most areas of the corridor.

Construction of the TPSSs, switching stations, and paralleling stations would incorporate erosion and sedimentation controls to stabilize disturbed soils and prevent erosion from occurring along slopes or sediments from entering nearby storm drains and waterbodies. Good housekeeping practices will also be incorporated, along with plans regarding spill prevention and response, to prevent discharge of trash, hazardous materials, or other materials to waters (**HYD-IAMF#3**). Waste management and materials pollution controls will also be included. The contractor will apply measures and BMPs and comply with permit requirements to minimize potential effects on water quality during construction. Therefore, construction activities would not conflict with or obstruct implementation of a water quality control plan.

6.6.2.2 Operation

The TPSSs, switching stations, and paralleling stations would require maintenance activities and the storage of oil and other hazardous materials for equipment maintenance. For example, oil-filled transformers require the storage of chemicals such as cleaning liquids and transformer oil for maintenance. The storage of such materials is regulated by existing state and federal law. Therefore, compliance with existing regulations would reduce the potential for pollutants in stormwater runoff and the degradation of receiving water.

6.6.3 Impact HWR-2: Effects on Groundwater Volume, Quality, and Recharge

6.6.3.1 Construction

Because of the overall depth to groundwater (more than 50 feet) at the TPSSs, switching stations, and paralleling stations, the amount of dewatering is likely to be relatively minor, if any. Effects from groundwater dewatering would be temporary because once construction is completed, dewatering would cease. The contractor would conduct dewatering activities according to Los Angeles and Santa Ana RWQCB dewatering requirements by treating the water prior to discharge so that discharges would not contain significant quantities of pollutants or hauling the water to a treatment facility, in accordance with the Caltrans *Field Guide to Construction Dewatering* (Caltrans 2014). The Authority or its contractor will apply measures during construction activities to avoid or minimize groundwater overdraft that are, to the extent feasible, consistent with local groundwater requirements. The contractor will apply IAMFs to control stormwater runoff and manage on-site use of hazardous materials, thereby reducing potential effects on groundwater quality. The contractor and material pollution controls to protect groundwater levels and quality during dewatering activities. In addition, during construction, the contractor will apply measures to comply with waste discharge requirements during construction dewatering and would not conflict with or obstruct implementation of a sustainable groundwater management plan.

No portions of the TPSSs, switching stations, and paralleling stations serve as recharge areas; they would still allow for drainage and infiltration within the project footprint, similar to existing conditions. However, the Shared Passenger Track Alternatives could affect groundwater recharge through the placement of new impervious surfaces. Overall, relative to the size of the groundwater RSA, the Shared Passenger Track Alternatives would not result in a large area of new impervious surfaces and would not affect existing recharge areas.

6.6.3.2 Operation

No portions of the TPSSs, switching stations, and paralleling stations serve as recharge areas; operations would still allow for drainage and infiltration within the project footprint, similar to existing conditions. Potential operational effects on groundwater recharge would be minimal.

6.6.4 Impact HWR-4: Effects on Floodplains and the Risk of Release of Pollutants

The locations of the proposed two TPSSs, switching stations, electrical interconnections, and paralleling stations are not within the floodplain. There would be no impacts on floodplains from construction and operational improvements at the proposed two TPSSs, switching stations, and paralleling stations. No tsunami or seiche hazard is anticipated because of the location of the project.

6.7 Cumulative Impacts

This section presents potential cumulative impacts, based on current knowledge of the Shared Passenger Track Alternatives. Subsequent to this technical report, the Authority would further refine the cumulative impacts described herein and present the information in Section 3.19 of the Draft EIR/EIS.

Cumulative impacts are those resulting from past, present, and reasonably foreseeable future actions, combined with the potential hydrology and water resource impacts of the proposed project. The cumulative analysis for hydrology and water resources includes the evaluation of surface water, groundwater, and floodplains, as described below.

6.7.1 Surface Water Hydrology and Quality

The RSA for the cumulative impact analysis for surface waters includes the entire Los Angeles River Watershed, San Gabriel River Watershed, Santa Ana River Watershed, and Seal Beach Watershed. The watersheds are described in Section 5.1, Resource Study Area Watersheds. Other present and reasonably foreseeable future projects could have construction schedules that overlap with that of the Shared Passenger Track Alternatives. Construction in, across, or over channels has the potential to degrade water quality, and this degradation of water quality could be exacerbated by concurrent construction schedules for multiple projects. Most present or reasonably foreseeable future projects greater than 1 acre in area (and, therefore, subject to federal, state, and local regulations) would be required to comply with the requirements of the Construction General Permit. The Construction General Permit would require the preparation of a SWPPP and implementation of construction BMPs to target pollutants of concern during construction. Projects affecting areas of less than 1 acre are not expected to increase peak flows substantially and would adhere to local regulations to protect water quality.

The development of present and reasonably foreseeable future projects could result in increased impervious surface area and stormwater runoff volume and, therefore, could contribute to pollutant loading in stormwater runoff that reaches the storm drain systems' receiving waters within the receiving watersheds. The Shared Passenger Track Alternatives would result in an increase in impervious surface area, which is anticipated to be small when compared with the total area of the watersheds. New development, including Shared Passenger Track Alternatives facilities, would comply with stormwater control ordinances and post-construction requirements from the waste discharge requirements or NPDES permits, as applicable. MS4 permit requirements include minimizing the impervious surface area and employing LID BMPs to mimic predevelopment hydrology through infiltration, evapotranspiration, and rainfall harvesting and

use. In addition, the cities and county would review construction projects to ensure that sufficient local and regional drainage capacity is available.

Urban runoff can carry dissolved or suspended residue from both natural and human sources within the watershed. Stormwater originates as overland flow before entering the storm drain system; therefore, surrounding land uses affect surface water quality. Pollutant sources in urban areas include primarily parking lots and streets, industrial uses, rooftops, exposed earth at construction sites, and landscaped areas. Pollutants in runoff can include sediment, oil and grease, hydrocarbons (e.g., fuels, solvents), heavy metals, organic fertilizers and pesticides, pathogens, nutrients, and debris. The Shared Passenger Track Alternatives, together with the past, present, and foreseeable projects identified for the RSA, could create new sources of runoff pollution that would contribute to cumulative impacts. Potential future uses could increase pollution of stormwater runoff by introducing new activities in the area. However, similar to the Shared Passenger Track Alternatives, other projects would be subject to regulations and permits required by the SWRCB and RWQCB to minimize impacts on water quality by implementing BMPs to reduce pollutants in stormwater runoff. These regulations are in place to ensure that new developments and infrastructure projects do not result in violations of water-quality standards or hydrologic impacts. When combined with past, present, and reasonably foreseeable projects, a potential for cumulative impacts is not anticipated.

6.7.2 Groundwater

The RSA for cumulative impacts on groundwater is the groundwater basins crossed by the Shared Passenger Track Alternatives: the Central Basin of the Coastal Plain of Los Angeles Groundwater Basin and the Main Subbasin of the Coastal Plain of the Orange County Groundwater Basin. These groundwater basins are described in Section 5.5, Groundwater. Planned development and roadway widening projects would increase impervious surface area in the groundwater basins, as would the HSR Project Alternative. However, new impervious surface areas associated with the Shared Passenger Track Alternatives and other foreseeable future projects outside the urban areas would be small compared with the size of the groundwater basins. The planned projects would comply with the MS4 permit requirements, which include minimizing the impervious surface area and employing LID BMPs to mimic predevelopment hydrology through infiltration, evapotranspiration, and rainfall harvesting and use. Implementation of LID BMPs would promote infiltration to the groundwater aquifer, which would help to offset cumulative impacts on groundwater. When combined with past, present, and reasonably foreseeable projects, a potential for cumulative impacts is not anticipated.

6.7.3 Floodplains

The RSA for the cumulative floodplain evaluation consists of FEMA-mapped 100-year floodplains crossed by the project section and the land adjacent to these floodplains. No FEMA regulatory floodways are within the project section. As stated in Section 5.6, Floodplains, the direct RSA crosses several floodplains. The floodplain crossings would be further evaluated and designed to prevent increases greater than 1 foot in the BFE in floodplains in accordance with FEMA. Other ongoing and future federal projects would be required to comply with FEMA regulations, which require a floodplain analysis to prevent projects from increasing the BFE greater than 1 foot in floodplains or substantially changing the floodplain limits. Also, county and city general plan policies, programs, and ordinances are intended to offset potential direct and cumulative flooding problems that may arise from development. Ongoing and reasonably foreseeable future projects are subject to and would be required to comply with these policies, programs, and ordinances. When combined with past, present, and reasonably foreseeable projects, a potential for cumulative impacts is not anticipated.

7 PROJECT IMPACT AVOIDANCE AND MINIMIZATION FEATURES

The Authority has developed environmental commitments that are applicable to the Shared Passenger Track Alternatives, station site, maintenance facility, and electric power utility improvements. Environmental commitments consist of two categories of actions: IAMFs and mitigation measures. IAMFs are standard practices, actions, and design features that are incorporated into the project description. Mitigation measures consist of practices, actions, and design features that are applied to the project after an impact is identified.

The Authority will apply the following IAMFs to address potential effects on hydrology and water resources. These IAMFs include measures that are specific to hydrology and water resources.

7.1 Hydrology and Water Resources

7.1.1 HYD-IAMF#1: Stormwater Management

Prior to construction, the Authority-designated contractor will prepare a stormwater management and treatment plan in compliance with MS4 and construction general permits, issued by the State Water Resources Control Board for review and approval by the Authority. During the detailed design phase, each receiving stormwater system's capacity to accommodate project runoff will be evaluated. As necessary, on-site stormwater management measures, such as detention or selected upgrades to the receiving system, will be designed to provide adequate capacity and comply with the design standards in the latest version of Authority Technical Memorandum 2.6.5, *Hydraulics and Hydrology Guidelines* (Authority 2011), HSR Design Criteria Manual, Caltrans *Stormwater Quality Handbook: Project Planning and Design Guide* (Caltrans 2017), and the requirements stated in the applicable state and local NPDES permits and guidelines. On-site stormwater management facilities will be designed and built to capture runoff and provide treatment of pollutant-generating surfaces prior to discharge off site, including from station parking areas, access roads, new road over- and underpasses, reconstructed interchanges, and new or relocated roads and highways. LID techniques will be used to detain runoff on site and reduce off-site runoff, such as through use of built wetland systems, biofiltration and bioretention systems, wet ponds, organic mulch layers, soil beds, and vegetated systems (biofilters), such as vegetated swales and grass filter strips, which will be used where appropriate. The stormwater management and treatment plan will also address hydromodification such that preproject hydrology is maintained. Hydromodification design measures will include incorporating on-site retention of stormwater runoff by using flow dispersion, infiltration, and evaporation (supplemented by detention where required). Additional flow control measures will be implemented where local regulations or drainage requirements dictate.

7.1.2 HYD-IAMF#2: Flood Protection

Prior to construction, the Authority-designated contractor will prepare a flood protection plan for Authority review and approval. The flood protection plan will be prepared to ensure that the project is designed to both remain operational during flood events and minimize increases in 100-year flood elevations, as applicable to locale. The Authority-designated contractor will be responsible for implementation of the design standards as presented in the flood protection plan. Design standards, as itemized in the flood protection plan, will include the following:

- Establish track elevation to prevent saturation and infiltration of stormwater into the sub-ballast.
- Minimize development within the floodplain to such an extent that the WSE in the floodplain will not increase by more than 1 foot, or as required by state or local agencies, during the 100-year floodflow (as applicable to locale). Avoid placing facilities in the floodplain or raising the ground with fill above the BFE.
- Design the floodplain crossings to maintain a 100-year floodwater surface elevation of no greater than 1 foot above current levels, or as required by state or local agencies, and ensure project features within the floodway itself will not increase existing 100-year floodwater

surface elevations in FEMA-designated floodways or as otherwise agreed upon with the local county flood control district floodplains manager.

The following design standards will minimize the effects of pier placement on floodplains and floodways:

- Design site crossings to be as nearly perpendicular to the channel as feasible to minimize bridge length.
- Orient piers to be parallel to the expected high-water flow direction to minimize flow disturbance.
- Elevate bridge crossings at least 3 feet above the high-water surface elevation to provide adequate clearance for floating debris or as required by local agencies.
- Conduct engineering analyses of channel scour depths at each crossing to evaluate the depth for burying the bridge piers and abutments. Implement scour-control measures to reduce erosion potential.
- Use quarry stone, cobblestone, or their equivalent for erosion control along rivers and streams, complemented with native riparian plantings or other natural stabilization alternatives that will restore and maintain a natural riparian corridor.
- Place bedding materials under the stone protection at locations where the underlying soils require stabilization as a result of streamflow velocity.

7.1.3 HYD-IAMF#3: Prepare and Implement a Construction Stormwater Pollution Prevention Plan

Prior to construction (ground-disturbing activities), the Authority-designated contractor will comply with the SWRCB Construction General Permit requiring preparation and implementation of a SWPPP. The construction SWPPP will propose BMPs to minimize potential short-term increases in sediment transport caused by construction, including erosion control requirements, stormwater management, and channel dewatering for affected stream crossings. These BMPs will include measures to incorporate permeable surfaces into facility design plans where feasible and describe how treated stormwater would be retained or detained on site. Other BMPs will include strategies to manage the amount and quality of overall stormwater runoff. The construction SWPPP will include measures to address, but is not limited to, the following:

- Hydromodification management to verify maintenance of preproject hydrology by emphasizing on-site retention of stormwater runoff using measures such as flow dispersion, infiltration, and evaporation (supplemented by detention where required); implementing additional flow control measures where local regulations or drainage requirements dictate
- Implementing practices to minimize the contact of construction materials, equipment, and maintenance supplies with stormwater
- Limiting fueling and other activities using hazardous materials to areas distant from surface water, providing drip pans under equipment, and requiring daily checks of vehicle condition
- Implementing practices to reduce erosion of exposed soil, including soil stabilization, regular watering for dust control, perimeter siltation fences, and sediment catchment basins
- Implementing practices to maintain current water quality, including siltation fencing, wattle barriers, stabilized construction entrances, grass buffer strips, ponding areas, organic mulch layers, inlet protection, storage tanks, and sediment traps to arrest and settle sediment
- Where feasible, avoiding areas that may have substantial erosion risk, including areas with erosive soils and steep slopes
- Using diversion ditches to intercept surface runoff from off site
- Where feasible, limiting construction to dry periods when flows in waterbodies are low or absent

- Implementing practices to capture and provide proper off-site disposal of concrete wash water, including isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system and possible treatments (e.g., dry ice)
- Developing and implementing a spill prevention and emergency response plan to handle potential fuel or hazardous material spills
- Implementing a SWPPP by the construction Authority-designated contractor as directed by the Authority-designated contractor's QSP or designee. The qualified SWPPP developer will report all findings to the Authority-designated contractor's environmental manager. As part of that responsibility, the effectiveness of construction BMPs must be monitored before, during, and after storm events. Records of these inspections and monitoring results are submitted to the local RWQCB as part of the annual report required by the statewide Construction General Permit. The reports are available to the public online. The SWRCB and RWQCB would have the opportunity to review these documents.

7.1.4 HYD-IAMF#4: Prepare and Implement an Industrial Stormwater Pollution Prevention Plan

Prior to construction of a facility classified as an industrial facility (e.g., vehicle maintenance facilities), the Authority-designated contractor will comply with existing industrial stormwater quality regulations. The general permit for stormwater discharges associated with industrial activities, NPDES No. CAS000001, requires preparation of an industrial SWPPP by a qualified industrial SWPPP preparer and a monitoring plan for industrial facilities that discharge stormwater from the site, including vehicle maintenance facilities associated with transportation operations. The permit includes performance standards for pollution control. The industrial SWPPP will describe the facility functions, treatment BMPs, operations BMPs, inspection and monitoring activities, and recordkeeping that will be implemented during the facility operations as they pertain specifically to stormwater. The SWPPP will be designed to:

1. Protect existing water quality and comply with the industrial NPDES permit.
2. Identify activities that have the potential to cause surface water or groundwater contamination and the BMPs required to reduce, eliminate, or prevent contamination.

The Authority-designated contractor will provide a fully trained and certified Qualified Industrial Storm Water Practitioner to assist with compliance with and implementation of this permit.

7.2 Other Resources

Additional IAMFs applicable to hydrology and water resources include:

- **BIO-IAMF#9, Dispose of Construction Spoils and Waste:** Temporarily store excavated materials produced by construction activities in areas at or near construction sites.
- **BIO-IAMF#11, Maintain Construction Sites and BMP Training:** Prepare a construction site BMP field manual that will contain standard construction sites housekeeping practices required to be implemented by construction personnel.
- **GEO-IAMF#1, Geologic Hazards:** Prepare a Construction Management Plan that includes a component for controlling the amount of groundwater withdrawal from the project.
- **GEO-IAMF#1A, Groundwater Withdrawal:** Control the amount of groundwater withdrawal from the project by reinjecting groundwater or using alternate foundation designs to offset potential for settlement.
- **GEO-IAMF#1B, Unstable Soils:** Employ various methods to mitigate for the risk of ground failure, such as replacement with competent soils, strengthening with geosynthetics, stone columns and similar approaches, and vertical drains.
- **GEO-IAMF#1D, Water and Wind Erosion:** Implement erosion control methods as appropriate from the various erosion control methods documented in the Construction Stormwater Pollution Prevention Plan, the California Department of Transportation

Construction Manuals, and the construction technical memorandum, and in coordination with other erosion, sediment, stormwater management, and fugitive dust control efforts.

- **HMW-IAMF#3, Work and Vapor Barriers:** This action reduces impacts resulting from hazardous materials and waste by requiring additional construction procedures that limit the potential release of subsurface contaminants during construction.
- **HMW-IAMF#4, Known, Suspected, and Unanticipated Environmental Contamination:** Prepare a Construction Management Plan addressing procedures for the disturbance and handling of known, suspected, and unanticipated contamination. The Construction Management Plan will include an effective monitoring and cleanup program for spills and leaks of any hazardous materials or contaminated media. Requirements for sampling and analysis of media suspected to be contaminated shall be included in the Construction Management Plan.
- **HMW-IAMF#6, Spill Prevention:** Prepare a spill prevention, control, and countermeasure plan or soil prevention and response plan, as applicable, to prescribe BMPs to prevent hazardous material releases and ensure cleanup of hazardous material releases.
- **HMW-IAMF#7, Storage and Transport of Materials:** Prepare a hazardous materials and waste plan describing responsible parties and procedures for hazardous waste and hazardous materials transport.
- **HMW-IAMF#8: Permit Conditions:** Comply with the SWRCB Construction CWA Section 402 General Permit conditions and requirements for transport, labeling, containment, cover, and other BMPs for storage of hazardous materials during construction.
- **HMW-IAMF#9, Environmental Management System:** Prepare an Environmental Management System to describe the process that will be used to evaluate the full inventory of hazardous materials as defined by federal and state law employed on an annual basis and replace hazardous materials with nonhazardous materials.
- **HMW-IAMF#10, Hazardous Materials Plans:** Prepare a hazardous materials monitoring plan.
- **SS-IAMF#3, Hazard Analyses:** Conduct a hazards assessment of associated risk and application of control measures to reduce the risk to an acceptable level, such as flooding.

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8.2 Persons and Agencies Consulted

No persons or agencies were consulted during preparation of this report.

9 PREPARER QUALIFICATIONS

Project Role	Name, Credential	Qualifications
ICF		
Water Resources and Water Quality Specialist, Hydrology and Water Quality Author	Katrina Sukola	18 years of experience in water quality, environmental resource management, and stormwater M.S., Chemistry, University of Manitoba B.S., Environmental Chemistry, University of Waterloo
Senior Technical Specialist, Hydrology and Water Quality Technical Reviewer	David Johnson	20 years of experience in environmental impact assessment and regulatory compliance B.S., Biology, University of Minnesota
Technical Editor	Elizabeth Irvin	20 years of experience editing environmental documents B.A., English, University of California, Irvine
Quality Assurance/Quality Control	Debra Einstein Leight	23 years of experience B.A., Environmental Analysis and Design, University of California, Irvine
Technical Editor	Saadia Byram	30 years of experience
STV Incorporated		
QA/QC Reviewer	Rex Lloyd	36 years of experience B.S., Geography, University of Maryland, College Park
QA/QC Reviewer	Doreen Zhao, AICP	9 years of experience M.U.R.P., Urban and Regional Planning, University of California, Los Angeles B.S., Business Management, Arizona State University
QA/QC Reviewer	Deborah Roberts	17 years of experience M.S. candidate, Regenerative Studies, California State Polytechnic University, Pomona