3.8 Hydrology and Water Resources

3.8.1 Introduction

Section 3.8, Hydrology and Water Resources, of the *Burbank to Los Angeles Project Section Environmental Impact Report/Environmental Impact Statement* (EIR/EIS) analyzes the potential impacts of the No Project Alternative and the High-Speed Rail (HSR) Build Alternative, and describes impact avoidance and minimization features (IAMF) that would avoid, minimize, or reduce these impacts. Where applicable, mitigation measures are proposed to further reduce, compensate for, or offset impacts of the HSR Build Alternative. This section also defines the hydrology and water resources within the region and describes the affected environment in the resource study areas (RSA).

Hydrology and Water Resources

Water resources are important natural resources, and those considered waters of the United States are protected under the Clean Water Act. The Regional Water Quality Control Boards are charged with identifying beneficial uses and water quality objectives for the protection of surface and groundwaters within their jurisdiction. Water resources include surface waters, associated floodplains, and groundwater. The purpose of this analysis is to examine potential impacts on surface water hydrology, surface water quality, groundwater, and floodplains.

The *Burbank to Los Angeles Project Section Hydrology and Water Resources Technical Report* (California High-Speed Rail Authority [Authority] 2019a) provides additional technical details on hydrology and water resources. Additional details on hydrology and water resources are provided in the following appendix in Volume 2 of this Draft EIR/EIS:

- Appendix 3.1-B, Regional and Local Policy Inventory

Five other resource sections in this Draft EIR/EIS provide additional information related to hydrology and water resources:

- **Section 3.6, Public Utilities and Energy**—Construction and operations impacts of the HSR Build Alternative related to water infrastructure, such as storm drain systems, water districts, and water supply.
- **Section 3.7, Biological and Aquatic Resources**—Construction and operations impacts of the HSR Build Alternative related to wetlands and aquatic resources.
- **Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources**—Construction and operations impacts of the HSR Build Alternative related to soil erosion and stability, as well as the potential of inundation as a result of failure of a levee or dam, seiche, tsunami, or mudflow.
- **Section 3.10, Hazardous Materials and Wastes**—Construction and operations impacts of the HSR Build Alternative related to contamination of soils and groundwater, spill prevention, and other best management practices (BMP).
- **Section 3.19, Cumulative Impacts**—Construction and operations impacts of the HSR Build Alternative and other past, present, and reasonably foreseeable future projects.

3.8.1.1 *Definition of Resources*

The following are definitions for the hydrology and water resources analyzed in this EIR/EIS.

- **Surface Water Hydrology** refers to the occurrence, distribution, and movement of surface water, including water found in rivers, creeks, and stormwater drainage systems. Stormwater runoff and drainage patterns are directed by the topography and the gradient of the land.
- **Surface Water Quality** is a measure of the suitability of water relative to the requirements for a particular use based on selected physical, chemical, and biological characteristics. It is most frequently used by reference to a set of standards against which compliance can be assessed.

- **Groundwater** is the water found underground in the cracks and spaces in soil, sand, and rock. It is stored in and moves slowly through aquifers. Groundwater supplies are replenished, or recharged, by precipitation that seeps into the land's surface.
- **Floodplains** are areas of land susceptible to inundation by floodwaters from any source. Typically, they are low-lying areas adjacent to waterways and subject to flooding during storm events. A 100-year floodplain differs in that it is an area adjoining a river, stream, or other waterway that is covered by water in the event of a 100-year flood (a flood having a 1 percent chance of being equaled or exceeded in magnitude in any given year).

3.8.2 Laws, Regulations, and Orders

This section describes the federal, state, and local laws, regulations, orders, and plans that are relevant to hydrology and water resources.

3.8.2.1 *Federal*

Federal Railroad Administration, Procedures for Considering Environmental Impacts (64 Fed. Reg. 28545)

On May 26, 1999, the Federal Railroad Administration (FRA) released *Procedures for Considering Environmental Impacts* (FRA 1999). These FRA procedures supplement the Council on Environmental Quality Regulations (40 Code of Federal Regulations Part 1500 et seq.) and describe 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 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 impacts on hydrology and water resources.

Clean Water Act (33 U.S. Code, § 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 any 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 requires the planning agency of each state to prepare a basin plan to set forth regulatory requirements for protection of surface water quality, which include designated beneficial uses for surface waterbodies, as well as specified water quality objectives to protect those uses.
- Section 303(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) of pollutants for impaired waterbodies. The TMDL must account for the pollution sources causing the water to be listed.
- Under Section 401, 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 will not violate water quality standards, including water quality objectives and beneficial uses.
- Under Section 402, all point-source discharges, including, but not limited to, construction-related runoff discharges to surface waters and some post-development dischargers, are regulated through the National Pollutant Discharge Elimination System (NPDES) program. Project sponsors must obtain an NPDES permit from the State Water Resources Control Board (SWRCB).

- Under Section 404, 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 waters of the U.S. The HSR Build Alternative is anticipated to be permitted through multiple Nationwide Permits (one for each water crossing), rather than an individual Section 404 permit.

Rivers and Harbors Act of 1899 (33 U.S. Code, § 401 et seq.)

The Rivers and Harbors Act is a primary federal law regulating activities that may affect navigation on the nation's waterways. Section 14 of the Rivers and Harbors Act, which is codified at 33 USC 408 (Section 408), requires USACE permission for the use, including modifications or alterations, of any flood control facility work built by the U.S. to ensure that the usefulness of the federal facility 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.

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, and restore and preserve natural and beneficial floodplain values. U.S. Department of Transportation Order 5650.2 contains policies and procedures for the transportation agencies to implement USEO 11988 on transportation projects. Furthermore, 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 located 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.

Protection of Wetlands (U.S. Executive Order 11990)

USEO 11990 aims to avoid direct or indirect impacts to 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.

National Flood Insurance Act (42 U.S.C, § 4001 et seq.) and Flood Disaster Protection Act (42 United States Code §§ 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 any 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 the flood-hazard areas identified by the Federal Emergency Management Agency (FEMA).

The Flood Disaster Protection Act requires the purchase of insurance for buildings in special flood hazard areas identified and mapped by FEMA.

Safe Drinking Water Act of 1974 (42 U.S. Code, § 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 the 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 the water source.

3.8.2.2 *State*

Porter-Cologne Water Quality Control Act (California Water Code § 13000 et seq.)

The Porter-Cologne Water Quality Control Act requires the regulation of all pollutant discharges, including wastes in Project runoff that could affect the quality of the state's water. Any entity proposing to discharge a waste must file a Report of Waste Discharge with the appropriate Regional Water Quality Control Board (RWQCB) or State Water Resources Control Board (SWRCB). The RWQCBs are responsible for implementing CWA Sections 401, 402, and 303(d). Because the project is a project of statewide importance, any permit or certification requests will be filed with the SWRCB. The act also provides for the development and periodic reviews of basin plans that designate beneficial uses of California's major rivers and groundwater basins and establish water quality objectives for those waters.

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 a National Pollutant Discharge Elimination System (NPDES) permit. The SWRCB has adopted the Construction General Permit that applies to projects resulting in 1 or more acres of soil disturbance. For projects disturbing more than 1 acre of soil, the SWRCB requires permittees to prepare a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP specifies site management activities that permittees or their construction contractors must implement during site development. These management activities include construction stormwater BMPs, erosion and sedimentation controls, dewatering (nuisance water removal), runoff controls, and construction equipment maintenance.

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). Qualifying industrial sites are required to prepare SWPPPs describing BMPs that will 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 number 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.

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, as amended by 2014-0006-EXEC, 2014-0077-DWQ, and 2015-0036-EXEC) that regulates stormwater discharge from Caltrans properties, facilities, and activities and requires that the Caltrans construction program comply with the adopted Construction General Permit (described above). The permit requires Caltrans to implement a year-round program in all parts of the state to effectively control stormwater and non-stormwater discharges. The Caltrans permit is applicable to portions of the HSR project that involve modifications to state highways.

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). 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) 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. Low-impact development design standards and a post-construction stormwater management program are required under the MS4 permit.

Cobey-Alquist Flood Plain Management Act (California Water Code, § 8400 et seq.)

The Cobey-Alquist Flood Plain 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.

Streambed Alteration Agreement (California Fish and Game Code §§ 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.

Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act of 2014 is a comprehensive three-bill package that Governor Jerry Brown signed into California state law in September 2014. The Sustainable Groundwater Management Act provides a framework for sustainable management of groundwater supplies by local authorities, with a limited role for state intervention only if necessary to protect the resource. The plan is intended to ensure a reliable groundwater water supply for California for years to come.

3.8.2.3 *Regional and Local*

Table 3.8-1 lists county and city plans, goals, policies, and ordinances relevant to the HSR Build Alternative.

Table 3.8-1 Regional and Local Plans and Policies

Policy Title	Summary
Los Angeles Regional Water Quality Control Board	
Los Angeles County MS4 Permit (2012)	Order No. R4-2012-0175, as amended by SWRCB Order WQ 2015-0075 and R4-2012-0175-A01, Waste Discharge Requirements for MS4 Discharges within the Coastal Watershed of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4
Los Angeles Basin Plan (2014)	The Water Quality Control Plan for the Los Angeles Region (Basin Plan) 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.
Groundwater Dewatering Permit (2013)	Order No. R4-2013-0095, NPDES No. CAG994004, Waste Discharge Requirements for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles
Los Angeles County	
Los Angeles County General Plan 2035 (2015)	General Goals and Policies, Conservation and Open Space Element, Public Services and Facilities Element, and Water and Waste Management Element

Policy Title	Summary
Los Angeles County Municipal Code (2019)	Chapter 12.80: Stormwater and Runoff Pollution Control Chapter 12.84: Low-Impact Development (LID) Standards Chapter 21: Stormwater and Runoff Pollution Control
Los Angeles County Grading Code (2019)	Chapter 26: Building Code, Appendix J: Grading of the Municipal Code
Los Angeles County Green Street Policy (2011)	Los Angeles County Green Street Policy
City of Burbank	
City of Burbank 2035 General Plan (2013)	General Policies, Open Space and Conservation Element, Safety Element, and Plan Realization Element
City of Burbank Municipal Code (2019)	Chapter 7-1-101: Grading, Fills and Excavations Chapter 7-3-102: Green Streets Policy, Definition and Applicability Chapter 8-1-1002: Storm Water and Runoff Pollution Control Chapter 9-3-401: Standard Urban Storm Water and Urban Runoff Management Programs
City of Burbank Grading Code (2019)	Title 9, Building Regulations, of the Municipal Code Chapter 9-1-1-J104.5, Appendix J: Fees, Bonds and Insurance - Excavation and Grading of the Municipal Code
City of Glendale	
City of Glendale General Plan (2014)	General Policies, Open Space and Conservation Element, and Safety Element
City of Glendale Municipal Code (2019)	Chapter 8.20: Floodplain Management Chapter 13.42: Stormwater and Urban Runoff Pollution Prevention Control Chapter 13.43: Low Impact Development Standards
City of Glendale Grading Code (2019)	Appendix J, Grading, of the Municipal Code
City of Los Angeles	
City of Los Angeles General Plan (1995)	General Policies, General Plan Framework, Safety Element, and Conservation Element
City of Los Angeles Municipal Code (2019)	Article 4.2: Stormwater Pollution Abatement Charge Article 4.4: Stormwater and Urban Runoff Pollution Control
City of Los Angeles Grading Code (2019)	Article 1, Division 70, Grading Excavations and Fills, of the Municipal Code
City of Los Angeles Low-Impact Development Ordinance (2019)	Chapter 6, Article 4.4: Stormwater and Urban Runoff Pollution Control, LID Ordinance #181899, Low-Impact Development Ordinance
City of Los Angeles Green Streets Policy (2011)	City of Los Angeles Green Streets
Central City Community Plan (2016)	Street/Hierarchy Standards, Policy 3: Modify Street Standards
Cornfield Arroyo Seco Specific Plan (2013)	Chapter 2.4 Open Space Chapter 3.1 Streets
Alameda District Specific Plan Appendix F (2001)	Includes grading specifications and stormwater specifications

Policy Title	Summary
Alameda District Specific Plan Appendix G (2001)	Contains measures to reduce erosion and stormwater discharges during construction
Los Angeles River Revitalization Master Plan (2007)	The Los Angeles River Revitalization Master Plan provides a framework for revitalizing the Los Angeles River to: • Enhance Flood Storage • Enhance Water Quality • Enable Safe Public Access • Restore a Functional Ecosystem.
United States 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 would reestablish riparian strand, freshwater marsh, and aquatic habitat communities and reconnect the river to major tributaries, its historic floodplain, and the regional habitat zones of the Santa Monica, San Gabriel, and Verdugo Mountains while maintaining 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.

Sources: City of Burbank, 2013, 2019; City of Glendale, 2014; 2019; City of Los Angeles, 1995, 2016; City of Los Angeles Department of Public Works, 2007; County of Los Angeles, 2015a, 2019; County of Los Angeles Department of Public Works, 2011; Los Angeles Department of City Planning, 2001, 2013; Los Angeles Regional Water Quality Control Board, 2012, 2013, and 2014; and United States Army Corps of Engineers 2015.

LID = Low-Impact Development
MS4 = Municipal Separate Storm Sewer System
NPDES = National Pollutant Discharge Elimination System
SWRCB = State Water Resources Control Board

3.8.3 Consistency with Plans and Laws

As indicated in Section 3.1, Introduction, California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) regulations[1] require a discussion of inconsistencies or conflicts between a proposed undertaking and federal, state, regional, or local plans and laws.

Several federal and state laws, listed in Section 3.8.2.1, Federal, and Section 3.8.2.2, State, pertain to hydrology and water resources. The Authority, as the federal and state lead agency proposing to construct and operate the HSR system, is required to comply with all federal and state laws and regulations and to secure all applicable federal and state permits prior to initiating construction of the project. Therefore, there would be no inconsistencies between the HSR Build Alternative and these federal and state laws and regulations.

The Authority is a state agency and therefore is not required to comply with local land use and zoning regulations; however, it has endeavored to design and construct the HSR project so that it is consistent with land use and zoning regulations. A total of 14 plans and 50 policies were reviewed. The HSR Build Alternative would be consistent with all 50 policies contained in the 14 plans.

The HSR Build Alternative includes a new Main Street bridge that would include new structures in the Los Angeles River. However, the HSR Build Alternative would be consistent with the goals of the Los Angeles River Revitalization Master Plan to enhance the existing flood capacity in the river and the Los Angeles River Ecosystem Project to provide flood storage. The bridge structures would be designed to provide flow conveyance and connectivity and to comply with the hydraulic criteria of the applicable jurisdiction. In addition, all floodplain crossings would be required to comply with the requirements set forth in USEO 11988 and the FEMA regulations to prevent projects from increasing the base flood elevation by more than 1 foot in floodplains or by substantially changing the floodplain limits. For these reasons, the HSR Build Alternative would be consistent with the goals of the Los Angeles River Revitalization Master Plan to maintain the

[1] NEPA regulations refer to the regulations issued by the Council for Environmental Quality at 40 Code of Federal Regulations Part 1500.

existing flood capacity in the river and the Los Angeles River Ecosystem Project to provide flood storage.

Additionally, the HSR Build Alternative includes construction, hydromodification, and post-construction BMPs to reduce pollutants of concern in stormwater runoff discharged to the Los Angeles River. The HSR Build Alterative would not adversely degrade water quality and would therefore be consistent with the goals of the Los Angeles River Revitalization Master Plan and Los Angeles River Ecosystem Project to improve water quality in the Los Angeles River. The HSR Build Alternative would neither preclude nor conflict with the restoration activities proposed under the Los Angeles River Revitalization Master Plan or the Los Angeles River Ecosystem Restoration, Final Feasibility Report and Environmental Impact Statement/Environmental Impact Report. For additional details, please see Volume 2, Appendix 3.1-B, Regional and Local Policy Inventory.

3.8.4 Methods for Evaluating Impacts

The following sections summarize the RSAs and the methods used to analyze impacts on hydrology and water resources. As summarized in Section 3.8.1, Introduction, five other sections also provide additional information related to hydrology and water resources: Section 3.6, Public Utilities and Energy; Section 3.7, Biological and Aquatic Resources; Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources; Section 3.10, Hazardous Materials and Wastes; and Section 3.19, Cumulative Impacts.

3.8.4.1 Definition of Resource Study Areas

As defined in Section 3.1, Introduction, RSAs are the geographic boundaries within which the Authority conducted environmental investigations specific to each resource topic. The RSA for impacts on hydrology and water resources includes the project footprint of the HSR Build Alternative within the associated watersheds, surface waters, groundwater basins, and floodplains. The RSA also includes surface water resources adjoining, adjacent, or downstream that could receive runoff and sediment from the potential area of disturbance. RSA boundaries vary for surface water, groundwater, and floodplains. Table 3.8-2 provides a general definition and boundary description for each RSA within the Burbank to Los Angeles Project Section as shown in Figure 3.8-1 and Figure 3.8-2.

Table 3.8-2 Definition of Resource Study Areas

General Definition	Resource Study Area Boundary and Definition
Direct RSA	Project footprint plus a 250-foot buffer (e.g., stations, track, and temporary construction areas)
Indirect RSA	Area beyond the direct RSA's 250-foot buffer. Also includes water resources downstream 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 RSA: Watersheds and receiving waters of project runoff • Groundwater RSA: Aquifer(s) underlying the project section footprint • Floodplains RSA: FEMA-designated flood-hazard areas within receiving waters

FEMA = Federal Emergency Management Agency
RSA = resource study area

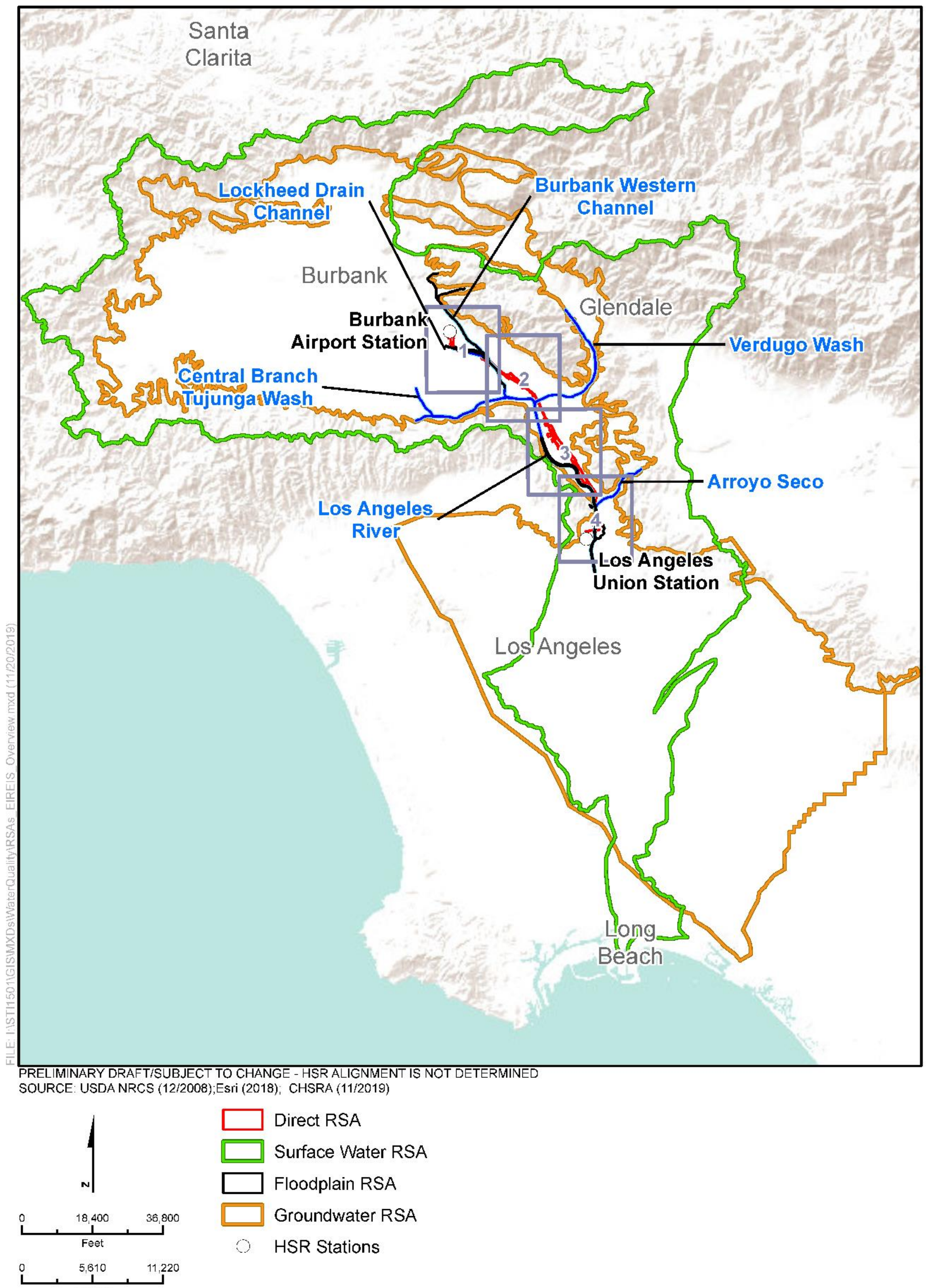


Figure 3.8-1 Direct and Indirect Resource Study Area Overview Map

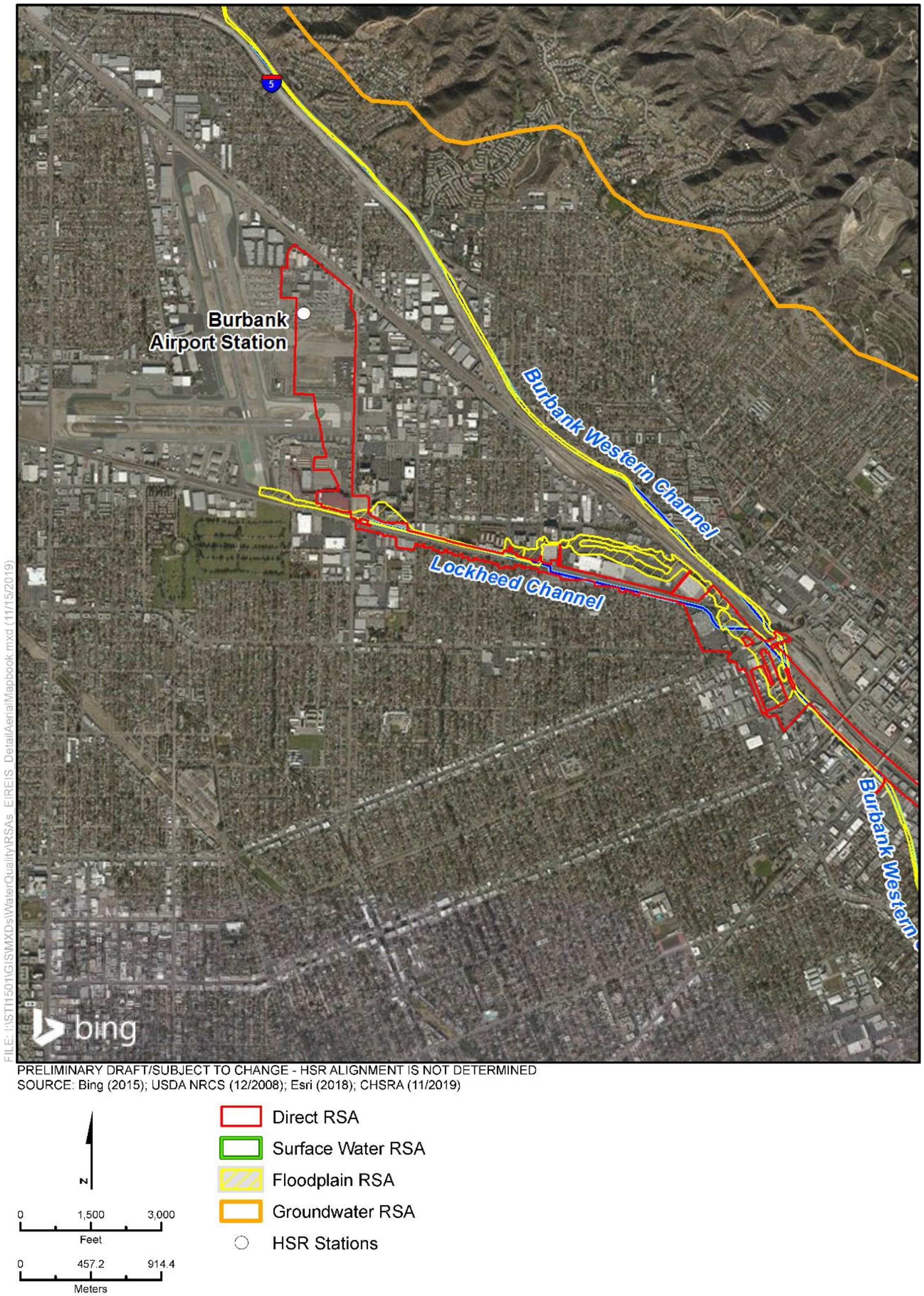


Figure 3.8-2 Direct and Indirect Resource Study Areas

(Sheet 1 of 4)

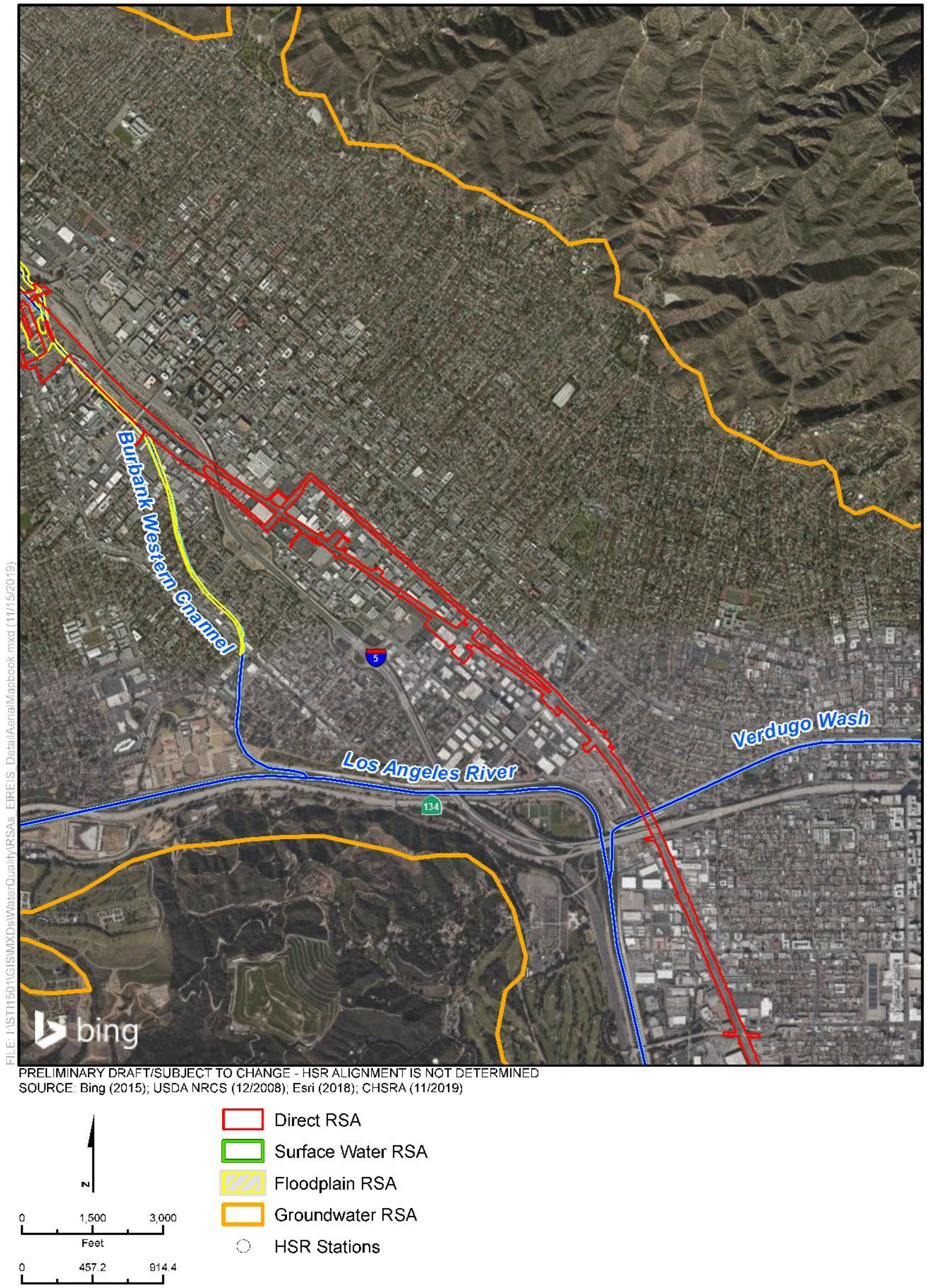


Figure 3.8-2 Direct and Indirect Resource Study Areas

(Sheet 2 of 4)

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
SOURCE: Bing (2015); USDA NRCS (12/2008); Esri (2018); CHSRA (11/2019)

Figure 3.8-2 Direct and Indirect Resource Study Areas

(Sheet 3 of 4)

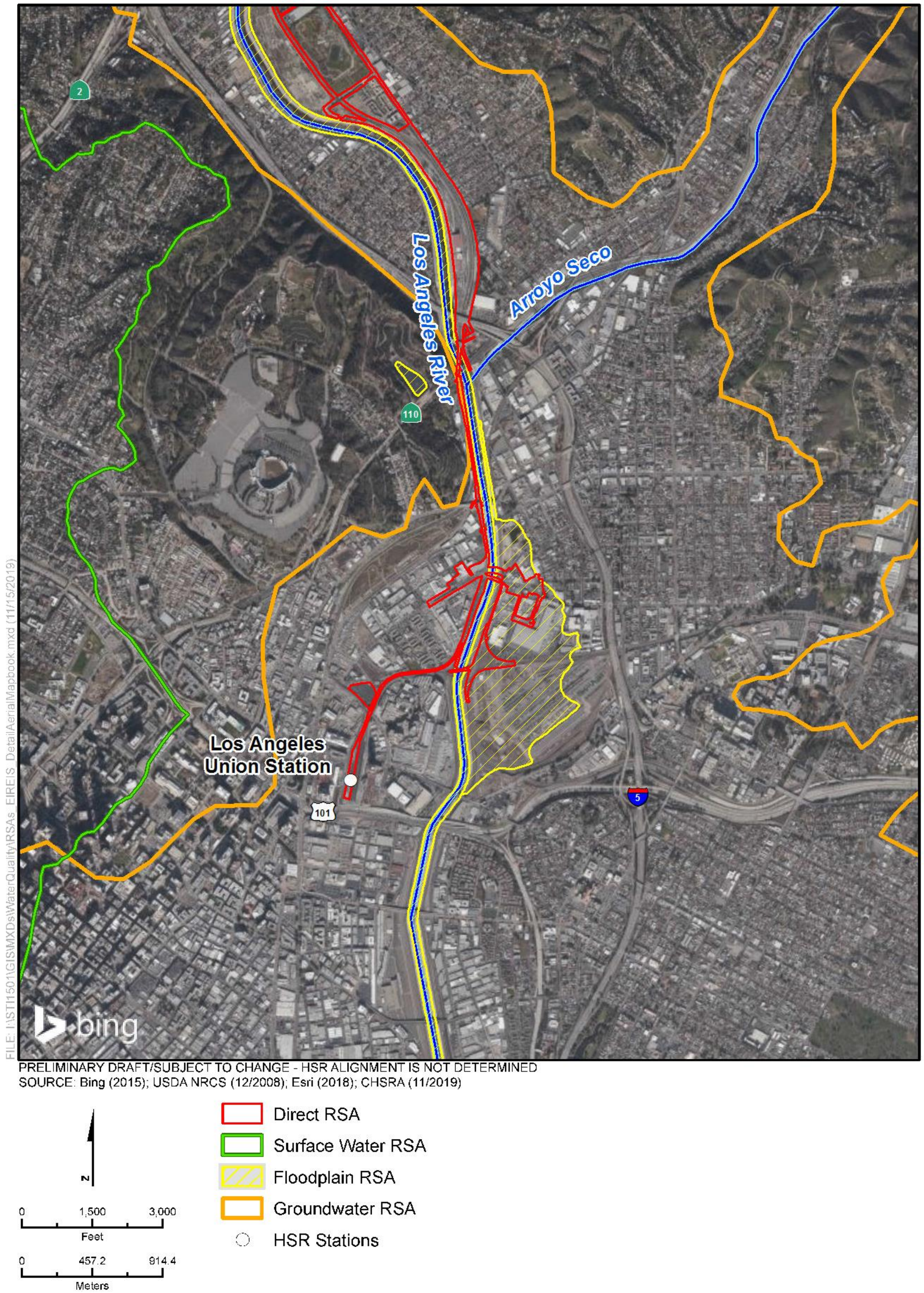


Figure 3.8-2 Direct and Indirect Resource Study Areas

(Sheet 4 of 4)

3.8.4.2 *Impact Avoidance and Minimization Features*

The HSR Build Alternative incorporates standardized HSR features to avoid and minimize impacts. These features are referred to as IAMFs. The Authority would implement IAMFs during project design and construction; as such, the analysis of impacts of the HSR Build Alternative in this section factors in all applicable IAMFs. Appendix 2-B, Impact Avoidance and Minimization Features, provides a detailed description of IAMFs that are included as part of the HSR Build Alternative design. 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: Prepare a construction site BMP field manual that would contain standard construction site 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.
- HMW-IAMF#1, Property Acquisition Phase 1 and Phase 2 Environmental Site Assessments: Requires completion of a Phase 1 Environmental Site Assessment during the right-of-way acquisition phase to identify potential hazardous waste on parcels to be acquired, as well as appropriate testing and remediation (if necessary).
- 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 any hazardous material releases.
- HMW-IAMF#7, 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 CWA Section 402 Construction 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 Systems: Limit use of hazardous materials during operations and maintenance and replace them with nonhazardous materials.
- HMW-IAMF#10, Hazardous Materials Plans: Prepare a hazardous materials monitoring plan for operations and maintenance.
- HYD-IAMF#1, Stormwater Management: Prepare a stormwater management and treatment plan. On-site stormwater management facilities would be designed and constructed to capture runoff and provide treatment prior to discharge of pollutant-generating surfaces. Low-impact development techniques would be used to detain runoff on-site and to reduce off-site runoff.
- HYD-IAMF#2, Flood Protection: Prepare a flood protection plan. The project would be designed both to remain operational during flood events and to minimize increases in 100-year or 200-year flood elevations.
- HYD-IAMF#3, Prepare and Implement a Construction Stormwater Pollution Prevention Plan: Comply with the SWRCB Construction General Permit requiring preparation and implementation of a SWPPP and erosion and sediment control BMPs to minimize potential short-term increases in sediment transport. Other BMPs would include strategies to manage the amount and quality of overall stormwater runoff and construction materials and wastes.

3.8.4.3 *Methods for NEPA and CEQA Impact Analysis*

This section describes the sources and methods the Authority used to analyze potential impacts from implementing the HSR Build Alternative on hydrology and water resources. These methods apply to both NEPA and CEQA unless otherwise indicated. Refer to Section 3.1.3.3, Methods for Evaluating Impacts, for a description of the general framework for evaluating impacts under NEPA and CEQA. Refer to the *Burbank to Los Angeles Project Section Hydrology and Water*

Resources Technical Report (Authority 2019a) for information regarding the methods and data sources used in this analysis. Laws, regulations, and orders (Section 3.8.2, Laws, Regulations, and Orders) that regulate hydrology and water resources were also considered in the evaluation of impacts on hydrology and water resources.

Analysts used the following methods to evaluate potential direct and indirect impacts from construction on surface water hydrology, surface water quality, groundwater, and floodplains.

Surface Water Hydrology

An evaluation of the potential impacts the HSR Build Alternative could have on surface waters includes the following:

- Overlaid geographic information system (GIS) layers for the HSR Build Alternative onto 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 impacts on surface waters. These GIS layers were used to identify project crossings of surface waters.
- The lengths of rivers and creeks crossed by the project footprint were estimated using GIS.
- The amount of existing impervious surface area in the permanent project footprint was calculated using land use data from the Southern California Association of Governments and the impervious surface area percentages for each land use type from the Los Angeles County Department of Public Works.
- The amount of existing and proposed impervious and pervious area was determined based on an accurate account of existing conditions/features as supplied by topographic survey and GIS data. The edges/boundaries of both existing and proposed surfaces were identified per surveyed and proposed design data and areas were calculated using computer-aided drafting software. Impervious areas include bridges and other structures, roads and other paved areas (e.g., parking lots, walks, bicycle paths), communication and traction power systems/shelters (traction power substation, radio, and interlocking sites), rail station facilities, access easements, and a percentage of trackwork infrastructure. Pervious areas include undeveloped land with graded/compacted soil and landscaped areas that are subject to infiltration and absorption.
- Evaluation of changes to drainage patterns in the direct RSA during construction and operation.

Surface Water Quality

The following methods were used to evaluate the potential impacts the HSR Build Alternative could have on surface water quality:

- Analysts considered the location of water segments with impaired water quality in relation to the direct RSA.
- The potential for construction activities to affect surface water quality as a result of uncontrolled runoff and discharges was evaluated. 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 potential for in-water construction work to directly contaminate surface water quality and redirect flows was considered.
- The potential for operation and maintenance activities related to the HSR Build Alternative to introduce pollutants into the environment was considered.
- The potential for the HSR Build Alternative to create significant new sources of pollutants (e.g., construction equipment and parking lots), which could lead to new sources of contaminated runoff in the direct RSA, was evaluated.

Groundwater

The following methods were used to evaluate the potential impacts the HSR Build Alternative could have on groundwater:

- Analysts reviewed documents available from the California Department of Water Resources (DWR), the Los Angeles RWQCB, counties, and other agencies.
- Analysts compared GIS layers for the project footprint with GIS layers for groundwater basins to identify potential impacts to groundwater basins. The length and acreage of groundwater basins beneath the project footprint were estimated using GIS.
- The depth to groundwater within the direct RSA was estimated on the basis of available documentation from the DWR.
- For construction-related impacts, the following were evaluated:
  - Excavation activities that could result in intrusions below the groundwater table, which 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
- For operations impacts, the following were evaluated:
  - Increases in impervious surface area as a result of the HSR Build Alternative that could reduce groundwater recharge
  - Potential for contaminated site runoff to percolate to the groundwater aquifer from operation and maintenance activities

Floodplains

The following methods were used to evaluate the potential impacts the HSR Build Alternative could have on floodplains:

- Review of conceptual-level plans (15 percent design) for the HSR Build Alternative and comparison with information on existing floodplains.
- Analysts estimated the lengths of the floodplains (defined as special flood hazard areas) crossed by the alignment using GIS layers for the alignment overlaid onto the GIS layers for floodplains.
- Evaluation of changes to floodplains was based on hydraulic model results included in the *Burbank to Los Angeles Project Section: Floodplain, Hydrology, and Hydraulics Technical Report* (Authority 2019b). In addition, the Hydrologic Engineering Center's River Analysis System model, which was available from the USACE for both the Verdugo Wash and the Los Angeles River system, was used to determine the existing water surface elevation.
- Analysts reviewed the potential for HSR Build Alternative facilities within a designated floodplain to expose the HSR Build Alternative to risks related to flooding, as well as subject other areas to effects resulting from changes in the location and or direction of flood flows.
- Analysts evaluated the potential for the HSR Build Alternative to increase flood height and/or to divert flood flows using flood information from the FEMA flood insurance studies and available topographic data.
- Analysts evaluated of the potential for the HSR Build Alternative to result in incompatible floodplain development and to impact floodplain values using flood information from the FEMA flood insurance studies.
- The potential for construction activities within a designated floodplain to redirect flows and pose a risk to construction workers and equipment was considered.

3.8.4.4 *Method for Determining Significance under CEQA*

CEQA requires that an EIR identify the significant environmental impacts of a project (State CEQA Guidelines §15126). One of the primary differences between NEPA and CEQA is that CEQA requires a significance determination for each impact using a threshold-based analysis (see 3.1.3.3, Methods for Evaluating Impacts, for further information). By contrast, under NEPA, significance is used to determine whether an EIS would be required; NEPA requires that an EIS be prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment." Accordingly, Section 3.8.9, CEQA Significance Conclusions, summarizes the significance of the environmental impacts on hydrology and water resources for the HSR Build Alternative. The Authority is using the following thresholds to determine if a significant impact on hydrology and water resources would occur as a result of the HSR Build Alternative. A significant impact is one that would:

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would:
  - Result in substantial erosion or siltation on- or off-site;
  - Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
  - Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
  - Impede or redirect flood flows
- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation
- Conflict with or obstruct implementation of a water quality control or sustainable groundwater management plan

3.8.5 Affected Environment

This section describes the affected environment for hydrology and water resources in the RSAs, including surface water hydrology and quality, groundwater hydrology and quality, and floodplains. The information provides the context for the environmental analysis and evaluation of impacts.

A summary of stakeholder issues and concerns from public outreach efforts can be found in Chapter 9, Public and Agency Involvement.

3.8.5.1 *Study Area Watersheds*

Los Angeles River Watershed

The direct RSA is entirely within the Los Angeles River Watershed (Figure 3.8-3). The Los Angeles River Watershed covers a land area of 834 square miles. The western portion of the watershed spans from the Santa Monica Mountains to the Simi Hills and in the eastern portion of the watershed from the Santa Susana Mountains to the San Gabriel Mountains. The watershed encompasses and is shaped by the path of the Los Angeles River. The Los Angeles River has evolved from an uncontrolled, meandering river that provided a valuable source of water for early inhabitants to a major flood protection waterway.

Watershed

A watershed is an area of land that drains all the streams and rainfall to a common outlet, such as the outflow of a reservoir, the mouth of a bay, or any point along a stream channel. The watershed consists of the surface water of the area (lakes, streams, reservoirs, and wetlands) and all the underlying groundwater.

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
SOURCE: USDA NRCS (12/2008); National Geographic/Esri (2018); CHSRA (11/2019)

Upper and Lower Los Angeles River Watershed
HSR Build Alternative
HSR Stations

N

0 18,400 36,800
Feet

0 5,610 11,220
Meters

Figure 3.8-3 Watershed

The direct RSA is within the jurisdiction of the Los Angeles RWQCB. The Los Angeles RWQCB has jurisdiction over all coastal drainages flowing to the Pacific Ocean between Rincon Point and the eastern Los Angeles County line, as well as the drainages of five coastal islands (Anacapa, San Nicolas, Santa Barbara, Santa Catalina, and San Clemente).

The direct RSA consists of both pervious and impervious surfaces. Approximately 412 acres of the total 617-acre project footprint consist of existing impervious surfaces that do not infiltrate water.

3.8.5.2 *Climate and Precipitation*

The climate in the region is classified as Mediterranean (i.e., semi-arid climate with hot and dry summers and moderately mild and wet winters). Overall, the climate of the area is relatively mild (temperatures typically range between 40 and 90 degrees Fahrenheit [°F]). Summer daytime high temperatures average in the 80s°F, with overnight lows in the 60s°F. Winter daytime high temperatures average in the 60s°F, with overnight lows in the 40s°F. Rain is common in this area during the winter. Precipitation in the region generally occurs as rainfall, with an annual average of 15 to 16 inches. Although the rainy season is defined as October 1 through May 1, most of the precipitation and storms occur from November to March.

3.8.5.3 Geology, Soils, and Erosion

Geology

The direct RSA is in the transition zone between the south-central part of the Transverse Ranges Geomorphic Province and the northern end of the Peninsular Ranges Geomorphic Province.

The Transverse Ranges Geomorphic Province is characterized by steep mountains and valleys that trend in an east-west direction at an oblique angle to the northwest-southeast trend of the California coast (hence the name “Transverse”). This type of trend is extremely rare elsewhere in the U.S. Compression along the San Andreas fault is squeezing and rotating the Transverse Ranges, making this area one of the most rapidly rising regions on earth. Tectonic activity in this province has also folded and faulted thick sequences of Cenozoic, organic-rich sedimentary rocks, making the area an important source for oil. The Peninsular Ranges Geomorphic Province is a 900-mile-long northwest-southeast-trending structural block that extends from the Transverse Ranges in the north to the tip of Baja California in the south and includes the Los Angeles Basin. This province is characterized by mountains and valleys that trend in a northwest-southeast direction, roughly parallel to the San Andreas fault. The total width of the province is approximately 225 miles, extending from the Colorado Desert in the east across the continental shelf to the southern Channel Islands (i.e., Santa Barbara, San Nicolas, Santa Catalina, and San Clemente). It contains extensive pre-Cretaceous (more than 145 million years ago) and Cretaceous (145 to 66 million years ago) igneous and metamorphic rock covered by limited exposures of post-Cretaceous (less than 66 million years ago) sedimentary deposits.

Soils

Soil units present within the direct RSA include artificial fill, alluvial fan deposits (Holocene), young alluvial deposits (Holocene and late Pleistocene), young/old alluvial fan deposits (Holocene-Late Pleistocene), and Puente Formation (Late Miocene to early Pliocene). Most soils within the direct RSA have been modified and disturbed by grading and earthmoving associated with development, which includes the placement of artificial fill. Therefore, it is unlikely that large areas of undisturbed native soils are present along the surface within the direct RSA. Alluvial material within the direct RSA is predominantly sand and silty sand with some gravel. Smaller amounts of clay are also known to occur, along with cobbles and boulders.

As discussed in Section 3.10 Hazardous Materials and Wastes, surface and near-surface soils along heavily used roadways in the direct RSA have the potential to contain elevated concentrations of lead. Aerially deposited lead is generally found within 30 feet from the edge of the road pavement. Contaminants common in railway corridors include wood preservatives (e.g., creosote and arsenic) and heavy metals in ballast rock. Asbestos-containing material might also occur in ballast rock and soils associated with railroad tracks. In addition, soils in and adjacent to these corridors might contain herbicide residues as a result of historic and ongoing weed-abatement practices.

Erosion

Soil type is one criterion used to evaluate the potential effects of development, as well as effects of the HSR Build Alternative on the environment. Depending on type, some soils are susceptible to erosion and/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. 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.

The direct RSA is in areas with a moderate susceptibility to erosion (with K factor of 0.24 and K factor of 0.24 and 0.32 north and south, respectively, of the intersection of Interstate (I-) 5 and Riverside Drive).

3.8.5.4 *Surface Water Hydrology*

Surface Water Features

Surface waters in the project vicinity are shown on Figure 3.8-4 and are discussed in more detail below.

At the northern end of the direct RSA, the HSR Build Alternative crosses the Burbank Western Channel and the Lockheed Channel near I-5. The HSR Build Alternative then crosses the Verdugo Wash (Reach 1) at State Route (SR) 134. In addition, the HSR Build Alternative runs adjacent to Arroyo Seco at I-110. Most of the HSR Build Alternative runs parallel to the Los Angeles River (Reaches 2 and 3). The HSR Build Alternative includes three crossings over the Los Angeles River: north of SR 110 at the existing Downey Bridge; at Main Street; and at the Mission Tower bridge (Figure 3.8-5).

Los Angeles River

The main channel of the approximately 50-mile-long Los Angeles River originates in the neighborhood of Canoga Park in the city of Los Angeles and flows to the Pacific Ocean in the city of Long Beach. The approximately 9-mile portion of the Los Angeles River that runs parallel to the direct RSA is a 370-foot-wide, concrete-lined, trapezoidal channel with an earthen bottom and riparian vegetation. The flow in the Los Angeles River varies greatly over the course of the year. During the dry season (July 1 through October 15), most of the water in the river is from wastewater effluent. Discharge from three wastewater treatment plants, the Tillman, Burbank, and Glendale wastewater treatment plants, constitutes most of the volume flowing in the river during the dry period. During the wet season (October 16 through June 30), the river contains runoff from large storms. In addition to variability in seasonal flow, the volume of flow in the channel increases greatly as the river flows toward its mouth on the Pacific Ocean.

Reach 2 of the Los Angeles River extends from Carson Street to Figueroa Street. Reach 3 of the Los Angeles River extends from Figueroa Street to Riverside Drive. The design flow rate for the Los Angeles River is 104,000 cubic feet per second (cfs) where the HSR Build Alternative crosses the river.

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
SOURCE: National Geopgraphic/Esri (2018); CHSRA (11/2019)

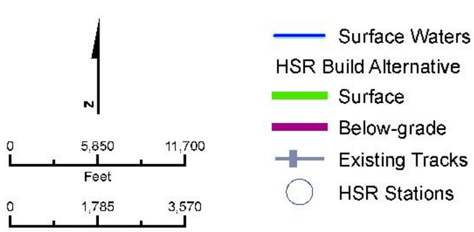


Figure 3.8-4 Surface Waters

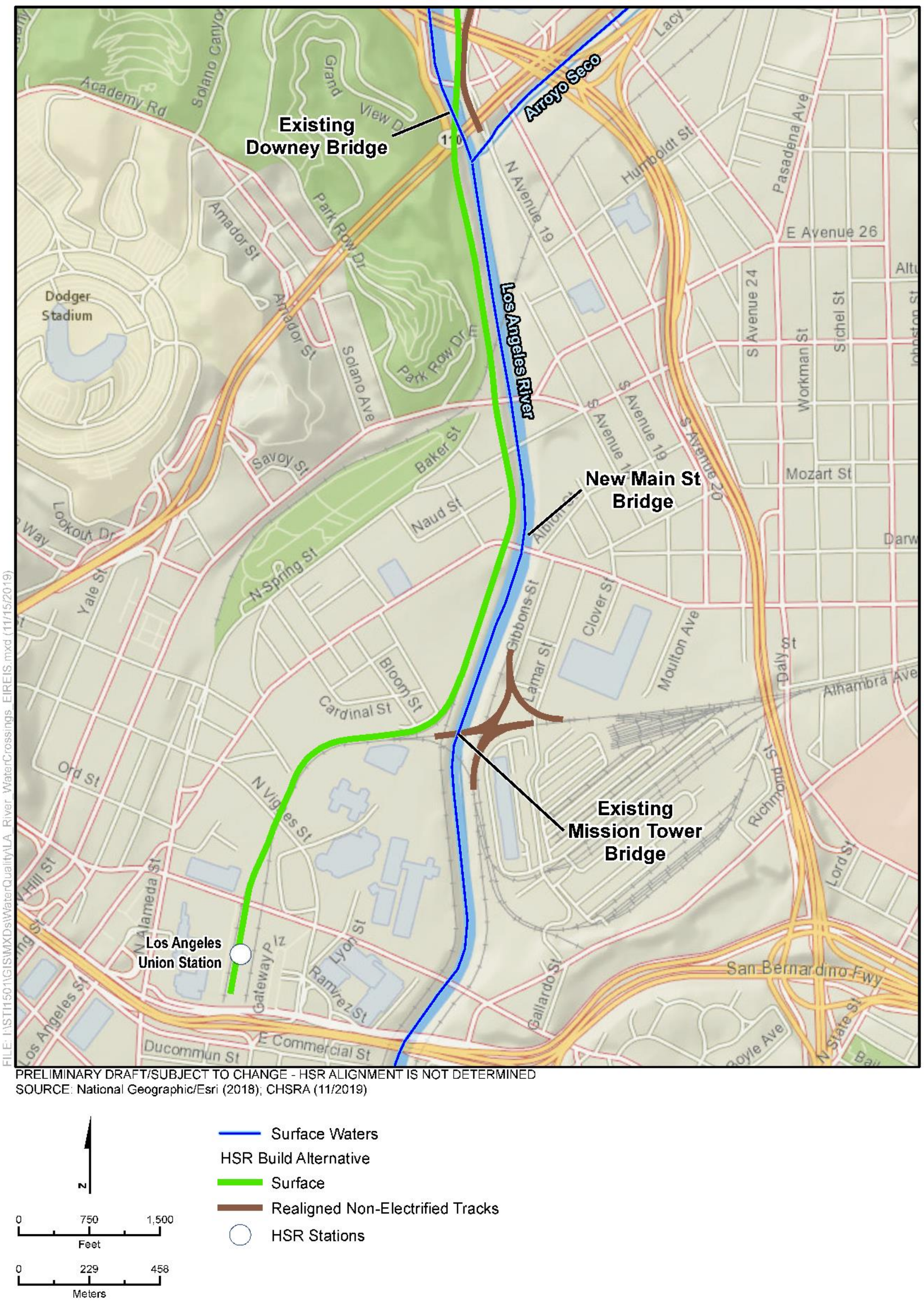


Figure 3.8-5 Los Angeles River Crossings

Arroyo Seco

The Arroyo Seco is a 22-mile-long river that originates in the San Gabriel Mountains, flows between La Cañada Flintridge on the west and Altadena on the east, continues along the western boundary of South Pasadena, and then flows along SR 110 into northeast Los Angeles, where it drains into the Los Angeles River near the I-5/SR 110 interchange. The Arroyo Seco within the direct RSA is a 35-foot trapezoidal concrete flood control channel.

Reach 1 of the Arroyo Seco extends from the Los Angeles River to W Holly Street in the city of Pasadena. The design flow rate for the Arroyo Seco is 25,700 cfs.

Verdugo Wash

The Verdugo Wash is a 9.4-mile-long, 86-foot-wide, rectangular concrete flood control channel in the city of Glendale. The Verdugo Wash originates just south of I-210 in the Crescenta Valley, flows southeast along the eastern edge of the Verdugo Mountains, and then flows south through a pass between the Verdugo Mountains and the San Rafael Hills, ultimately discharging into the Los Angeles River just northeast of Griffith Park.

Reach 1 of the Verdugo Wash extends from the Los Angeles River (Reach 3) to Verdugo Road/ Towne Street. The design flow rate for the Verdugo Wash is approximately 42,900 cfs.

Burbank Western Channel

The Burbank Western Channel is a 6.3-mile-long, 30-foot-wide, reinforced concrete box culvert that drains to the Los Angeles River in the eastern San Fernando Valley of Los Angeles County, California.

The Burbank Western Channel begins at the confluence of the Hansen Heights Channel and La Tuna Canyon Lateral in Sun Valley. It runs adjacent to I-5 for most of its length and is entirely encased in a concrete flood control channel. The stream travels southeast through downtown Burbank and the Riverside Rancho area of Glendale, ultimately joining the Los Angeles River by the edge of the Los Angeles Equestrian Center. Tributaries to the Burbank Western Channel include the Lockheed Channel, the Hansen Heights Channel, and several unnamed streams originating from the nearby Verdugo Mountains.

Lockheed Channel

The Lockheed Channel is a concrete-lined canal that is a tributary to the Burbank Western Channel. The source of water for this waterbody includes surface runoff from Hollywood Burbank Airport and the surrounding area.

3.8.5.5 *Surface Water Quality*

Existing Surface Water Quality

Los Angeles River Watershed

As previously stated, the surface waters in the direct RSA are within the Los Angeles River Watershed. Pollutants from dense clusters of residential, industrial, and other urban activities have impaired water quality in the middle and lower watersheds. Added to this complex mixture of pollutant sources (in particular, pollutants associated with urban and stormwater runoff) is the high number of point-source discharges. Excessive nutrients, coliform, and metals are widespread problems in the watershed. Major issues of concern in the Los Angeles River Watershed include:

- Protection and enhancement of fish and wildlife habitat
- Removal of exotic vegetation
- Enhancement of recreational areas
- Attaining a balance between water reclamation and minimum flows to support habitat
- Management of stormwater quality

- Assessment of other nonpoint sources (e.g., horse stables, golf courses, and septic systems)
- Pollution from contaminated groundwater
- Groundwater recharge with reclaimed water, contamination of groundwater by volatile organic compounds, leakage of methyl tertiary butyl ether from underground storage tanks, groundwater contamination with heavy metals (particularly hexavalent chromium), and contaminated sediments within the Los Angeles River estuary

Surface Water Beneficial Uses

Beneficial uses of inland surface waters form the cornerstone of water quality protection under the Los Angeles RWQCB Basin Plan (Basin Plan). They are defined in the Basin Plan as those necessary for the survival or well-being of humans, plants, and wildlife. Examples of beneficial uses include swimming, fishing, drinking water supplies, industrial water supply, and the support of freshwater and marine habitats and their organisms.

The existing, potential, and intermittent beneficial uses for the Los Angeles River, the Arroyo Seco, the Verdugo Wash, and the Burbank Western Channel, as identified in the Los Angeles RWQCB Basin Plan, are identified in Table 3.8-3. No existing, potential, or intermittent beneficial uses are identified in the Basin Plan for the Lockheed Channel.

Table 3.8-3 Receiving Waters Beneficial Uses

Beneficial Use	Los Angeles River		Arroyo Seco	Verdugo Wash	Burbank Western Channel
	Reach 2	Reach 3	Reach 1	Reach 1	
Municipal and Domestic Supply (MUN)	P[1]	P[1]	P[1]	P[1]	P[1]
Industrial Service Supply (IND)	P	P			
Groundwater Recharge (GWR)	E	E		I	
Water Contact Recreation (REC-1)	Es	Es	I	Pm	Pm
Non-Contact Water Recreation (REC-2)	E	E	I	I	I
Warm Freshwater Habitat (WARM)	E	E	P	P	P
Wildlife Habitat (WILD)	P	E	P	P	P
Wetland Habitat (WET)		E			
High Flow Suspension	Y[av]	Y[av]		Y[av]	Y[av]

Source: California High-Speed Rail Authority, 2019a

[1] 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.

av = High Flow Suspension only applies to water contact recreational activities associated with the swimmable goal as expressed in the federal CWA, Section 101(a)(2), and regulated under the REC-1 use, noncontact water recreation involving incidental water contact regulated under the REC-2 use, and the associated bacteriological objectives set to protect those activities. Water quality objectives set to protect (1) other recreational uses associated with the fishable goal as expressed in the federal CWA, Section 101(a)(2), and regulated under the REC-1 use and (2) other REC-2 uses (e.g., uses involving the aesthetic aspects of water) shall remain in effect at all times for waters where the "(av)" footnote appears.

CWA = Clean Water Act
P = potential beneficial uses
E = existing beneficial uses
I = intermittent beneficial uses
m = access prohibited by Los Angeles County Department of Public Works in the concrete-channelized areas
s = access prohibited by Los Angeles County Department of Public Works
Y = currently dry with no plans for restoration

Surface Water Quality Objectives

Surface water quality objectives for all inland waters in the Los Angeles region, as documented in the Basin Plan, are listed in Table 3.8-4. The site-specific water quality objectives were identified for segments of the Los Angeles River and other tributaries and are listed below.

Table 3.8-4 Surface Water Quality Objectives for Inland Surface Waters

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 Tables 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-1: Fecal coliform concentration shall not exceed a log mean of 200/100 ml (based on a minimum of not less than four samples for any 30-day period), nor shall more than 10 percent of samples collected during any 30-day period exceed 400/100 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 percent 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.
BOD	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 uses. 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 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 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 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: California High-Speed Rail Authority, 2019a
Basin Plan = Los Angeles RWQCB Basin Plan
BOD = Biochemical Oxygen Demand
Cal. Code Regs. = California Code of Regulations
°F = degrees Fahrenheit
MBAS = Methylene Blue Activated Substances
ml = milliliters
MUN = municipal and domestic supply
mg/L = milligrams per liter
ng/L = nanograms per liter
NTU = National Turbidity Units
PCBs = polychlorinated biphenyls
pg/L = picograms per liter
pH = percentage of hydrogen
RWQCB = Regional Water Quality Control Board
WARM = warm freshwater habitat

The Los Angeles River between the Sepulveda Flood Control Basin and Figueroa Street (including the Burbank Western Channel) has the following site-specific water quality objectives:

- Total Dissolved Solids (TDS): 950 milligrams per liter (mg/L)
- Sulfate: 300 mg/L
- Chloride: 190 mg/L
- Nitrogen: 8 mg/L

The Los Angeles River between Figueroa Street and the Los Angeles River Estuary (at Willow Street) has the following site-specific water quality objectives:

- TDS: 1,500 mg/L
- Sulfate: 350 mg/L
- Chloride: 190 mg/L
- Nitrogen: 8 mg/L

Other tributaries to the Los Angeles River between the Sepulveda Flood Control Basin and Figueroa Street (including the Verdugo Wash) have the following site-specific water quality objectives:

- TDS: 950 mg/L
- Sulfate: 300 mg/L
- Chloride: 150 mg/L
- Nitrogen: 8 mg/L

Other tributaries to Los Angeles River between Figueroa Street and the Los Angeles River Estuary (including the Arroyo Seco) have the following site-specific water quality objectives:

- TDS: 1,500 mg/L
- Sulfate: 350 mg/L
- Chloride: 150 mg/L
- Nitrogen: 8 mg/L

Water Quality Impairments

The SWRCB developed a list of waterbodies (known as 303[d] water quality-limited waterbodies) that do not meet water quality objectives. The SWRCB approved the 2014/2016 Integrated Report (CWA Section 303(d) List) on October 3, 2017. On April 6, 2018, the USEPA approved the 2014/2016 California 303(d) List of Water Quality Limited Segments.

The Los Angeles River (Reach 2) is listed on the 303(d) List as impaired for ammonia, indicator bacteria, copper, lead, nutrients (algae), oil, and trash. The Los Angeles River (Reach 3) is listed as impaired for ammonia, copper, nutrients (algae), indicator bacteria, toxicity, and trash. The Arroyo Seco (Reach 1) is listed as impaired for indicator bacteria and trash. The Verdugo Wash (Reach 1) is listed as impaired for indicator bacteria, copper, and trash. The Burbank Western Channel is listed as impaired for copper, cyanide, indicator bacteria, lead, selenium, and trash.

A TMDL is developed by states, territories, or authorized tribes for constituents on the CWA Section 303(d) List to restore the quality of the waterbody.

Applicable TMDLs for the Los Angeles River and its tributaries, including the Arroyo Seco and the Verdugo Wash, include trash, metals, selenium, nitrogen compounds, and bacteria. More details on the TMDLs can be found in the *Hydrology and Water Resources Technical Report* (Authority 2019a).

3.8.5.6 Groundwater

The southern portion of the direct RSA (approximately one-quarter of the direct RSA) is within the Central Subbasin of the Coastal Plain of Los Angeles Groundwater Basin. The northern portion of the direct RSA (approximately three-quarters of the direct RSA) is within the San Fernando Valley Groundwater Basin. The groundwater basins are shown on Figure 3.8-6. Table 3.8-5 includes the groundwater basin area, storage capacity, typical well depth, and whether the basins are designated as sole-source aquifers.

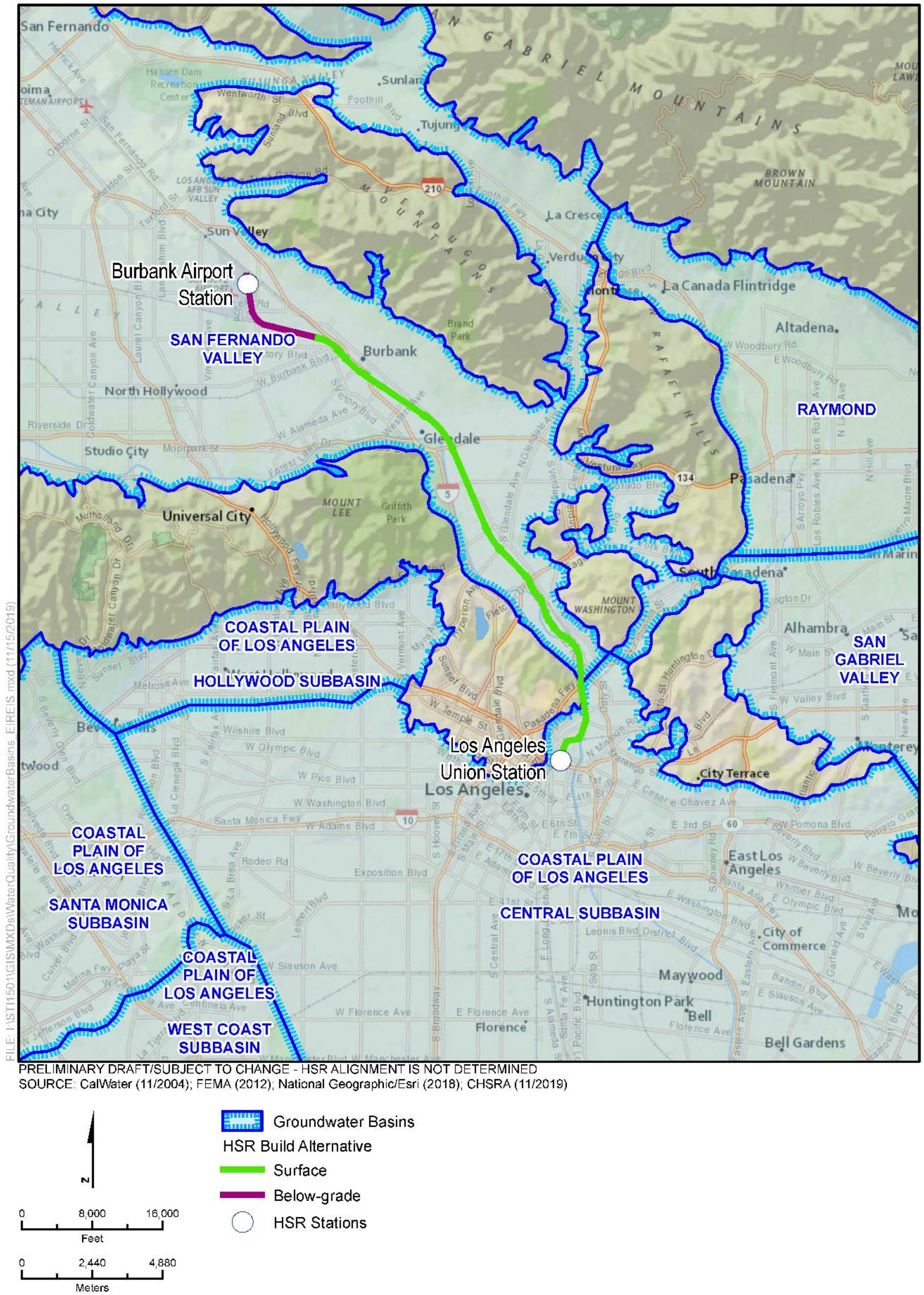


Figure 3.8-6 Groundwater Basins

Table 3.8-5 Groundwater Basins in the Vicinity of the Burbank to Los Angeles Project Section of the California High-Speed Rail Project

Groundwater Basin Name (Basin Number)[1]	Total Groundwater Basin Area (acres)[1]	Groundwater Storage (acre-feet)[1]	Typical Well Depths (feet)[1]	Designated Sole-Source Aquifer[2]
San Fernando Valley Groundwater Basin (412)	145,000	3,670,000	1,220 to 3,240	No
Central Subbasin of Coastal Plain of Los Angeles Groundwater Basin (4-11.04)	177,000	13,800,000	N/A	No

Source: California High-Speed Rail Authority, 2019a
[1] Basin areas, storage, and well depths are from *California's Groundwater: Bulletin 118*, DWR 2004b and DWR 2004c.
[2] The USEPA 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 all those who depend on the aquifer for drinking water. For convenience, all designated sole- or principal-source aquifers are referred to as "sole-source aquifers" (USEPA 2016).
DWR = California Department of Water Resources
USEPA = U.S. Environmental Protection Agency
N/A = information not available in *California's Groundwater: Bulletin 118*

The Sustainable Groundwater Management Act requires the formation of local Groundwater Sustainability Agencies, which are required to adopt Groundwater Sustainability Plans (GSPs) to manage the sustainability of groundwater basins. The adoption of a GSP is required for all high- and medium-priority basins as identified by DWR. The San Fernando Valley Groundwater Basin was adjudicated in 1979 and is managed by the Upper Los Angeles River Area Watermaster. The Central Basin was adjudicated in 1965 and has been managed by the Central Basin Watermaster since June 30, 2014, when the DWR was replaced as the Watermaster. The San Fernando Valley Groundwater Basin and Central Basin are both identified by the DWR as very low-priority basins. Therefore, development of GSPs for the San Fernando Valley Groundwater Basin and Central Basin is not required (DWR 2019).

Groundwater levels in the Central Subbasin of the Coastal Plain of Los Angeles Groundwater Basin varied by approximately 25 feet between 1961 and 1977 and have varied by approximately 5 to 10 feet since 1996. Water levels in the San Fernando Valley Groundwater Basin have been fairly stable over about the past 35 years, since adjudication of the basin in 1979. Hydrographs show variations in water levels of 5 to 40 feet in the western part of the basin, approximately 40 feet in the southern and northern parts of the basin, and approximately 80 feet in the eastern part of the basin.

As discussed in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources, groundwater levels are shallow through the city of Burbank at or near the direct RSA where it is near the Los Angeles River and become deeper as it shifts farther from the Los Angeles River in Glendale. Groundwater levels become shallow again as the direct RSA nears the Los Angeles River in Los Angeles.

As also discussed in the Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources, California Geologic Survey and earlier Caltrans borings identified groundwater near an elevation of approximately 635 feet above mean sea level, approximately 25 feet below ground surface (bgs), at the southern end of the direct RSA. Borings at the northern end of the direct RSA did not encounter groundwater. Historically, groundwater has been as high as the ground surface at the southern end of the project footprint, near the Los Angeles River. According to the California Geologic Survey historical high groundwater maps, there is shallow groundwater (less than 50 feet bgs) within the direct RSA. Please refer to Figure 3.9-1 in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources for a map of the historically high groundwater levels.

Existing Groundwater Quality

In the Central Basin, TDS range from 200 to 2,500 mg/L and average 453 mg/L, according to data from 293 public supply wells. 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.

In the western part of the San Fernando Valley Groundwater Basin, calcium sulfate-bicarbonate character is dominant, and calcium bicarbonate character dominates the eastern part of the basin. Volatile organic compounds from industry and nitrates from subsurface sewage disposal and past agricultural activities are the primary pollutants in much of the groundwater through the basin.

A number of investigations have determined contamination of volatile organic compounds such as trichloroethylene, perchloroethylene, petroleum compounds, chloroform, nitrate, sulfate, and heavy metals. Trichloroethylene, perchloroethylene, and nitrate contamination occurs in the eastern part of the basin, and elevated sulfate concentration occurs in the western part of the basin. TDS range from 326 mg/L to 615 mg/L and average 499 mg/L, according to data from 125 public supply wells.

Groundwater Beneficial Uses

The existing beneficial uses for the Coastal Plain of Los Angeles Groundwater Basin, the Central Basin, and the San Fernando Valley 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

Groundwater Quality Objectives

The groundwater quality objectives for all groundwater basins in the Los Angeles Region, as designated in the Basin Plan, are provided in Table 3.8-6.

Table 3.8-6 Groundwater Quality Objectives

Constituent	Basin Plan Objectives
Bacteria	In groundwaters designated MUN, the concentration of coliform organisms over any 7-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 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: California High-Speed Rail Authority, 2019a
Basin Plan: Los Angeles RWQCB Basin Plan
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 groundwater quality objectives for the groundwater basins in the direct RSA are listed below:

- **Central Basin:**
  - TDS: 700 mg/L
  - Sulfate: 250 mg/L
  - Chloride: 150 mg/L
  - Boron: 1.0 mg/L
- **San Fernando Valley Basin (east of I-405):**
  - TDS: 700 mg/L
  - Sulfate: 300 mg/L
  - Chloride: 100 mg/L
  - Boron: 1.5 mg/L
- **San Fernando Valley Basin (area encompassing RT-Tujunga-Erwin-North Hollywood-Whithall-Los Angeles/Verdugo-Crystal Springs-Headworks-Glendale/Burbank well fields):**
  - TDS: 600 mg/L
  - Sulfate: 250 mg/L
  - Chloride: 100 mg/L
  - Boron: 1.5 mg/L
- **San Fernando Valley Basin (narrow area below the confluence of Verdugo Wash with Los Angeles River)**
  - TDS: 900 mg/L
  - Sulfate: 300 mg/L
  - Chloride: 150 mg/L
  - Boron: 1.5 mg/L

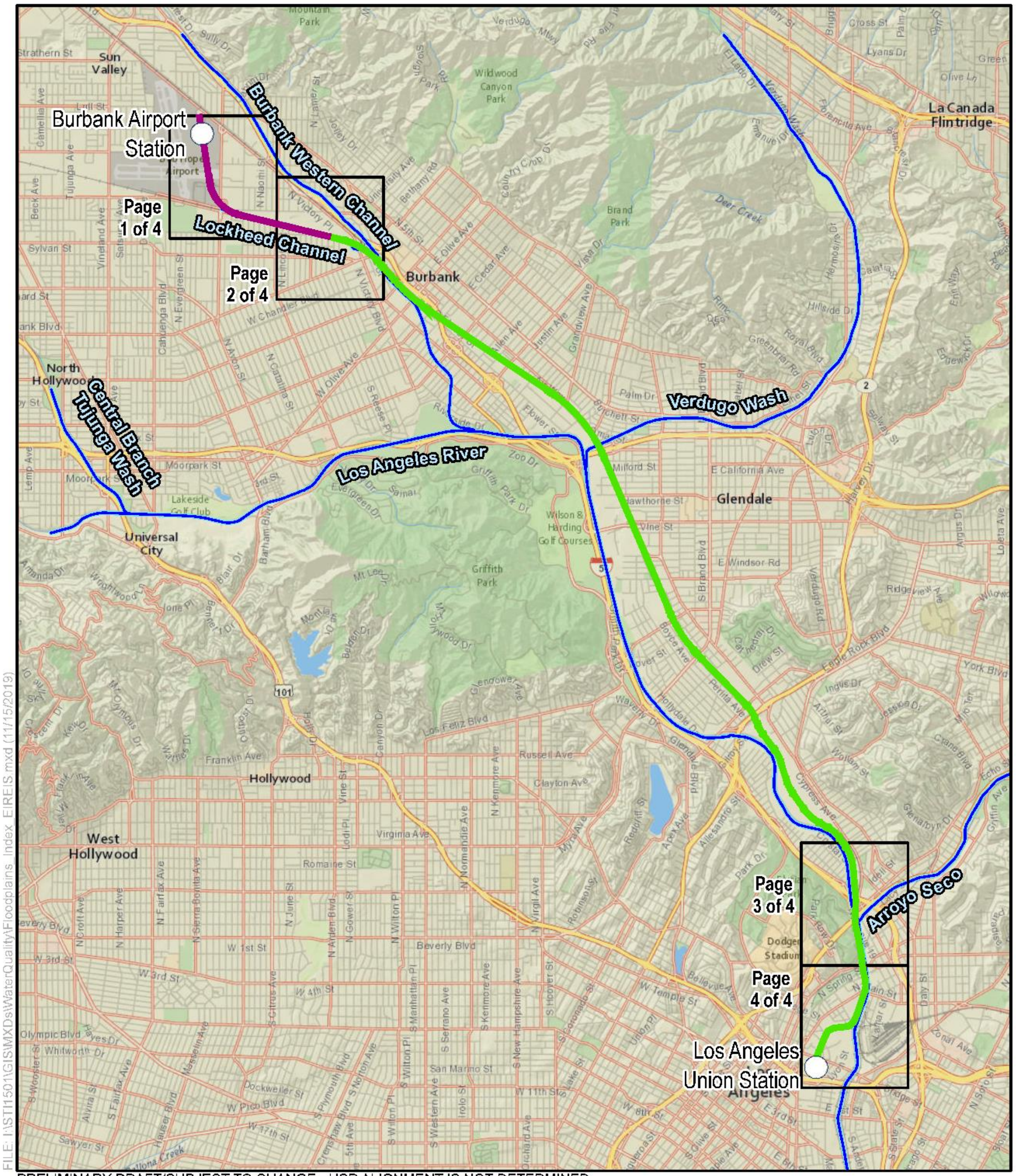
3.8.5.7 *Floodplains*

Existing Federal Emergency Management Agency Designated Flood Zones

FEMA identified special flood-hazard areas on Flood Insurance Rate Maps (FIRM) for all communities that participate in the National Flood Insurance Program, including Los Angeles County. State and local governments use these FIRMs for administering floodplain management programs, enforcing building codes, and mitigating flooding losses. The 100-year floodplain corresponds to FEMA's special flood-hazard areas. The special flood-hazard areas are the land area covered by the base flood to which the FEMA floodplain management regulations apply. Special flood-hazard areas in the direct RSA include Zone AO, Zone AE, and Zone A. These special flood-hazard areas are depicted on Figure 3.8-7 and Figure 3.8-8 (Index plus Sheets 1 through 4) and Table 3.8-7. Zone AO are areas with a 1 percent or greater annual chance of shallow flooding (100-year flood), usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. Zone AE are areas with a 1 percent annual chance of flooding (100-year flood) with base flood elevations determined. Zone A is areas with a 1 percent annual chance of flooding (100-year flood) with no base flood elevations determined.

Awareness Flood Zones Areas

The DWR also publishes Awareness Floodplain Maps, which identify all pertinent flood-hazard areas for areas not mapped under the FEMA National Flood Insurance Program. The intent of the Awareness Floodplain Maps is to provide the community and residents an additional tool in understanding potential flood hazards currently not mapped as regulated floodplains. The DWR has only mapped awareness floodplains in the Burbank area; however, the project footprint does not cross any DWR awareness floodplains.



FILE: I:\STI1501\GIS\MXDs\WaterQuality\Floodplains_Index_EIREIS.mxd (11/15/2019)

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
SOURCE: National Geographic/Esri (2018); USGS NHD (2015); CHSRA (11/2019)

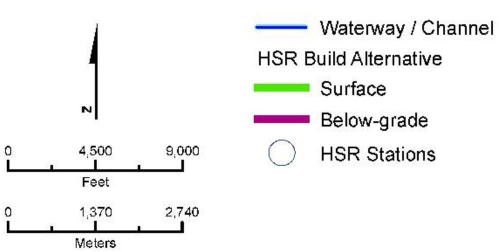


Figure 3.8-7 Floodplains Index Map

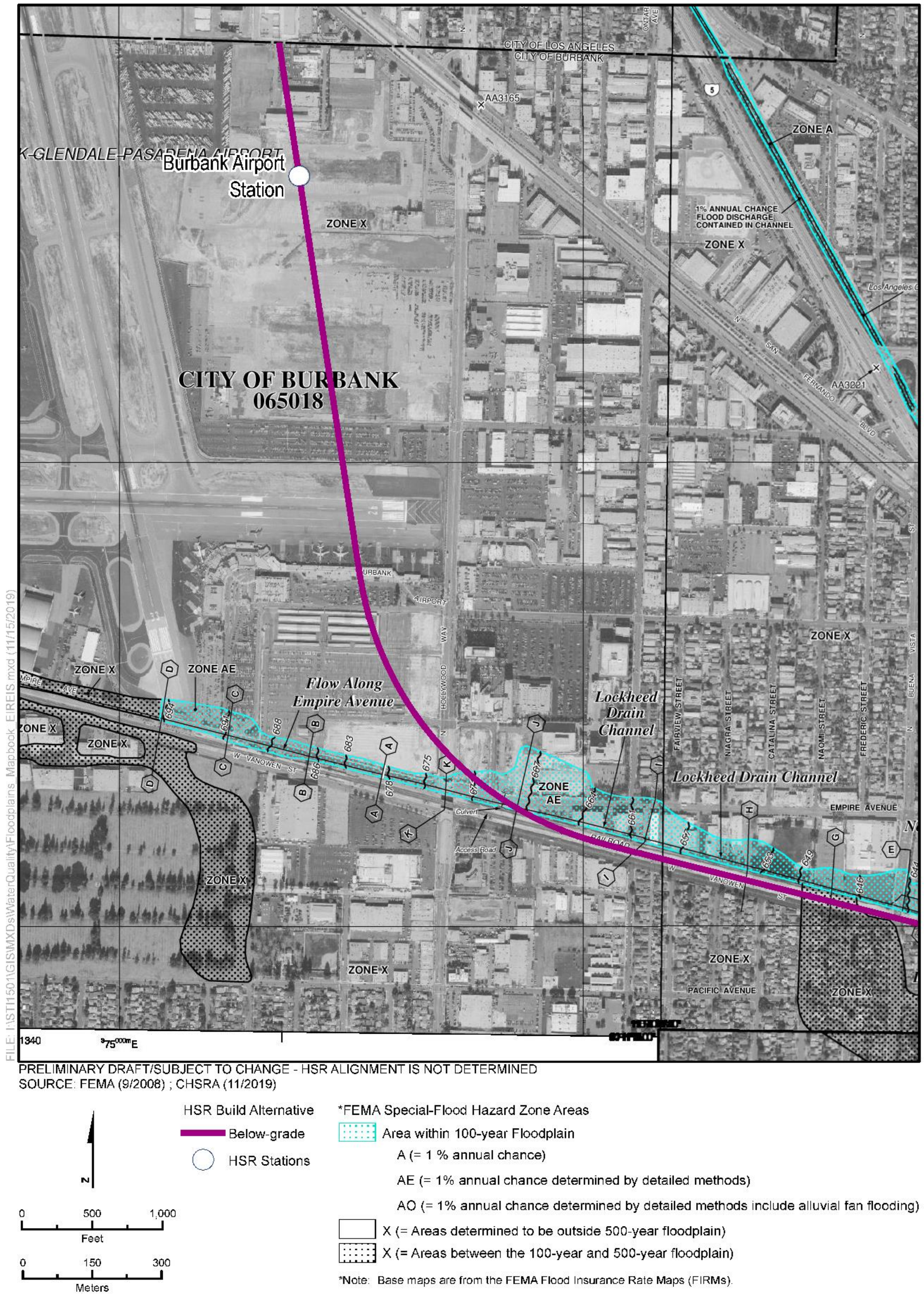
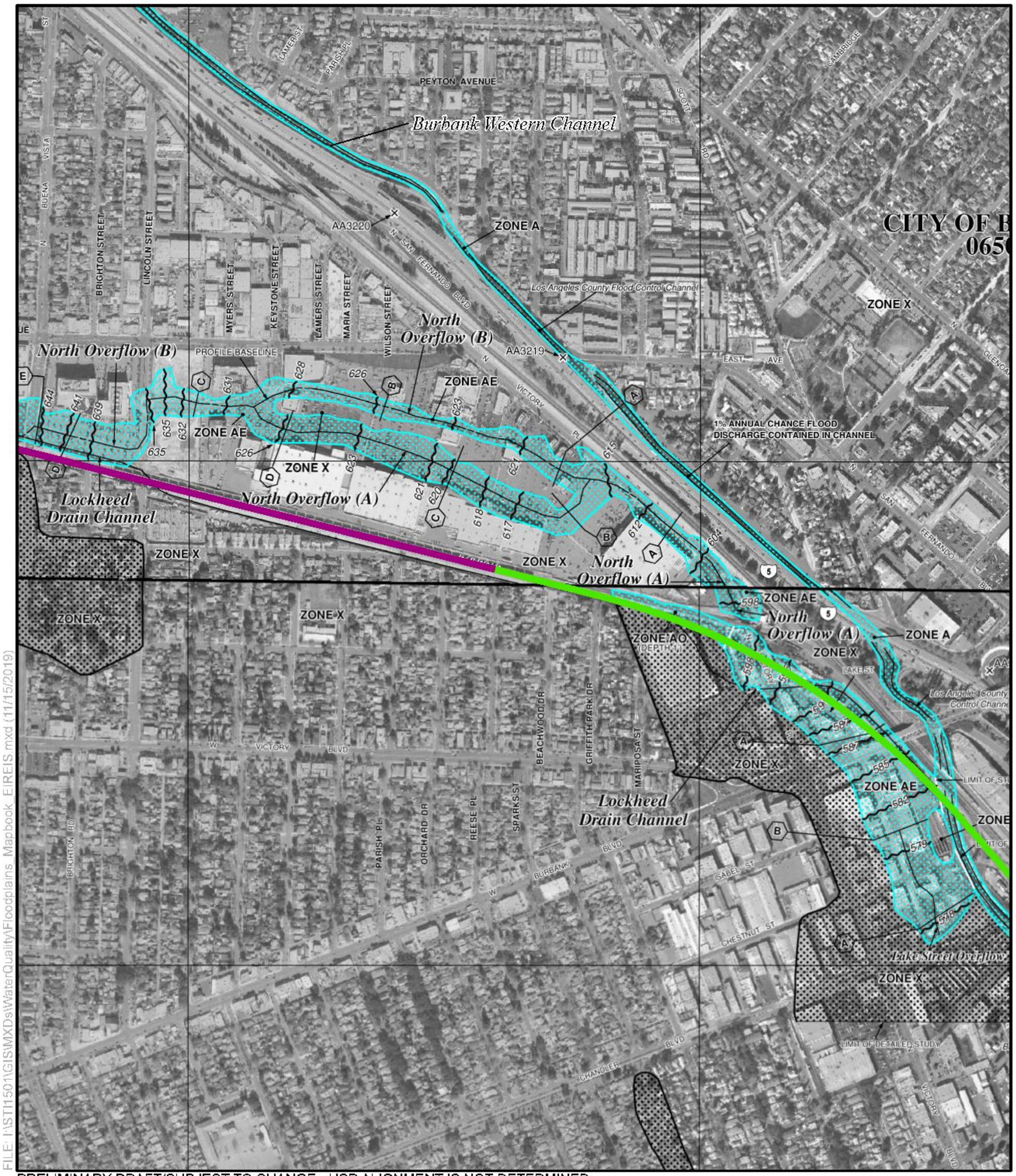


Figure 3.8-8 Floodplains

(Sheet 1 of 4)



FILE: I:\STI1501\GIS\MXDs\WaterQuality\Floodplains_Mapbook_EIREIS.mxd (11/15/2019)

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
SOURCE: FEMA (9/2008) ; CHSRA (11/2019)

N

0 500 1,000 Feet

0 150 300 Meters

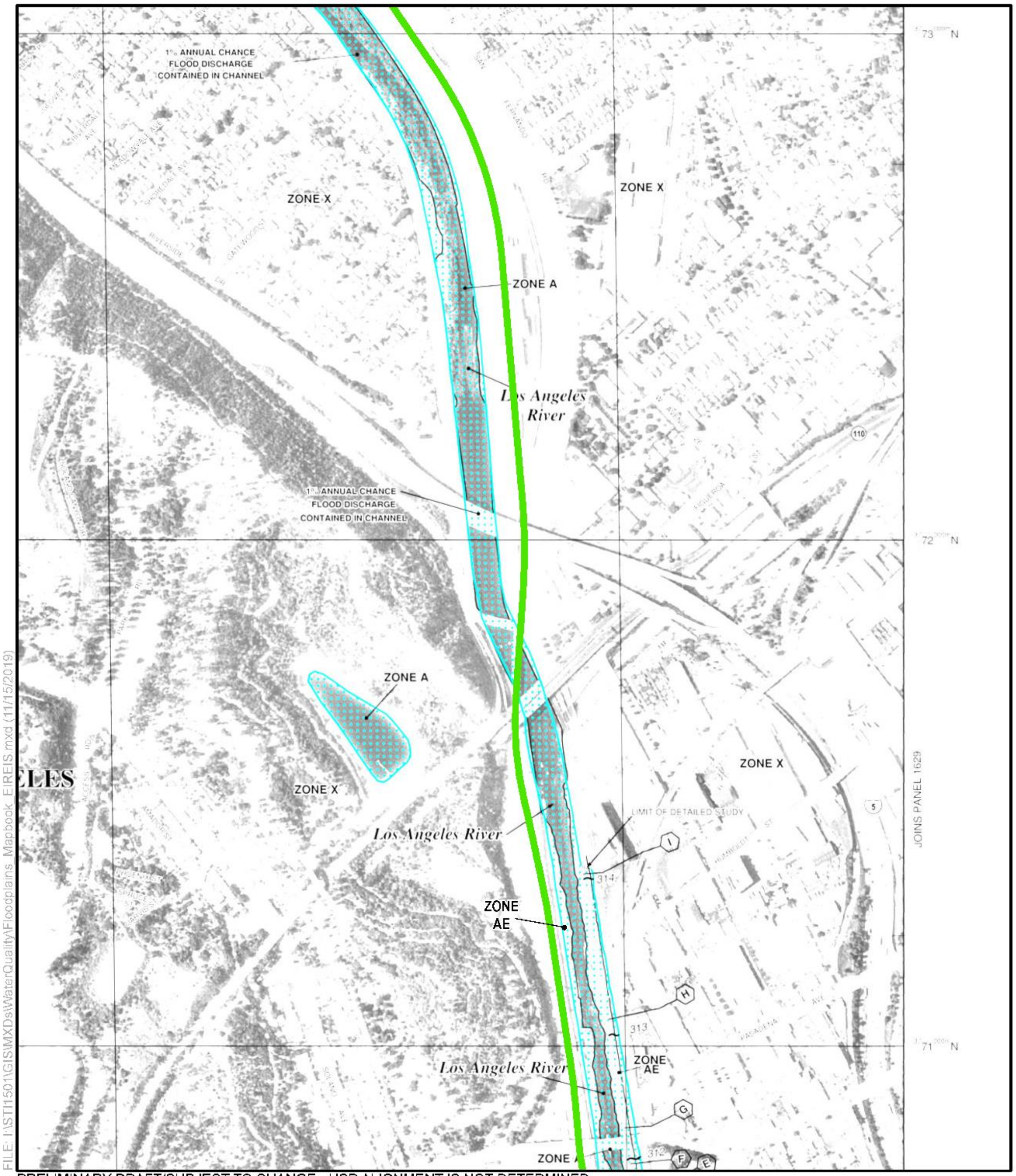
HSR Build Alternative
- Surface
- Below-grade

*FEMA Special-Flood Hazard Zone Areas
- Area within 100-year Floodplain
  - A (= 1 % annual chance)
  - AE (= 1% annual chance determined by detailed methods)
  - AO (= 1% annual chance determined by detailed methods include alluvial fan flooding)
- X (= Areas determined to be outside 500-year floodplain)
- X (= Areas between the 100-year and 500-year floodplain)

*Note: Base maps are from the FEMA Flood Insurance Rate Maps (FIRMs).

Figure 3.8-8 Floodplains

(Sheet 2 of 4)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
SOURCE: FEMA (9/2008) ; CHSRA (11/2019)

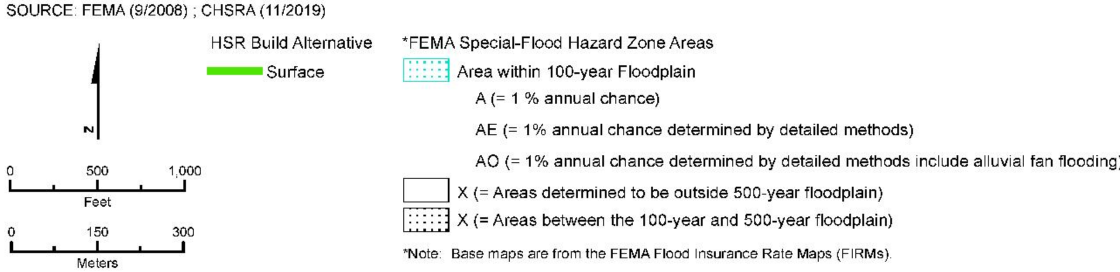
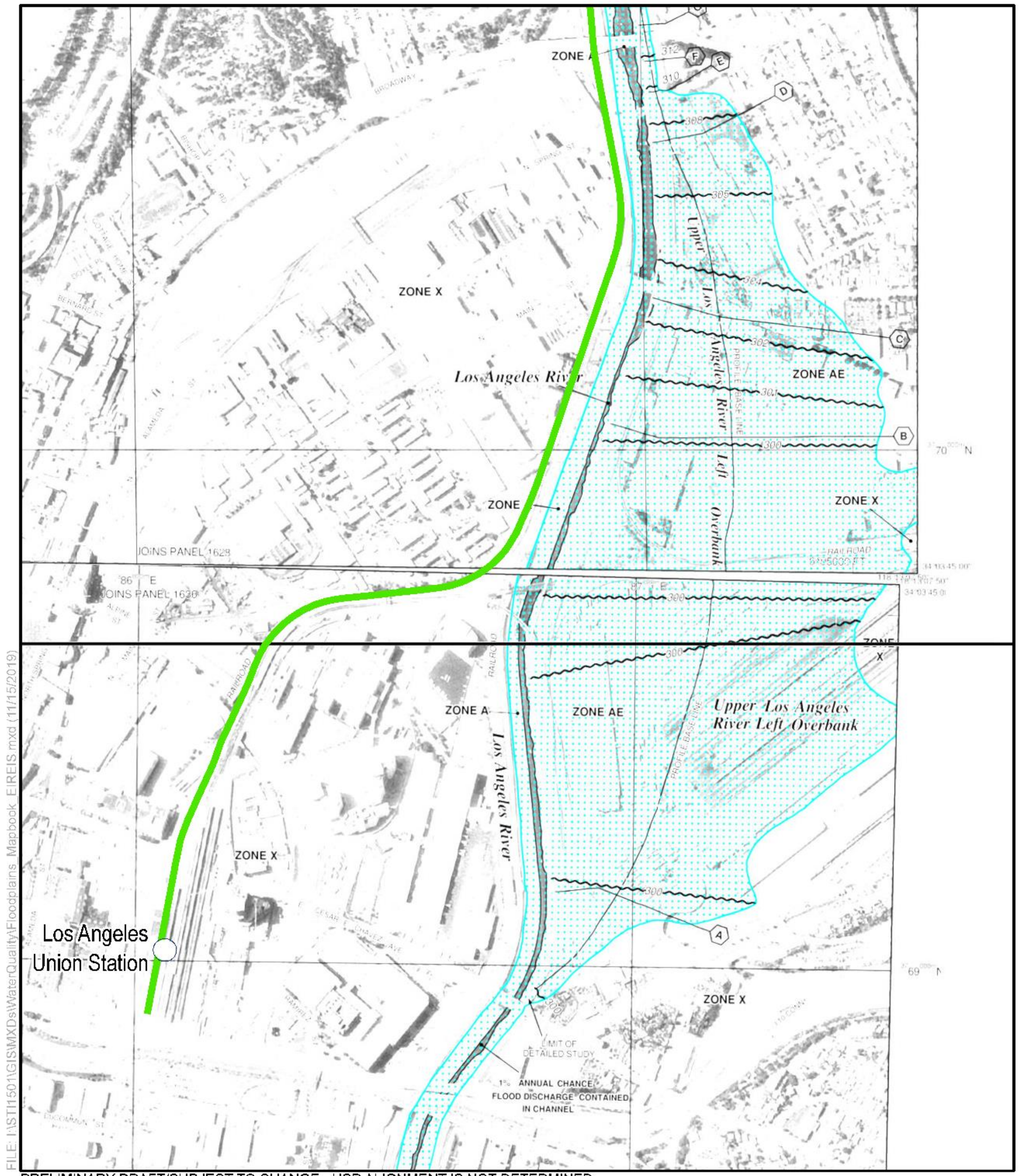


Figure 3.8-8 Floodplains

(Sheet 3 of 4)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
SOURCE: FEMA (9/2008) ; CHSRA (11/2019)

N

0 500 1,000 Feet

0 150 300 Meters

HSR Build Alternative
- Surface
- HSR Stations

*FEMA Special-Flood Hazard Zone Areas
- Area within 100-year Floodplain
  - A (= 1 % annual chance)
  - AE (= 1% annual chance determined by detailed methods)
  - AO (= 1% annual chance determined by detailed methods include alluvial fan flooding)
- X (= Areas determined to be outside 500-year floodplain)
- X (= Areas between the 100-year and 500-year floodplain)

*Note: Base maps are from the FEMA Flood Insurance Rate Maps (FIRMs).

Figure 3.8-8 Floodplains

(Sheet 4 of 4)

Table 3.8-7 Floodplains in the Vicinity of the Burbank to Los Angeles Project Section of the California High-Speed Rail Project

Floodplain Name or Floodplain Source	City	FEMA Special Flood Hazard Area[1]	Design Flow Rate (cfs)	Existing Water Surface Elevation[4] (feet)	FEMA FIRM Panel
Lockheed Channel	Burbank	Zone AO Zone AE	2,910	579	06037C1337F 06037C1328F 06037C1329F
Burbank Western Channel	Burbank	Zone A	15,000	543–596[5]	06037C1329F 06037C1337F 06037C1345F
Verdugo Wash Bridge	Glendale	N/A[2]	42,900	449	06037C1345F
Arroyo Seco	Los Angeles	N/A[2]	25,700	305	06037C1628F
Los Angeles River	Los Angeles	Zone AE	104,000[3]	303–313[6]	06037C1628F 06037C1636F

Source: California High-Speed Rail Authority, 2019a
[1] Special flood hazard areas (i.e., 100-year flood areas) are designated by FEMA. In the direct RSA, these include Zone AE (the floodway is the channel of the stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1 percent annual chance flood can be carried without substantial increases in flood heights) and Zone A (areas with 1 percent annual chance of flooding [100-year flood] with no base flood elevations determined).
[2] No floodplains for the Verdugo Wash or the Arroyo Seco are mapped by FEMA.
[3] The design flow rate for the Los Angeles River is the design flow rate within the direct RSA.
[4] Water surface elevation is for the 100-year storm event.
[5] Existing water surface elevation is a range from several station locations in the Burbank Western Channel.
[6] Existing water surface elevation is a range from several station locations in the Los Angeles River from Figueroa Street to the SR 110 bridge.
cfs = cubic feet per second
FEMA = Federal Emergency Management Agency
FIRM = Flood Insurance Rate Map
N/A = not available
RSA = resource study area
SR = State Route

3.8.5.8 *Seismically Induced Flooding*

As detailed in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources, the primary risk of inundation is from dam failure during a seismic event. Flooding as a result of seismic seiche or tsunami is unlikely to occur within the direct RSA due to the distance to any large waterbodies (i.e., reservoirs or the Pacific Ocean).

Dam and reservoir inundation areas in the direct RSA are shown on Figure 3.9-9 in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources. Dams near the direct RSA that could potentially fail due to seismic shaking are the Hansen Dam and the Eagle Rock Dam, which are at distances of approximately 5 and 4 miles from the direct RSA, respectively. The direct RSA is within the inundation areas for the dams.

Reservoirs near the direct RSA that could potentially fail due to seismic shaking are the Elysian Reservoir in the city of Los Angeles; the Diedrich Reservoir, Glenoaks 968 Reservoir, and 10th & Western Reservoir in the city of Glendale; and Reservoir Numbers 1, 4, and 5 in the city of Burbank. The Elysian Reservoir, Diedrich Reservoir, 10th & Western Reservoir, and city of Burbank Reservoirs 1, 4, and 5 are within the direct RSA. The Glenoaks 968 Reservoir is approximately 1 mile from the direct RSA. The direct RSA is within the inundation areas of the aforementioned reservoirs.

3.8.6 Environmental Consequences

3.8.6.1 *Overview*

This section evaluates how the No Project Alternative and the HSR Build Alternative could affect hydrology and water resources. The impacts of the HSR Build Alternative are described and organized as follows:

- **Construction Impacts**
  - Impact HWR #1: Temporary Impacts on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology) during Construction
  - Impact HWR #2: Permanent Impacts on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology) during Construction
  - Impact HWR #3: Temporary Impacts on Surface Water Quality during Construction
  - Impact HWR #4: Permanent Impacts on Surface Water Quality during Construction
  - Impact HWR #5: Temporary Impacts on Groundwater Volume, Quality, and Recharge during Construction
  - Impact HWR #6: Permanent Impacts on Groundwater Volume, Quality, and Recharge during Construction
  - Impact HWR #7: Temporary Impact on Floodplains during Construction
  - Impact HWR #8: Permanent Impact on Floodplains during Construction
- **Operations Impacts**
  - Impact HWR #9: Intermittent Permanent Impacts on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology) during Operations
  - Impact HWR #10: Intermittent Continuous Permanent Surface Water Quality during Operations
  - Impact HWR #11: Intermittent and Continuous Permanent Impacts on Groundwater Volume, Quality, and Recharge during Operations
  - Impact HWR #12: Intermittent Permanent Impact on Floodplains during Operations
  - Impact HWR #13: Intermittent Impact from Risk of Release of Pollutants from Inundation during Operations

3.8.6.2 *No Project Alternative*

Under the No Project Alternative, recent development trends within the Burbank to Los Angeles Project Section are anticipated to continue, leading to ongoing hydrology and water resources impacts. Effects on hydrologic and water resources, including floodplains, surface waters, and groundwater, could result from transportation improvements and land development projects under the No Project Alternative.

Transportation improvement projects may cross FEMA-designated 100-year floodplains and land development projects, such as residential and commercial developments, and may affect flood flow volume or rates due to increases in impervious area.[2] All other projects without the No Project Alternative would be required to comply with FEMA regulations and the requirements set forth in USEO 11988, similar to the HSR Build Alternative described below.

[2] Impervious surfaces prohibit the infiltration of water. Impervious surfaces within the direct RSA include commercial, residential, and industrial buildings; roadways; floodway structures; and other concrete or asphalt surfaces. An increase in impervious surfaces would increase the volume and velocity of runoff during a storm, which would increase the amount of pollutants discharged into downstream receiving waters.

In addition, due to other approved transportation improvement projects and land development projects, there would be an overall increase in impervious surface area even without the No Project Alternative. Increases in impervious surfaces could lead to increased volumes and velocities of stormwater runoff and pollutants of concern reaching receiving waters. Short-term water quality impacts would occur as a result of construction activities associated with other project development. Long-term water quality effects would occur from continued operation of existing highways, airports, and railways and from operational activities associated with new projects unrelated to the HSR project. It is reasonable to assume that planned developments would comply with existing laws and regulations that protect surface water hydrology, including various CWA Section 402 NPDES permits.

The demand for domestic water supply would increase as a result of the anticipated increased population, and aquifers could continue to experience drawdown effects if groundwater withdrawals exceed recharge rates. Further, increases in impervious surfaces could further decrease the amount of runoff that is able to infiltrate and recharge the aquifer or groundwater basin. Planned development would comply with existing laws, regulations, and agencies that protect groundwater resources.

3.8.6.3 *High-Speed Rail Build Alternative*

Construction of the HSR Build Alternative would involve demolition of existing structures, clearing, and grubbing; reduction of permeable surface area; handling, storing, hauling, excavating, and placing fill; possible pile driving; and construction of aerial structures, bridges, road modifications, utility upgrades and relocations, HSR electrical systems, and railbeds. Operation of the HSR Build Alternative would include inspection and maintenance along the track and railroad right-of-way, as well as on the structures, fencing, power system, train control, electric interconnection facilities, and communications. Construction and operations and maintenance are more fully described in Chapter 2, Alternatives.

Construction Impacts

Impact HWR #1: Temporary Impacts on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology) during Construction

Construction activities associated with the HSR Build Alternative, such as grading and excavation, would alter existing drainage patterns and redirect stormwater runoff. Construction activities associated with the HSR Build Alternative would disturb approximately 594 acres. Soil would be compacted during ground-disturbing activities, resulting in a decrease in infiltration and an increase in the volume and rate of stormwater runoff during storm events. The potential for erosion, siltation, and flooding in areas of exposed soils and downstream of construction areas would be increased. 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-off away from disturbed soil and work areas and prevent discharging sediment-laden runoff to receiving waters during construction. Temporary drainage systems are discussed in further detail under Impact HWR #2. However, construction activities within surface waters could affect hydrology and drainage patterns when water is present.

As discussed in Section 3.8.4.2, Impact Avoidance and Minimization Features, IAMFs are incorporated as part of the HSR Build Alternative design to help avoid and minimize impacts. As specified in HYD-IAMF#3 and HMW-IAMF#8, construction of the HSR Build Alternative would comply with the requirements of the Construction General Permit, which include preparation of a SWPPP and identification of project-specific construction BMPs to be implemented as part of the HSR Build Alternative at all construction sites and in adjacent areas. Construction BMPs include both structural and nonstructural (institutional) BMPs (refer to the text box above). Construction BMPs,

> *Structural and Nonstructural BMPs*
>
> Structural BMPs include temporary silt fences, fiber rolls, sand bag barriers, diversion berms and drainage swales, and check dams.
>
> Nonstructural BMPs are incorporated into the operation of the construction site and include preserving existing vegetation, hydroseeding, dust control, and street/parking lot sweeping.

such as check dams and preserving existing vegetation, would reduce the volume and rate of stormwater runoff during construction activities. The SWPPP would also describe temporary drainage patterns within the construction sites and indicate stormwater discharge locations from the construction sites to the existing drainage system. Further, hydromodification management controls would be implemented during construction to maintain pre-project hydrology by emphasizing on-site detention of stormwater runoff. Additionally, as specified in BIO-IAMF#11, a construction site BMP field manual would be prepared and would specify construction site housekeeping practices to be implemented by construction personnel.

Construction of new bridge structures within the Los Angeles River flow channel could still affect hydrology and drainage patterns when water is present in the river. Additionally, fill would be required to be placed within or adjacent to the Lockheed Channel and the Burbank Western Channel in the City of Burbank. Implementation of HYD-IAMF#3 would also restrict in-water work around the bridge piers in the Los Angeles River[3] to the dry season. If the channel has year-round flows, the contractor would develop a water diversion plan prior to construction. A water diversion plan includes the installation of cofferdams or sandbag barriers around the work areas (such as in locations where piers or abutments would be constructed) to keep water out and to reduce sediment pollution from construction work in and under water. Once construction is complete, the temporary water diversion would be removed and the channel would be restored to its pre-construction condition. The HSR Build Alternative would also be required to comply with any additional conditions of the Section 404 Nationwide Permit 14 authorized by the USACE and the Section 401 Permit from the SWRCB to reduce hydrologic and drainage effects to these surface waters.

The depth to groundwater varies along the project footprint. As discussed in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources, groundwater is generally deep (i.e., more than 100 feet) in the vicinity of the Burbank Airport Station, at the northern end of the alignment. Historically, groundwater in the vicinity of the below-grade sections of the HSR Build Alternative was as high as 40 to 64 feet bgs. Please refer to Figure 3.9-1 in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources for a map of the historically high groundwater levels. Based on the historic groundwater levels, the below-grade sections are anticipated to be above the groundwater table. However, not enough groundwater information is available at this time to rule out the potential for groundwater to be encountered during construction of the below-grade sections (tunnel beneath Hollywood Burbank Airport, cut-and-cover from south of the airport to the Metrolink Ventura Subdivision, and the trench within the Metrolink Ventura Subdivision to near Beachwood Drive in the City of Burbank). Consequently, it was conservatively assumed that construction of the below-grade sections could encounter groundwater. Shallow groundwater (less than 50 feet bgs) also occurs within the direct RSA, especially in locations adjacent to the Los Angeles River. Pier construction for the Main Street bridge crossing would extend to approximately 50 to 120 feet bgs and could encounter groundwater. Therefore, it is likely that groundwater would be encountered during construction of the Main Street bridge in the Los Angeles River. Additionally, there is potential to encounter groundwater during the Flower Street and Goodwin Avenue/Chevy Chase Drive grade separations, which are early action projects described in more detail in Chapter 2. Water produced during groundwater dewatering activities that is discharged to surface waters could affect the hydraulics of the surface water channel by increasing the volume of water flowing within the channel. However, the discharge of dewatered groundwater to surface waters would be temporary and would cease once construction boring is complete. Additionally, the amount of groundwater withdrawal and release to surface waters would be controlled and re-injection of groundwater at specific locations would occur if necessary, as required by GEO-IAMF#1.

CEQA Conclusion

Through adherence to HYD-IAMF#3, HMW-IAMF#8, BIO-IAMF#11, and GEO-IAMF#1, temporary impacts on drainage patterns, stormwater runoff, and hydraulic capacity associated with the construction of the HSR Build Alternative would be less than significant under CEQA because temporary drainage features, stormwater management BMPs, and limitations on the

[3] All in-water work would be restricted to the dry season, including work at the Main Street grade separation, an early investment project described in more detail in Chapter 2.

amount of groundwater withdrawal and release to surface waters would be implemented during construction. HYD-IAMF#3, HMW-IAMF#8, BIO-IAMF#11, and GEO-IAMF#1 would minimize the impacts of changes to existing drainage patterns such that ground disturbance during construction and discharge of groundwater to surface waters would not result in a substantial change in the existing drainage pattern or a substantial increase in the rate or amount of runoff during construction that would cause erosion, siltation, or flooding on- or off-site. Therefore, CEQA does not require mitigation.

Impact HWR #2: Permanent Impacts on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology) during Construction

Implementation of the HSR Build Alternative would result in alteration of the existing drainage patterns due to the HSR Build Alternative's project elements. An alteration to the existing drainage pattern has the potential to increase surface water volume and rate, which can increase erosion and flooding. The existing impervious surface area in the project footprint is approximately 266 acres (69 percent of the 388-acre permanent project footprint). Development of the HSR Build Alternative would increase impervious surface area by approximately 19 acres, resulting in a proposed impervious surface area of approximately 285 acres (74 percent of the project footprint). Increasing the amount of impervious surface area has the potential to increase the rate and volume of stormwater runoff reaching receiving waters. Because the HSR Build Alternative would create and/or replace more than 5,000 square feet (0.11 acre) of impervious surface, the California HSR Project would be considered a "Regulated Project" under the Phase II MS4 Permit and would be required to implement measures for runoff reduction and hydromodification management.

The HSR Build Alternative would add new tracks and shift the existing tracks within the existing railroad corridor and would widen the right-of-way in some locations. The surface along the track would consist of gravel, which would be considered pervious; however, gravel included in the subballast would be considered impervious. Extending and/or widening the track ballast may affect the drainage patterns in the vicinity of 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. In addition, the area within the existing right-of-way is highly compacted and primarily impervious; thus, the rate and volume of stormwater runoff from the existing right-of-way would be similar to existing conditions. As stated above, post-construction hydromodification BMPs would be implemented to reduce the rate and volume of stormwater runoff associated with the project. Further, the proposed drainage system would collect, convey, and discharge surface water runoff from the HSR Build Alternative track right-of-way to the existing storm drain system while maintaining the existing drainage pattern to the maximum extent practicable, in compliance with the requirements of the Phase II MS4 Permit.

Below is a more detailed description of the proposed drainage system that would be required to convey stormwater runoff and prevent flooding and standing water based on the type of structure proposed (i.e., aerial or at-grade structure).

Aerial structure decks would be impervious. The proposed aerial structures (i.e., bridges) would involve the installation of piers to support the bridges. The bridges would not result in a substantial increase in impervious surface area, as they would be in an impervious urban area. Overall, increases in impervious surface area would be small compared to the size of the watershed in which they are located. Two methods of track construction are being considered for aerial structures. One method, known as direct fixation, or slab track, would attach the track directly to the structural concrete. The other method, known as traditional ballast track, would attach the rails to crossties situated on stone ballast. Slab track would likely drain to the center, between the tracks, and be piped parallel to the track until it can be conveyed to a post-construction BMP prior to discharge to the local storm drain system at column locations. Ballast track would drain away from the centerline of the rails and be collected by a piped system, then routed to post-construction BMPs prior to discharge to the local storm drain system.

For at-grade sections of the track, stormwater runoff would either be discharged to storm drain piping downgrade of the ballast or infiltrate back into the ground adjacent to the tracks in the open drainage condition.

Tracks placed on retained fill with retaining walls would feature drainage ditches near the base of the wall to prevent the build-up of stormwater. Drainage from the track bed would be collected through piped drainage systems. Periodic storm drains may also be incorporated behind the top of the retaining walls to accommodate peak storm events. Although the location of infiltration would be slightly altered, runoff would drain to the pervious ground surface or unlined drainage ditches and basins.

In addition, the HSR Build Alternative would cross nine roadways, five of which would require modifications. Additionally, four at-grade crossings (Sonora Avenue, Grandview Avenue, Flower Street, and Main Street) are proposed to be grade separated. One grade separation (Buena Vista Street) would remain at grade for Metrolink and Union Pacific Railroad tracks, but a new undercrossing would be constructed to grade separate the HSR tracks from the roadway. One new undercrossing (Goodwin Avenue) is proposed. Six existing undercrossings (Victory Place, Alameda Avenue, Colorado Street, Los Feliz Boulevard, Glendale Boulevard, and Kerr Road) are proposed to be modified, two existing at-grade crossings (Chevy Chase Drive and Los Angeles Department of Water and Power private road) are proposed to be closed, and one new pedestrian undercrossing at Chevy Chase Drive would be provided. Undercrossings change the hydrology and drainage in the area by depressing a large area below the existing ground level. For undercrossings, stormwater runoff would drain to the sump and then be pumped to a nearby drainage system. Overcrossings can alter the hydrology and drainage in the area by increasing impervious surface area. Only one new overcrossing would be constructed as part of the HSR Build Alternative at Main Street. Several of the new grade separations would require new access roads to connect to the existing roadway network. On-site stormwater runoff would flow into roadside ditches and infiltrate. Off-site stormwater runoff would flow to an existing storm drain system. Additional catch basins and/or storm drains would be installed as required to meet the applicable jurisdictions' hydrologic criteria to capture, infiltrate, or treat stormwater runoff from the 85th percentile storm event.[4]

There are 28 minor cross-drainage locations (where the proposed track drainage system could tie into the existing storm drain system) along the direct RSA. These facilities are owned by the Los Angeles County Flood Control District, the City of Burbank, the City of Glendale, and the City of Los Angeles. HYD-IAMF#1 would reduce hydrologic and drainage effects by requiring the preparation of a stormwater management and treatment plan, evaluation of each receiving system's capacity to accommodate project runoff, and identification of stormwater management BMPs to reduce stormwater runoff. Storm drain hydraulics would be reviewed to identify if the existing drainage systems are sufficient to support the changes in drainage proposed as part of the HSR Build Alternative. *Technical Memorandum 2.6.5: Hydraulics and Hydrology Design Guidelines* (Authority 2010) requires that drainage facilities adjacent to the HSR tracks be designed for the peak 50-year storm event in urban areas within Authority right-of-way; however, this is substantially greater than the current design capacity of the cross-drainage systems. Stormwater flows associated with the 50-year storm event would likely not be able to be accommodated by existing systems designed for smaller events. Therefore, it is unlikely that the drainage systems for the HSR Build Alternative would connect to local systems, because these local systems are sized to accommodate runoff from storm events that are smaller than a 50-year storm.

Drainage alternatives will be evaluated as more information becomes available during the design-build phase of the HSR Build Alternative, as specified in HYD-IAMF#1. Drainage facilities would be designed in compliance with the applicable jurisdiction requirements (City of Burbank, City of Glendale, Los Angeles County Flood Control District, or the USACE) and would comply with the design standards in the in the latest version of Authority Technical Memorandum *2.6.5 Hydraulics and Hydrology Guidelines* to ensure that capacity of downstream drainage systems are not exceeded. Storage facilities, such as basins or subsurface systems, may be required for flow attenuation so that the capacity of downstream drainage systems is not exceeded. If it is determined that the subdrainage system within the direct RSA would support infiltration to reduce

[4] The 85th percentile storm event is an event where the precipitation total is greater than or equal to 85 percent of all 24-hour storms on an annual basis.

the velocity and volume of runoff, infiltration devices would be incorporated. Another alternative would be to provide storage systems that would control the discharge of stormwater runoff from the HSR Build Alternative to maintain the current design capacity. Stormwater runoff could also be conveyed to proposed grade separations, where the pump would control discharge rates. Lastly, as specified in HYD-IAMF#1, existing drainage systems' design capacity would be further evaluated during the design-build phase as more information becomes available to identify drainage improvements that would provide adequate capacity in compliance with the design standards of the applicable jurisdictions and the latest version of Authority Technical Memorandum *2.6.5 Hydraulics and Hydrology Guidelines* in order to ensure that stormwater runoff is adequately captured and conveyed.

In summary, stormwater runoff captured along and within the direct RSA would be directed to existing facilities, maintaining the existing drainage pattern. Alternatives for drainage facilities to attenuate flow will be evaluated as more information becomes available during the design-build phase of the HSR Build Alternative, as specified by HYD-IAMF#1.

In addition to increasing stormwater runoff as discussed above, the HSR Build Alternative could affect drainage and hydrology by altering the course of a stream or river unless it is designed to not impede or redirect flood flows. The HSR Build Alternative would realign the Lockheed Channel and extend the Burbank Western Channel. These channels would be designed to accommodate flows within the channels to minimize hydrologic effects. The HSR Build Alternative would also require placement of structures within the Los Angeles River. HYD-IAMF#2 requires preparation of a flood protection plan and compliance with design standards to minimize the hydrologic effects of water crossing structures. As described in further detail in Impact HWR #8: Permanent Impacts to Floodplains during Construction, bridge crossings would be designed to provide flow conveyance and connectivity. The hydraulic design of the crossings would comply with the hydraulic criteria of the applicable jurisdiction. As specified in HYD-IAMF#2, the bridge crossings would be elevated a minimum of 3 feet above the high-water surface elevation, and piers/columns associated with the Main Street grade separation placed within the Los Angeles River channel would be oriented parallel to the expected high-water flow direction. In addition, the placement of fill would be minimized in the flow channel to reduce hydraulic effects. The columns required for the Main Street grade separation[5] would be placed within the Los Angeles River flow channel to support the aerial structure/bridge. However, the placement of additional soil or fill would not be required within the Los Angeles River. In summary, the design standards required by HYD-IAMF#2 would minimize effects on hydraulic capacity and surface water connectivity at each waterbody crossing through design optimization.

CEQA Conclusion

Through adherence to HYD-IAMF#1 and HYD-IAMF#2, permanent impacts on surface water hydrology would be less than significant under CEQA because a stormwater management and treatment plan would be implemented (HYD-IAMF#1) and bridge design standards (HYD-IAMF#2) would be adhered to. The stormwater management and treatment plan would evaluate the capacity of receiving stormwater drainage systems to determine the improvements required to maintain existing drainage capacity. The plan would specify BMPs, including detention or upgrades to the receiving drainage system, to manage increased flow volumes and velocities resulting from new and reconstructed impervious surfaces and avoid erosion and sedimentation in receiving waterbodies. Drainage facilities would be designed in compliance with the applicable jurisdiction requirements (City of Burbank, City of Glendale, Los Angeles County Flood Control District, or the USACE). Furthermore, a flood protection plan would include measures that minimize development in floodplains and require compliance with design standards to minimize hydrologic effects of new structures within surface waters. HYD-IAMF#1 and HYD-IAMF#2 would minimize the impacts from alteration to existing drainage patterns in a manner that would result in on- or off-site erosion, on- or off-site flooding, or exceedance of the capacity of stormwater drainage systems. Therefore, CEQA does not require mitigation.

[5] The Main Street grade separation is an early action project that is described in more detail in Chapter 2.

Impact HWR #3: Temporary Impacts on Surface Water Quality during Construction

Pollutants of concern during construction include sediments, trash, petroleum products, concrete waste (dry and wet), sanitary waste, and chemicals. During construction activities, excavated soil would be exposed, and there would be an increased potential for soil erosion compared to existing conditions. In addition, chemicals, liquid products, petroleum products (such as paints, solvents, and fuels), and concrete-related waste may be spilled or leaked during construction. Any of these pollutants have the potential to be transported via storm runoff into receiving waters and could have a detrimental effect on surface water quality.

Construction activities associated with the HSR Build Alternative would disturb approximately 594 acres of soil (both upland and within waterbodies), which would include work within three waterbodies (the Lockheed Channel, the Burbank Western Channel, and the Los Angeles River). During construction activities, land would be disturbed, thereby exposing soil to the potential for erosion. When new structures are installed (e.g., HSR track bed, overcrossings, undercrossings, Burbank Airport Station), concrete and/or asphalt applications could be a source of fine sediment, metals, and chemicals that could affect downstream waterbodies if BMPs are not implemented correctly. Grading and other earthmoving activities during construction could be a source of petroleum products and heavy metals if construction equipment leaks petroleum products, such as engine oil, hydraulic oil, or antifreeze. Furthermore, temporary or portable sanitary facilities provided for construction workers could be a source of sanitary waste if they leak.

As discussed in greater detail in Section 3.10, Hazardous Materials and Waste, soil contaminated by petroleum hydrocarbons, pesticides, herbicides, asbestos, heavy metals, or other hazardous materials may be present in the direct RSA. Construction activities could disturb contaminated soils and increase the potential for stormwater to carry these pollutants into receiving waters. As required in HMW-IAMF#1, before the construction of project facilities is initiated, soils would be tested and contaminated soils would be remediated (i.e., cleaned up). Any contaminated soils unearthed during construction would be classified as hazardous waste and disposed of at appropriate off-site disposal facilities in accordance with state and federal regulations. Removal and disposal of contaminated soils before construction of the proposed facilities is initiated would reduce the potential for these pollutants to be introduced into receiving waters.

Additionally, construction within waterbodies would provide a direct path for construction-related contaminants to reach surface waters. Construction work within all three waterbodies could result in temporary sediment release and increase the risk of spills or leaks into these waterbodies, which could degrade water quality. However, because the Lockheed Channel and the Burbank Western Channel are concrete-lined, less sediment disruption would occur compared to the Los Angeles River, which has an earthen bottom and riparian vegetation within the direct RSA.

As specified in HYD-IAMF#3 and HMW-IAMF#8, construction of the HSR Build Alternative would comply with the requirements of the Construction General Permit to avoid or minimize effects to surface water quality during construction. The Construction General Permit requires the preparation of a SWPPP and identification of project-specific construction BMPs to be implemented (as detailed in BIO-IAMF#11). Construction BMPs include, but are not limited to, Erosion and Sediment Control BMPs (e.g., hydromulch, temporary silt fences, and check dams) designed to minimize erosion and retain sediment on-site, and Good Housekeeping BMPs (e.g., spill prevention and control, stockpile management) to prevent spills, leaks, and discharges of construction debris and waste into receiving waters. HMW-IAMF#6 requires preparation of a Construction Management Plan and implementation of BMPs to address hazardous material releases and ensure cleanup of any hazardous material releases during construction. Waste management and materials pollution controls (as detailed in BIO-IAMF#9 and HMW-IAMF#7) would also be included to ensure trash is properly disposed of on a daily basis and would minimize the effects on water quality.

HYD-IAMF#3 would restrict in-water work during construction to the dry season, including construction of the bridge piers in the Los Angeles River.[6] However, if the channel has year-round flows, dewatering or diversion of the surface water flow could be required. The contractor would develop a water diversion plan prior to construction, which would include the installation of cofferdams or sandbag barriers around the work areas (such as in locations where piers or abutments would be constructed) to keep water out and to reduce sediment pollution from construction work in and under water. However, even with implementation of a water diversion plan, there would be a potential for water quality effects to occur from increased erosion from the dewatering and diversion activities. To avoid or minimize the potential turbidity and siltation effects from dewatering activities, mitigation measure BIO-MM#10 requires the Authority to prepare a dewatering plan for construction dewatering or work requiring a water diversion where open or flowing water is present. The dewatering plan would identify how to divert water from the work area in a manner that avoids or minimizes effects on resources to the maximum extent practicable, including monitoring of water quality. The Authority would obtain review and approval from the applicable regulatory agency (e.g., RWQCB, USACE). These efforts would minimize any changes to overall water quality so that dewatering and diversion of surface waters would not contribute to a violation of regulatory standards or waste discharge requirements. Because construction of the HSR Build Alternative would take place within the channel of surface waters, within waters of the U.S. and the state, a Nationwide Permit 14 under Section 404 permitting would be required from the USACE and a Section 401 Permit would be required from the SWRCB. These permits would include any additional necessary conditions to reduce effects to surface water quality.

As described in further detail in Impact HWR#5: Temporary Impacts on Groundwater Volume, Quality, and Recharge during Construction, groundwater dewatering would be required during excavation activities associated with the Main Street bridge crossing over the Los Angeles River, and may be required during construction of the below-grade sections. Additionally, there is potential for groundwater to be encountered during the Flower Street and Goodwin Avenue/Chevy Chase Drive grade separations, which are early action projects described in more detail in Chapter 2. Dewatering groundwater could affect surface water quality through the discharge of polluted groundwater to surface waterbodies. Water produced during dewatering activities could contain sediments and contaminants that could degrade water quality if the water were to be discharged directly to surface water or land without treatment. The Authority would control the amount of groundwater withdrawal and release into surface waters and re-inject groundwater at specific locations if necessary (GEO-IAMF#1). Additionally, if groundwater is encountered during construction, it would be removed and disposed of according to the requirements of the Los Angeles RWQCB's Dewatering Permit. Adherence to the requirements of the Los Angeles RWQCB's Dewatering Permit would ensure groundwater discharged to surface water or land would not degrade existing water quality by requiring testing prior to discharge. For any contaminated groundwater, the water may be collected and off-hauled to a local sanitary sewer or an active treatment system that may be required to treat the water prior to discharge.

Preparation of a SWPPP, implementation of construction BMPs, compliance with the Dewatering Permit, testing and treatment of groundwater prior to release to surface waters, and implementation of a dewatering plan (BIO-MM#62) would reduce the potential for pollutants to be discharged to surface waters. Construction activities would not adversely affect beneficial uses of surface waters or attainment of water quality objectives established in the water quality control plans applicable to the RSA (i.e., the Los Angeles Basin Plan). Therefore, the HSR Build Alternative would not conflict with the implementation of the Los Angeles Basin Plan.

California Environmental Quality Act Conclusion

Implementation of HYD-IAMF#3, HMW-IAMF#1, HMW-IAMF#6, HMW-IAMF#7, HMW-IAMF#8, BIO-IAMF#9, BIO-IAMF#11, and GEO-IAMF#1 would reduce temporary impacts on surface water quality because measures to manage stormwater and prevent the potential for introduction of pollutants to surfaces would be implemented during construction activities, as described above. Even after implementation of IAMFs, there would, nevertheless, be significant impacts related to

[6] All in-water work would be restricted to the dry season, including work at the Main Street grade separation, an early action project described in more detail in Chapter 2.

violation of water quality standards and waste discharge requirements, degradation of water quality, creation of additional sources of polluted runoff, and conflict with the implementation of a water quality control plan would still remain from dewatering and diversion of surface waters because dewatering activities may contain sediments and contaminants that could degrade water quality. Mitigation measure BIO-MM#62 requires the Authority to prepare a dewatering plan for review and approval by regulatory agencies for construction dewatering or work requiring a water diversion where open or flowing water is present. With implementation of BIO-MM#62, surface water quality impacts would be less than significant under CEQA because the HSR Build Alternative would not result in the violation of any water quality standards or discharge requirements, degrade water quality, create additional sources of polluted runoff, or conflict with the implementation of a water quality control plan.

Impact HWR #4: Permanent Impacts on Surface Water Quality during Construction

The HSR Build Alternative would increase impervious surface area by approximately 19 acres along the Burbank to Los Angeles Project Section. An increase in impervious surface area would increase the volume of runoff during a storm, thereby increasing the potential for more effectively transporting pollutants to receiving waters and increasing on-site or downstream erosion. However, the Los Angeles River Watershed within the indirect and direct RSAs is already highly urbanized and impervious, and increases in impervious surface area as a result of the HSR Build Alternative would be small compared to the size of the Los Angeles River Watershed (i.e., the HSR Build Alternative would increase impervious surface area by approximately 19 acres in a 533,760-acre [834-square-mile] watershed).

New and replaced impervious surfaces collect pollutants, 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 a surface water either directly or through drainage systems. Stormwater discharges associated with the operation of the HSR Build Alternative would comply with the Phase II MS4 Permit to minimize effects on water quality.

As specified in HYD-IAMF#1, a stormwater management and treatment plan would be prepared. In compliance with this plan, post-construction BMPs would be implemented to reduce effects to water quality, as required by the Phase II MS4 Permit. BMPs would reduce surface water quality effects by reducing stormwater flow and removing pollutants 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 particular site. Potential structural BMPs could include surface infiltration basins, subsurface infiltration systems, seasonal dry detention ponds, sand and media filters, and infiltration trenches. Nonstructural BMPs are incorporated into the design of the HSR Build Alternative and mostly consist of preventative measures such as conserving natural areas, protecting slopes and channels, storm drain stenciling and signage, and vehicle/equipment cleaning.

Implementation of post-construction BMPs would reduce the potential for pollutants to be discharged to surface waters. Construction activities would not permanently adversely affect beneficial uses of surface waters or attainment of water quality objectives established in the water quality control plans applicable to the RSA (i.e., the Los Angeles Basin Plan). Therefore, the HSR Build Alternative would not conflict with the implementation of the Los Angeles Basin Plan.

CEQA Conclusion

Through adherence to HYD-IAMF#1, the permanent surface water impacts from construction of the HSR Build Alternative would be less than significant under CEQA because the HSR Build Alternative would comply with the Phase II MS4 Permit requirements and include design measures, such as BMPs, that would reduce the discharge of pollutants. HYD-IAMF#1 would minimize surface water quality impacts such that the HSR Build Alternative would not result in the violation of any water quality standards or discharge requirements, degrade water quality, create additional sources of polluted runoff, or conflict with the implementation of a water quality control plan. Therefore, CEQA does not require mitigation.

Impact HWR #5: Temporary Impacts on Groundwater Volume, Quality, and Recharge during Construction

Shallow groundwater (less than 50 feet bgs) occurs within the direct RSA, especially in locations where the direct RSA is adjacent to the Los Angeles River. Groundwater was detected approximately 25 feet bgs at the southern end of the direct RSA, near the Los Angeles River. Historically, groundwater has been as shallow as 20 feet bgs. Therefore, shallow groundwater may be encountered during construction activities associated with the Main Street bridge crossing over the Los Angeles River. Additionally, there is potential for groundwater to be encountered during the Flower Street and Goodwin Avenue/Chevy Chase Drive grade separations, which are early action projects described in more detail in Chapter 2. Pier construction would extend to approximately 50 to 120 feet bgs. Therefore, it is likely that groundwater would be encountered during construction activities for the bridges and grade separations. Dewatering groundwater during construction activities could reduce the amount of groundwater available in the groundwater basin. The volume of groundwater that would be removed would be relatively minor due to the size of the groundwater basins. The amount of groundwater dewatering is likely to be relatively small and done in widely spaced locations. Any effects from groundwater dewatering would be temporary because dewatering would cease once construction has been completed. Additionally, the Authority would control the amount of groundwater withdrawal and re-inject groundwater at specific locations if necessary (GEO-IAMF#1). Therefore, groundwater dewatering activities from construction of bridges and grade separations are not anticipated to substantially affect groundwater levels or supplies.

As discussed in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources, groundwater levels are shallow through the City of Burbank where the below-grade sections would be constructed. At the northern end of the direct RSA, groundwater is generally deep (i.e., deeper than 100 feet bgs) in the vicinity of the Burbank Airport Station. Historically, groundwater in the vicinity of the below-grade sections of the HSR Build Alternative was as high as 40 to 64 feet bgs. Please refer to Figure 3.9-1 in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources for a map of the historically high groundwater levels. Based on the historic groundwater levels, the below-grade sections are anticipated to be above the groundwater table. However, not enough groundwater information is available at this time to rule out the potential for groundwater to be encountered during construction of the below-grade sections (tunnel beneath Hollywood Burbank Airport, cut-and-cover from south of the airport to the Metrolink Ventura Subdivision, and the trench within the Metrolink Ventura Subdivision to near Beachwood Drive in the City of Burbank). Consequently, it was conservatively assumed for purposes of this analysis that construction of the below-grade sections could encounter groundwater.

If encountered, groundwater inflows into the excavations during construction of the below grade sections are anticipated. Because a relatively dry excavation is required during construction, groundwater dewatering would be required to draw down the groundwater level to 5 feet below the structure invert of the below-grade sections to prevent groundwater inflow into the below-grade sections. Construction of groundwater wells may be required to pump groundwater to achieve the required drawdown. Groundwater dewatering would lower the groundwater table in the vicinity below-grade sections, which would pose a risk of ground settlement and mobilization of contaminant plumes from nearby groundwater cleanup sites. If groundwater dewatering is deemed infeasible during final design, measures such as chemical or jet grouting or permeation grouting may be required to prevent groundwater flow into the vicinity of below-grade sections. In addition, secant pile cut-off walls may be required for support of excavation in place of soldier piles and lagging as an alternative to groundwater dewatering, chemical or jet grouting, or permeation grouting. Mitigation measure HWR-MM#1, included in Section 3.8.7, requires groundwater levels, flow, and quality to be monitored prior to, during, and after construction to reduce groundwater effects from construction of the below-grade sections. Regular monitoring would indicate potential changes in the depth to groundwater beyond the expected seasonal variations. The below-grade sections would be lined to minimize groundwater seepage into the below-grade sections and the lining would be inspected regularly throughout the construction phase to monitor for potential leaks. Should leaks be found, the lining would be repaired immediately and assessed for future integrity.

Grading and construction activities along the entire length of the Burbank to Los Angeles Project Section would compact soil, which can decrease infiltration during construction. However, the reduction in infiltration would not be substantial due to the size of the groundwater basins underlying the indirect and direct RSAs. The area of the San Fernando Valley Groundwater Basin crossed by the HSR Build Alternative is approximately 711 acres, which is approximately 0.5 percent of the total 145,000-acre basin. The area of the Coastal Plain of Los Angeles Groundwater Basin—Central Basin crossed by the HSR Build Alternative is approximately 65 acres, which is approximately 0.04 percent of the total 177,000-acre basin (Table 3.8-8; Figure 3.8-7). Therefore, soil compaction during construction is not anticipated to substantially affect groundwater levels or supplies.

Table 3.8-8 Groundwater Basins Crossed by the High-Speed Rail Build Alternative

Groundwater Basin Name (basin number)	Total Groundwater Basin Area (acres)	Groundwater Storage (acre/feet)	Length of Groundwater Basin Crossed (miles)	Area of Groundwater Basin Crossed (acres)	Percentage of Total Groundwater Basin Area Crossed
San Fernando Valley Groundwater Basin	145,000	3,670,000	22.83	711	0.5%
Coastal Plain of Los Angeles Groundwater Basin—Central Basin	177,000	13,800,000	3.68	65	0.04%

Source: California High-Speed Rail Authority, 2019a

Infiltration of contaminated stormwater could have the potential to affect groundwater quality in areas of shallow groundwater. Pollutants are generally removed by soil through absorption. Therefore, in areas of deep groundwater, there is more absorption potential and, as a result, less potential for pollutants to reach groundwater. As discussed previously, contaminated soil that is currently present in the direct RSA would be removed and disposed of prior to construction of the proposed facilities, which would reduce the potential for stormwater infiltration to carry pollutants to groundwater. In addition, if pollutants were leaked or spilled during construction, there is a potential for them to infiltrate the groundwater. However, as specified in HYD-IAMF#3, construction BMPs (e.g., Good Housekeeping BMPs) would be implemented at construction sites as part of the SWPPP (in compliance with the Construction General Permit), which would minimize the potential for construction-related pollutants to infiltrate the groundwater basins during construction. Therefore, construction activities are not anticipated to substantially affect groundwater quality.

As discussed previously, the Sustainable Groundwater Management Act requires GSPs to be developed in medium- and high-priority basins to manage the sustainability of groundwater basins. The DWR identifies both the San Fernando Valley Groundwater Basin and Central Basin as very low-priority basins. Therefore, development of GSPs for the San Fernando Valley Groundwater Basin and Central Basin is not required. Because there is not an adopted GSP applicable to the groundwater basins within the project alignment, construction activities would not conflict with or obstruct the implementation of a sustainable groundwater management plan.

CEQA Conclusion

Implementation of GEO-IAMF#1 and HYD-IAMF#3 would reduce the potential for temporary impacts to groundwater during construction by requiring measures to control the amount of groundwater withdrawal and construction BMPs to minimize pollutants that could infiltrate groundwater. Even with implementation of GEO-IAMF#1 and HYD-IAMF#3, impacts to groundwater levels and quality during construction of the below-grade sections would still be significant because of the potential for substantially depleting groundwater supplies and substantial interference with groundwater recharge. Therefore, CEQA requires mitigation. Mitigation measure HWR-MM#1 would be implemented to reduce impacts to groundwater levels and quality through a variety of methods, including construction methods to reduce inflow of groundwater into the below-grade sections, waterproofing of the below grade sections, groundwater monitoring, and inspections of the below-grade sections. If groundwater is affected, monitoring of groundwater would continue until the groundwater system has normalized to pre-construction conditions. With implementation of HWR-MM#1, temporary impacts to groundwater supplies, groundwater recharge, and groundwater quality associated with construction of the HSR Build Alternative would be less than significant pursuant to CEQA.

Because there are no applicable groundwater management plans, no impact would occur related to conflict with implementation of a sustainable groundwater management plan and no mitigation is required.

Impact HWR #6: Permanent Impacts on Groundwater Volume, Quality, and Recharge during Construction

Much of the area proposed for development is within areas of existing development, within urban areas of the cities of Burbank, Glendale, and Los Angeles. The Los Angeles County Department of Public Works maintains spreading grounds within Los Angeles County for groundwater recharge. Although the HSR Build Alternative would not cross Los Angeles County spreading grounds, increases in impervious surface area would have the potential to interfere with groundwater recharge. Implementation of the HSR Build Alternative would result in an increase in impervious surface area (approximately 19 acres) along the Burbank to Los Angeles Project Section. An increase in impervious surface area decreases infiltration, which can decrease the amount of water that is able to recharge the aquifer/groundwater basin. However, this reduction in infiltration would be small in comparison to the size of the groundwater basins (the San Fernando Valley Groundwater Basin is approximately 145,000 acres and the Central Basin is approximately 177,000 acres in total area) (Table 3.8-8). Additionally, native materials with high infiltration potential at the ground surface would be used and retained in areas that are critical to infiltration for groundwater recharge (i.e., areas in proximity to the Los Angeles River, including at the Flower Street, Goodwin Avenue/Chevy Chase Drive, and Main Street grade separations, which are early action projects described in more detail in Chapter 2).

Infiltration of stormwater could have the potential to affect groundwater quality in areas of shallow groundwater. Pollutants are generally removed by soil through absorption. Therefore, in areas of deep groundwater, there is more absorption potential and, as a result, less potential for pollutants to reach groundwater. It is not expected that stormwater infiltration would affect groundwater quality because there is not a direct path for pollutants to reach groundwater. In addition, the HSR Build Alternative would be required to implement post-construction BMPs to promote infiltration and recharge of the groundwater aquifer and to treat stormwater prior to infiltration, as described in HYD-IAMF#1. The small increase in the total new impervious surfaces would not affect existing groundwater recharge capabilities, 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, and would not affect groundwater quality with the addition of the proposed BMPs to promote infiltration.

Because there is not an adopted GSP applicable to the groundwater basins within the project alignment, construction activities would not result in permanent impacts related to conflict with or obstruction of the implementation of a sustainable groundwater management plan.

CEQA Conclusion

Through adherence to HYD-IAMF#1, permanent groundwater impacts from construction would be less than significant under CEQA because the HSR Build Alternative includes project features that minimize permanent impacts on groundwater, such as designing drainage systems and stormwater BMPs to facilitate infiltration of runoff and managing the quality and quantity of runoff. These stormwater project features would minimize the exposure of pollutants to runoff and directly improve the quality of runoff that could percolate to groundwater. HYD-IAMF#1 would minimize the permanent impacts to groundwater from construction such that the HSR Build Alternative would not violate groundwater quality standards or waste discharge requirements, otherwise substantially degrade groundwater quality, substantially deplete groundwater supplies, or interfere with groundwater recharges. Therefore, CEQA does not require mitigation.

Because there are no applicable groundwater management plans, no impact would occur related to conflict with implementation of a sustainable groundwater management plan and no mitigation is required.

Impact HWR #7: Temporary Impact on Floodplains during Construction

Construction of the HSR Build Alternative would take place in or over the FEMA-designated floodplains associated with the Lockheed Channel, the Burbank Western Channel, and the Los Angeles River. The Los Angeles River 100-year floodplain would be crossed at the following three locations:

- An existing rail bridge north of SR 110 (Los Angeles River Downey Bridge)
- A new vehicular bridge adjacent to the existing Main Street bridge for the proposed Main Street grade separation (one of the early action projects)
- An existing rail bridge southeast of Bolero Lane (Mission Tower Bridge)

Construction activities associated with the HSR Build Alternative in these FEMA-designated floodplains would include grading and excavation; construction of bridges, culverts, embankments, and/or retaining walls; placement of fill, and street demolition/reconstruction. During construction, construction equipment, materials, and temporary staging areas near the Lockheed Channel/Burbank Western Channel confluence and at the Main Street bridge crossing over the Los Angeles River would be present in floodplains. These construction activities could temporarily impede or redirect flood flows, which have the potential to increase flood elevations, redefine flood hazard areas, and cause flooding in areas previously not at risk from a 100-year flood. In addition, construction workers would be exposed to potential risk associated with floods.

Construction of the HSR Build Alternative in this subsection would require temporary fill and structures 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 in a floodplain could also temporarily impede or redirect flood flows because of the presence of construction equipment and materials in the floodplain, depending on the activity occurring within a specific area. Floodplains temporarily disturbed during construction activities would be restored to their pre-existing conditions where feasible. In addition, as specified in HYD-IAMF#3, construction of the HSR Build Alternative would comply with the requirements of the Construction General Permit, which would include construction BMPs to manage the overall amount of stormwater runoff generated from the construction soil disturbance areas. Construction activities within floodplains would be short-term, and equipment and materials would be required to be stored outside of the floodplain to minimize the potential flood risk. Consistent with typical SWPPP requirements, weather conditions would be monitored for heavy storms (and potential flood flows) so that construction workers would be notified to relocate construction equipment and minimize the potential flood risk. In addition, in the event that a heavy storm or flood event is identified, it is standard practice for construction equipment to be relocated from within flood control channels (i.e., the Lockheed Channel, the Burbank Western Channel, and the Los Angeles River) to staging areas outside of the flood control channel.

With application of HYD-IAMF#3, temporary effects on floodplains associated with construction activities would be minimized. Project features would avoid construction activities in waterbodies when the risk of flooding is greatest and would require the construction contractor to monitor weather forecasts and to relocate equipment and materials temporarily stored in floodplains to minimize flood risk.

CEQA Conclusion
Through adherence to HYD-IAMF#3, temporary impacts to floodplains would be less than significant under CEQA because measures would be implemented to avoid construction activities in waterbodies when the risk of flooding is greatest and the construction contractor would monitor weather forecasts and relocate equipment and materials temporarily stored in floodplains to

minimize flood risk. HYD-IAMF#3 would minimize impacts such that construction of the HSR Build Alternative would not substantially alter drainage patterns, resulting in flooding; or impede or redirect flood flows during construction. Therefore, CEQA does not require mitigation.

Impact HWR #8: Permanent Impact on Floodplains during Construction

The improvements associated with the HSR Build Alternative would mostly take place outside of the 100-year floodplain. However, the HSR Build Alternative would cross floodplains at several locations, as summarized in Table 3.8-9. The following describes improvements at each surface water crossing. Refer to the *Water Crossings Technical Report* (Authority 2019d) and the *Floodplain, Hydrology, and Hydraulics Technical Report* (Authority 2019b) for figures and hydraulic model results for the floodplain crossings.

Lockheed Channel

The Lockheed Channel would be realigned in two locations due to implementation of the HSR Build Alternative (Figure 3.8-9 [Sheets 1 through 3]). The upstream realignment would be between Avon Street and Lima Street. At this location, the HSR tracks would be constructed through the use of cut-and-cover. The alignment of the Lockheed Channel would be in approximately the same location as existing conditions; however, construction of a new box culvert would be required where the HSR tracks cross Lockheed Channel.

The downstream realignment would take place between Lincoln Street and the channel's confluence with the Burbank Western Channel. In the existing condition, the Lockheed Channel crosses under the Metrolink and Union Pacific Railroad tracks just east of Lincoln Street. The HSR tracks would parallel the Metrolink and Union Pacific Railroad tracks at this location, but the elevation would be below the existing tracks by approximately 30 feet and would conflict with the existing channel. Therefore, the Lockheed Channel crossing would be relocated to the east, where the proposed HSR tracks would be built above ground level.

The realignments of the Lockheed Channel would be required to comply with the requirements of the Los Angeles County Flood Control District Hydraulic Design Manual, which mandates the design of the drainage facilities to maintain the existing hydraulic grade when joining a new or realigned facility to an existing facility. For the upstream realignment of the Lockheed Channel, the capacity of the new portion of the channel would be increased to maintain/improve the hydraulic grade within the existing Lockheed Channel. Therefore, the proposed Lockheed Channel realignments would either maintain or slightly lower the hydraulic grade line (water surface of open flow) of all inlets to the Lockheed Channel. The channel would be designed to accommodate flows within the channel, and the realignments would not affect the 100-year floodplain elevations, as the hydraulic grade line of all inlets to the Lockheed Channel would be the same as or lower than the existing water surface for the Lockheed Channel. Therefore, the hydraulics of the adjoining storm drain system would be improved over the existing condition. Although flooding currently occurs in this location due to the overtopping of the Lockheed Channel and would continue to occur under the proposed condition, this flooding would be reduced due to the lower hydraulic grade line of the inlets to the Lockheed Channel.

The existing non-electrified tracks along Vanowen Street would be modified to accommodate the additional electrified tracks within the existing rail corridor. The track work proposed along Vanowen Street would be adjacent to the 100-year floodplain associated with the Lockheed Channel (Figure 3.8-9) and may involve the placement of fill within land designated as part of the Lockheed Channel 100-year floodplain. As mentioned above, flooding currently occurs in this location during 100-year storm events.

Table 3.8-9 Floodplains Crossed by the High-Speed Rail Build Alternative

Surface Water Crossing	FEMA FIRM Panel	FEMA Special Flood Hazard Area[1] and Estimated Floodplain Level	Approximate Length of Floodplain Crossing (miles)[2]	Cubic Feet of Structure Within Floodplain	Area of Impact (acres)	HSR Build Alternative Component	Crossing Type
Lockheed Channel (near Hollywood Way)	06037C1525F	Zone AE	0.09[4]	0	0	Below-Grade Alignments	Below Grade
Lockheed Channel	06037C1328F 06037C1329F 06037C1337F	Zone AE (Min: 171.3 feet; Max: 193.0 feet)	0.38[4]	0	1.05 (realigned)	Surface and Below-Grade Alignments	Surface/Below Grade
Burbank Western Channel	06037C1337F 06037C1329F 06037C1345F	Zone AE (Min: 168.4 feet; Max: 175.5 feet)	0.02	13,500	0.51 (covered)	Surface Alignment	Surface
Verdugo Wash Bridge	06037C1345F	N/A[3]	0.017	0	0	Electrified and Non-Electrified Tracks	Replacement Bridge
Los Angeles River at Downey Bridge	06037C1628F	Zone AE (Min: 88.6 feet; Max: 92.9 feet)	0.071	0	0	Electrified Tracks	Existing Bridge
Los Angeles River at Main Street Grade Separation	06037C1636F	Zone AE (Min: 80.3 feet; Max: 93.6 feet)	1.38	12,096	0.005(fill)	Roadway Bridge	New Bridge
Los Angeles River at Mission Tower Bridge	06037C1636F	Zone AE (Min: 82.3 feet; Max: 92.8 feet)	0.05	0	0	Non-Electrified Tracks	Existing Bridge

Source: California High-Speed Rail Authority, 2019a

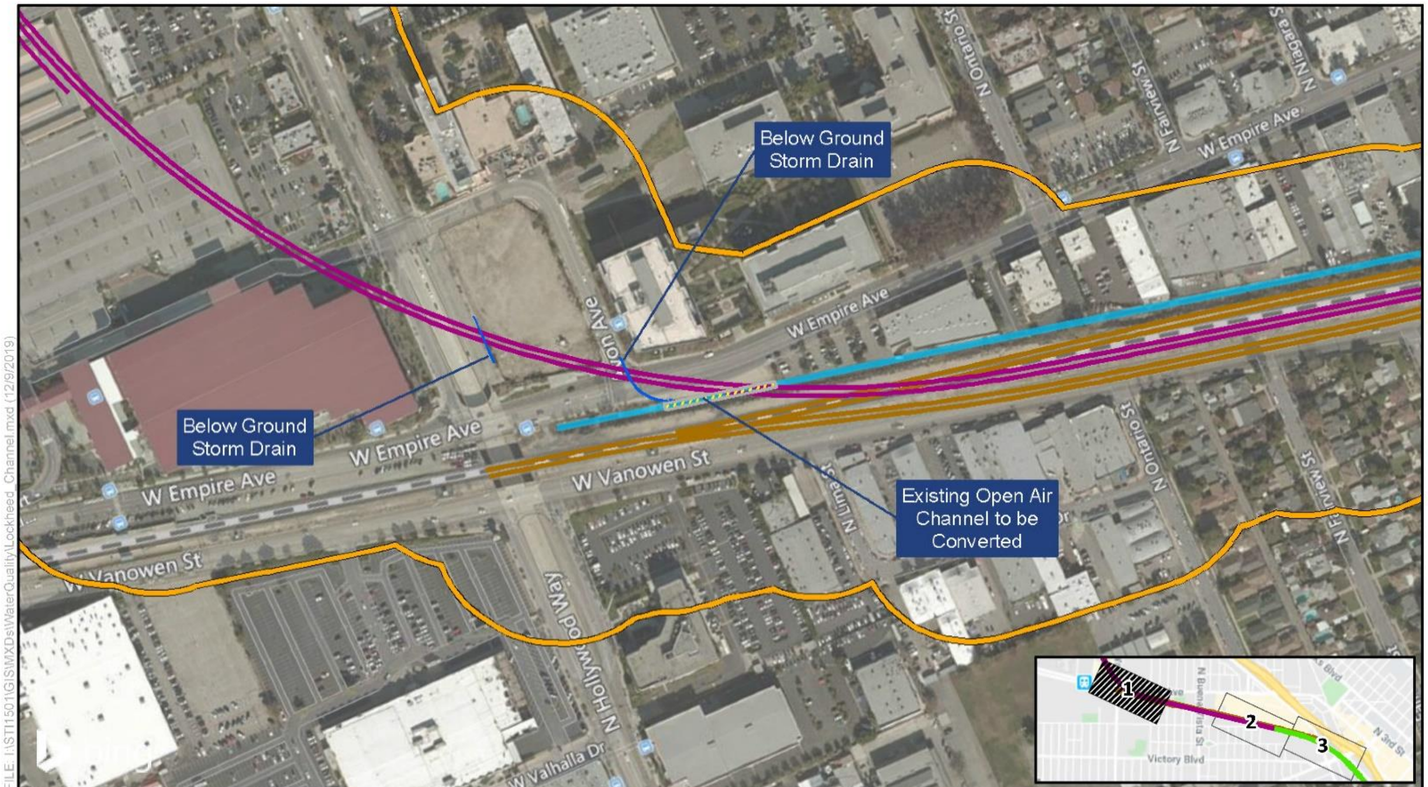
[1] Special flood-hazard areas (i.e., 100-year flood areas) designated by FEMA. Flood-hazard areas impacted by the HSR Build Alternative include Zone AE (the floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1 percent annual chance flood can be carried without substantial increases in flood heights). The HSR Build Alternative would not encroach on Zone A of the Los Angeles River.

[2] Crossing lengths estimated using GIS based on FEMA FIRMs and the HSR Build Alternative centerline, unless otherwise noted.

[3] No floodplains for the Verdugo Wash or the Arroyo Seco are mapped by FEMA.

[4] Crossing length of the proposed realigned Lockheed Channel.

FEMA = Federal Emergency Management Agency
FIRM = Flood Insurance Rate Map
GIS = geographic information system
HSR = high-speed rail
Max. = maximum
Min. = minimum
N/A = not applicable



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
SOURCE: Bing (2018); CHSRA (11/2019)

0 175 350 Feet
0 55 110 Meters

Resource Study Area
Existing Structure
Proposed Structure
Storm Drains
HSR Build Alternative
Surface
Below-Grade
Realigned, Non-electrified Tracks

Potential Non-Wetland Waters of the U.S.
Riverine
Project Design Features related to Lockheed Channel
Temporary Impacts to Existing Channel (0.63 acre total)
Proposed Channel Realignment (2.02 acres total)
Existing Open Air Alignment to be Converted (1.65 acres total)

Figure 3.8-9 Lockheed Channel

(Sheet 1 of 3)

PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
SOURCE: Bing (2018); CHSRA (11/2019)

N

0 175 350
Feet

0 55 110
Meters

Resource Study Area
Existing Structure
Proposed Structure
Storm Drains

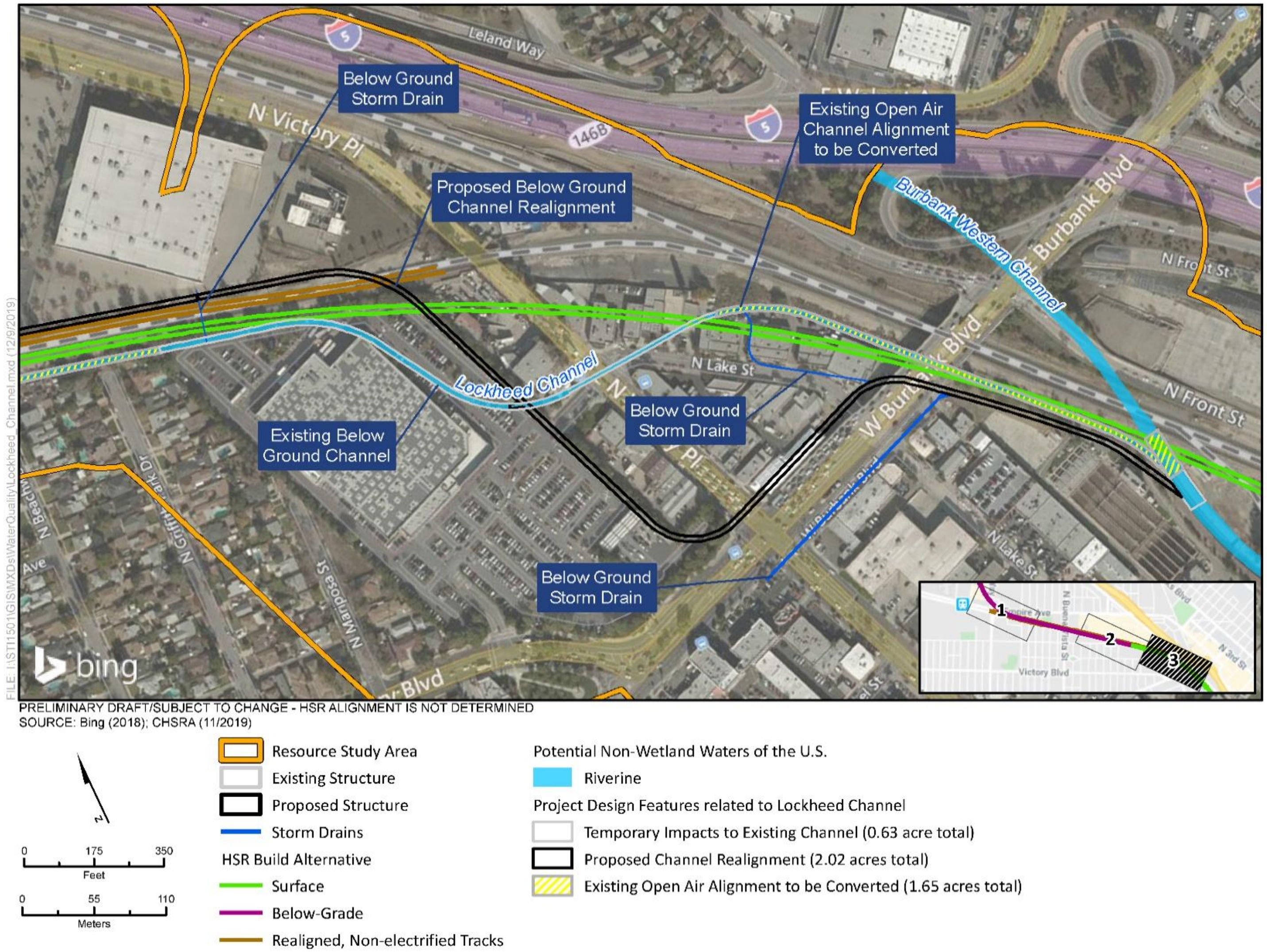
HSR Build Alternative
Surface
Below-Grade
Realigned, Non-electrified Tracks

Potential Non-Wetland Waters of the U.S.
Riverine

Project Design Features related to Lockheed Channel
Temporary Impacts to Existing Channel (0.63 acre total)
Proposed Channel Realignment (2.02 acres total)
Existing Open Air Alignment to be Converted (1.65 acres total)

Figure 3.8-9 Lockheed Channel

(Sheet 2 of 3)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
SOURCE: Bing (2018); CHSRA (11/2019)

Figure 3.8-9 Lockheed Channel

(Sheet 3 of 3)

The placement of new structures associated with the Victory Place railroad bridge within the limits of the Lockheed Channel floodplain could result in additional flooding in a narrow strip along the north side of the Lockheed Channel, extending from N Buena Vista Street to Victory Place. However, the additional flooding would occur in an area that is already flooded during 100-year storm events in the existing condition. The changes in flood elevations would be limited to areas already affected by flooding, and additional flooding would not occur in areas not already flooded during 100-year storm events. Additionally, the new railroad bridge at Victory Place and the development of HSR tracks would result in the demolition of several buildings within the limits of the existing flooding and would not increase flooding at any buildings that would remain within the flood zone. Therefore, no buildings would be affected by any changes in water surface elevations. Further, as described above, the proposed Lockheed Channel realignments would either maintain or slightly lower the hydraulic grade line of all inlets to the Lockheed Channel. Further, as described above, the proposed Lockheed Channel realignments would either maintain or slightly lower the hydraulic grade line of all inlets to the Lockheed Channel. Refer to Section 5 of the *Water Crossings Technical Report* (Authority 2019d) for further discussion on the model results for the Lockheed Channel. Although the HSR Build Alternative would place structures within the floodplain (i.e., support structures for the tracks and new railroad bridge), the tracks would be outside the floodplain, buildings would be removed, and the capacity of the Lockheed Channel would be maintained.

The existing Burbank Boulevard overcrossing would be reconstructed to cross over the electrified and non-electrified tracks, and the roadway on the west side would be raised in elevation on retained fill. Work proposed on Burbank Boulevard would be within and adjacent to the 100-year floodplain associated with the Lockheed Channel. However, the placement of structures and fill associated with reconstruction of the overcrossing would be similar to the existing condition and would not result in an increase in water surface elevation (refer to Section 5 of the *Water Crossings Technical Report* [Authority 2019d]). Additionally, as described above, the proposed Lockheed Channel realignments would either maintain or slightly lower the hydraulic grade line of all inlets to the Lockheed Channel.

The HSR Build Alternative would include flood protection measures that would minimize effects on the vertical profile, horizontal extent, flow patterns, and peak flows of 100-year floodplains. Project features include the development and implementation of a Flood Protection Plan that would include specific measures to minimize development within floodplains, prevent increases in 100-year water surface elevations by more than 1 foot, and optimize bridge designs to minimize backwater (as required by HYD-IAMF#2). Additionally, the Authority would design the shape and alignment of the piers to minimize adverse hydraulic effects. The HSR Build Alternative would also comply with the requirements set forth in USEO 11988, Floodplain Management and FEMA regulations. USEO 11988 requires compliance with the National Flood Insurance Program, which aims to reduce the effect of flooding on private and public structures. FEMA regulations require a floodplain analysis to demonstrate that projects are prevented from increasing the base flood elevation by greater than 1 foot in floodplains or substantially changing the floodplain limits. Additionally, a Conditional Letter of Map Revision/Letter of Map Revision would be obtained from FEMA. The Conditional Letter of Map Revision would serve as FEMA's acknowledgement that the HSR Build Alternative would affect the base flood elevation or modify the boundaries of a floodplain. The Letter of Map Revision would officially revise the FIRM to reflect the change in the floodplain. Modifying the FIRM ensures that future development can account for the change in the conditions of the floodplain to reduce the risk of flooding to future development proposed in the area. Therefore, through compliance with HYD-IAMF#2, the requirements set forth in USEO 11988, and FEMA requirements, permanent effects from construction within the Lockheed Channel floodplain would be minimized.

Burbank Western Channel

The HSR Build Alternative would cross the Burbank Western Channel just south of Burbank Boulevard, near I-5, at the Burbank Western Channel and Lockheed Channel confluence. At the proposed water crossing of the Burbank Western Channel, the channel is capped and changes from a 30-foot-wide reinforced concrete box culvert to a 50-foot-wide open, concrete-lined channel. The Burbank Western Channel was designed to convey a 13,200 cfs flow upstream of the channel transition and a 15,000 cfs flow downstream of the channel transition. In the existing condition, the 100-year flood is contained within the Burbank Western Channel downstream of Magnolia Boulevard, south of the proposed HSR crossing. However, during the 100-year storm, the Burbank Western Channel overflows upstream of Magnolia Boulevard and existing storm drains may cause localized flooding. The proposed channel crossing would include extending the existing capped channel by a short additional length. In addition, the Lockheed Channel would be realigned to join with the Burbank Western Channel downstream of the existing condition at the same angle as under the existing condition. The extension of the capped channel would place structures within the 100-year floodplain; however, because the realigned Lockheed Channel would join the Burbank Western Channel at the same angle, the watercourse's ability to convey peak flows would not be reduced.

The 1999 *USACE Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual* (USACE manual) includes design flow rate information, typical cross-sections, and required freeboard for major drainage facilities built by USACE in Los Angeles County. The Burbank Western Channel was built by USACE, and the required freeboard established by the USACE manual is 1.5 feet in the covered channel portion and 2 feet in the open channel portion. Under the existing condition, the design storm flow is contained within the channel with a freeboard of 5.43 feet, which is greater than the required freeboard of 2 feet. As shown in Table 3.8-10, the maximum increase in water surface elevation from construction of the Burbank Western Channel crossing would be 0.18 foot. Although the HSR Build Alternative would increase water surface elevation within the channel, the design storm would continue to be contained in the channel with a freeboard of 5.25 feet in the vicinity of the Burbank Western Channel crossing; the freeboard under the proposed condition would continue to be greater than the USACE-required freeboard of 2 feet for open channel portions. In addition, the water surface elevation at the Burbank Western Channel and Lockheed Channel confluence would decrease by approximately 3 feet due to realignment of the Lockheed Channel. The realignment would move the Lockheed Channel and Burbank Western Channel confluence downstream, which would change the hydraulics at that location and decrease the water surface elevation.

Table 3.8-10 Floodplain Crossings Water Surface Elevation Comparison

Surface Water Crossing Location	Maximum Increase in Water Surface Elevation (feet)	Distance from Crossing (feet)[1]	Length of Impact (feet)[2]
Lockheed Channel	No change in water surface elevation; the channel realignment would either maintain or slightly lower the hydraulic grade line of the channel and all inlets to the channel under the proposed condition.		
Burbank Western Channel	0.18	625	0
Verdugo Wash Bridge	No change in water surface elevation; the channel would be spanned under proposed conditions, as it is under existing conditions.		
Los Angeles River at Downey Bridge	No change in water surface elevation; the existing bridge structure would not be modified under proposed conditions		
Los Angeles River at Main Street Grade Separation	0.17	223	713
Los Angeles River at Mission Tower Bridge	No change in water surface elevation; the existing bridge structure will not be modified under proposed conditions.		

Source: California High-Speed Rail Authority, 2019a
[1] Distance from the HSR crossing where the maximum increase in water surface elevation occurs.
[2] Length along the centerline of the channel for which the water surface elevation is greater than 0.1 foot above existing conditions.
HSR = high-speed rail

The HSR Build Alternative would include flood protection measures that minimize effects on the vertical profile, horizontal extent, flow patterns, and peak flows of 100-year floodplains. Project features include the development and implementation of a Flood Protection Plan that would include specific measures to minimize development within floodplains and prevent increases in 100-year water surface elevations by more than 1 foot (as required by HYD-IAMF#2). Additionally, the Authority would design the shape and alignment of the piers to minimize adverse hydraulic effects. The HSR Build Alternative would also comply with the requirements set forth in USEO 11988, Floodplain Management and FEMA regulations. USEO 11988 requires compliance with the National Flood Insurance Program, which aims to reduce the effect of flooding on private and public structures. FEMA regulations require a floodplain analysis to demonstrate that projects are prevented from increasing the base flood elevation by greater than 1 foot in floodplains or substantially changing the floodplain limits. Additionally, a Conditional Letter of Map Revision/ Letter of Map Revision would be obtained from FEMA. The Conditional Letter of Map Revision would serve as FEMA's acknowledgement that the HSR Build Alternative would affect the base flood elevation or modify the boundaries of a floodplain. The Letter of Map Revision would officially revise the FIRM to reflect the change in the floodplain. Modifying the FIRM ensures that future development can account for the change in the conditions of the floodplain to reduce the risk of flooding to future development proposed in the area. Therefore, through compliance with HYD-IAMF#2, the requirements set forth in USEO 11988, and FEMA requirements, permanent effects from construction within the Burbank Western Channel floodplain would be minimized.

Verdugo Wash Bridge (Electrified and Non-Electrified Tracks)

The new proposed electrified and relocated non-electrified tracks would cross the Verdugo Wash just east and upstream of its confluence with the Los Angeles River. At the proposed water crossing of the Verdugo Wash, the channel is approximately 86 feet wide, rectangular, and concrete-lined. The channel is concrete-lined to reduce potential erosion or siltation from high-velocity stormwater flows. The current FEMA FIRM does not include any information for the area within the city of Glendale; therefore, no floodplains are mapped for the Verdugo Wash. The HSR Build Alternative would reconstruct the existing spanning bridge in order to accommodate the new electrified tracks along with the relocated existing non-electrified tracks to the east. The proposed bridge would span the Verdugo Wash and would not require modifications to the existing channel. The Los Angeles County 50-year design storm event of 42,900 cfs would continue to be contained in the channel with a minimum freeboard[7] of just less than 3 feet. Therefore, because the replacement bridge would be similar to the existing bridge and would not impede the channel, no effects to existing floodplain values or uses of the Verdugo Wash would occur during operations.

Los Angeles River at Downey Bridge (Electrified Tracks)

The HSR Build Alternative would cross the Los Angeles River at the existing Downey Bridge (currently used by passenger rail operators) north of SR 110 and west of the I-5/SR 110 interchange. The existing bridge would be electrified to support HSR trains, but the structure would not otherwise be modified and, therefore, would not require any modifications to the existing Los Angeles River floodplain crossing at Downey Bridge. The existing floodplain would remain the same as it is under existing conditions, and the current capacity of the channel would not be reduced due to the improvements to the existing bridge. During operations of the HSR Build Alternative, the design storm would continue to be contained in the channel with a minimum freeboard of just less than 7 feet in the vicinity of the Downey Bridge. The improvements to the existing bridge would not result in any effects to the existing Los Angeles River floodplain values or uses during operations of the HSR Build Alternative at Downey Bridge.

Los Angeles River at Main Street (Roadway Bridge)

A new grade separation would be required at Main Street and at the existing railroad tracks on both sides of the Los Angeles River as the current historic bridge is at the same grade as the existing tracks. As the existing railroad tracks are on the west and east banks of the Los Angeles River, the grade separation would include a new bridge structure parallel to the existing historic Main Street

[7] Freeboard is the distance between the maximum calculated flood elevation and the top of a channel or bottom of a bridge structure. Freeboard is a factor of safety that compensates for the unknown factors that contribute to flood heights greater than the height calculated for a selected size flood.

Bridge. At the location of the new bridge, the Los Angeles River channel is approximately 280 feet wide and is trapezoidal with concrete lining. In addition, a trapezoidal low flow channel is in the center of the channel. Main Street would be elevated on an aerial structure and would cross the Los Angeles River at a different location compared to the existing condition. The existing Main Street Bridge would remain. The new Main Street bridge over the Los Angeles River would place three support columns within the Los Angeles River channel, within the 100-year floodplain. The columns could reduce the watercourse's ability to convey peak flows by reducing the floodplain's capacity to convey flows, resulting in potential floodplain impacts. Therefore, the proposed Main Street grade separation would encroach into the Los Angeles River floodplain.

The 1999 USACE manual includes design flow rate information, typical cross-sections, and required freeboard for major drainage facilities built by USACE in Los Angeles County. The USACE built the modern Los Angeles River channel, and the required freeboard established by the USACE manual is 2.5 feet. Under the existing condition, the design storm flow is contained within the channel with a freeboard of 8.77 feet, which is greater than the required freeboard of 2.5 feet. As shown in Table 3.8-10, the maximum increase in water surface elevation from construction of the proposed new Main Street bridge would be 0.17 foot. Although the HSR Build Alternative would increase water surface elevation within the channel, the design storm flow would continue to be contained in the channel with a freeboard of 8.6 feet in the vicinity of the Main Street roadway bridge; the freeboard under the proposed condition would continue to be greater than the USACE-required freeboard of 2.5 feet.

The HSR Build Alternative would include flood protection measures that would minimize effects on the vertical profile, horizontal extent, flow patterns, and peak flows of 100-year floodplains. Project features include the development and implementation of a Flood Protection Plan that would include specific measures to minimize development within floodplains and prevent increases in 100-year water surface elevations by more than 1 foot and optimize bridge designs to minimize backwater (as required by HYD-IAMF#2). Additionally, the Authority would design the shape and alignment of the piers to minimize adverse hydraulic effects. The HSR Build Alternative would also comply with the requirements set forth in USEO 11988, Floodplain Management and FEMA regulations. USEO 11988 requires compliance with the National Flood Insurance Program, which aims to reduce the effect of flooding on private and public structures. FEMA regulations require a floodplain analysis to demonstrate that projects are prevented from increasing the base flood elevation by greater than 1 foot in floodplains or substantially changing the floodplain limits. Additionally, a Conditional Letter of Map Revision/Letter of Map Revision would be obtained from FEMA. The Conditional Letter of Map Revision would serve as FEMA's acknowledgement that the HSR Build Alternative would affect the base flood elevation or modify the boundaries of a floodplain. The Letter of Map Revision would officially revise the FIRM to reflect the change in the floodplain. Modifying the FIRM ensures that future development can account for the change in the conditions of the floodplain to reduce the risk of flooding to future development proposed in the area. Therefore, through compliance with HYD-IAMF#2, the requirements set forth in USEO 11988, and FEMA requirements, permanent effects from construction within the Los Angeles River floodplain would be minimized.

The project would require review from USACE under Section 408 where the subsection would include modifications or alterations of any federal flood control facility built to ensure that its usefulness is not impaired. The Los Angeles River is a USACE facility under Section 14 of the Rivers and Harbors Act of 1899, as amended and codified in 33 U.S. Code 408 (Section 408). Therefore, during the design phase, the Authority would be required to coordinate with the Los Angeles County Flood Control District and USACE to obtain Section 408 review for the Los Angeles River new bridge crossing. 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.

Los Angeles River at Mission Tower Bridge (Non-Electrified Tracks)
The existing non-electrified tracks cross the Los Angeles River floodplain on the existing Mission Tower Bridge southeast of Bolero Lane. No proposed modifications to the Mission Tower Bridge would take place other than to reinstall a set of non-electrified tracks on the existing bridge. Therefore, because the existing Mission Tower Bridge would not be modified, the Los Angeles River floodplain crossing at the Mission Tower Bridge would not be modified. The existing floodplain would remain the same as under existing conditions, and the current capacity of the channel would not be reduced due to the restoration of tracks at the existing bridge. The non-electrified tracks would not result in any effects to the Los Angeles River floodplain values or uses during operations of the HSR Build Alternative at the Mission Tower Bridge.

CEQA Conclusion
Through adherence to HYD-IAMF#2 and the requirements set forth in USEO 11988, permanent impacts to floodplains from construction would be less than significant under CEQA because the design of the HSR Build Alternative would include flood protection measures that minimize effects on the vertical profile, horizontal extent, flow patterns, and peak flows of 100-year floodplains. HYD-IAMF#2 would minimize floodplain impacts such that the HSR Build Alternative would not place structures in a floodplain in a manner that would impede or redirect flood flows and would not substantially alter the existing drainage patterns in a manner that would result in flooding on- or off-site. Therefore, CEQA does not require mitigation.

Operations Impacts

Operation of the HSR Build Alternative would include inspection and maintenance along the track and railroad right-of-way, as well as on the structures, fencing, power system, train control, electric interconnection facilities, and communications. Operations and maintenance are more fully described in Chapter 2, Alternatives.

Impact HWR #9: Intermittent Permanent Impacts on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology) during Operations

Operational activities of the HSR Build Alternative would include passenger access to and from stations, use of parking structures or lots, maintenance activities along the HSR Build Alternative trackway, and facility security patrols. Routine maintenance activities would take place periodically around the Burbank Airport Station and Los Angeles Union Station as well as along the trackway, and include inspection and maintenance along the track and railroad right-of-way, as well as on the structures, fencing, power system, train control, electric interconnection facilities, and communications. These activities would be similar to maintenance activities that take place for other major transportation infrastructure facilities in the area, such as freeways, the Metrolink rail line, and local major arterial streets. Operation and maintenance activities associated with the HSR system would be similar to what exists today for the existing rail corridor that does not alter drainage patterns, stormwater runoff, and hydraulic capacity. As a result, none of the operational and routine maintenance activities would be anticipated to involve activities that would alter drainage patterns, stormwater runoff, and hydraulic capacity.

CEQA Conclusion
No operations impacts to drainage patterns, stormwater runoff, or hydraulic capacity would occur under CEQA because operation and maintenance of the HSR Build Alternative would be similar to activities that currently exist which do not and would not involve activities that would alter drainage patterns, stormwater runoff, or hydraulic capacity. Therefore, CEQA does not require mitigation.

Impact HWR #10: Intermittent and Continuous Permanent Impacts on Surface Water Quality during Operations

Because there are existing railways within the Burbank to Los Angeles Project Section, the HSR Build Alternative would not introduce new types of pollutants to the indirect and direct RSAs. However, the presence of the HSR Build Alternative could increase the amount of the pollutants associated with railroads (pollutants that may already exist in the watershed) because of increased rail service and maintenance. During operation and maintenance activities, anticipated pollutants associated with a railway facility include heavy metals, dissolved metals, nutrients, sediments, particulate matter, organic compounds, trash and debris, and oil and grease. As discussed further below, stormwater discharges associated with the operation of the HSR Build Alternative would comply with the Phase II MS4 Permit, which includes implementation of post-construction BMPs to reduce pollutants of concern in stormwater runoff and minimize effects on water quality.

The HSR system would be electrically powered and would not emit petroleum hydrocarbons or byproducts of internal combustion engines. In addition, the technology proposed for the HSR Build Alternative does not require large amounts of lubricants or hazardous materials for operation. Greases may be used to lubricate switching equipment along the trackway. Routine vegetation removal along the tracks and associated infrastructure may require land disturbance, resulting in increased susceptibility to erosion and sedimentation along slopes. Additionally, herbicides and/or pesticides may be used along the right-of-way to control weeds and vermin as required by state and federal regulations. Appropriate laws and regulations pertaining to the use of pesticides and herbicides and safety standards for employees and the public (including the Federal Insecticide, Fungicide and Rodenticide Act [7 U.S. Code § 136 and 40 Code of Federal Regulations Parts 152.1–171], federal Occupational Safety and Health Act of 1970, California Health and Safety Code, and California Occupational Safety and Health Act) would be followed to minimize adverse effects on the environment. The Authority would implement environmental management system and hazardous materials monitoring plans to limit the potential for spills, limit the amount of hazardous substances used for HSR operations, and establish cleanup protocols and trained personnel to prevent accidental spills of hazardous materials and other pollutants from reaching surface waterbodies during operation (as specified in HMW-IAMF#9 and HMW-IAMF#10).

However, as stated previously, the operation of the HSR Build Alternative could increase the amount of the pollutants associated with rail operations because of increased rail service. Specifically, dust generated by braking would be continuously generated and released by trains. Brake dust consists of particulate metals, primarily iron, but may also include copper, silicon, calcium, manganese, chromium, and barium. Although brake dust consists primarily of particulate metals, some of these metals could become dissolved in rainwater. Although brake dust would be released into the environment during operations, the electric trains would use regenerative braking technology, resulting in reduced physical braking and associated wear compared to conventional petroleum-fueled trains. Brake dust would not be generated in equal amount throughout the HSR alignment. The primary locations where brake dust would be generated are areas where the trains must reduce their travel speed, such as approaches to stations, turns, and elevation changes (primarily descents). Long stretches of flat terrain with a straight rail alignment would generate less brake dust than other areas. In addition, brake dust is generally anticipated to be retained in track ballast. Parking lots associated with the stations would also be a primary source of pollutants, including heavy metals, organic compounds, trash and debris, oil and grease, nutrients, pesticides, and sediments.

In consideration of the potential for brake-pad particles and parking lot runoff to be conveyed to surface waters, the Authority would prepare a stormwater management and treatment plan that complies with the Phase II MS4 permit requirements (HYD-IAMF#1). The plan would include post-construction BMPs and low-impact development techniques to reduce the quantity and improve the quality of stormwater runoff before runoff is discharged into a surface waterbody. A variety of BMPs would be considered, including, but not limited to, surface infiltration basins, subsurface infiltration systems, seasonal dry detention ponds, sand and media filters, and infiltration trenches. Of these potential treatment BMPs, all are capable of reducing particulate and dissolved metal concentrations in runoff. Post-construction BMPs would 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 retained-fill portions of the HSR alignment, brake dust is generally anticipated to be retained in track ballast. Accordingly, post-construction BMPs would 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 because the electric trains would use regenerative braking technology to reduce brake pad wear and the amount of potential metal particles deposited within the track right-of-way. Even though certain heavy metals have the potential to bioaccumulate within the aquatic environment or stimulate the growth of microbes (e.g., algae), 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 would implement treatment BMPs in compliance with Phase II MS4 permit requirements to reduce the quantity and improve the quality of runoff generated on all new and replaced impervious surfaces, the project would minimize potential water quality impacts from brake dust to the maximum extent practicable using the best available technology.

The Los Angeles River, the Verdugo Wash, the Arroyo Seco, and the Burbank Western Chanel are all listed for various impairments on the 303(d) List. The Los Angeles River (Reach 2) is listed as impaired for ammonia, indicator bacteria, copper, lead, nutrients (algae), oil*, and trash. The Los Angeles River (Reach 3) is listed as impaired for ammonia, copper, nutrients (algae), indicator bacteria, and trash. Arroyo Seco (Reach 1) is listed as impaired for indicator bacteria and trash. The Verdugo Wash (Reach 1) is listed as impaired for indicator bacteria, copper, and trash. The Burbank Western Channel is listed as impaired for copper, cyanide*, indicator bacteria, lead, selenium, and trash.[8]

Operation of the HSR Build Alternative has the potential to contribute to heavy metal, nutrient, sediment, organic compound, trash and debris, and oil and grease existing water quality impairments. However, as stated above, post-construction BMPs and low-impact development techniques would be implemented in compliance with Phase II MS4 permit requirements to reduce effects to water quality by reducing pollutants of concern in stormwater runoff, as required by the Phase II MS4 Permit, prior to discharge to the existing storm drain system (HYD-IAMF#1). 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 particular site. As stated above, potential structural BMPs could include surface infiltration basins, subsurface infiltration systems, seasonal dry detention ponds, sand and media filters, and infiltration trenches. Nonstructural BMPs are incorporated into the design of the HSR Build Alternative and mostly consist of preventative measures, such as conserving natural areas, protecting slopes and channels, storm drain stenciling and signage, and vehicle/equipment cleaning. As a result of the IAMFs, the HSR Build Alternative would 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.

Implementation of post-construction BMPs in compliance with Phase II MS4 permit requirements would reduce the potential for pollutants to be discharged to surface waters. Operations of the HSR Build Alternative would not permanently adversely affect beneficial uses of surface waters or attainment of water quality objectives established in the water quality control plans applicable to the RSA (i.e., the Los Angeles Basin Plan). Therefore, the HSR Build Alternative would not conflict with the implementation of the Los Angeles Basin Plan.

CEQA Conclusion

Through adherence to HYD-IAMF#1, HMW-IAMF#9, and HMW-IAMF#10, operations impacts on surface water quality would be less than significant under CEQA through implementation of an environmental management system, a hazardous materials plan, and operational BMPs to prevent pollutants from reaching surface waters, as described above. HYD-IAMF#1, HMW-IAMF#9, and HMW-IAMF#10 would minimize surface water quality impacts such that the HSR Build Alternative would not result in the violation of any water quality standards or discharge requirements, degrade water quality, provide additional sources of polluted runoff, or conflict with implementation of a water quality control plan. Therefore, CEQA does not require mitigation.

[8] Constituents for which a TMDL has not been developed are marked with an asterisk (*).

Impact HWR #11: Intermittent and Continuous Permanent Impacts on Groundwater Volume, Quality, and Recharge during Operations

The below-grade sections of the HSR Build Alternative would be waterproofed to prevent groundwater seepage into the below-grade sections (tunnel beneath Hollywood Burbank Airport, cut-and-cover from south of the airport to the Metrolink Ventura Subdivision, and the trench within the Metrolink Ventura Subdivision to near Beachwood Drive in the City of Burbank). The lining would be inspected regularly to monitor for potential leaks. Should leaks be found, the lining would be repaired immediately and assessed for future integrity. Any groundwater seepage into the below-grade sections would be minimal due to the lining and would drain toward a low point in the below-grade sections and then be conveyed to a sump. The water would then be treated and pumped out to local storm drain facilities.

Operation of the HSR Build Alternative would not involve direct extraction of groundwater. However, operation of the proposed stations would increase the need for municipal water in the cities of Burbank and Los Angeles for the use of toilets, sinks, landscaping, and other improvements. The only water usage associated with the HSR Build Alternative alignment would be in the city of Burbank at below grade sections and portals during operations for cleaning of the below-grade sections, fire and life safety, domestic needs, and general maintenance operations. Municipal water in the cities of Burbank and Los Angeles is partly supplied by groundwater. Water use within the cities of Burbank and Los Angeles is managed by Burbank Water and Power and the Los Angeles Department of Water and Power through implementation of Urban Water Management Plans. These agencies are responsible for ensuring adequate water supplies are available for existing and proposed development so that groundwater overdraft does not occur. As also discussed in Section 3.6, Public Utilities and Energy, water use at the Burbank Airport Station during operation of the HSR Build Alternative would be 164 acre feet/year, which is approximately 15 percent less than existing water demand in the Burbank area of the project footprint (192 acre-feet/year). Water use at Los Angeles Union Station would be 168 acre-feet/year, which is an increase of 243 percent due to the additional passengers and employees at the facility compared to the existing water demand in the Los Angeles Union Station area of the project footprint (69 acre-feet/year). However, as discussed in further detail in Section 3.6, Public Utilities and Energy, anticipated water demand for the Burbank Airport Station would be 0.6 percent of Burbank Water and Power's total water supply by the year 2040. Anticipated water demand for Los Angeles Union Station would be 0.02 percent of the Los Angeles Department of Water and Power's total water supply by the year 2040. The HSR Build Alternative would not adversely affect groundwater volumes in the city of Burbank because the anticipated demand for water to serve the Burbank Airport station would be less than the existing uses on the same areas. The HSR Build Alternative would not adversely affect groundwater volumes in the city of Los Angeles, because the increase in demand to serve the Los Angeles Union Station represents a small fraction of the total supplies available.

Pollutants from operational and maintenance activities would not substantially affect groundwater quality because (1) post-construction BMPs would reduce pollutants from stormwater runoff prior to infiltration to the groundwater basin (HYD-IAMF#1), and (2) there is not a direct pathway for stormwater pollutants to reach groundwater (soil would filter out pollutants before they would reach groundwater). Additionally, because there is not an adopted GSP applicable to the groundwater basins within the project alignment, operation of the HSR Build Alternative would not conflict with or obstruct the implementation of a sustainable groundwater management plan.

CEQA Conclusion

Through adherence to HYD-IAMF#1, groundwater impacts during operations would be less than significant under CEQA because the HSR Build Alternative includes project features that minimize operations impacts on groundwater quality, such as stormwater BMPs to facilitate infiltration and reduce pollutants before they can reach groundwater. Additionally, the HSR Build Alternative would not significantly affect groundwater supplies because demand for water that could be supplied by groundwater represents a small fraction of the total supply available. Implementation of HYD-IAMF#1 would ensure the permanent impacts related to violation of groundwater quality standards or waste discharge requirements, degradation of groundwater quality, depletion of groundwater supplies, and interference with groundwater recharge would be less than significant. Therefore, CEQA does not require mitigation.

Because there are no applicable groundwater management plans, no impact would occur related to conflict with implementation of a sustainable groundwater management plan and no mitigation is required.

Impact HWR #12: Intermittent Permanent Impact on Floodplains during Operations

Operational activities of the HSR Build Alternative would include passenger access to and from stations, use of parking structures or lots, maintenance activities along the HSR Build Alternative trackway, and facility security patrols. Routine maintenance activities would take place periodically around the Burbank Airport Station and Los Angeles Union Station as well as along the trackway. These activities would be similar to maintenance activities that take place for other major transportation infrastructure facilities in the area, such as freeways, the Metrolink rail line, and local major arterial streets. No operations or maintenance activities are anticipated to be required within floodplains. Additionally, the tracks and stations would be elevated above the floodplain and would therefore not expose passengers to flooding risks during storm events. Therefore, operations and maintenance activities would not be anticipated to affect floodplains.

CEQA Conclusion
Operations and maintenance would not result in floodplain impacts because these activities would not occur within floodplains. The HSR Build Alternative would not place structures in a floodplain in a manner that would impede or redirect flood flows. Therefore, CEQA does not require mitigation.

Impact HWR#13: Intermittent Impact from Risk of Release of Pollutants from Inundation during Operations

Although there are several floodplains within the RSA, the HSR tracks and stations would not be within a floodplain and would not be anticipated to be inundated during a flood event. Therefore, there is no risk of release of pollutants due to inundation from flooding during a storm event. As discussed in Section 3.8.5.8, flooding as a result of seismic seiche or tsunami is unlikely to occur within the direct RSA due to the distance to any large waterbodies (i.e., reservoirs or the Pacific Ocean). For these reasons, the HSR Build Alternative would not increase the risk release of pollutants during inundation.

CEQA Conclusion
Because the HSR tracks and stations would not be subject to inundation risk, there would be no impact under CEQA related to risk of release of pollutants from inundation. Therefore, CEQA does not require mitigation.

3.8.7 Mitigation Measures

The Authority has identified the following mitigation measures for impacts under NEPA and significant impacts under CEQA that cannot be avoided or minimized adequately by IAMFs.

HWR-MM#1: Below-Grade Section Constructability and Hydrogeological Monitoring

The Authority would implement the following mitigation measures to reduce hydrogeological impacts associated with construction of the below grade sections:

- Excavation of the below grade sections would include continuous probing to assess the ground and groundwater conditions.
- Pre-excavation grouting would be used to control groundwater inflows and provide face stability where applicable
- Should areas of abnormally high flow be encountered, drilling would stop and methods reevaluated to minimize potential impacts to surface water features and groundwater aquifers.

- All below grade sections would be waterproofed. The lining of the below grade section would be designed to withstand construction, ground, seismic, and hydrostatic loads.
- The lining of the below grade sections would be inspected regularly throughout the construction phase to monitor for potential leaks. Should leaks be found, the lining would be repaired. Groundwater infiltration would be treated and disposed of in accordance with state and local regulations.
- If it is determined that the below grade sections will be below the groundwater table, a groundwater monitoring plan would be prepared and implemented. Monitoring may include measurements of water levels in wells, inflows into the below grade sections, probe-hole flow, and portal discharges. Monitoring of groundwater, if impacted, would continue until the groundwater system has normalized to pre-construction conditions.
- The Authority would develop a plan to inspect the below grade sections after seismic events to assess and seal leaks exceeding set inflow criteria.

Impacts from Implementing Mitigation Measure HWR-MM#1

HWR-MM#1 would implement several measures to minimize the potential for the construction and operation of below-grade sections to affect groundwater levels. Procedures regulating development of the lining of the below-grade sections, lining inspections, and groundwater monitoring during construction of the below-grade sections would not result in physical environmental effects. Groundwater quality and quantity monitoring typically requires temporary minor disturbance to assess flow rates and take water samples. These actions would not result in secondary environmental effects. Therefore, implementation of HWR-MM#1 would not result in any impacts pursuant to CEQA.

BIO-MM#62: Prepare Plan for Dewatering and Water Diversions

Prior to initiating any construction activity that occurs within open or flowing water, the Authority will prepare a dewatering plan, which will be subject to the review and approval by the applicable regulatory agencies. The plan will incorporate measures to minimize turbidity and siltation. The Project Biologist will monitor the dewatering and/or water diversion sites, including collection of water quality data, as applicable. Prior to the dewatering or diverting of water from a site, the Project Biologist will conduct pre-activity surveys to determine the presence or absence of special-status species within the affected waterbody. In the event that special-status species are detected during pre-activity surveys, the Project Biologist will relocate the species (unless the species is Fully Protected under State law), consistent with any regulatory authorizations applicable to the species.

Impacts from Implementing Mitigation Measure BIO-MM#62

Implementation of BIO-MM#62 would require monitoring of surface water quality during dewatering or water diversion within surface waters to reduce the effects to surface water quality. This measure would not result in changes to the physical environment. Therefore, implementation of BIO-MM#62 would not result in any impacts pursuant to CEQA.

3.8.7.1 *Early Action Projects*

As described in Chapter 2, Section 2.5.2.9, early action projects would be completed in collaboration with local and regional agencies. They include grade separations and improvements at regional passenger rail stations. These early action projects are analyzed in further detail to allow the agencies to adopt the findings and mitigation measures as needed to construct the projects. The mitigation measures listed in Table 3.8-11 would be required for each of the early action projects.

Table 3.8-11 Mitigation Measures Required for Early Action Projects

Early Action Project	Impact	Mitigation Measure
Main Street Grade Separation	Impact HWR#3	BIO-MM#62

3.8.8 NEPA Impact Summary

This section summarizes impacts of the HSR Build Alternative and compares them to the anticipated impacts of the No Project Alternative.

Under the No Project Alternative, recent development trends within the Burbank to Los Angeles Project Section are anticipated to continue, leading to ongoing hydrology and water resources impacts. Transportation improvement projects may cross FEMA-designated 100-year floodplains and land development projects, such as residential and commercial developments, and may affect flood flow volumes or rates due to increases in impervious area. All other projects without the No Project Alternative would likely be required to comply with FEMA regulations and the requirements set forth in USEO 11988, similar to the HSR Build Alternative, as described below.

In addition, due to other approved transportation improvement projects and land development projects, there would be an overall increase in impervious surface area even without the No Project Alternative. Increases in impervious surfaces could lead to increased volumes and velocities of stormwater runoff and pollutants of concern reaching receiving waters. Short-term water quality impacts would occur as a result of construction activities associated with other project development. Long-term water quality effects would occur from continued operation of existing highways, airports, and railways, and from operational activities associated with new projects unrelated to the HSR project. Planned developments would likely comply with existing laws and regulations that protect surface water hydrology, including various CWA Section 402 NPDES permits.

Construction activities associated with the HSR Build Alternative, such as grading and excavation, would alter existing drainage patterns and redirect stormwater runoff. Soil would be compacted during ground-disturbing activities, resulting in a decrease in infiltration and an increase in the volume and rate of stormwater runoff during storm events. However, with implementation of IAMFs, which would require implementation of construction BMPs and would limit work within surface waters, no temporary effects related to changes in drainage patterns, stormwater runoff, or hydraulic capacity during construction would occur under NEPA.

Construction of the HSR Build Alternative would increase impervious surface area, alter drainage patterns, and increase stormwater runoff. However, with implementation of IAMFs, which would require implementation of post-construction BMPs (including those for flow attenuation) and compliance with applicable NPDES permits, no permanent effects related to drainage patterns, stormwater runoff, or hydraulic capacity from construction would occur under NEPA.

Construction activities would increase pollutants of concern in stormwater runoff. In addition, surface water dewatering or diversion and discharge of groundwater during dewatering activities could introduce pollutants to surface waters. However, with implementation of IAMFs and mitigation, which would require implementation of construction BMPs, compliance with applicable NPDES permits, and water quality monitoring during surface water dewatering or diversion, no temporary effects to surface water quality during construction would occur under NEPA.

Construction of the HSR Build Alternative would increase impervious surface area and pollutants in stormwater runoff. However, with implementation of IAMFs, which would require implementation of post-construction BMPs to minimize pollutants in stormwater and compliance with applicable NPDES permits, no permanent effects related to surface water quality from construction would occur under NEPA.

Groundwater dewatering, particularly during construction of the below-grade sections, could reduce groundwater levels and mobilize pollutant plumes. In addition, construction activities could decrease infiltration and contribute pollutants of concern to groundwater. However, with implementation of IAMFs and mitigation measures, which would require implementation of construction BMPs, limit groundwater withdrawal and require re-injection, and require monitoring of groundwater levels, flow, and quality prior to, during, and after construction of the below-grade sections, no temporary effects related to changes in groundwater volume, quality, and recharge during construction would occur under NEPA.

Construction of the HSR Build Alternative would increase impervious surface area, which would reduce infiltration. However, this reduction in infiltration would be negligible in comparison to the size of the groundwater basins. The HSR Build Alternative would also increase pollutants of concern, which could infiltrate groundwater. However, with implementation of IAMFs, which would require implementation of post-construction BMPs to minimize pollutants in stormwater that could infiltrate groundwater, no permanent effects related to groundwater quality or quantity from construction would occur under NEPA.

Construction of the HSR Build Alternative would take place in or over FEMA-designated floodplains. These construction activities could temporarily impede or redirect flood flows, which has the potential to increase flood elevations, redefine flood hazard areas, and cause flooding in areas previously not at risk from a 100-year flood. In addition, construction workers would be exposed to potential risk associated with floods. However, with implementation of IAMFs, which would limit structures and construction activities in the floodplain and ensure restoration of impacted floodplains, no effects to designated floodplains during construction would occur under NEPA.

Construction of the HSR Build Alternative would place new structures within the 100-year floodplain, which would permanently alter floodplain elevations. However, with implementation of IAMFs, which would require flood protection measures that minimize effects to 100-year floodplain water surface elevations, as well as compliance with the requirements set forth in USEO 11988 and the FEMA regulations, no permanent effects to designated floodplains from construction would occur under NEPA.

Operation and maintenance of the HSR Build Alternative would increase generation of pollutants of concern, particularly from train braking. However, with implementation of IAMFs, which would require implementation of operational BMPs to treat stormwater and remove pollutants of concern as well as compliance with applicable NPDES permits, no effects to surface water quality during operation would occur under NEPA.

Operation and maintenance of the HSR Build Alternative would not substantially deplete groundwater volumes compared to the existing condition because the project would not include extraction of groundwater. Additionally, water demand for the HSR Build Alternative, including the stations, would not substantially affect groundwater supplies because water use that could be supplied by groundwater represents a small fraction of the total supply available, Operation and maintenance activities could introduce pollutants to stormwater that could infiltrate groundwater. With implementation of IAMFs and mitigation measures, which include implementation of operational BMPs to treat stormwater and remove pollutants of concern before they can reach groundwater and preparation of a Water Supply Assessment, no effects to groundwater quality or quantity would occur during operation of the HSR Build Alternative.

Operations and maintenance would have no effect under NEPA on drainage patterns, stormwater runoff, hydraulic capacity, or floodplains. With implementation of IAMFs, no effects from release of pollutants from inundation would occur during operation of the HSR Build Alternative.

3.8.9 CEQA Significance Conclusions

Table 3.8-12 provides a summary of the CEQA determination of significance for all construction and operations impacts discussed in Section 3.8.6.3, High-Speed Rail Build Alternative.

Table 3.8-12 Summary of CEQA Significance Conclusions and Mitigation Measures for Hydrology and Water Resources

Impact	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Construction			
Impact HWR#1: Temporary Impacts on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology) during Construction	Less than Significant	No mitigation measures are required	Not Applicable
Impact HWR#2: Permanent Impacts on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology) during Construction	Less than Significant	No mitigation measures are required	Not Applicable
Impact HWR#3: Temporary Impacts on Surface Water Quality during Construction	Significant	BIO-MM#10	Less than Significant
Impact HWR#4: Permanent Impacts on Surface Water Quality during Construction	Less than Significant	No mitigation measures are required	Not Applicable
Impact HWR#5: Temporary Impacts on Groundwater Volume, Quality, and Recharge during Construction	Significant	HWR-MM#1	Less than Significant
Impact HWR#6: Permanent Impacts on Groundwater Volume, Quality, and Recharge during Construction	Less than Significant	No mitigation measures are required	Not Applicable
Impact HWR#7: Temporary Impact on Floodplains during Construction	Less than Significant	No mitigation measures are required	Not Applicable
Impact HWR#8: Permanent Impact on Floodplains during Construction	Less than Significant	No mitigation measures are required	Not Applicable
Operations			
Impact HWR#9: Intermittent Permanent Impacts on Drainage Patterns, Stormwater Runoff, and Hydraulic Capacity (Surface Water Hydrology) during Operations	No Impact	No mitigation measures are required	Not Applicable
Impact HWR#10: Intermittent Continuous Permanent Surface Water Quality during Operations	Less than Significant	No mitigation measures are required	Not Applicable
Impact HWR#11: Intermittent and Continuous Permanent Impacts on Groundwater Volume, Quality, and Recharge during Operations	Less than Significant	No mitigation measures are required	Not Applicable
Impact HWR#12: Intermittent Permanent Impact on Floodplains during Operations	No Impact	No mitigation measures are required	Not Applicable

Impact	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Impact HWR#13: Intermittent Impact from Risk of Release of Pollutants from Inundation during Operations	No Impact	No mitigation measures are required	Not Applicable

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