3.8 Hydrology and Water Resources

This section describes the regulatory setting and the affected environment for hydrology and water resources, the impacts on hydrology and water resources that would result from implementation of the Fresno to Bakersfield Locally Generated Alternative (F-B LGA), and mitigation measures applicable to the F-B LGA that would reduce these impacts. Within the context of hydrology and water resources, the F-B LGA is also compared to the complementary portion of the Preferred Alternative that was identified in the *Fresno to Bakersfield Section Final Environmental Impact Report/Environmental Impact Statement* (EIR/EIS). As discussed in Section 1.1.3 of this Draft Supplemental EIR/EIS, the complementary portion of the Preferred Alternative consists of the portion of the BNSF Alternative from Poplar Avenue to Hageman Road and the Bakersfield Hybrid from Hageman Road to Oswell Street (further referenced as the "May 2014 Project" in this Draft Supplemental EIR/EIS). Since the Fresno to Bakersfield Section Final EIR/EIS does not evaluate the May 2014 Project as a discrete subsection of the Fresno to Bakersfield Project (as it did for example for the Allensworth Bypass), affected environment and impact summary discussion included in this section for the May 2014 Project has been extrapolated from the available information contained within the Fresno to Bakersfield Section Final EIR/EIS.

This section includes a range of topics related to water resources, including surface water hydrology, water quality, groundwater, and floodplains. The information in this section is based on the supporting documents prepared for the preliminary design, including the following:

- Draft Stormwater Management Report (California High-Speed Rail Authority [Authority] 2016a)
- Draft Floodplain Impact Report (Authority 2016b)
- Draft Preliminary Engineering for Project Definition Hydrology, Hydraulics, and Drainage Report (Authority 2016c)

3.8.1 Regulatory Setting

Federal, state, and local laws, regulations, orders, or plans relevant to hydrology and water resources affected by the project are presented in Sections 3.8.1.1, 3.8.1.2, and 3.8.1.3. National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) requirements for assessment and disclosure of environmental impacts are described in Section 3.1, Introduction, and are, therefore, not restated for each resource section of the chapter.

3.8.1.1 Federal

The following federal regulations would be applicable to the F-B LGA. These regulations are discussed in further detail in Section 3.8.2.1 of the Fresno to Bakersfield Section Final EIR/ EIS (pages 3.8-1 through 3.8-3).

- Clean Water Act (CWA; 33 United States Code [U.S.C.] § 1251 et seq.)
- Permit for Fill Material in Waters and Wetlands (Section 404)
- National Pollutant Discharge Elimination System Program (NPDES) (Section 402)
- Clean Water Quality Certification (Section 401)
- Water Quality Impairments (Section 303[d])
- Safe Drinking Water Act of 1974 (42 U.S.C. § 300 et seq.)
- National Flood Insurance Act (42 U.S.C. § 4001 et seq.)
- Floodplain Management and Protection (United States Department of Transportation Order 5650.2) and Flood Disaster Protection Act (42 U.S.C. Sections 4001–4128)

The following federal regulation was included in the Fresno to Bakersfield Section Final EIR/EIS but has since been updated:

- Floodplain Management (Executive Order 11988): Executive Order 11988 requires federal agencies to avoid the long and short-term adverse impacts associated with modification of floodplains to the maximum extent practicable and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. The updated Executive Order, released on January 30, 2015, is similar to the previously adopted Executive Order of May 24, 1977, and would not result in a difference in regulatory action for the F-B LGA (The White House Office of the Press Secretary 2015).

The following federal regulations were not included in Section 3.8.2.1 of the Fresno to Bakersfield Section Final EIR/EIS but are applicable to the F-B LGA:

- Section 102 of the CWA (33 U.S.C. § 1251 et seq.): 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 water bodies, as well as specified water quality objectives to protect those uses. Analysis of the degree to which discharges of runoff from the project may or may not adversely affect project receiving water beneficial uses and attainment by the receiving water of assigned water quality objectives indicates the degree to which the project may affect water quality of existing surface waters.

3.8.1.2 State

The following state regulations would be applicable to the F-B LGA. These regulations are discussed in further detail in Section 3.8.2.2 of the Fresno to Bakersfield Section Final EIR/EIS (Authority and FRA 2014: pages 3.8-3 through 3.8-5).

- Porter-Cologne Water Quality Control Act (Water Code Section 13000 et seq.)
- Construction Activities, National Pollutant Discharge Elimination System General Construction Permit (Order No. 2009-0009-DWQ, as amended by 2010-0014-DWG and 2012-0006-DWQ, NPDES No. CAS000002)Streambed Alteration Agreement (California Fish and Game Code Sections 1601 through 1603)
- Cobey-Alquist Flood Plain Management Act (California Water Code Section 8400 et seq.)
- Central Valley Flood Protection Board (California Code of Regulations [Cal. Code Regs.] Title 23, Division 1)
- Central Valley Flood Protection Act (Central Valley Flood Protection Act of 2008)

The following state regulations were included in the Fresno to Bakersfield Section Final EIR/EIS but have since been updated:

- **State of California Department of Transportation (Caltrans) NPDES Statewide Stormwater Permit:** The statewide stormwater permit for Caltrans facilities (State Water Resources Control Board [SWRCB] Water Quality Order No. 2012-0011-DWQ, NPDES No. CAS000003) has been amended by Order WQ 2014-0077-DWQ. This amendment updates the TMDL requirements Caltrans must comply with to meet NPDES permit requirements.
- **NPDES General Industrial Permit:** The statewide General Permit for Discharges of Stormwater Associated with Industrial Activities (SWRCB Water Quality Order No. 2014-0057-DWQ, NPDES No. CAS000001) regulates discharge associated with industrial activities. Qualifying industrial sites are required to prepare Stormwater Pollution Prevention Plans (SWPPP) describing Best Management Practices (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[1] and best available technology

[1] Conventional pollutants are statutorily listed pollutants that are amenable to treatment by a municipal treatment plan. The list of conventional pollutants is defined in the CWA and includes biochemical oxygen demand, total suspended soils, pH, fecal coliform, and oil and grease.

economically achievable for toxic and non-conventional pollutants. Monitoring of runoff leaving the site is also required. For transportation facilities, this permit applies only to vehicle maintenance shops, equipment-cleaning operations, or airport de-icing operations. This permit incorporates a multiple objective performance measurement system that includes the establishment of numeric action levels, new comprehensive training requirements, and reports and action plans to inform the public and water boards about the following: (1) the overall pollutant control performance at any facility; (2) and the overall performance of the industrial statewide storm water program.

- **Clean Water Act Section 402:** Under the state Clean Water Act Section 402, all point-source discharges, including, but not limited to, construction-related runoff discharges to surface waters and some post-development, are regulated through the NPDES program. Project sponsors must obtain an NPDES permit from the SWRCB.

The following state regulation was not included in the Fresno to Bakersfield Section Final EIR/EIS but is applicable to the F-B LGA:

- NPDES Phase II Small Municipal Separate Storm Sewer System (MS4) Permit: The Authority requested designation as a nontraditional permittee of the Phase II Small MS4 permit (Order No. 2013-0001-DWQ); the permit became effective on August 22, 2014. This order is the only MS4 permit for which the Authority has obtained coverage as a nontraditional permittee. The Authority's MS4 permit replaces county-/city-specific MS4 permits that would otherwise be applicable to the project. Low-impact development design standards and a post-construction stormwater management program are required under the MS4 permit.

3.8.1.3 Regional and Local

The following regional and local jurisdictions, planning documents, regulations and permitting requirements would be applicable to the F-B LGA. These jurisdictions, planning documents, regulations, and permitting requirements are discussed in further detail in Section 3.8.2.3 of the Fresno to Bakersfield Section Final EIR/EIS (Authority and FRA 2014: pages 3.8-5 and 3.8-6).

- Central Valley Regional Water Quality Control Board (CVRWQCB)
- Water Quality Control Plan for the Tulare Lake Basin (CVRWQCB 2015)
- Total Maximum Daily Load (TMDL)
- Dewatering Activities:
  - CVRWQCB Order No. R5-2013-0074 (NPDES No. CAG995001), Waste Discharge Requirements for Dewatering and Other Low Threat Discharges to Surface Water, covers discharges to surface water from dewatering activities.
  - SWRCBs Order No. 2003-0003-DWQ, General Waste Discharge Requirements For Discharges to Land With a Low Threat to Water Quality, covers discharges to land from dewatering activities.
  - CVRWQCB Resolution No. R5-2013-0145, Approving Waiver of Reports of Waste Discharge and Waste Discharge Requirements for Specific Types of Discharge within the Central Valley Region, covers general discharges in the Central Valley Region.

3.8.1.4 City and County Policies and Regulations

City and county policies and regulations that pertain to hydrology and water resources are addressed in the various ordinances and policies for Kern County, and for the cities of Shafter and Bakersfield. These policies and regulations are listed in Table 3.8-1 in the Fresno to Bakersfield Section Final EIR/EIS (Authority and FRA 2014: pages 3.8-6 through 3.8-10).

3.8.2 Methods for Evaluating Impacts

The following information sources (and associated geographic information system [GIS] data) describe the project's affected environment:

- **Climate, Precipitation, and Topography** – Sources of information for these elements included the Statewide Program EIR/EIS, climate data from the Western Regional Climate Center (2015), United States Geological Survey (USGS) topographic maps, project description, and conceptual design, plans, and profiles.
- **Regional and Local Hydrology and Water Quality** – The following hydrology and water quality features exist in the regional and local project vicinity: surface water features, including rivers, canals, and floodplains; water quality impairments; and groundwater aquifers. Information regarding these features and their conditions originated from the following sources: the Statewide Program EIR/EIS, USGS topographic maps, Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) (FEMA 2008a, 2008b), Central Valley Flood Protection Board (CVFPB) floodway maps (CVFPB 1976a and 1976b), CWA Section 303(d) lists of water quality–impaired reaches (SWRCB 2015), and the National Resource Conservation Service Web Soil Survey (2013).

3.8.2.1 Methods for Analyzing F-B LGA Study Area Impacts

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

- Preliminary Engineering for Project Definition for the F-B LGA were reviewed and compared with information on existing floodplains, surface water features, and groundwater basins.
- Federal and state statutes regulating water resources were reviewed as part of the analysis of potential flooding, hydrology, and water quality impacts. The applicable statutes establish water quality standards, regulate discharges and pollution sources, and protect drinking water systems, aquifers, and floodplain values. County and city general plans and ordinances were also reviewed for applicable policies and regulations to determine if implementation of the F-B LGA would result in potential impacts.
- A review of available documents from various agencies including the USGS, FEMA, the CVFPB, and the CVRWQCB was conducted to determine whether water quality and/or water resources would be affected by the F-B LGA. These agencies were consulted regarding canal crossings.
- Floodplain maps from FEMA and the CVFPB were reviewed. Floodplain boundaries were determined using digital FIRMs obtained from FEMA (FEMA 2008b). The FEMA-designated 100-year floodplain areas and base flood elevations were identified and mapped using GIS and are based on FEMA's FIRMs for Kern County. The FIRMs have effective dates of September 26, 2008 for Kern County (FEMA 2008a).

The following sections summarize the methods used to analyze project impacts on surface water hydrology, surface water quality, groundwater, and floodplains using the data gathered (and the GIS databases) from the sources listed above:

Surface Water Hydrology

- Analysts overlaid GIS layers for the proposed F-B LGA on the GIS layers for surface waters and floodplains, USGS topographic maps, and aerial photography from web mapping services. Analysts then used these GIS layers to identify project crossings of rivers and canals and to identify the potential impacts on surface waters.

Surface Water Quality

- Analysts evaluated construction activities for the potential to affect surface water quality due to uncontrolled runoff and discharges, including 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.
- Analysts evaluated project operation and maintenance activities for the potential to affect surface water quality due to uncontrolled runoff and discharges, including changes in

impervious surface areas, increased rate, and volume of runoff, and increases in the amount of pollutants discharging to receiving waters.

Groundwater

- The location of the proposed F-B LGA was used to evaluate the potential for groundwater impacts during construction where there is a potential for site runoff to percolate to the groundwater aquifer. Analysts reviewed the potential for construction activities and structures associated with the F-B LGA to reduce infiltration and affect groundwater recharge.
- Analysts evaluated the potential effects of groundwater dewatering during construction activities.

Floodplains

- Analysts overlaid GIS layers for the proposed F-B LGA on the GIS floodplain layers to identify the area of the project footprint that lies within the 100-year floodplain.
- Analysts evaluated the potential for the proposed F-B LGA to increase flood height and/or to divert flood flows using flood information from the FEMA county flood insurance study and the available topographic data.
- Flow data for the Kern River was obtained from Kern County FEMA Flood Insurance Study (FEMA 2008c). The 1 percent annual chance (100-year flood) flow for the Kern River at the Stockdale Highway, which is located approximately 6.5 miles downstream from the project site, was used to analyze the floodplain in the study area. The 100-year flood flow at this location is approximately 10,200 cubic feet per second.

3.8.2.2 F-B LGA Study Area for Analysis

The F-B LGA study area (study area) lies within the South Valley Floor in the Tulare Lake Basin as shown in Figure 3.8-1. The study area is within Kern County and is generally defined as the project corridor for the F-B LGA, running south from the northern end of the city of Shafter through unincorporated portions of Kern County, into the city of Bakersfield. Please refer to Chapter 3.8 of the Fresno to Bakersfield Section Final EIR/EIS for a discussion of the study area for the May 2014 Project (Authority and FRA 2014: page 3.8-15). The study area for hydrology and water resources ranges from approximately 50 feet to 280 feet wide and includes both sides of the F-B LGA right-of-way and the physical ground disturbance footprint (e.g., stations, track, equipment storage areas, substations, temporary construction areas), as described in Section 3.1, Introduction, of this Draft Supplemental EIR/EIS and the following elements:

- **Surface Water:** Receiving waters of project runoff.
- **Groundwater:** Aquifer(s) underlying the construction footprint.
- **Flooding:** FEMA-designated flood-hazard areas (FEMA 2008b) within the physical ground disturbance footprint of the F-B LGA, as well as any areas where flood frequency, extent, and duration could be affected by the project.

3.8.2.3 Methods for Evaluating Effects under NEPA

In the Fresno to Bakersfield Section Final EIR/EIS, analysts applied specified thresholds for each resource topic to assess whether the intensity of each impact is negligible, moderate, or substantial for the Build Alternatives, and provided a conclusion of whether the impact was "significant". Since the Fresno to Bakersfield Section Final EIR/EIS does not evaluate the May 2014 Project as a discrete subsection of the Fresno to Bakersfield Project (as it did for example for the Allensworth Bypass), it does not provide conclusions using intensity thresholds for the May 2014 Project; therefore, intensity thresholds are not used for the F-B LGA. Instead, the evaluation of impacts under NEPA in this Draft Supplemental EIR/EIS focuses on a comprehensive discussion of the project's potential impacts in terms of context, intensity, and duration and provides agency decision makers and the public with an apples-to-apples comparison between the May 2014 Project and the F-B LGA.

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Figure 3.8-1 Regional Hydrologic Setting

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3.8.2.4 CEQA Significance Criteria

For this project, the following criteria are used in determining whether the project would result in a significant impact on hydrology and water quality:

- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted).
- Substantially alter the existing drainage pattern of an area, including through the alteration of the stream or river, in a manner which would result in substantial erosion or siltation on-site or off-site.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on-site 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.
- Otherwise substantially degrade water quality.
- Place housing within a 100-year flood hazard area as mapped on FIRMs or other flood hazard delineation map.
- Place structures within a 100-year flood hazard area which would impede or redirect flood flows.
- Expose people or structures to loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.

Because the project will not construct any housing or require the relocation of residents that would cause construction of new housing (refer to subsection 3.12.4, Environmental Consequences in Section 3.12, Socioeconomics and Communities), placing housing within a 100-year flood hazard area is not addressed. Exposing people or structures to loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam, is addressed in subsection 3.9.4.2, Fresno to Bakersfield Locally Generated Alternative in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources.

3.8.3 Affected Environment

3.8.3.1 Summary of the May 2014 Project Affected Environment

This section provides a summary of the affected environment related to hydrology and water resources in the study area of the May 2014 Project using information from the Fresno to Bakersfield Section Final EIR/EIS. The May 2014 Project is the comparable portion of the Preferred Alternative used to compare impacts to the F-B LGA. The May 2014 Project is located entirely within the Tulare Lake Basin and is within the South Valley Floor Hydrologic Unit, designated by the CVRWQCB. The Friant-Kern Canal, Kern River, Cross Valley Canal, Carrier Canal (referred to as the Stine Canal), Kern Island Canal, and East Side Canal are all crossed by the May 2014 Project alignment. The May 2014 Project is located entirely within the Kern County Subbasin of the San Joaquin Valley Groundwater Basin. Floodplains crossed by the May 2014 Project include an unnamed 100-year floodplain Zone A in the city of Shafter near 7th Standard Road and the 100-year floodplain Zone AE associated with the Kern River.

3.8.3.2 Fresno to Bakersfield Locally Generated Alternative

This section discusses the affected environment related to hydrology and water resources in the study area of the F-B LGA.

Regional Hydrology and Water Quality

Information in this section is summarized from the Fresno to Bakersfield Section Final EIR/EIS. The F-B LGA is within the Tulare Lake Basin; specifically within the following three USGS (hydrologic unit code eight) sub-watershed basins: Tulare-Buena Vista Lakes Watershed (18030012), Upper Poso Watershed (1803004), and Middle Kern-Upper Tehachapi-Grapevine Watershed (1803003). Refer to Section 3.7, Biological Resources, of this Draft Supplemental EIR/EIS for a further discussion on and graphic depicting the sub-watersheds. The Tulare Lake Basin covers a large and diverse area in California and has a drainage area of 17,400 square miles (CVRWQCB 2015; see Figure 3.8-1). The Tulare Lake Basin is drained by the Kings, Kaweah, Tule, and Kern rivers, which flow to the dry beds of Tulare, Buena Vista, and Kern lakes. Before agricultural development, the Tulare Lake Basin was dominated by four large, shallow, and mainly temporary inland lakes (Gronberg et al. 1998). Due to development in the Tulare Lake Basin, the basin has been turned into a system of levees and irrigation canals as a flood control system. However, during extreme flooding periods, floodwaters may inundate farmland within the Tulare Lake Basin. Residual floodwaters in the basin are used for irrigation to the maximum extent possible (Tulare Lake Basin Water Storage District 2015).

Canals typically provide irrigation water from riverine diversions and convey agricultural drainage. Many canals are highly altered from their natural state in order to convey water for agricultural purposes. Such channels often have little to no slope so that water can be moved in either direction. Farmers and other agricultural producers pump groundwater and surface water to and from numerous canals and drains delivering irrigation water to and from agricultural fields throughout the region. Composed of packed earth or concrete-lined, canals generally lack the meanders of natural streams.

What is Nonpoint- and Point-Source Pollution?

Nonpoint-source pollution is caused by rainfall moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water (United States Environmental Protection Agency 2005). A point-source discharge usually refers to a waste emanating from a single, identifiable place (USGS 2015).

Stream flow within the Tulare Lake Basin consists of natural flows, irrigation runoff, and other point- and nonpoint-source discharges (United States Environmental Protection Agency 2005). Natural flows depend on precipitation, snowmelt runoff, and the slow discharge of groundwater through surface seeps and springs. Natural or human-made impoundments, water diversions, levees, and channel straightening or realignment regulates stream flows.

The eastern side of the southern Tulare Lake Basin is drained primarily by the Kern River. Small streams draining the foothills are usually dry except during winter and spring runoff. Historically, runoff from large storm events flowed from the foothills and terminated on the valley floor. As areas were developed, natural flow paths were altered and encroached upon by agricultural practices and urban development, resulting in a series of streams and canals that are not capable of handling large storm event flows.

For regulatory purposes, the CVRWQCB designates watershed areas in Hydrologic Units that are further divided into Hydrological Areas. As designated by the CVRWQCB, the study area is located within the South Valley Floor Hydrologic Unit.

Climate and Precipitation

The climate within the study area is semi-arid, and desert-like with long, hot, dry summers and temperate, brief, and moist winters. The southern Central Valley receives on average 4 to 8 inches of rainfall annually, most of which falls between November and April. Three types of storms produce precipitation in the area: general winter storms, thunderstorms, and tropical cyclones.

In the winter, the region experiences a phenomenon known in southern San Joaquin Valley as “Tule Fog”. Tule Fog forms as a result of radiation inversions during which air closer to the ground

is cooled faster than the air above. While Tule Fog can contain significant moisture, it does not qualify as precipitation as it does not typically soak into the soils.

Geology and Soils

Per the California Geological Survey Note 36, California Geomorphic Provinces, the F-B LGA is within the Great Valley Geomorphic province.[2] The southern portion of the Great Valley province, where the study area is located, drains to the endorheic Tulare Lake. The central portion of the province is drained by the San Joaquin River, and the northern portion of the province is drained by the Sacramento River. Assisted by enclosed drainages and a network of waterways, sediment has been accumulating on the valley floor for approximately 160 million years.

Endorheic basins

Endorheic basins are closed drainage basins that retain water but allow no outflow to other external bodies of water such as seas or oceans. These basins are usually in the interior of a landmass, in areas of relatively low rainfall where the topography prevents their drainage to the oceans, and they converge into lakes that form a balance of surface inflows, evaporation, and seepage.

The soils underlying the F-B LGA consist primarily of alluvial deposits of clay, silt, sand, and gravel with varying grain sizes and content. The soil types and consistencies of these depo sits vary by location, depending on how they were deposited. The surface soils in the project vicinity generally have high permeability and infiltrate runoff relatively quickly. Subsection 3.9.3.1, Physiography and Regional Geologic Setting in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources, provides more information on soils in the project area.

Surface Water Hydrology

Surface Water Features

As described previously and shown on Figure 3.8-2, the Tulare Lake Basin consists primarily of a system of canals and levees. The Kern River is the only natural water body that flows through the study area. The following waterbodies flow through or adjacent to the F-B LGA study area from north to south and are depicted on Figure 3.8-2.

- Calloway Canal
- Friant-Kern Canal
- Beardsley (Lerdo) Canal
- Cross Valley Canal
- Kern River
- Stine Canal (also known as the Carrier Canal)
- Kern Island Canal
- East Side Canal
- California Aqueduct

The following discussion provides more detail of the major water conveyance systems and natural water bodies located within the project vicinity.

Calloway Canal

The Calloway Canal is an irrigation canal that is owned by the North Kern Water Storage District. It originates from the Kern River and travels northwest. The Calloway Canal runs parallel to the Friant-Kern Canal; however, water flows in opposite directions. The Calloway Canal ends at reservoirs near the city of McFarland.

[2] Geomorphic provinces are naturally defined regions with distinct geology, landform, landscape, faults, and topographic relief.

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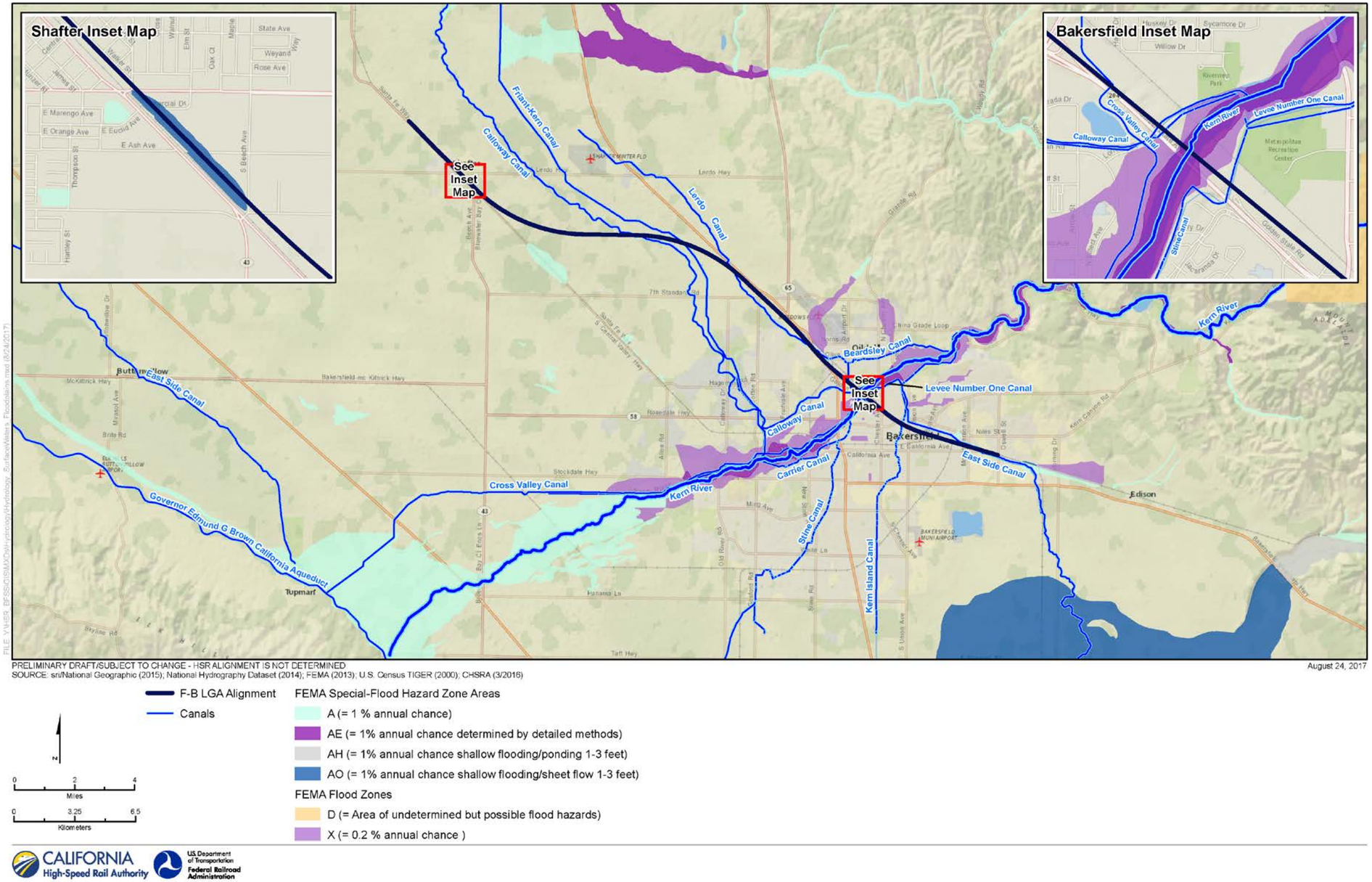

Figure 3.8-2 Surface Waters and Floodplain

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Friant-Kern Canal

The Friant-Kern Canal is one of the major water conveyance systems that cross the study area. The 152-mile-long Friant-Kern Canal transports water south from Millerton Lake, a reservoir north of Fresno created by Friant Dam, and joins the Kern River within the city of Bakersfield. The canal capacity near Millerton Lake is 5,000 cubic feet per second and decreases to 2,000 cubic feet per second in the southern portion of the valley as water is diverted for municipal, industrial, and agricultural use (ICF Jones & Stokes 2008). The Friant-Kern Canal joins the Kern River in the city of Bakersfield.

Beardsley Canal

The 33-mile-long Beardsley Canal originates at the Kern River and ends at reservoirs located in the unincorporated community of Famoso. North of 7th Standard Road, this canal becomes the Lerdo Canal. The Beardsley Canal has an initial capacity of 300 cubic feet per second and is primarily concrete-lined (Bookman-Edmonston Engineering, Inc. 1999).

Cross Valley Canal

The Cross Valley Canal is owned by the Kern County Water Agency (KCWA) and serves as the KCWA's primary conduit for water deliveries to and from the California Aqueduct (KCWA 2016). The canal is approximately 21 miles long and consists of approximately 74,000 feet of concrete-lined and approximately 36,000 feet of unlined channel (KCWA 2004).

Kern River

The Kern River, its forks, and Lake Isabella are the major water features within the Kern River watershed (ICF Jones & Stokes 2008). The Kern River flows generally southwest through Bakersfield to the Buena Vista Lakebed.

The upper reaches of the north and south forks of the Kern River, upstream of Lake Isabella, are designated Wild and Scenic. These reaches of the river are located approximately 60 miles east of the study area. In the Central Valley, the Kern River is bordered by conveyance and diversion canals for much of its length, and its water is diverted for consumption or groundwater recharge (ICF Jones & Stokes 2008).

Lake Isabella Dam was constructed in 1953 on the Kern River approximately 35 miles northeast of Bakersfield, and forms Lake Isabella. The primary purpose of the dam and reservoir is to provide flood control. The dam is operated so that the maximum flow in the Kern River at the Pioneer turnout near Bakersfield does not exceed the capacity of the river channel, which is 4,600 cubic feet per second. Lake Isabella has a capacity of approximately 570,000 acre-feet, and provides water for irrigation (Gronberg et al. 1998). Stream flow data for the Kern River downstream of Lake Isabella were collected at USGS gauging stations and are summarized in the *Fresno to Bakersfield Section: Hydrology and Water Quality Technical Report* (Authority 2011).

Navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (Code of Federal Regulations Title 33, Part 329.4). Although conclusive determinations of navigability are made by federal courts, those made by federal agencies are accorded substantial weight by the courts (Code of Federal Regulations Title 33, Part 329.14). The Kern River is on the United States Army Corps of Engineers Sacramento District's list of "navigable-in-fact" traditionally navigable waters.

The Kern River has regulated uses according to the Bakersfield Zoning Code. The City of Bakersfield Planning Division has zoned the Kern River and adjacent land as Floodplain Primary and Floodplain Secondary zones, respectively. The City of Bakersfield restricts uses that would obstruct flood flow or cause peripheral flooding of other properties. The City also regulates uses of the land adjacent to the Kern River in the Floodplain Secondary Zone, and requires conditional-use permits for most development projects.

Stine Canal (Carrier Canal)

The Stine Canal which is also referred to as the Carrier Canal is used to convey water from the Kern River to several smaller canals operated by the City of Bakersfield and the Kern Delta Water

District (City of Bakersfield 2003). The Kern Island Canal was built in 1870. The canal originates from a common diversion point in the city of Bakersfield, runs west and south, and ends at the Kern Lakebed. The Kern Island Canal primarily irrigates farmland located in the Kern Lakebed, south of the city of Bakersfield.

East Side Canal

The East Side Canal originates from the same diversion point at the Kern Island Canal in the city of Bakersfield. The canal travels south, roughly adjacent to the Kern Island Canal, and ends west of the city of Arvin.

California Aqueduct

The California Aqueduct is a major water conveyance system that is adjacent to the study area. The California Aqueduct, approximately 30 miles west of the study area (refer to Figure 3.8-2), was constructed in the 1970s and supplies water to agricultural and municipal areas in the San Joaquin Valley and southern California. The California Aqueduct generally runs north-south.

Water Districts

The F-B LGA crosses through numerous large- and small-scale special districts that provide local potable water supply, flood control, sanitation, and agricultural water supply, storage, and groundwater banking infrastructure between the cities of Shafter and Bakersfield. Because the F-B LGA is located within these districts' jurisdictions, these districts may potentially have infrastructure crossing the F-B LGA. Table 3.8-1, Figure 3.8-3 and Figure 3.8-4 show these federal, state, and private districts. Table 3.8-1 states the water districts' primary sources of water. Details on the districts, including their locations, are provided in subsection 3.6.3.1, Public Utilities, in Section 3.6, Public Utilities and Energy of this Draft Supplemental EIR/EIS.

Table 3.8-1 Districts Supplying Water that Potentially Have Infrastructure Crossing the F-B LGA

Water Districts	Water Sources
California Water Service Company	Kern River, groundwater, and State Water Project
Kern County Water Agency Improvement District No. 4	Kern River and State Water Project
North Kern Water Storage District	Kern River, Poso Creek, Central Valley Project, and State Water Project
Arvin-Edison Water Storage District	Kern River, Central Valley Project, and groundwater
Cawelo Water District	State Water Project, groundwater, and produced water from oil production
Shafter-Wasco Irrigation District	Central Valley Project
East Niles Community Services District	Groundwater and State Water Project
North of the River Municipal Water District	Groundwater, Central Valley Project, and Kern River
Oildale Mutual Water Company	State Water Project and groundwater

Sources: United States Bureau of Reclamation, 2003a; United States Bureau of Reclamation, 2003b; Cawelo Water District, 2015; East Niles Community Services District, 2016; North of the River Municipal Water District, 2014; Oildale Mutual Water Company, 2010; Arvin-Edison Water Storage District, 2008; California Water Service Company, 2011; David Beard, 2014; North Kern Water Storage District, 2016; Shafter-Wasco Irrigation District,2013

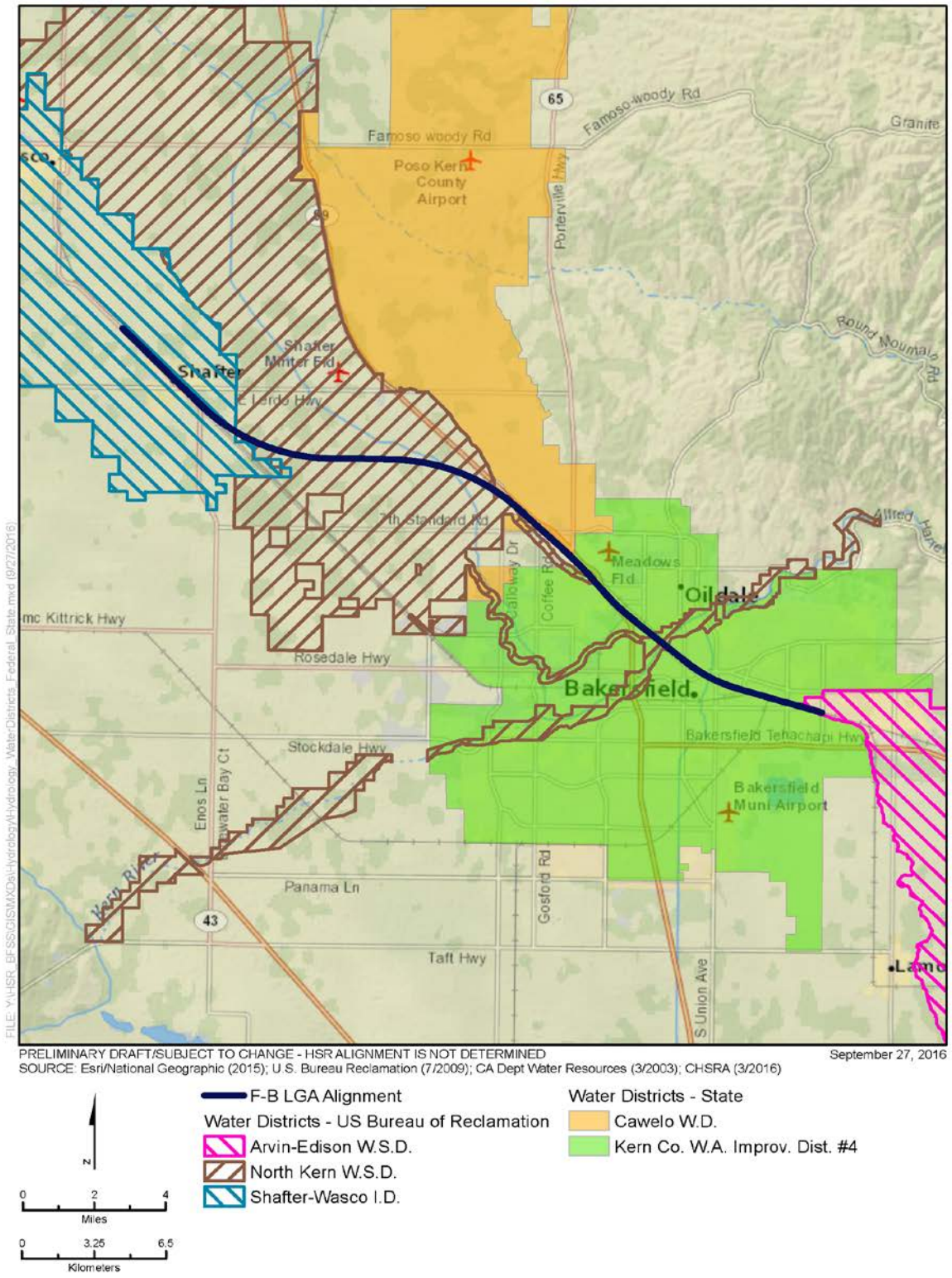

Figure 3.8-3 Water Districts - Federal and State

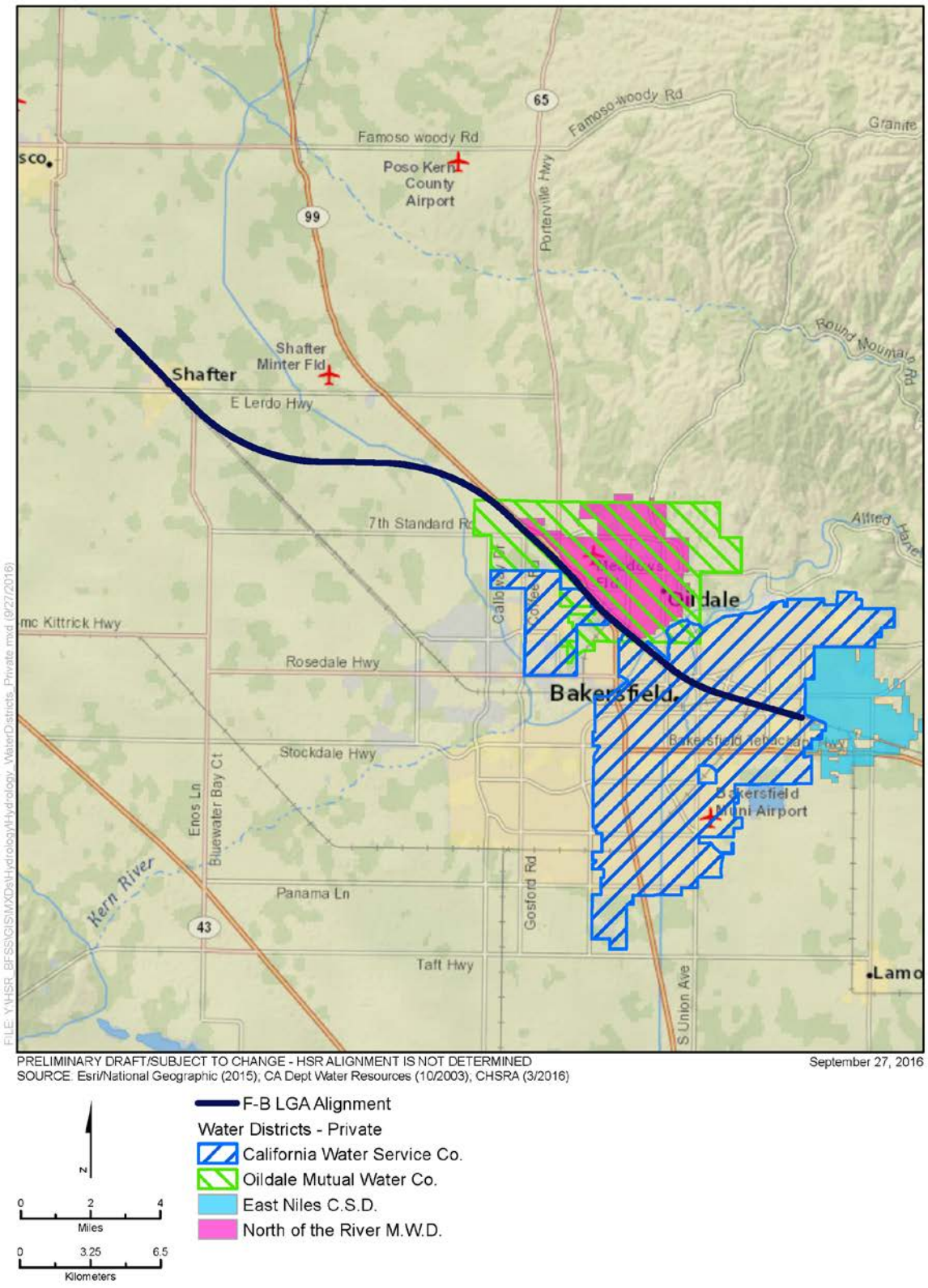

Figure 3.8-4 Water Districts - Private

Surface Water Quality

Natural flow from the headwaters in the Sierra Nevada Mountains starts out generally free of human-made pollutants. As natural flows decrease seasonally, concentrations of pollutants increase. Stormwater and irrigation runoff enters streams directly as overland flow, affecting surface water quality. Urban and agricultural runoff can carry the dissolved or suspended residue of both natural and human land uses within the watershed. Pollutant sources in urban areas include, but are not limited to, parking lots and streets, industrial uses, rooftops, exposed earth at construction sites, and landscaped areas. Pollutant sources in rural and agricultural areas primarily include agricultural fields, farms, and operations. Pollutants in runoff can include sediment, oil and grease, hydrocarbons (e.g., fuels, solvents), heavy metals, organic fertilizers and pesticides, pathogens, nutrients, and debris.

Construction activities, such as grading that removes vegetation and exposes soil to erosion, can contribute to accelerated erosion rates, which can result in runoff containing sediment that ultimately flows into surface waters. In addition, potentially erosive conditions occur in areas that have a combination of erosive soil types and steep slopes. Section 3.9.4.2 of this Draft Supplemental EIR/EIS provides more details regarding soil erosion.

Surface Water Beneficial Uses

The Basin Plan (CVRWQCB 2015) designates beneficial uses for surface waters, establishes water quality objectives to protect those uses, and sets forth policies to guide the implementation of programs to attain the objectives. Below is a list of beneficial uses that have been identified for the Kern River (below Southern California Edison Kern River Powerhouse No. 1 which is located approximately 20 miles upstream from the study area). The Kern River is the only surface water within the study area with beneficial uses identified in the Basin Plan. Beneficial uses for canals are not identified in the Basin Plan.

Beneficial uses for the Kern River (below Southern California Edison Kern River Powerhouse No. 1) include:

- Municipal and Domestic Water Supply
- Agricultural Supply
- Industrial Service Supply
- Industrial Process Supply
- Hydropower Generation
- Water Contact Recreation
- Non-Contact Water Recreation
- Warm Freshwater Habitat
- Wildlife Habitat
- Rare, Threatened, or Endangered Species
- Groundwater Recharge

Surface Water Quality Objectives

Surface water quality objectives for all inland waters in the Tulare Lake Basin, as documented in the Basin Plan, are listed in Table 3.8-2. In addition, the Kern River (below Southern California Edison Kern River Powerhouse No. 1) has a site specific water quality objective of 300 micromhos per centimeter for salinity (maximum electrical conductivity).

Table 3.8-2 Surface Water Quality Objectives for Inland Surface Waters in the Tulare Lake Basin

Water Quality Constituent	Water Quality Objective
Ammonia	In no case shall the discharge of wastes cause concentrations of NH3 to exceed 0.025 mg/L (as N) in receiving waters.
Bacteria	In waters designated REC-1, the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than 10% of the total number of samples taken during any 30-day period exceed 400/100 ml.
Biostimulatory Substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.
Chemical Constituents	Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At a minimum, water designated MUN shall not contain concentrations of chemical constituents in excess of the MCLs specified in the following provisions of Title 22 of the Cal. Code Regs.
Color	Waters shall be free of discoloration that causes nuisance or adversely affects beneficial uses.
Dissolved Oxygen	Waste discharges shall not cause the monthly median DO concentrations in the main water mass (at centroid of flow) of streams and above the thermocline in lakes to fall below 85% of saturation concentration, and the 95th percentile concentration to fall below 75% of saturation concentration. The DO in surface waters shall always meet or exceed the listed concentration for specific waterbodies and the following levels for all aquatic life: • Waters designated WARM: 5.0 mg/l • Waters designated COLD or SPWN: 7.0 mg/l Where ambient DO is less than the objectives, discharges shall not cause further decrease in DO concentrations.
Floating Material	Waters shall not contain floating material, including but not limited to solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.
pH	The pH of water shall not be depressed below 6.5, raised above 8.3, or changed at any time more than 0.3 units from normal ambient pH. In determining compliance with the above limits, the Regional Water Board may prescribe appropriate averaging periods provided that beneficial uses will be fully protected.
Pesticides	Waters shall not contain pesticides in concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses. At a minimum, waters designated MUN shall not contain concentrations of pesticides constituents in excess of the MCLs specified in Table 64444-A (Organic Chemicals) of Section 64444 of Title 22 of the Cal. Code Regs. In waters designated COLD, total identifiable chlorinated hydrocarbon pesticides shall not be present at concentrations detectable within the accuracy of analytical methods prescribed in Standard Methods for the Examination of Water and Wastewater, 18th Edition, or other equivalent methods approved by the Executive Officer.

Water Quality Constituent	Water Quality Objective
Radioactivity	Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or which result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. At a minimum, waters designated MUN shall not contain concentrations of radionuclides in excess of the MCLs specified in Table 64442 of Section 64442 and Table 64443 of Section 64443 of Title 22, Cal. Code Regs.
Salinity	Waters shall be maintained as close to natural concentrations of dissolved matter as is reasonable considering careful use of the water resources.
Sediment	The suspended sediment load and suspended sediment discharge rate of waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Settable Material	Waters shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.
Suspended Material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Taste and Odors	Waters shall not contain taste- or odor-producing substances in concentrations that cause nuisance, adversely affect beneficial uses, or impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin or to domestic or municipal water supplies.
Temperature	Natural temperatures of waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses. Elevated temperature wastes shall not cause the temperature of waters designated COLD or WARM to increase by more than 5°F above natural receiving water temperature. The Regional Water Board may prescribe appropriate averaging periods provided that beneficial uses will be fully protected.
Toxicity	All waters shall be maintained free of toxic substances in concentrations 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 turbidity attributable to controllable water quality factors shall not exceed limits provided in the Basin Plan.

Source: Central Valley Regional Water Quality Control Board, 2015

Cal. Code Regs. = California Code of Regulations
COLD = cold freshwater habitat
DO = dissolved oxygen
°F = degrees Fahrenheit
MCL = maximum contaminant level
mg/L = milligram(s) per liter
ml = milliliter
MUN = municipal and domestic water supply
N = nitrogen
NH_3 = un-ionized ammonia
REC-1 = water contact recreation
SPWN = spawning, reproduction, and/or early development
WARM= warm freshwater habitat

Water Quality Impairments

The SWRCB developed a list of water bodies (known as 303[d] water quality-limited water bodies) that are impaired and do not meet water quality objectives. The SWRCB approved the 2012 Integrated Report (CWA Section 303[d] List) on April 8, 2015. On July 30, 2015, the United States Environmental Protection Agency approved the 2012 California 303(d) List of Water Quality Limited Segments. The Kern River is not listed for any impairments on the 2012 California 303 (d) List of Water Quality Limited Segments (SWRCB 2015). Canals are not included on the CWA Section 303(d) List.

A TMDL is developed for constituents on the CWA Section 303(d) List to restore the quality of the water body. However, because the Kern River is not listed on the CWA Section 303(d) List, no TMDLs have been identified for the Kern River. In addition, TMDLs are not identified for canals.

Groundwater

The study area is within the San Joaquin Valley Groundwater Basin within the Kern County Subbasin (refer to Figure 3.8-5). Groundwater in the San Joaquin Valley Groundwater Basin is present in unconfined or semi-confined aquifers. Groundwater levels fluctuate with seasonal rainfall, withdrawal, and recharge. The freshwater-bearing deposits of the aquifers in the Kern County Subbasin are generally thick, reaching their maximum thickness of 4,400 feet at the southern end of the San Joaquin Valley. Although the average depth to groundwater is shallow at some locations in the groundwater subbasin, water supply wells frequently extend 1,000 feet below ground surface (California Department of Water Resources 2003). Although water levels in different parts of the Kern County Subbasin have varied over the last several decades, the average groundwater level in the subbasin has been relatively stable since 1970 (California Department of Water Resources 2006). Table 3.8-3 identifies the total groundwater basin area, typical well depth, and if it is a designated sole source aquifer.

Table 3.8-3 Groundwater Basin Crossed by the F-B LGA

Groundwater Basin (Name)	Total Groundwater Basin Area (acres)	Typical Well Depths (feet)	Designated Sole-Source Aquifer[1]
Kern County Subbasin	1,945,000	150 to 1,200	No

Sources: California Department of Water Resources, 2006; United States Environmental Protection Agency, 2016

[1] The United States Environmental Protection Agency defines a sole- or principal-source aquifer as an aquifer that supplies at least 50% 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".

Groundwater in the Kern County Subbasin is used for urban and agricultural purposes and may have localized impairments, which include total dissolved solids, sodium chloride, and sulfate. Groundwater has been overdrafted in the region for municipal and industrial supplies, and by agricultural uses including practices such as over-applying irrigation water. Numerous agricultural and domestic wells are intersected by the project alignment. Wells were not considered further qualitatively, as any well replacement would be located in the same aquifer and would pump at a similar depth and rate as the original wells, resulting in no additional groundwater quality impact or draw.

Groundwater is the primary source for local municipal supply. The amount of groundwater pumped for the California Water Service Company's Bakersfield District was between 44,000 and 53,900 acre-feet per year between 2006 and 2010 (57 to 65 percent of the municipal supply) (California Water Service Company 2011). Groundwater overdraft occurs when the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years that approximates long-term average hydrologic conditions (California Department of Water Resources 2006). The primary sources of groundwater recharge are from the Kern River and artificial recharge at groundwater banking facilities located throughout the subbasin. These groundwater banking facilities can store approximately 5.7 million acre-feet of water to recharge or store water during wet years, and through pumping, extract water for use during dry years. In addition, almost every water district within Kern County participates in a type of groundwater banking program (Water Association of Kern County 2016). Secondary sources of groundwater recharge include return flows from agricultural and municipal irrigation and infiltration of flows from intermittent streams (USGS 2013).

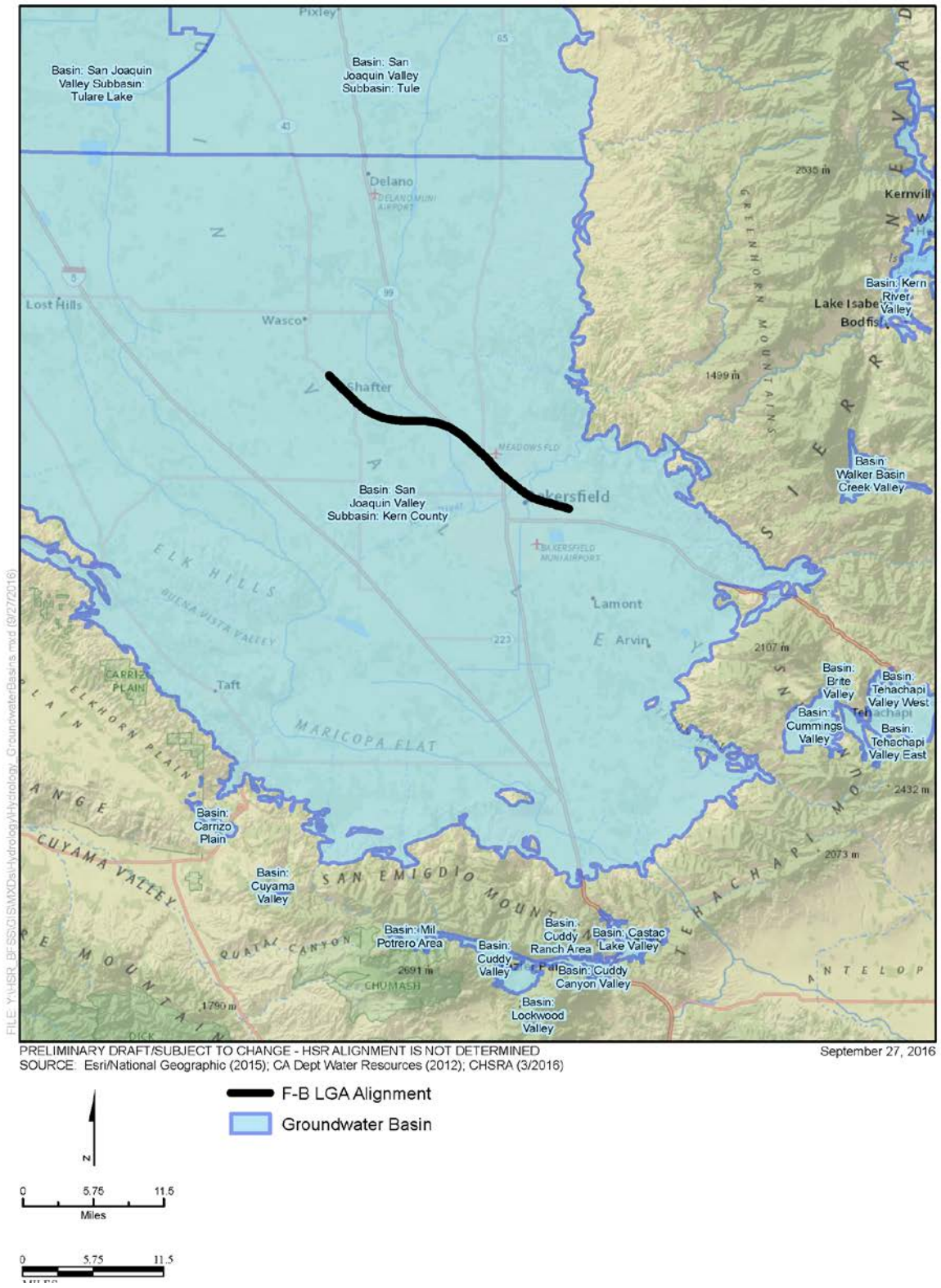

Figure 3.8-5 Groundwater Basins

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In addition, the large demand for groundwater has caused subsidence in some areas of the valley, primarily along its western side and southern end (California Department of Water Resources 2003). The areas with greatest land subsidence are in the western portion of the San Joaquin Valley, where subsidence of more than 28 feet was recorded between 1926 and 1970. In the study area, subsidence has been far less dramatic than on the western side of the valley, with subsidence measured at less than 1 foot between 1926 and 1970 (Faunt 2009; Galloway and Riley 1999). Over the last several decades, the use of pipelines and aqueducts for surface water deliveries from other parts of California has reduced dependence on groundwater for agricultural use, and, as a result, land subsidence has slowed or reversed in some areas of the San Joaquin Valley. During drought conditions, however, increased reliance on groundwater may result in increased subsidence rates.

Groundwater Beneficial Uses

The Basin Plan (CVRWQCB 2015) designates beneficial uses for groundwater resources, identifies groundwater quality objectives to protect those uses, and sets forth policies to guide the implementation of programs to attain the objectives. For regulatory purposes, the Basin Plan divides groundwater basins into Groundwater Hydrologic Units and Detailed Analysis Units. As designated by the Basin Plan, the study area is located within the Kern River Groundwater Hydrologic Unit and the Kern County Basin Detailed Analysis Unit 254. Beneficial uses for the Kern County Basin Detailed Analysis Unit 254 include:

- Municipal and Domestic Water Supply
- Agricultural Supply
- Industrial Service Supply
- Industrial Process Supply
- Water Contact Recreation
- Non-Contact Water Recreation
- Wildlife Habitat

Groundwater Quality Objectives

Water quality objectives for groundwaters in the Tulare Lake Basin, as documented in the Basin Plan, are listed in Table 3.8-4. In addition, the Kern River Groundwater Hydrologic Unit has a site-specific water quality objective of 5 micromhos per centimeter for salinity.

Table 3.8-4 Groundwater Quality Objectives for Groundwaters in the Tulare Lake Basin

Water Quality Constituent	Water Quality Objective
Ammonia	In no case shall the discharge of wastes cause concentrations of NH_3 to exceed 0.025 mg/L (as N) in receiving waters.
Bacteria	In waters designated REC-1, the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than 10% of the total number of samples taken during any 30-day period exceed 400/100 ml.
Biostimulatory Substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.
Chemical Constituents	Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At a minimum, water designated MUN shall not contain concentrations of chemical constituents in excess of the MCLs specified in the following provisions of Title 22 of the Cal. Code Regs.
Color	Waters shall be free of discoloration that causes nuisance or adversely affects beneficial uses.

Water Quality Constituent	Water Quality Objective
Dissolved Oxygen	Waste discharges shall not cause the monthly median DO concentrations in the main water mass (at centroid of flow) of streams and above the thermocline in lakes to fall below 85% of saturation concentration, and the 95th percentile concentration to fall below 75% of saturation concentration. The DO in surface waters shall always meet or exceed the listed concentration for specific waterbodies and the following levels for all aquatic life: Waters designated WARM: 5.0 mg/l Waters designated COLD or SPWN: 7.0 mg/l Where ambient DO is less than the objectives, discharges shall not cause further decrease in DO concentrations.
Floating Material	Waters shall not contain floating material, including but not limited to solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.
pH	The pH of water shall not be depressed below 6.5, raised above 8.3, or changed at any time more than 0.3 units from normal ambient pH. In determining compliance with the above limits, the Regional Water Quality Board may prescribe appropriate averaging periods provided that beneficial uses will be fully protected.
Pesticides	Waters shall not contain pesticides in concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses. At a minimum, waters designated MUN shall not contain concentrations of pesticides constituents in excess of the MCLs specified in Table 64444-A (Organic Chemicals) of Section 64444 of Title 22 of the Cal. Code Regs. In waters designated COLD, total identifiable chlorinated hydrocarbon pesticides shall not be present at concentrations detectable within the accuracy of analytical methods prescribed in Standard Methods for the Examination of Water and Wastewater, 18th Edition, or other equivalent methods approved by the Executive Officer.
Radioactivity	Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or which result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. At a minimum, waters designated MUN shall not contain concentrations of radionuclides in excess of the MCLs specified in Table 64442 of Section 64442 and Table 64443 of Section 64443 of Title 22, Cal. Code Regs.
Salinity	Waters shall be maintained as close to natural concentrations of dissolved matter as is reasonable considering careful use of the water resources.
Taste and Odors	Groundwaters shall not contain taste- or odor-producing substances in concentrations that cause nuisance, adversely affect beneficial uses.
Toxicity	Groundwaters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.

Source: Central Valley Regional Water Quality Control Board, 2015

Cal. Code Regs.= California Code of Regulations
DO = dissolved oxygen
MCL = maximum contaminant level
mg/L = milligram(s) per liter
ml = milliliter
MUN = municipal and domestic water supply
NH_3 = un-ionized ammonia
WARM= warm freshwater habitat
COLD = cold freshwater habitat
SPWN = spawning, reproduction, and/or early development

Floodplains

Although an extensive flood control system has been constructed in the region, large portions of the Tulare Lake Basin are considered to be flood hazard areas. This threat is mainly from riverine flooding and ponding on the flat valley floor. The Tulare Lake Basin is relatively flat, with broad, shallow floodplains that are either uncontained, or are uncontained at higher flows due to levee overtopping. When the stream channels overflow, shallow, 1- to 3-foot-deep overland flooding occurs that tends to pond against linear obstacles such as canal levees and road and railroad embankments that cross the land gradient. If these facilities lack sufficient culverts or other means of cross drainage, the overland flows can be diverted for long distances before finally overflowing the linear obstacles. Refer to the Section 3.8.4.2 of the Fresno to Bakersfield Section Final EIR/EIS (Authority and FRA 2014: pages 3.8-29 and 3.8-30) for a more detailed description of floodplains within the Tulare Lake Basin.

FEMA has identified special flood-hazard areas on FIRMs for all communities that participate in the National Flood Insurance Program, including the County of Kern. 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 Area. The Special Flood Hazard Area is the land area covered by the base flood to which FEMA floodplain management regulations apply. Special Flood Hazard Areas in the study area include flood zones A, AE, AH, and AO. Additional flood hazard areas include Zone X and Zone D, which are moderate to low or undetermined flood risk areas. Figure 3.8-2 depicts the flood zones within the study area. These flood zones are defined in Table 3.8-5.

Table 3.8-5 FEMA Flood Hazard Zone Designations in the Study Area

Zone	Zone Description
A	Areas with a 1% annual chance of flooding. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
AE	Areas with a 1% annual chance of flooding. FEMA flood maps provide base flood elevations.
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas and areas with a 1%, or greater, chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. Average flood depths derived from detailed analyses are shown within these zones.
X	Areas with 0.2% annual chance of flooding (also known as the 500-year floodplain). Zone X are floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted.

Source: Federal Emergency Management Agency, 2015
FEMA = Federal Emergency Management Agency

3.8.4 Environmental Consequences

This section describes the impact analysis relating to hydrology and water resources for the F-B LGA.

This section evaluates the temporary and permanent impacts that would result from both construction and operational activities of the F-B LGA on hydrology and water resources. Hydrology and water resources are described below in four categories: (1) drainage patterns and storm water runoff impacts, (2) water quality impacts, (3) groundwater impacts and (4) floodplain impacts.

Mitigation measures to reduce or eliminate potential impacts are identified in each impact discussion and described in Section 3.8.5, Mitigation Measures and Avoidance and Minimization Measures.

3.8.4.1 Summary of Analysis for the May 2014 Project

This section provides a summary of the effects of the May 2014 Project using information from the Fresno to Bakersfield Section Final EIR/EIS.

Construction and operational activities associated with the May 2014 Project could potentially result in hydrology and water quality impacts to existing drainage, irrigation distribution systems, and water quality; however, the May 2014 Project's design incorporated avoidance and minimization measures to reduce impacts on hydrology and water resources. These measures included, but are not limited to, measures for storm water management and flood protection, and erosion and sedimentation controls, tracking controls, and waste management and materials pollution controls.

Construction of the May 2014 Project would disturb approximately 570 acres. In addition, stream channels and canals would temporarily be disturbed at eight water body crossings, including Arvin Edison Canal, Friant-Kern Canal, Cross Valley Canal, Kern River, Carrier Canal, Stine Canal, Kern Island Canal, and East Side Canal. Some of these crossings, such as the Kern River crossing, would require in-water work for the construction of supporting piers. To the extent construction in the stream channel occurs during wet weather, there could be an increase in sediment in the river during the event. Construction BMPs, such as cofferdams, would be incorporated into the design to minimize or avoid discharge of sediment from the construction site. The use of coffer dams during construction within the wet season if allowed could have a temporary effect on flood storage capacity and potentially impact water levels in the Kern River. This type of construction method is not expected to change the existing vegetation patterns. In those streams with wet-weather construction in the stream channel, the effects on water quality during construction would be less than significant under CEQA.

Project facilities would result in changes to existing drainage patterns, as well as increased runoff from increases in impervious surfaces. Development of the May 2014 Project would result in a net increase of impervious surface area of approximately 72 acres. The May 2014 Project could redirect shallow flooding, and thereby affect special flood-hazard areas. Placing at-grade track sections on embankments with culverts adequately sized and placed would minimize flood and drainage problems. The May 2014 Project would incorporate avoidance and minimization measures to maintain pre-project drainage conditions to the extent practicable (e.g., emphasizing on-site retention of stormwater runoff using measures such as flow dispersion, infiltration, and evaporation, supplemented by detention, where required). Effects on flood risk at the at-grade sections of the track would be less than significant under CEQA.

The May 2014 Project could result in changes to the hydrology, hydraulics, and connectivity of natural watercourses, including floodplains. The May 2014 Project would cross three 100-year floodplains: a Zone AH and Zone AO floodplain in Shafter, a Zone A floodplain south of Shafter, and a Zone AE floodplain associated with the Kern River. Water and floodplain crossings would be designed to maintain existing hydraulic capacity and connectivity thereby ensuring that no operational impacts on hydrology and floodplains would occur. As part of the May 2014 Project design, the soffit of the bridges would be set above the estimated 100-year flood level, and the

total width of openings in the embankment would convey the 100-year flood flows either without increasing the water surface elevation in the floodway, without increasing the water surface elevation in the floodplain by more than 1 foot, or as required by state or local agencies. Piers would be placed and designed to minimize backwater effects and local scouring. The shape and alignment of the piers would be designed to minimize adverse hydraulic effects. Effects on hydraulic capacity at water crossings would be less than significant under CEQA.

The trains and tracks would not be expected to be significant pollutant sources; however, the station and the new road overpasses could create new sources of potentially contaminated runoff. Project stormwater system design would accommodate project runoff and would provide stormwater quality treatment for the new and replaced roads and highways and train stations. Runoff from these facilities would be directed to treatment BMPs and would not result in water quality changes to local water bodies. Effects on surface water quality during project operation would be less than significant under CEQA.

3.8.4.2 Fresno to Bakersfield Locally Generated Alternative

A complete definition of the F-B LGA is provided in Chapter 2 of this Draft Supplemental EIR/EIS.

Construction Period Impacts

Construction of the Project (such as grading, excavating, constructing the high-speed rail bed) began in 2015 and is anticipated to be completed within six to nine years with laying the trackway and electrification. Completion of the station would follow. Construction at any one site would not occur continuously for this period. Potential effects include changes in hydrology, stormwater runoff patterns, water quality, and flood flows.

Impact HWR #1 – Temporary Changes to Drainage Patterns and Stormwater Runoff

Construction activities such as grading and excavation could alter existing drainage patterns and redirect stormwater runoff. During ground-disturbing activities, soil would be compacted, thereby resulting in a decrease in infiltration and an increase in the volume and rate of stormwater runoff during storm events. Given the urban nature of the F Street Station location, there would be little effect on stormwater runoff patterns. In addition, during construction, the F-B LGA would be required to comply with the Construction General Permit, which requires the preparation of a SWPPP to identify project-specific Construction BMPs to be implemented as part of the project. The SWPPP would be prepared prior to construction and would describe temporary drainage patterns within the construction sites and identify storm water discharge locations from the construction sites to the existing drainage system. In-water work during construction would be performed during the dry season and would require the use of cofferdams. Cofferdams[3] would be constructed around work areas (such as in locations where piers or foundations would be removed or constructed) to keep water out and to reduce sediment pollution from construction work in and under water. Cofferdams would be designed per the SWPPP as required by the Construction General Permit. In addition, cofferdams would be designed to minimize increases in water surface elevations during the design flood event as required by state or local agencies. Therefore, through adherence to the requirements set forth by the Construction General Permit, as required by Avoidance and Minimization Measure HYD-AM #3, and implementation of cofferdams for in-water work, temporary changes to stormwater drainage patterns, storm water runoff, and hydraulic capacity would be minimal and have a less-than-significant impact under CEQA because stormwater would infiltrate on the site and/or existing discharge locations would be maintained. This avoidance and minimization measure would be incorporated into the design of the project.

[3] A cofferdam is a watertight enclosure from which water is pumped to expose the bottom of a body of water and allow construction.

Impact HWR#2 – Temporary Water Quality Impacts

Chapter 2.0, F-B LGA, of this Draft Supplemental EIR/EIS discusses project construction. As stated in Chapter 2.0, the Construction Plan and Phased Implementation Strategy discussed in the Fresno to Bakersfield Section Final EIR/EIS would be applicable to the F-B LGA. The majority of project construction is anticipated to be completed within 8 years, with completion of the station following thereafter. Heavy construction (such as grading, excavating, constructing the HSR railbed, and laying the trackway) would be accomplished within a 4-year period; however, heavy construction at any one site would not occur continuously for this period. Potential effects include changes in hydrology, stormwater runoff patterns, and water quality. Section 3.10, Hazardous Materials and Wastes, of this Draft Supplemental EIR/EIS addresses impacts from release of hazardous materials.

Construction activities associated with the F-B LGA include: grading, hauling, excavating, and placing fill; pile driving; construction of a station, parking lot, maintenance facility, concrete track bed, elevated structures, viaducts, retaining walls, and embankments; realignment of existing roads; and construction of new underpasses, overpasses, and roadways. Pollutants of concern during construction include sediment, trash, petroleum products, concrete waste (dry and wet), sanitary waste, and chemicals (e.g., fuels and solvents). Each of these pollutants on its own or in combination with other pollutants can have a detrimental effect on water quality. During construction activities, excavated soil would be exposed, resulting in an increased potential for soil erosion and sedimentation 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 water runoff into receiving waters.

The potential impacts to water quality during construction of the F-B LGA would occur both on land and within the channels. As shown in Table 3.8-6, the total disturbed area during construction would be approximately 921 acres. During ground-disturbing activities, land and vegetation would be cleared, thereby exposing soil to the potential for erosion. When new structures are installed or modified (e.g., HSR track bed, overpasses, underpasses, etc.), concrete and/or asphalt applications could be a source of fine sediment, metals, and chemicals that could affect downstream waterbodies. Grading and other earthmoving activities during construction could be a source of petroleum products (e.g., engine oil, hydraulic oil, and antifreeze) and heavy metals from leaking construction equipment. Furthermore, temporary or portable sanitary facilities provided for construction workers could be a source of sanitary waste. In addition, water crossings associated with construction in the channels would provide a direct path for construction-related contaminants to reach surface waters.

Table 3.8-6 Acres Disturbed During Construction of the F-B LGA

HSR Facility	Disturbed Acres[1]
F-B LGA Track Alignment	780
Bakersfield F Street Station	93
Maintenance of Infrastructure Facility	48
Total Acreage	921

Source: Authority, 2016d
[1] Disturbed areas include the limits of construction. Construction footprints will be refined further during design.
F-B LGA = Fresno to Bakersfield Locally Generated Alternative
HSR = high-speed rail

During construction, the F-B LGA would be required to comply with the Construction General Permit, which requires the preparation of a SWPPP to identify project-specific Construction BMPs to be implemented as part of the project, as described in Avoidance and Minimization Measure HYD-AM #3. Construction BMPs include, but are not limited to, Erosion and Sediment Control BMPs designed to minimize erosion and retain sediment on site and Good Housekeeping BMPs

to prevent spills, leaks, and discharges of construction debris and waste into receiving waters. In-water work during construction would be performed during the dry season and would require the use of cofferdams. Cofferdams would be constructed around work areas (such as in locations where piers or foundations would be removed or constructed) to keep water out and to reduce sediment pollution from construction work in and under water. Cofferdams would be designed per the SWPPP, and would be designed to minimize increases in water surface elevations during the design flood event as required by state or local agencies. Therefore, through adherence to the requirements of the Construction General Permit, as required by Avoidance and Minimization Measure HYD-AM #3, and implementation of cofferdams for in-water work, effects from construction on surface water quality would be less than significant under CEQA because erosion would be minimized and pollutants of concern in stormwater runoff would be reduced. This avoidance and minimization measures would be incorporated into the design of the project.

Impact HWR#3 – Temporary Impacts on Groundwater

Groundwater levels in the study area are generally deep; most of the water depths in the study area are between 150 feet and 300 feet below ground surface (Authority 2016e). However, areas of localized perched groundwater could occur anywhere within the Tulare Lake Basin due to clay lenses within the groundwater aquifer. Additionally, shallow groundwater could occur adjacent to canal crossings and the Kern River. Therefore, there is a potential for groundwater to be encountered during excavation activities associated with the at-grade sections of track through the Tulare Lake Basin and the concrete columns (piers) associated with the water body crossings. Pier construction methods have not yet been finalized and would be based on local conditions. For large diameter piers, the piers either would be constructed dry by using a full-length casing and oscillator or would be constructed wet by using drilling slurry. As discussed in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources of this Draft Supplemental EIR/EIS, construction and design methods provided by Caltrans, in the Caltrans Construction Site BMP Manual and the Construction Site BMP Field Manual and Troubleshooting Guide would be implemented to ensure successful excavation in areas with shallow groundwater. The specific excavation methods selected will be determined by the construction contractor, based on site-specific conditions. However, if groundwater is encountered during pier construction, it would be removed and disposed of according to the requirements set forth by the Dewatering Permit, as required in Avoidance and Minimization Measure HYD-AM #4. To the extent practical, permanent retention facilities and other applicable drainage and stormwater facilities may be constructed in the early stages of construction to serve as the discharge point for dewatering activities. These permanent retention facilities would be built to fully retain the discharge from dewatering activities. However, in the event that dewatering activity discharges exceed the capacity of the retention facilities or must be directly discharged into surface waters, the contractor would be required to obtain a Dewatering Permit. Contaminated groundwater may be collected and off-hauled to a local sanitary sewer, or an active treatment system may be required to treat the water prior to discharge. It is anticipated that the volume of groundwater that would be removed during construction of the piers would be minor due to the depth of groundwater.

Water would be used during construction activities to prepare concrete, control dust, and re-seed disturbed areas. As described previously, water is provided to the study area by nine water districts. The water districts' sources of water supply include primarily groundwater and surface water. It is anticipated that the same water sources currently used to supply water for municipal and agricultural uses along the alignment would be used to meet construction-related water needs for the project. Therefore, groundwater may be pumped for construction use which could increase local groundwater withdrawals. However, construction of the F-B LGA would reduce water use along the alignment because project-related water requirements would be less intense than water requirements associated with existing agricultural land uses. An analysis of the changes to water use patterns and intensities from construction and operation of the F-B LGA is included in Section 3.6.4.2 of this Draft Supplemental EIR/EIS.

Due to the depth to groundwater in the vicinity of the F-B LGA, it is unlikely that construction activities associated with the F-B LGA would not affect groundwater quality because there would not be a direct path for construction-related contaminants to reach groundwater. However,

construction-related contaminants could infiltrate and reach shallow areas of localized perched groundwater within the Tulare Lake Basin, adjacent to canal crossings and the Kern River. As part of the SWPPP, Construction BMPs (e.g., Erosion and Sediment Control and Good Housekeeping) would be implemented at construction sites in compliance with the Construction General Permit to remove pollutants from stormwater runoff that could infiltrate into the groundwater basin, as required by Avoidance and Minimization Measure HYD-AM #3. However, there is a potential that groundwater quality could be adversely impacted if poor-quality water or chemicals enter a well from the surface and that well provides a conduit for contaminants to enter the groundwater. Alternatively, poor-quality groundwater or chemicals present in the subsurface could enter a well and then move through the well to another subsurface layer with good-quality water. The DWR has developed well standards to protect groundwater quality consistent with California Water Code, Section 231. *California Well Standards, Water Wells, Monitoring Wells, Cathodic Protection Wells*, Bulletins 74-81 and 74-90 (California Department of Water Resources 2016) provide minimum standards for the construction, alteration, maintenance, or destruction of wells to prevent pollution of groundwater.

In general, the soils along the F-B LGA have a fairly high infiltration rate. Grading and construction activities would compact soil, which can decrease infiltration to groundwater basins during construction. However, this reduction in infiltration would not be substantial due to the overall size of the Kern County Subbasin in comparison to the size of the impacted area. In addition, construction of the Bakersfield F Street Station would be located in an urbanized area in the city of Bakersfield; thus, there is little existing potential for groundwater recharge. Therefore, it is not anticipated that construction activities would decrease infiltration rates, substantially affecting groundwater recharge.

In summary, through compliance with the requirements set forth in the Dewatering Permit and the Construction General Permit, as required by Avoidance and Minimization Measures HYD-AM #3 and HYD-AM #4, respectively, construction of the F-B LGA would not substantially deplete groundwater volumes, affect groundwater quality, or reduce groundwater recharge in the subbasin due to the depth of groundwater in the study area, existing agricultural water usage along the alignment, and the size of the groundwater basin. The requirements set forth in these avoidance and minimization measures would be incorporated into the design of the project. Therefore, construction would result in impacts would be less than significant under CEQA.

Impact HWR#4 – Temporary Impacts on Floodplains

Construction in a floodplain could temporarily impede or redirect flood flows because of the presence of construction equipment and materials in the floodplain. The F-B LGA alignment would travel through two FEMA-designated floodplains: 1) an unnamed floodplain within the city of Shafter; and 2) the Kern River floodplain. Construction activities associated with the F-B LGA in these FEMA-designated floodplains would include the placement of fill within the unnamed floodplain in the city of Shafter and construction of viaduct structures within the Kern River floodplain. Standard measures, including BMPs, would be implemented during construction to minimize impacts to floodplains, as specified in Mitigation Measure HWR-MM #1. These standard measures will be developed in subsequent engineering phases. In addition, designated construction employees and local jurisdictions' floodplain administrators would monitor weather conditions for heavy storms (and potential flood flows) during the construction period. In the event that a heavy storm or flood event is identified, construction equipment would be relocated outside of the floodplain in order to minimize the potential flood risk.

The floodplain associated with the Kern River is regulated by the CVFPB. The CVFPB requires an encroachment permit for construction within a CVFPB-designated floodway, as specified in Avoidance and Minimization Measure HYD-AM #5. Construction staging areas associated with the F-B LGA would be located outside of the CVFPB-designated floodway. Work activities such as excavation, cut-and-fill construction, and obstruction in the floodway are not allowed during the flood season (typically from November 1 to July 15). The CVFPB grants exemptions to this time restriction if it determines that forecasts for weather or river flood conditions are favorable. Uses that do not impede free flow in the floodway or jeopardize public safety are permitted in a

designated floodway. These permitted uses include structures that do not impede flows, and are anchored to prevent the structure from floating; roads, pipelines, fences, and walls that do not obstruct flood flows; and storage yards for equipment and materials that are securely anchored or can be removed upon notice.

In summary, construction within a CVFPB-designated floodway would be required to obtain an encroachment permit, which would be incorporated into the design of the project, as specified in Avoidance and Minimization Measure HYD-AM #5. However, construction of the F-B LGA within FEMA-designated floodplains could result in temporary floodplain effects and be considered a potentially significant impact under CEQA by disrupting flood flows . Through the implementation of Mitigation Measure HWR-MM #1, effects associated with construction of the F-B LGA would be reduced to a less-than-significant level under CEQA.

Project Operational Impacts

The track alignment, station, maintenance of infrastructure facility, and other associated improvements would consist of impervious surfaces, thereby resulting in a permanent increase in impervious surface in the study area. Water quality impacts could result from runoff associated with increases in new impervious surface area. However, water quality control measures (e.g., Site Design, Source Control, and Treatment BMPs required by the Authority's MS4 Permit, or Spill Prevention Plan) would be implemented to reduce the potential for adverse water quality impacts. In addition, potential effects from operation of the F-B LGA include changes in hydrology, stormwater runoff patterns, and flood flows.

Impact HWR#5 - Permanent Impacts on Hydraulic Capacity and Connectivity of Natural Water Bodies

Operation of the F-B LGA would alter existing drainage patterns due to the placement of fill; and construction of embankments, retaining walls, elevated and viaduct structures, concrete track bed, and new underpasses, overpasses, and roadways. The proposed drainage system would collect, convey, and discharge surface runoff from the track right-of-way through a network of channels, ditches, and culverts while maintaining the existing drainage pattern to the maximum extent practicable. Additionally, the new drainage facilities would incorporate vegetation or gravel linings to control erosion and decrease the velocity of storm water runoff. Where the F-B LGA travels through urban areas primarily consisting of impermeable surfaces, existing drainage systems would convey track runoff, maintaining the existing drainage pattern. In undeveloped areas with infiltrative soils, runoff would likely infiltrate within the right-of-way. The following is a description of the proposed drainage system for the F-B LGA and adjacent facilities such as road crossings.

In locations where the track is on an embankment, a crown would be added to the track subgrade to facilitate drainage. Storm water would be discharged in ditches along each side of the embankment and would connect to local, existing drainage systems where feasible. In the flatter rural areas where runoff flows as sheet-flow across the proposed right-of-way, the current drainage pattern would be maintained by incorporating zero sloped detention ditches on both the upstream and downstream sides of the fill embankment and connecting the upstream and downstream ditch with a culvert. Runoff would pond and then overflow over the downstream side of the fill embankment.

Tracks supported by retaining walls would feature weep holes near the base of the wall to prevent the buildup of stormwater in the embankment. Drainage from the track bed would be collected thorough piped drainage systems and discharged to lined ditches or channels to the existing drainage system.

Tracks supported by viaduct structures would include downspouts at the columns which would discharge stormwater into a detention basin, convey stormwater to an existing drainage system, or discharge stormwater into swales under the viaduct structure. Detention basins and

Definitions

Retention Basin – A basin designed to hold and infiltrate most or all of the runoff that it receives.

Detention Basin – A basin designed to temporarily store and slowly release the runoff that it receives.

Swale – A shallow ditch used to temporarily convey, store, or filter runoff.

swales underneath the viaduct would allow for infiltration, decreasing the rate and volume of stormwater runoff.

Operation of the F-B LGA would require the realignment of existing roads and highways as overpasses or underpasses, as well as the construction of new roads. Roadway overpasses would result in a slight increase in impervious area due to increasing the paved surfaces compared to the existing at-grade roadways. Stormwater would be collected at the toe of the embankments, directed to detention basins, and then to the existing drainage system. Runoff collected on the bridge decks would be collected along deck drains and then conveyed through pipes to column downdrains where it would be discharge to nearby drainage systems beneath the bridge deck or to nearby retention basins. Road underpasses would require pump stations to pump runoff out of the low point of the road to either a drainage system or a detention/retention basin. BMPs such as temporary desilting basins or tanks, media filters, and bag filters would be incorporated into the design to provide water pollution control for the discharge of the water collected by the pump stations before entering the drainage system, as specified in Impact Avoidance and Minimization Measure HYD-AM#1. Several rail-crossing improvements would require new paved access or frontage roads. In most cases, new roads would be located in rural areas and stormwater would flow into unlined roadside ditches to infiltrate. For new roads located in urban areas, stormwater would flow to an existing storm drain system. Additional catch basins and/or storm drains would be installed as needed to meet local stormwater criteria.

As indicated in Table 3.8-7, the F-B LGA would cross one natural waterbody (Kern River) and eight major human-made canals. Table 3.8-7 indicates the approximate crossing width and the proposed crossing type for each major waterbody crossed by the F-B LGA. The waterbodies are crossed by elevated structures, viaducts, embankments or retaining walls, and culverts. The crossings would require support columns near the water channel or culverts at the channel. Viaduct or elevated structure components could obstruct the ability of the waterbody to convey peak flows by reducing its channel capacity. Final design would minimize structure supports in close proximity to channels to the maximum extent possible. These waterbody crossings would be required to meet the provisions of Title 23 of the California Code of Regulations. This regulation requires that new crossings maintain stream channel flow capacity through such measures as perpendicular crossings (where practicable), adequate streambank freeboard, and measures to protect against streambank erosion and channel scour. [4]

Table 3.8-7 F-B LGA Waterbody Crossings

Waterbody Name	Approximate Crossing Width (feet)[1]	Type[2]	Crossing Type
Calloway Canal	260	C	Embankment or Retaining Wall
Friant-Kern Canal	230	C	Viaduct or Elevated Structure
Beardsley (Lerdo) Canal	423	C	Viaduct or Elevated Structure
Beardsley Canal (second crossing)	180	C	Viaduct or Elevated Structure
Cross Valley Canal	Underground	C	Elevated

[4] Section 208.10 under Title 33 Code of Federal Regulations and Section 408 of Title 33 United States Code also relate to flow capacity. Section 208.10 requires that improvements, including crossings, do not reduce the capacity of a channel within a federal flood control project. Because there are no federal flood control projects in the vicinity of the F-B LGA study area, Section 208.10 is not applicable to the F-B LGA. A Section 408 permit would be required if construction modifies a federal levee; however, USACE determined that the Kern River levees are not federal project levees and are not subject to Section 408. Because as the Kern River crossing is upstream of federal facilities, USACE requested that documentation be provided to demonstrate that the F-B LGA would not affect the ability of the Kern River channel to pass 8,000 cfs flow.

Waterbody Name	Approximate Crossing Width (feet)[1]	Type[2]	Crossing Type
Calloway Canal (second crossing)	120	C	Viaduct or Elevated Structure
Kern River	533	P	Viaduct or Elevated Structure
Stine Canal (Carrier Canal)	196	C	Viaduct or Elevated Structure
Kern Island Canal[3]	Underground	C	Viaduct or Elevated Structure
East Side Canal	Underground	C	Viaduct or Elevated Structure

Source: Authority and FRA, 2016a
[1] Crossing widths subject to change once F-B LGA is finalized. Crossing width is based off of the F-B LGA limits of construction.
[2] Type: C= canal
P=perennial
[3] Canal is conveyed inside a culvert at the F-B LGA crossing.
F-B LGA = Fresno to Bakersfield Locally Generated Alternative

The project includes new cross culverts and bridges throughout the F-B LGA. All culverts would consist of reinforced concrete pipe or box culverts. The culverts would be installed to maintain or provide greater hydraulic conveyance capacity of the channels. In addition, crossings would be designed based on the hydraulic criteria developed by the Cities of Bakersfield and Shafter and County of Kern as outlined in the *Draft Hydrology, Hydraulics, & Drainage Report* (Authority 2016c).

The capacity of the receiving drainage system would be evaluated, and if necessary, on-site stormwater management measures, such as detention/retention basins or selected upgrades to the receiving system, would be designed to provide adequate capacity, as specified in Avoidance and Minimization Measure HYD-AM #1. These proposed drainage improvements would be incorporated into the design of the project.

Therefore, through compliance with Avoidance and Minimization Measure HYD-AM #1, permanent effects to drainage patterns, stormwater runoff, and hydraulic capacity would be minimal and be less than significant under CEQA because the F-B LGA would maintain the existing drainage pattern to the maximum extent practicable, include drainage improvements that promote infiltration, and maintain the hydraulic conveyance and capacity of all crossings. The requirements set forth in this avoidance and minimization measure would be incorporated into the design of the project.

Impact HWR#6 - Permanent Impacts on Surface Water Quality

As a result of project operation and maintenance, certain pollutants associated with these activities would potentially need to be addressed, including sediments, oil and grease, trash and debris, heavy metals, nutrients, and pesticides. The technology proposed for the railway system does not require large amounts of lubricants or hazardous materials for operation. 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. Greases may be used to lubricate switching equipment along the trackway. 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, as established by the U.S. Environmental Protection Agency, the California Department of Pesticide Regulation, and local jurisdictions, would be followed to minimize the adverse impacts on the environment.

As shown in Table 3.8-8, the F-B LGA would result in a net increase in impervious surface area of approximately 147 acres. 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. Also, an increase in impervious surface area would also increase the total amount of pollutants in the storm water runoff and non-storm water runoff, which would increase the amount of pollutants traveling to on-site drainages and downstream receiving waters.

Table 3.8-8 Acres of New Impervious Surface Area

HSR Facility	Net Impervious Surface (acres)[1]
F-B LGA Track Alignment	67
Bakersfield F Street Station	21
Maintenance of Infrastructure Facility	35
Total Acreage	123

Source: Authority and FRA, 2016a
[1] Permanent footprint will be refined further during design.
F-B LGA = Fresno to Bakersfield Locally Generated Alternative
HSR = high-speed rail

Because there are existing railway facilities within the Tulare Lake Basin, the F-B LGA would not introduce new types of pollutants to the study area. However, the presence of the new railway facility would increase the amount of the pollutants associated with rail operations that may already exist in the area because of increased rail service. Yet because the HSR System is powered by electricity, stormwater runoff from the track would carry fewer pollutants associated with rail operations (i.e., heavy metals) than existing railways that are powered by diesel engines. No runoff from the project would be discharged directly to any surface water bodies or irrigation canals without being directed to a treatment device such as an infiltration basin. In addition, none of the waterbodies within the study area are on the 303(d) list for which a TMDL has been developed; therefore, operation of the F-B LGA would not contribute to any existing water quality impairments.

Increases in impervious surface area would increase the volume of runoff during a storm and increase the total amount of pollutants in the storm water runoff and non-storm water runoff traveling to on-site drainages and downstream receiving waters. However, all runoff from the study area would be treated prior to discharge. Runoff from the track right-of-way would be dispersed in a non-erosive fashion, infiltrated on-site, conveyed to a nearby drainage system, or directed through swales to retention/detention basins located within the project right-of-way and maintained by the project. Runoff from overpasses, underpasses, and viaduct structures at major crossings would be collected and discharged to the ground surface in a non-erosive manner, discharged to volume-based or flow-based stormwater treatment devices such as infiltration basins, or discharged to adjacent drainage systems. These drainage improvements, specified in Avoidance and Minimization Measure HYD-AM #1, would provide hydromodification controls and target pollutants of concern. They would be incorporated into the design of the project.

In addition, the F-B LGA would include the implementation of Site Design, Source Control, and Treatment BMPs, as required by the Authority's MS4 Permit , to prevent pollutants of concern from reaching receiving waters. Site Design BMPs reduce runoff or pollutants at the source. Source Control BMPs eliminate post-project runoff and control sources of pollutants. Treatment BMPs utilize treatment mechanisms to remove pollutants that have entered storm water runoff. Proposed Treatment BMPs that are being considered for the project include biofiltration swales, biofiltration strips, infiltration devices, detention devices, media filters, multi-chambered treatment trains, wet basins, dry weather diversion, and gross solids removal devices. Site Design, Source Control, and Treatment BMPs would be finalized during subsequent design phases. Therefore, through compliance with the Authority's MS4 Permit and implementation of Site Design, Source Control, and Treatment BMPs, permanent effects to surface water quality would be minimal and be less than significant under CEQA because BMPs would target pollutants of concern in stormwater runoff. Site Design, Source Control, and Treatment BMPs would be incorporated into the design of the project.

Impact HWR#7 - Permanent Impacts on Groundwater Quality and Volume

Implementation of the F-B LGA would increase impervious surface area by approximately 147 acres. An increase in impervious surface area decreases infiltration, which can decrease the amount of water that is able to recharge the aquifer/groundwater. This reduction in infiltration

would not be substantial due to the size of the Kern County Subbasin (i.e., the area of the Kern County Subbasin crossed by the F-B LGA is approximately 990 acres compared to the total 1,945,000 acres subbasin) and the highly variable nature of the existing groundwater flow paths. In addition, the proposed drainage improvements would promote infiltration through the use of retention/detention basins which can increase groundwater recharge, as specified in Avoidance and Minimization Measure HYD-AM #1. These proposed drainage improvements would be incorporated into the design of the project. Furthermore, groundwater extraction would not be required for operation of the F-B LGA. Station area water requirements would be met by relying on the local system. Local system demands can be reduced by collecting grey water for reuse in landscape areas.

Implementation of the F-B LGA would displace existing agricultural and domestic wells within the F-B LGA right-of-way. The displacement of these wells would not further deplete groundwater supplies through additional groundwater pumping or substantially change the water level in neighboring wells because the replacement wells would be located in the same aquifer as the original wells and would pump at the same rate and depth as the original wells. The Authority would work with individuals on a case-by-case basis to provide equal utility for wells affected by the alignment. Hydraulic studies would be done during subsequent design phases to determine the location of replacement wells such that operation of these wells would not create secondary effects to existing wells in the vicinity. Other than the replacement wells, no new wells are anticipated. Therefore, there would be no change to groundwater pumping at wells between the existing and proposed condition.

Even though the presence of the F-B LGA would increase the amount of pollutants associated with rail operations in the study area, implementation of BMPs would target pollutants of concern and prevent pollutants from infiltrating into the underlying groundwater basin. In addition, due to the depth of groundwater in the vicinity of the F-B LGA, operational activities would not affect groundwater quality because there would not be a direct path for operational-related contaminants to reach groundwater.

In summary, through the implementation of Avoidance and Minimization Measure HYD-AM #1, operation of the F-B LGA would not substantially deplete groundwater volumes, affect groundwater quality, or reduce groundwater recharge in the subbasin due to the size of the groundwater basin and proposed drainage improvements that promote infiltration. The requirements set forth in this avoidance and minimization measure would be incorporated into the design of the project. Therefore, ground water impacts from the operation of the F-B LGA would be less than significant under CEQA.

Impact HWR#8 - Permanent Impacts on Floodplains

The study area has a relatively flat gradient that slopes gently to the west or southwest. During periods of high stream flow, shallow overland flooding, which can range from 1 to 3 feet in depth, tends to pond against canal berms, levees, and road and railroad embankments that are perpendicular to the land gradient. The HSR tracks could divert shallow flood flows from overflowing channels by serving as an obstacle to the shallow overland flow if sufficient culverts or cross drainage are not provided. At locations where the HSR tracks cross contours at a skew, storm water runoff would flow to the HSR embankment and be diverted laterally, parallel to the embankment, until the runoff flows to a cross culvert which would convey the flow under the tracks. In areas where the track is elevated, there would be little potential for such diversion. Where the project is adjacent to existing rail or highway embankments, such flood barriers might already exist. New impacts would most likely occur where project tracks do not run parallel to existing embankments or where existing embankments could be overtopped. In locations where fill from the new track would block existing flow patterns, cross culverts would be incorporated within the floodplain to allow flow to travel through the HSR right-of-way, minimizing floodplain impacts and provide floodplain equalization and distribution conveyance. At canal crossings, openings in the embankment (e.g., culverts) would be designed to allow the same volume of water to pass along the same flow path. As discussed under Impact HWR #5, each crossing would be designed to allow for the same conveyance as the existing condition.

Floodplains crossed by the F-B LGA are summarized in Table 3.8-9. Project components in FEMA-designated floodplains would include the placement of fill and octagonal concrete columns supporting the viaducts. The placement of fill and these concrete columns could reduce the floodplain's capacity to convey flows and reduce the storage capacity of the floodplain, resulting in potential floodplain impacts. Design of these floodplain crossings would include measures to minimize the effects of placing structures within the floodplains. The impacts associated with crossing FEMA-designated flood areas are discussed for each of the floodplain crossings.

Unnamed Floodplain in the City of Shafter

The Zone AO (flood depth of 1 to 3 feet and average depth determined) unnamed floodplain is a shallow local depression that fills with surface runoff during extreme events due to inadequate local drainage. No known drainage channels connect to the floodplain and consequently, there are no concentrated flows into or out of this area, only surface runoff that ponds and then infiltrates or evaporates. Fill would be placed within the limits of the Zone AO floodplain to support the F-B LGA tracks through the city of Shafter. The current storage capacity of the Zone AO floodplain is approximately 23 acre-feet. The amount of fill would reduce the floodplain storage capacity by approximately 16.6 acre-feet, which is approximately 72 percent of the total storage capacity within the existing Zone AO floodplain. The potential impact to the floodplain would be minimized by providing a storage basin and infiltration ditches with storage volume equivalent to the fill volume placed inside the Zone AO floodplain (approximately 16.6 acre-feet). The design of the storage basin has not been determined. There are a variety of size and shapes of basins that could provide the required 16.6 acre-feet of storage. The dimensions of the storage basin would be finalized during subsequent design. The storage basin would most likely be located outside of Authority right-of-way, within the project footprint. One possible location for the storage basin would be on an undeveloped parcel east of the right-of-way, along the north side of East Ash Avenue, adjacent to the Zone AO floodplain. The proposed storage basin would be hydraulically connected to the existing floodplain so that flows intended for the floodplain would be stored in the basin. Construction of the storage basin would require minor grading activities which would comply with the requirements set forth by the Construction General Permit, as specified in Avoidance and Minimization Measure HYD-AM #3. Upon completion of construction, the storage basin may also be used as a park or other open space recreational uses. No additional impacts associated with the storage basin are anticipated.

Therefore, through implementation of the storage basin and infiltration ditches described above, permanent effects to floodplains from operation of the F-B LGA would be less than significant under CEQA because no reduction in floodplain storage capacity would result with implementation of the storage basin and infiltration ditches. The storage basin and infiltration ditches would be incorporated into the design of the project.

Table 3.8-9 Floodplains Crossed by the F-B LGA

Floodplain Name or Flooding Source	County	FEMA Special Flood-Hazard Area[1]	Length of Floodplain Crossed (miles)	Crossing Type[2] and Length (miles)	Floodplain Depth/ Elevation[3] (feet)	Length of FEMA Floodway Crossed (feet)	CVFPB Designated Floodway Width (feet)	FEMA FIRM Panel
Local Flooding (City of Shafter)	Kern	Zone AO	0.63	Fill, 0.63 (3,326 feet)	Depth = 1	N/A	N/A	06029C1275E, 06029C1775E
Kern River	Kern	Zone AE	0.10	Viaduct, 0.10 (540 feet)	El – 408 feet NAVD88[4]	N/A	600-800	06029C1819E

Sources: Federal Emergency Management Agency, 2008a, 2008b

[1] Special Flood-Hazard Areas or the 100-year flood designated by FEMA. In the study area, these include:
- Zone A–no BFE determined
- Zone AE–BFE determined
- Zone AH–flood depth of 1 to 3 feet and BFE determined
- Zone AO–flood depth of 1 to 3 feet and average depth determined

[2] Aerial structures and bridges are reported as "elevated."

[3] For Zone AO, average depth is shown. For Zones AE and AH, the FEMA-determined BFEs within the F-B LGA construction limits are shown on the table.

[4] NAVDD88 stands for North American Vertical Datum of 1988.

BFE = base flood elevation
CVFPB = Central Valley Flood Protection Board
El = elevation
FEMA = Federal Emergency Management Agency
FIRM = Flood Insurance Rate Map
N/A = not applicable

Kern River

The F-B LGA would cross the levees on the northwestern and southwestern banks of the Kern River in the city of Bakersfield via a viaduct structure supported by eight octagonal, 15-foot diameter concrete columns within the Zone AE (base flood elevation determined) floodplain associated with the Kern River. The concrete columns would reduce the floodplain storage capacity, obstruct the flow of the Kern River, and increase the water surface elevation upstream of the F-B LGA crossing. However, the volume of fill inside the 100- and 200-year floodplain would be limited to the concrete columns which are negligible in comparison to the size of the Kern River floodplain. FEMA regulations prevent projects from increasing the base flood elevation by greater than 1 foot in floodplains or substantially changing the floodplain limits, as specified in Avoidance and Minimization Measure HYD-AM #2. The F-B LGA crossing would result in a 0.7-foot increase in water surface elevation during the design 100- and 200-year storm events, complying with FEMA regulations and adhering to Avoidance and Minimization Measure HYD-AM #2. In addition, the 100- and 200-year flows would be conveyed inside the levees. However, in instances where fill would be placed within the floodplain, a Conditional Letter of Map Revision and Letter of Map Revision would be required to reduce floodplain impacts as well as coordination between the CVFPB, United States Army Corps of Engineers, City of Bakersfield, and County of Kern, as required by Mitigation Measure HWR-MM#2.The Conditional Letter of Map Revision/Letter of Map Revision serves as FEMA's acknowledgement that a project would affect the Base Flood Elevations of a floodplain. The Letter of Map Revision officially revises the Flood Insurance Rate Map to reflect the new flood elevations and boundaries. Because the increase in floodplain elevation would be less than 1 foot and the FEMA Flood Insurance Rate Map would be revised to reflect the new floodplain condition, the F-B LGA would minimize potential harm to or within the floodplain to the maximum extent practicable. Additionally, the impact to the Kern River floodplain could be further minimized by increasing the span length of the viaduct structure over the Kern River, which would reduce the number of concrete columns inside the floodplain.

In summary, the floodplain crossing over the Kern River would be required to comply with FEMA regulations, as specified in Avoidance and Minimization Measure HYD-AM #2. However, operation of the F-B LGA within the FEMA-designated floodplain could still result in permanent floodplain effects with potentially significant impacts under CEQA by disrupting flood flows and exposing structures to flooding within the vicinity. Through implementation of Mitigation Measure HWR-MM#2, which requires the preparation of a Conditional Letter of Map Revision/Letter of Map Revision and coordination between local jurisdictions and relevant agencies, permanent effects to the Kern River floodplain would be reduced to less than significant levels under CEQA.

3.8.5 Avoidance and Minimization Measures and Mitigation Measures

3.8.5.1 Avoidance and Minimization Measures

All of the avoidance and minimization measures (referred to as project design features in Section 3.8.6 of the Fresno to Bakersfield Section Final EIR/EIS) are applicable to the F-B LGA. The applicable list is provided in Technical Appendix 2-G Mitigation Monitoring and Enforcement Plan. Technical Appendix 2-H describes how implementation of these five measures would reduce adverse effects on hydrology and water resources. As shown in Table 3.8-10, the following Avoidance and Minimization Measures would be applicable to the May 2014 Project as well as the F-B LGA:

Table 3.8-10 Avoidance and Minimization Measures Applicable to the F-B LGA

Number	Description
HYD-AM #1	Stormwater Management and Treatment. During the detailed design phase, each receiving stormwater system's capacity will be evaluated to accommodate project runoff for the design storm event. As necessary, onsite stormwater management measures, such as detention or selected upgrades to the receiving system, will be designed to provide adequate capacity and to comply with the design standards in Appendix 2-D and the latest version of Technical Memorandum 2.6.5 Hydraulics and Hydrology Guidelines (Authority 2011). Onsite stormwater management facilities will be designed and constructed to capture runoff and provide treatment prior to discharge of pollutant-generating surfaces, including station parking areas, access roads, new road over- and underpasses, reconstructed interchanges, and new or relocated roads and highways. Low-impact development techniques will be used to detain runoff onsite and to reduce offsite runoff. Constructed wetland systems, biofiltration and bioretention systems, wet ponds, organic mulch layers, planting soil beds, and vegetated systems (biofilters) such as vegetated swales and grass filter strips will be used, where appropriate. Portions of the HMF site[1] will be used for onsite infiltration of runoff, if feasible, or for stormwater detention if not feasible. Stormwater infiltration or detention facilities are to be built in compliance with the design standards indicated in Appendix 2-D. Vegetated setbacks from streams will be used.
HYD-AM #2	Flood Protection. The project will be designed to both remain operational during flood events and to minimize increases in 100-year flood elevations. Design standards will include the following: • Establish track elevation to prevent saturation and infiltration of stormwater into the subballast. • Minimize development within the floodplain to such an extent that water surface elevation in the floodplain would not increase by more than 1 foot, or as required by State or local agencies, during the 100-year flood flow. Avoid placement of facilities in the floodplain (e.g., at the Shafter East and Shafter West HMF sites[1]) or raise the ground with fill above the baseflood elevation. The floodplain crossings will be designed to maintain a 100-year floodwater surface elevation of no greater than 1 foot above current levels, or as required by state or local agencies. Project features within the floodway itself will not increase existing 100-year floodwater surface elevations in FEMA-designated floodways, or as otherwise agreed upon with the county floodplain manager. The following design standards would minimize the effects of pier placement on floodplains and floodways: • Design site crossings to be as nearly perpendicular to the channel as feasible to minimize bridge length. • Orient piers to be parallel to the expected high-water flow direction to minimize flow disturbance. • Elevate bridge crossings at least 3 feet above the high-water surface elevation to provide adequate clearance for floating debris, or as required by local agencies. (The CVFPB requires that the bottom members [soffit] of a proposed bridge be at least 3 feet above the designated floodplain. The required clearance may be reduced to 2 feet on minor streams at sites where significant amounts of stream debris are unlikely.) • Conduct engineering analyses of channel scour depths at each crossing to evaluate the depth for burying the bridge piers and abutments. Implement scour-control measures to reduce erosion potential. • Use quarry stone, cobblestone, or their equivalent for erosion control along rivers and streams, complemented with native riparian plantings or other natural stabilization alternatives that would restore and maintain a natural riparian corridor. • Place bedding materials under the stone protection at locations where the underlying soils require stabilization as a result of stream-flow velocity.

Number	Description
HYD-AM #3	Construction Storm Water Pollution Prevention Plan. The SWRCB Construction General Permit (Order No. 2009-0009 DWQ, NPDES No. CAS000002) establishes three project risk levels that are based on site erosion and receiving-water risk factors. Risk Levels 1, 2, and 3 correspond to low-, medium-, and high-risk levels for a project. A preliminary analysis indicates that most of the project would fall under Risk Level 1, the lowest risk level. However, sections of the project may be more appropriately categorized as Risk Level 2 due to the combination of local rainfall, soil erodibility, and the lengths of the constructed slopes. For example, the portion of the project draining to the Kings River would fall under Risk Level 2. Risk Level 2 measures also would be carried out anywhere in the project vicinity where construction activities are conducted within or immediately adjacent to sensitive environmental areas such as streams, wetlands, and vernal pools. The Construction General Permit requires preparation and implementation of a SWPPP, which would provide BMPs to minimize potential short-term increases in sediment transport caused by construction, including erosion control requirements, stormwater management, and channel dewatering for affected stream crossings. These BMPs will include measures to provide permeable surfaces where feasible and to retain or detain and treat stormwater onsite. Other BMPs include strategies to manage the overall amount and quality of stormwater runoff. The Construction SWPPP will include measures to address, but are not limited to, the following: • Hydromodification management to ensure maintenance of pre-project hydrology by emphasizing onsite retention of stormwater runoff using measures such as flow dispersion, infiltration, and evaporation, supplemented by detention, where required. Additional flow control measures will be implemented where local regulations or drainage requirements dictate. • Implementing practices to minimize the contact of construction materials, equipment, and maintenance supplies with stormwater. • Limiting fueling and other activities using hazardous materials to areas distant from surface water, providing drip pans under equipment, and daily checks for vehicle condition. • Implementing practices to reduce erosion of exposed soil, including soil stabilization, watering for dust control, perimeter silt fences, and sediment basins. • Implementing practices to maintain current water quality including silt fences, stabilized construction entrances, grass buffer strips, ponding areas, organic mulch layers, inlet protection, and storage tanks and sediment traps to settle sediment. • Implementing practices to capture and provide proper offsite disposal of concrete washwater, including isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system, and possible treatment with dry ice or other acceptable means to reduce the alkaline character of the runoff (high pH) that typically results from new concrete. • Developing and implementing a spill prevention and emergency response plan to handle potential fuel or other spills. • Using diversion ditches to intercept offsite surface runoff. • Where feasible, avoiding areas that may have substantial erosion risk, including areas with erosive soils and steep slopes. • Where feasible, limiting construction to dry periods when flows in water bodies are low or absent. Implementation of a SWPPP is the responsibility of the construction contractor's Qualified SWPPP Practitioner or designee. As part of that responsibility, the effectiveness of construction BMPs must be monitored before and after storm events. Records of these inspections and monitoring results are submitted to the SWRCB/RWQCB as part of the annual report required by the Statewide Construction General Permit. The reports are available to the public online. The SWRCB and RWQCB have the opportunity to review these documents.

Number	Description
HYD-AM #4	Regional Dewatering Permit. The Central Valley RWQCB, Order No. R5-2008-0081, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters, is a permit that covers construction dewatering discharges and some other listed discharges that do not contain significant quantities of pollutants, and that either (1) are 4 months, or less, in duration, or (2) have an average dry-weather discharge that does not exceed 0.25 million gallons per day.
HYD-AM #5	Flood Protection. The CVFPB regulates specific river, creek, and slough crossings for flood protection. These crossings must meet the provisions of Title 23 of the Cal. Code Regs. Title 23 requires that new crossings maintain hydraulic capacity through such measures as in-line piers, adequate streambank height (freeboard), and measures to protect against streambank and channel erosion. Section 208.10 requires that improvements, including crossings, be constructed in a manner that does not reduce the channel's capacity or functionality, or that of any federal flood control project. The CVFPB reviews applications for encroachment permits for approval of a new channel crossing or other channel modification. For a proposed crossing or placement of a structure near a federal flood control project, the CVFPB coordinates review of the encroachment permit application with USACE pursuant to assurance agreements with USACE and the USACE Operation and Maintenance Manuals under Title 33 C.F.R., Section 208.10 and Title 33 U.S.C., Section 408.[2] Under Section 408 of the Rivers and Harbors Act, the USACE must approve any proposed modification that involves a federal flood control project. A Section 408 permit would be required if construction modifies a federal levee. A Section 208.10 permit would be required where the project crosses the right-of-way of a federal facility or interferes with its operation or maintenance without changing the system's structural geometry or hydraulic capacity.

Source: Authority, 2014

[1] The F-B LGA does not include the development of the Shafter East or Shafter West HMF sites. The design requirements would apply to the Maintenance of Infrastructure Facility (MOIF).

[2] Section 208.10 and Section 408 are not applicable to the F-B LGA. Section 208.10 applies to federal flood control projects. There are no federal flood control projects in the vicinity of the F-B LGA study area. A Section 408 permit would be required if construction modifies a federal levee. USACE determined that the Kern River levees are not federal project levees and are not subject to Section 408. However, as the Kern River crossing is upstream of federal facilities, USACE requested that documentation be provided to demonstrate that the F-B LGA would not affect the ability of the Kern River channel to pass 8,000 cfs flow. Documentation is provided in the Hydrology and Hydraulics/Section 408 Report.

BMP = Best Management Practice
Cal. Code Regs.= California Code of Regulations
C.F.R. = Code of Federal Regulations
CVFPB = Central Valley Flood Protection Board
F-B LGA = Fresno to Bakersfield Locally Generated Alternative
FEMA = Federal Emergency Management Agency
HMF = heavy maintenance facility
NPDES = National Pollutant Discharge Elimination System
RWQCB = Regional Water Quality Control Board
SWPPP = Stormwater Pollution Prevention Plans
SWRCB = State Water Resources Control Board
USACE = United States Army Corps of Engineers
U.S.C. = United States Code

3.8.5.2 Mitigation Measures Identified in the Fresno to Bakersfield Section Final EIR/EIS

No mitigation measures were identified in the Fresno to Bakersfield Section Mitigation and Monitoring Enforcement Plan (page 1-44) (Authority 2014).

3.8.5.3 Mitigation Measures Specific to the F-B LGA

Additional mitigation measures that address project-level impacts are further discussed in the following technical reports prepared for the F-B LGA (included in Volume 2, Technical Appendices, of this Draft Supplemental EIR/EIS):

- Fresno to Bakersfield Section Locally Generated Alternative Draft Preliminary Engineering for Project Definition Design Submission Draft Floodplain Impact Report (Authority 2016b)
- Fresno to Bakersfield Section Locally Generated Alternative Draft Preliminary Engineering for Project Definition Design Submission Draft Hydrology, Hydraulics, and Drainage Report (Authority 2016c)

- Fresno to Bakersfield Section Locally Generated Alternative Draft Preliminary Engineering for Project Definition Design Submission Draft Stormwater Management Report (Authority 2016a)

Mitigation measures included in Table 3.8-11 will be required as part of implementation of the F-B LGA and will mitigate impacts related to floodplains.

Table 3.8-11 Mitigation Measures Applicable to the F-B LGA

Number	Description
HWR-MM #1	Floodplain Protection: Construction. The following measures shall be implemented during the construction period to mitigate potential impacts to floodplains, including the following: • Implement standard floodplain measures, including best management practices (BMPs), during construction. BMPs may include preservation of existing vegetation to the maximum extent practicable, limiting the number of equipment trips across floodplain crossing, selecting equipment that exerts the least amount of ground surface pressure, use of vegetated buffers on slopes, and application of hydraulic mulch on disturbed streambanks. • Designated construction employees and local districts shall monitor weather for heavy storms and potential flood flows. If a heavy storm or flood event is identified, construction equipment shall be relocated outside of the floodplain.
HWR-MM #2	Floodplain Protection: Operation. The following measures shall be implemented as part of the project to reduce impacts to floodplains: • A Conditional Letter of Map Revision to Federal Emergency Management Agency shall be required for all construction activities inside the Kern River. • Potential impacts and mitigation measures for the Kern River shall require coordination with the Central Valley Flood Protection Board, the United States Army Corps of Engineers, the City of Bakersfield, and County of Kern.

Impacts to hydrology and water resources associated with implementation of the project would be less than significant after implementation of Mitigation Measures HWR-MM#1 and HWR-MM#2. No impacts would result from implementing Mitigation Measures HWR-MM#1 or HWR-MM#2. All mitigation measures will be implemented within the study area, and therefore do not raise the potential for impacts in any area not already analyzed for this project. All the proposed mitigation measures, with proper implementation, serve only to reduce potential impacts of the project, and by nature of their design do not result in additional environmental impacts to hydrology and water resources.

The F-B LGA would not result in any significant impacts under CEQA. With implementation of the recommended mitigation measures (HWR-MM#1 and HWR-MM#2), impacts of the F-B LGA related to: drainage patterns, stormwater runoff, and hydraulic capacity; surface water quality; groundwater volume, quality, and recharge; and floodplains would be less than significant under CEQA.