

3.8 HYDROLOGY AND FLOODPLAIN

3.8.1 REGULATORY SETTING

Executive Order (EO) 11988 (Floodplain Management) directs all Federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless it is the only practicable alternative. The Federal Highway Administration (FHWA) requirements for compliance with EO 11988 are outlined in 23 CFR 650 Subpart A.

In order to comply, the following must be analyzed:

- The practicability of alternatives to any longitudinal encroachments
- Risks of the action
- Impacts on natural and beneficial floodplain values
- Support of incompatible floodplain development
- Measures to minimize floodplain impacts and to preserve/restore any beneficial floodplain values impacted by the project

The base floodplain is defined as “the area subject to flooding by the flood or tide having a one percent chance of being exceeded in any given year.” An encroachment is defined as “an action within the limits of the base floodplain.”

3.8.2 AFFECTED ENVIRONMENT

This section is based on the *Los Angeles River Impact Report* (November 2011), the *Jurisdictional Delineation Report* (October 2011), the *Preliminary Hydrology Report* (November 2011) and the *Water Quality and Stormwater Runoff Study* (December 2011) for the Interstate 710 (I-710) Corridor Project.

3.8.2.1 FLOODPLAINS

The Federal Emergency Management Agency (FEMA) has prepared Flood Insurance Rate Maps (FIRMs) that delineate flood zones based on estimated flood risk. According to FEMA FIRM Nos. 06037C1810, 06037C1815F, 06037C1820F, 06037C1955F, 06037C1962F, and 06037C1964F (September 26, 2008), the Study Area is located within Zone A of the Los Angeles River, Compton Creek, and Rio Hondo Channel 100-year floodplains from the UP Railroad bridge, north of Firestone Blvd. in the city of South Gate, south to the Ocean Blvd. bridge in the city of Long Beach. Zone A is the FEMA designation for areas of 100-year floodplains where base flood elevations and flood hazard factors have not been determined.

The FEMA FIRMs are included in Appendix K of this Draft Environmental Impact Report/ Environmental Impact Statement (EIR/EIS).

A 100-year flood event would be mostly contained within the existing levees in the Study Area. However, two 100-year flood areas outside the Los Angeles River channel are located near the I-710/Anaheim St. Interchange in the city of Long Beach. Two other small ponding areas (Zone AH) are located just north of the Interstate 105 (I-105) freeway and east of I-710. Zone AH areas have a 1 percent annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from one to three feet. Zone X areas are shown on the FEMA FIRM along the reaches under study. These Zone X areas have either a 0.2 percent annual chance of flood (500-year floodplain) or a 1 percent annual chance of flood (100-year floodplain) with shallow flooding (less than one-foot depth).

The Los Angeles River parallels the I-710 freeway throughout much of the Study Area and, for the most part, is an unvegetated, concrete- and riprap-lined trapezoidal channel. A small portion of the Los Angeles River south of Willow St. in Long Beach has a natural bottom and supports riparian vegetation. The current flow in the river originates from runoff from adjacent commercial, industrial, and residential developments, and groundwater reaching the surface. Rio Hondo is an unvegetated, rectangular concrete channel with intermittent flows. Compton Creek is a trapezoidal channel with an earthen bottom and concrete and grouted riprap banks. Compton Creek supports riparian vegetation and perennial flows within the Study Area.

Floodplains and wetlands in their natural or relatively undisturbed state serve water resource values (e.g., natural moderation of floods, water quality maintenance, and groundwater recharge), living resource values (e.g., fish, wildlife, and plant species), and cultural resource values (e.g., open space, archaeological and historical resources, natural beauty, scientific study, outdoor education, and recreation). Beneficial uses of surface waters are identified in the Los Angeles Region Water Quality Control Plan (Basin Plan). Beneficial uses include the various ways that water can be used for the benefit of people and/or wildlife. The following existing beneficial uses are identified in the Basin Plan for the Los Angeles River and Compton Creek:

- Groundwater Recharge
- Contact Water Recreation
- Noncontact Water Recreation
- Warm Freshwater Habitat

I-710 Corridor Project EIR/EIS

- Wildlife Habitat
- Wetland Habitat

The following existing beneficial uses are identified in the Basin Plan for the Rio Hondo Channel:

- Noncontact Water Recreation
- Rare, Threatened, or Endangered Species

The following intermittent beneficial uses are identified in the Basin Plan for the Rio Hondo Channel:

- Groundwater Recharge
- Contact Water Recreation
- Wildlife Habitat

The following potential beneficial uses are identified in the Basin Plan for the Los Angeles River:

- Municipal and Domestic Supply
- Industrial Process Supply

The following potential beneficial use is identified in the Basin Plan for Compton Creek:

- Municipal and Domestic Supply

The following potential beneficial uses are identified in the Basin Plan for the Rio Hondo Channel:

- Municipal and Domestic Supply
- Warm Freshwater Habitat

3.8.2.2 DRAINAGE CONDITIONS

EXISTING DRAINAGE FACILITIES. The I-710 Corridor contains a complex series of interconnected drainage systems that handle flows from both on-site and off-site drainage areas. There are several drainage outlet scenarios depending on the relative elevation differential to the Los Angeles River levee and other physical constraints presented along the I-710 Corridor. Most

drainage areas are handled by pump stations located adjacent to the Los Angeles River. As the terrain and freeway profiles rise relative to the river levee height, more gravity drainage systems handle drainage from the freeway right-of-way and adjacent off-site drainage areas. Existing drainage systems that traverse the I-710 Corridor Project boundary fall into three categories: inflows, outlets, and transfer flows. A brief description of the existing drainage facilities located in each I-710 Corridor design segment near the Los Angeles River is provided below:

- Segment 1 (Ocean Blvd. to Willow St.) – The terrain in this segment is lower than the Los Angeles River levee height and large drainage areas are handled by a series of pump stations situated in the Long Beach Harbor and at the major arterial interchanges including Anaheim St., Pacific Coast Hwy., and Willow St.
- Segment 2 (Wardlow Rd. to Del Amo Blvd.) – Due to higher terrain, this segment contains several gravity-flow drainage systems that outlet to the Los Angeles River. The Dominguez Basin, located north of the I-710/Interstate 405 (I-405) interchange, serves to meter outflow from off-site drainage areas located west of the interchange. A California Department of Transportation (Caltrans) pump station located at the Blue Line overcrossing handles drainage from a low point in the freeway profile. There are several existing gravity outlets that enter the Southern California Edison (SCE) right-of-way and Compton Creek that will be affected by the I-710 improvements.
- Segment 3 (Long Beach Blvd. to Alondra Blvd.) – This segment includes pump stations located at Long Beach Blvd., the I-710/State Route 91 (SR-91) interchange, and Alondra Blvd. that handle large off-site drainage areas.
- Segment 4 (Rosecrans Ave. to Firestone Blvd.) – This segment has several gravity systems that outlet to the Los Angeles River. A Caltrans' pump station is located at the South Gate Union Pacific (UP Railroad) Crossing. The Bandini Trunk storm drain is a 20-foot by ten-foot concrete drainage channel and is located between the I-710 and the Los Angeles River. This drainage system transfers off-site flows to the Los Angeles River and also receives flows from several smaller drainage pipes.
- Segment 5 (Clara St. to Slauson Ave.) – This segment has Caltrans' pump stations located at Clara St., Gage Ave., and Slauson Ave. to handle low points in the freeway profile.
- Segment 6 (Atlantic Blvd. to Washington Blvd.) – The freeway is elevated through this segment. Smaller, localized drainage systems typically drain to city streets or connect to two major County flood control drains.

- Segment 7 (Washington Blvd. to State Route 60 [SR-60]) – Drainage areas typically drain to city streets or connect to two major County flood control drains. A large portion of the Interstate 5 (I-5)/I-710 interchange depressed area drains to a Caltrans pump station located near the Eastern Ave. bridge over I-5.

ON-SITE DRAINAGE. The on-site drainage areas are defined based on the topography, roadway profiles, and existing drainage systems. These drainage areas may feed multiple drainage systems before reaching an outlet or pump station. The existing on-site drainage systems consist of a complex series of drainage inlets, cross culverts, dikes, over-side drains, concrete and earthen channels, pump stations, and detention basins located within the vicinity of or directly within the I-710 freeway right-of-way. The I-710 lanes and ramps generally drain via sheet flow to the shoulders where drainage collects along curbs before entering into underground pipes or down-drains. In some sections of the I-710 freeway, storm water drains to the median shoulders where drainage inlets convey the runoff to the cross drainage facilities. Underground storm drain systems generally channel flows into larger pipes before entering a pump station or the Los Angeles River. In some cases, the underground systems outlet onto vegetated areas adjacent to the I-710 right-of-way or local streets.

OFF-SITE CONDITIONS. Because of the proximity of I-710 to the Los Angeles River, off-site drainage areas are tributary to the drainage systems located within the Study Area. The off-site areas tributary to the I-710 drainage systems consist mainly of commercial, residential, and vacant land parcels.

3.8.3 ENVIRONMENTAL CONSEQUENCES

3.8.3.1 PERMANENT IMPACTS

BUILD ALTERNATIVES.

ALTERNATIVE 5A.

FLOODPLAIN ENCROACHMENTS. As summarized in Table 3.8-1 and discussed in detail below, transverse (i.e., perpendicular to the direction of flow) encroachments would occur at 22 Los Angeles River locations, and one Compton Creek and one Rio Hondo channel location under Alternative 5A. At these locations, the encroachments would result from construction of new bridge columns or piers and extension of existing piers. There would be approximately 13,500 square feet of new structure placed within the floodplain. In addition, localized channel modifications would be required to maintain the existing channel hydraulic capacity. For Alternative 5A, there would be no longitudinal (i.e., parallel to the direction of flow) encroachments in the Los Angeles River. A total of 26 acres of property acquisition and/or easements would be required from flood control areas.

Table 3.8-1 Floodway Impact Areas

Floodway Structures	Disposition	Impact Area (square feet)	Removal Area (square feet)	Net Impacts (square feet)	Type of Improvement
Alternatives 5A and 6A/B/C Floodplain Impacts					
Compton Creek					
I-710 Mainline	Replace	1,740	1,870	-130	Replace piers
Rio Hondo Channel					
Garfield Ave. Bridge	Widen	144	0	144	Extend bridge piers
Los Angeles River					
Shoemaker Bridge	Replace	576	6,570	-5,994	Replace piers with columns
Anaheim St.	Widen	3,150	0	3,150	Extend bridge piers
Pacific Coast Hwy.	Widen	2,124	0	2,124	Extend bridge piers
Willow St.	Widen	2,700	0	2,700	Extend bridge piers
Wardlow Ave.	Replace	1,764	1,764	0	Replace piers
Northbound I-710 to southbound I-405 Connector	New	160	0	160	New columns
Southbound I-710 to southbound I-405 Connector	New	95	0	95	New columns
I-405 Mainline	Widen	560	240	320	Extend bridge piers
Northbound I-405 to southbound I-710 Connector	New	95	0	95	New columns
Northbound I-405 to northbound I-710 Connector	Replace	160	680	-520	Replace piers with columns
Del Amo Blvd.	Widen	620	0	620	Extend bridge piers
Long Beach Blvd. northbound Ramps	New	2,188	0	2,188	New piers
Long Beach Blvd.	Widen	483	0	483	Extend bridge piers
Alondra Blvd.	Replace	2,625	1,750	875	Replace piers
Imperial Hwy.	Widen	400	0	400	Extend bridge piers
I-710 Mainline over Los Angeles River (north of Imperial Hwy.)	Replace	3,570	1,827	1,743	Replace piers
Southern Ave.	New	1,584	0	1,584	New piers
Firestone Blvd.	Widen	342	0	342	Extend bridge piers
UP Railroad Crossing (at Patata)	Replace	216	171	45	Replace piers
Florence Ave.	Replace	3,072	1,416	1,656	Replace piers
UP Railroad Crossing (at Randolph)	Replace	400	385	15	Replace piers
Slauson Ave.	Replace	2,736	1,380	1,356	Replace piers
Subtotal		31,544	18,053	13,491	

Table 3.8-1 Floodway Impact Areas

Floodway Structures	Disposition	Impact Area (square feet)	Removal Area (square feet)	Net Impacts (square feet)	Type of Improvement
Additional Floodway Impacts for Alternatives 6A/B/C Only					
Compton Creek					
Freight Corridor	New	96	0	96	New columns
Northbound I-710 to northbound Freight Corridor	New	80	0	80	New columns
Southbound Freight Corridor to southbound I-710 Connector	New	80	0	80	New columns
Los Angeles River					
Northbound Freight Corridor to eastbound SR-91 Connector	New	380	0	380	New piers
Westbound SR-91 to southbound Freight Corridor Connector	New	562	0	562	New piers with outriggers
Freight Corridor	New	3,420	0	3,420	New piers
DWP Tower Relocations*	New	8,596	659,346	0	New retaining walls/piers
Patata St. Bridge	New	828	0	828	New piers
Clara St.	Replace	720	660	60	New columns
Subtotal		14,762	660,006	5,250	
Alternative 5A Total Impacts		31,544	18,053	13,491	
Alternatives 6A/B/C Total Impacts		46,306	678,059	18,741	

Source: *Los Angeles River Impact Report*, DWP, November 2011.

*Removal Area is the existing concrete trapezoidal channel area that is replaced with vertical channel walls.

DWP = Los Angeles County Department of Water and Power

I-405 = Interstate 405

I-710 = Interstate 710

SR-91 = State Route 91

The following project design feature would result in transverse encroachments of the Compton Creek 100-year floodplain:

- **I-710 Freeway Mainline Bridge:** The existing three-span bridge over Compton Creek has two pier walls in the channel. The replacement of the I-710 mainline bridge would have one column built within the channel, replacing the two existing pier walls, and one abutment on either side at the top of the levee.

The following project design feature would result in transverse encroachments of the Rio Hondo Channel 100-year floodplain:

- **Garfield Ave. Bridge:** The Garfield Ave. bridge over the Rio Hondo channel would be widened to provide for an additional lane on Garfield Ave. The existing three piers would be lengthened on the downstream side to accommodate the new widened structure.

The following project design features would result in transverse encroachments of the Los Angeles River 100-year floodplain:

- **Shoemaker Bridge:** Shoemaker Bridge (Shoreline Dr.) would be replaced and would require new bents/pier walls in the river. The existing bridge, which has five piers, including columns and pier walls, would be removed. The proposed bridge would be relocated approximately 400 feet downstream of the existing alignment.
- **Anaheim St. Bridge:** The Anaheim St. bridge would be widened and would require extension of the existing pier walls located in the river and extension of the existing abutments at the river's edge. The existing bridge has five piers in the river, including columns and pier walls. The existing piers would be extended approximately 30 feet on each side.
- **Pacific Coast Hwy. Bridge:** The Pacific Coast Hwy. bridge would be widened and would require extension of the existing pier walls located in the river and extension of the existing abutments at the river's edge. The existing bridge has five piers in the river, including columns and pier walls. The piers would be extended approximately 20 feet on the south side and 40 feet on the north side.
- **Willow St. Bridge:** Widening of this bridge would require extension of the existing pier walls located in the river and extension of the existing abutments at the river's edge. The existing bridge has seven piers in the river, including columns and pier walls. The piers would be extended approximately ten feet on the south side and 40 feet on the north side. Seven of the piers have large pier noses that would require reconstruction.
- **Wardlow Rd. Bridge:** The replacement of Wardlow Rd. Bridge allows for the reconfiguration of the lanes and removal of the northbound I-710 on-ramp. The existing bridge has six piers in the river, including pier walls.

- **Northbound I-710 to Southbound I-405 Connector, Southbound I-710 to Southbound I-405 Connector, Northbound I-405 to Southbound I-710 Connector, and Northbound I-405 to Northbound I-710 Connector Bridges:** Four new connector structures require the placement of column foundations in the river channel. Two existing connectors that are supported by piers would be removed from the river channel.
- **I-405 Mainline Bridge:** The existing I-405 mainline bridge would be widened in the westbound direction (upstream side). Four existing piers would be modified to accommodate a tapered widening of the existing bridge.
- **Del Amo Blvd. Bridge:** The existing Del Amo Blvd. bridge has five pier walls in the river channel and abutments on either side on top of the levee. The Del Amo Blvd. bridge would be widened and would require extension of the existing pier walls located in the river and extension of the existing abutments at the river's edge. The piers would need to be extended approximately 30 feet on either side of the bridge.
- **Long Beach Blvd. Ramps:** A new river bridge would be constructed for the northbound I-710 ramps and would be located downstream of the existing Long Beach Blvd. bridge. A total of seven new piers would be placed within the river channel along with two new bridge abutments located at the top of the levee.
- **Long Beach Blvd. Bridge:** The Long Beach Blvd. bridge over the Los Angeles River has seven pier walls within the river channel. The bridge would be widened approximately 20 feet to the south. The widening would require extension of the existing pier walls located in the river.
- **Alondra Blvd. Bridge:** The replacement of the Alondra Blvd. bridge would require new abutments and columns in the Los Angeles River, shifted directly south of the existing bridge. The existing bridge has five pier walls with debris noses. The same configuration is proposed for the new bridge. The widening would require extension of the pier walls by approximately 100 feet.
- **Imperial Hwy. Bridge:** The existing Imperial Hwy. bridge over the Los Angeles River has four pier walls with debris noses in the river channel. Imperial Hwy. would be widened to the north to allow for a wider median and two left-turn lanes. The existing pier walls would be extended approximately 50 feet and debris noses reconstructed.

- **I-710 Freeway Mainline:** The I-710 freeway mainline bridge over the Los Angeles River north of Imperial Hwy. would be replaced along a new alignment to the south of the existing bridge. The new structure would be approximately 100 feet wider than the existing structure. Three pier walls are proposed to match the three existing I-710 mainline bridge pier walls.
- **Southern Ave. Bridge:** A new Southern Ave. bridge is proposed for the Los Angeles River channel. The new bridge would contain three new column bents within the existing Los Angeles River channel.
- **Firestone Blvd. Bridge:** The Firestone Blvd. bridge over the Los Angeles River requires widening to allow for two new lanes to the southbound on-ramp to I-710. The approximately 60-foot widening would require extension of the existing pier walls in the river. The existing bridge has three pier walls with debris noses.
- **UP Railroad Crossing at Patata:** The new UP Railroad bridge would be located north of the existing UP Railroad alignment. The new bridge would require the construction of three new column bents within the existing Los Angeles River channel.
- **Florence Ave. Bridge:** The Florence Ave. bridge would be replaced and would require new bents/pier walls in the river and abutments at the river's edge. The existing bridge has four piers in the river channel. The proposed widening of approximately 40 feet on each side of the existing bridge would provide a wider median to allow for double left-turn lanes and three lanes on each side.
- **UP Railroad Crossing at Randolph St.:** A UP Railroad shoo-fly, required for staging of the I-710 mainline construction at Randolph St., would become the permanent UP Railroad bridge at that location. The new rail bridge would be located approximately 60 feet south of the existing one and would have four new columns within the river channel. The existing bridge is a four-span bridge with three piers in the river channel.
- **Slauson Ave. Bridge:** The Slauson Ave. bridge would be replaced with a much larger bridge and would require a replacement of the existing bents/pier walls in the river and two abutments at the river's edge. The existing bridge has four pier walls in the river channel.

RISKS TO LIFE AND PROPERTY. Construction of the improvements discussed above within the 100-year floodplain is not anticipated to substantially increase the base flood

elevation. At this time, it is anticipated that a Conditional Letter of Map Revision (CLOMR) would be required. No revisions to the FEMA FIRM maps (Letter of Map Revision [LOMR]) are anticipated. As specified below in Measure FP-1, a Final Los Angeles River Impact Report/Final Location Hydraulic Study would be prepared during final project design. The *Los Angeles River Impact Report* (November 2011) assesses the risk of the floodplain impacts. Final reports will be prepared during final design to demonstrate that the design of the proposed project provides acceptable flood protection. The change in floodplain elevations would be evaluated based on final design plans of the bridges and other structures where they encroach on the 100-year floodplain. The modeling results would be included in the application for a CLOMR and LOMR, if required, which would be processed through the Los Angeles County Flood Control District and FEMA.

Alternative 5A would not result in flood-related interruption of emergency services or routes. Alternative 5A would enhance the ability to move fire protection and emergency service resources from one area to another by providing a more reliable freeway network. Operation of Alternative 5A would not result in interruption of emergency services or routes and would improve access throughout the region during a flood event. In addition, Alternative 5A would not increase the risk of flooding because it would not substantially increase the base flood elevation. Therefore, there would be no substantial flood-related risks to life or property associated with implementation of Alternative 5A. Based on the assessment of level of risk in the Location Hydraulics Study Forms provided in the *Los Angeles River Impact Report*, the project is considered low-risk.

INCOMPATIBLE FLOODPLAIN DEVELOPMENT. Alternative 5A includes improvements to an existing transportation facility to improve air quality and public health; improve traffic safety; modernize freeway design; address projected traffic volumes; and address projected growth in population, employment, and economic activities related to goods movement. Alternative 5A would reduce congestion by modifying existing facilities and would not promote incompatible floodplain development.

NATURAL AND BENEFICIAL FLOODPLAIN VALUES. Alternative 5A has the potential to impact natural and beneficial water resource values by impacting water quality and jurisdictional waters. As discussed in detail later in Section 3.9, Water Quality and Storm Water Runoff, Alternative 5A would result in a net increase in impervious surfaces and, therefore, an increase in runoff. The runoff from the proposed roadway improvements would have the potential to impact water quality in the Los Angeles River, the Rio Hondo Channel, and Compton Creek. However, Treatment Best Management Practices (BMPs) would be implemented during operation of Alternative 5A to reduce impacts to water

quality. Improvements within the 100-year floodplain proposed under Alternative 5A would result in direct, permanent impacts to the Los Angeles River, Rio Hondo and Compton Creek, which are considered potentially jurisdictional to the United States Army Corps of Engineers (USACE), the California Department of Fish and Game (CDFG), and the Regional Water Quality Control Board (RWQCB). As discussed in Section 3.17, Wetlands, compensatory mitigation is proposed as part of Alternative 5A to reduce potential impacts to jurisdictional waters. Therefore, with the measures proposed in Sections 3.10 and 3.17, operation of Alternative 5A would not result in long-term adverse impacts to natural and beneficial floodplain values.

SIGNIFICANT FLOODPLAIN ENCROACHMENT. A “significant encroachment,” as defined in 23 CFR 650.105(q), is a highway encroachment that would result in (1) a significant potential for interruption or termination of a transportation facility that is needed for emergency vehicles or provides a community’s only means of evacuation, (2) a significant risk, or (3) a significant adverse impact on natural and beneficial floodplain values. Alternative 5A is a highway improvement project that would require encroachments within the 100-year floodplain in the Los Angeles River, Compton Creek, and the Rio Hondo Channel as part of the bridge and levee improvements discussed above. According to the *Los Angeles River Impact Report* (November 2011), Alternative 5A would not change the capacity of the Los Angeles River, Compton Creek, and the Rio Hondo Channel to carry water. Alternative 5A would not result in a measurable impact to the 100-year floodplain elevation. The proposed encroachment would not result in any adverse impacts on the natural and beneficial floodplain values, would not result in a substantial change in flood risk or damage, and does not have substantial potential to cause interruption or termination of emergency services or emergency routes. Therefore, Alternative 5A does not constitute a significant floodplain encroachment as defined in 23 CFR 650.105(q).

ALTERNATIVES 6A/B/C: Alternatives 6A/B/C would result in greater permanent impacts to the 100-year floodplain compared to Alternative 5A because more improvements within the 100-year floodplain are proposed due to the freight corridor feature. As summarized in Table 3.8-1, transverse encroachments would occur at 28 Los Angeles River locations, four Compton Creek locations, and one Rio Hondo location under Alternatives 6A/B/C. At these locations, the encroachments would result from construction of new columns or piers and extension of existing piers. There would be approximately 24,600 square feet of new structure placed within the floodplain. In addition, localized channel modifications would be required to maintain the existing channel hydraulic capacity. A total of 53 acres of property acquisition and/or easements would be required from flood control areas.

Alternatives 6A/B/C would result in all of the 100-year floodplain encroachments discussed above under Alternative 5A. In addition to the improvements discussed above under Alternative 5A, the following project design features proposed under Alternatives 6A/B/C would result in transverse encroachments of the Compton Creek 100-year floodplain:

- **Freight Corridor Bridge:** A proposed new freight corridor bridge crossing the existing channel would require two column-bents or pier walls to be placed within the existing channel and abutments located at the top of each side of the channel.
- **Northbound I-710 to Northbound Freight Corridor Connector Bridge:** Construction of the new northbound freight corridor connector requires one or more columns to be built within the existing channel.
- **Southbound Freight Corridor to Southbound I-710 Connector Bridge:** Construction of the new southbound freight corridor connector requires one or two columns to be built within the existing channel and a new abutment located at the southerly side.

In addition to the improvements discussed above under Alternative 5A, the following improvements proposed under Alternatives 6A/B/C would result in transverse encroachments of the Los Angeles River 100-year floodplain:

- **Northbound Freight Corridor to Eastbound SR-91 Connector Bridge:** A new northbound freight corridor to the eastbound SR-91 connector bridge would require the placement of five to six new columns in the river. The alignment of the columns would match the four pier wall locations of the existing SR-91 structure crossing the river.
- **Westbound SR-91 to Southbound Freight Corridor Connector:** A new westbound SR-91 to southbound freight corridor connector bridge would require four new columns in the river channel. The alignment of the columns would match the pier wall locations of the existing SR-91 structures crossing the river.
- **Freight Corridor Bridge:** A new freight corridor bridge would be constructed within the Los Angeles River channel north of Imperial Hwy. Approximately 15 new columns would be built within the channel. The column alignment would match the existing I-710 mainline bridge pier walls.
- **Patata St. Interchange:** The new Patata St. bridge would be located south of the existing UP Railroad alignment. The existing UP Railroad bridge would be relocated north to accommodate the new street alignment. The two new bridges would require

construction of three new column bents within the existing Los Angeles River channel.

- **Clara St. Bridge:** The existing Clara St. bridge would be replaced to improve channel hydraulics. The existing bridge has seven pier walls in the river channel.

In addition, the following improvements proposed under Alternatives 6A/B/C would result in longitudinal encroachments of the Los Angeles River 100-year floodplain:

- **Los Angeles Department of Water and Power (DWP) Tower Relocation:** The proposed freight corridor would be located above and adjacent to the improved freeway alignment in order to minimize residential impacts. The improvements encroach into the DWP transmission corridor situated along the Los Angeles River Corridor. The transmission towers are proposed to be relocated within the Los Angeles River channel between Firestone Blvd. and Slauson Ave. Each affected tower location requires the modification of approximately 1,000 feet of channel to accommodate the new tower supports and transitions. When consecutive DWP towers are relocated, the channel section is modified continuously between the relocated towers. The Hydrologic Engineering Centers River Analysis System (HEC-RAS) model was used to assess the flood level impact of the longitudinal encroachment. The results of the modeling indicated that the base flood elevation can be reduced to existing levels through implementation of localized channel modifications. The proposed channel modifications would ensure adequate hydraulic performance to control flood flows and would maintain the existing base flood elevation so that flood flows would continue to be contained in the Los Angeles River channel.

Finally, the Dominguez Gap Basin would be impacted by the freight corridor. As discussed in additional detail in Section 3.9, Water Quality and Stormwater Runoff, several parcels have been identified adjacent to I-710 and the Los Angeles River for relocation of the Dominguez Gap Basin.

The permanent impacts discussed above under Alternative 5A would be applicable to floodplain impacts to the Los Angeles River, Compton Creek, and the Rio Hondo Channel under Alternatives 6A/B/C. Although Alternatives 6A/B/C would result in more 100-year floodplain encroachments than Alternative 5A, permanent impacts related to emergency response, risks to life and property, incompatible floodplain development, and natural and beneficial floodplain values would be the same as those discussed above under Alternative 5A. Alternatives 6A/B/C would require relocation of the DWP towers to within the Los Angeles River channel. However, the water surface elevation and capacity of the Los

Angeles River during a 100-year storm event would be comparable to the existing condition. Because the new piers would mimic the existing pier configurations upstream and downstream, there would be no substantial effects to the water surface elevation, velocity of flood flows, sedimentation, or scour in the vicinity of the new piers. Because there are no substantial effects at the location of the modification, there are no substantial effects to downstream locations. Final design of channel modifications and associated hydraulic analysis would require USACE approval. For the same reasons discussed above under Alternative 5A, Alternatives 6A/B/C do not constitute a significant floodplain encroachment as defined in 23 CFR 650.105(q).

Similar to Alternative 5A, at this time it is anticipated that a CLOMR would be required. No revisions to the FEMA FIRM maps are anticipated. A Final Los Angeles River Impact Report/Final Location Hydraulic Study would be prepared during final project design as specified below in Measure FP-1. The change in floodplain elevations would be evaluated based on final design plans of the bridges and other structures where they encroach on the 100-year floodplain. The modeling results would be included in the application for a CLOMR and LOMR, if required, which would be processed through the Los Angeles County Flood Control District and FEMA.

SUMMARY OF FLOODPLAIN IMPACTS. Alternatives 5A and 6A/B/C consist of highway improvements that would require encroachments within the 100-year floodplain in the Los Angeles River, the Compton Creek, and the Rio Hondo Channel as part of the bridge and levee improvements and utility relocations. According to the *Los Angeles River Impact Report* (November 2011), Alternatives 5A and 6A/B/C would not change the capacity of the Los Angeles River, Compton Creek, and the Rio Hondo Channel to carry water or result in a measurable impact to the 100-year floodplain elevation. The proposed encroachments would not result in any adverse impacts on the natural and beneficial floodplain values, would not result in a substantial change in flood risk or damage, and would not have substantial potential to cause interruption or termination of emergency services or emergency routes. Therefore, Alternatives 5A and 6A/B/C do not constitute a significant floodplain encroachment as defined in 23 CFR 650.105(q).

HYDROLOGY. Most of the I-710 freeway is between existing developed areas and their respective drainage outlets to the various regional flood control facilities. In locations where there are existing pump stations that outlet to the Los Angeles River there are substantial off-site drainage areas that are tributary to each pump station. Off-site tributary areas are collected in underground storm drains and outlet to each pump station. The on-site drainage is collected in a similar manner. On-site drainage systems include inlets, paved channels, and underground storm drain systems. While the proposed freeway

improvements under all build alternatives may alter the location of existing pump stations and on-site flow patterns in localized areas, the confluence locations will remain in the general vicinity, and existing Los Angeles River outlets will be utilized whenever possible to minimize impacts to the river channel. The existing inflow drainage connections will be maintained and accommodated with the proposed on-site drainage systems. Existing drainage patterns on the arterial streets will be maintained by utilizing existing underground drains wherever possible.

Because the existing alignment of the freeway will be shifted horizontally and/or vertically, most of the freeway pavement will be reconstructed on I-710, which will require reconstruction of most of the drainage systems. As discussed below, this includes both on-site systems and off-site systems within the proposed right-of-way. There are hundreds of existing drainage systems over the 18-mile length of the proposed project. The required drainage system improvements will be determined during final design. However, impacts to major facilities (outlets and pump stations) have been assessed and are discussed below,

There are 30 existing drainage outlets impacted by the proposed improvements. Of the 30 existing outlets identified, 18 are proposed to be utilized by the proposed improvements under the build alternatives. This determination was made based on hydraulic sufficiency. The remaining outlets will require removal and reconstruction based on the physical impacts by the proposed improvements or based on the need to increase hydraulic capacity of the outlet.

There are 22 existing pump stations impacted by the build alternatives. Out of the 22 locations, 19 require modification including upgrading facilities to accommodate projected peak flows, relocation due to proposed improvements, or reconstruction due to freeway widening and/or profile changes. All pump stations located on the east side of the Los Angeles River will be protected-in-place during project construction.

The build alternatives will require substantial reconstruction of the existing drainage systems including drainage inlets, storm drains, cross culverts, dikes, overside drains, concrete and earthen channels, pump stations, and detention basins. Most of the existing on-site drainage systems will be replaced with new facilities. Some existing facilities may be extended to accommodate the wider freeway. The existing Dominguez Gap Basin located in the northeast quadrant of the I-710/I-405 interchange will not be impacted by the I-710 corridor improvements associated with Alternative 5A, as there are no proposed improvements adjacent to the existing basin. In the Alternatives 6A/B/C improvements, the existing basin and levees will be impacted by the proposed freight corridor alignment, retaining walls, and slopes which are below the Los Angeles River levee grade in the vicinity of the basin. The increase in on-site storm water runoff contributing to the Dominguez Gap Basin associated with the proposed improvements is inconsequential in comparison to the amount of storm water

runoff from off-site tributary watersheds and transfer flows from the basins located on the east side of the Los Angeles River.

In addition, most off-site drainage systems that convey flows from the adjacent neighborhoods, cross the I-710 corridor, and receive on-site flows, will be replaced within the Caltrans right-of-way. Off-site systems crossing the corridor that do not receive on-site runoff will be protected-in-place where possible. During final design, the drainage engineer will assess whether an existing drainage system is compatible with the proposed project. If the facility does not physically conflict with the location and function of the freeway and it provides adequate capacity and service as part of the reconstructed drainage system, it will be protected in place.

There are two existing retention basins located under the I-710/I-105 interchange that retain storm flows from the Los Angeles River during peak flow events. The retention system consists of a primary basin located between the I-710 and the Los Angeles River and a secondary basin located west of the I-710 that is connected together by a series of underground pipes. The freight corridor in Alternatives 6A/B/C bisects the primary basin. The capacity and functionality of the primary retention basin is impacted by the freight corridor alignment, and the basin will need to be reconfigured or relocated elsewhere in the interchange area to remain functional. Based on the existing underground piping configuration, one possible location for a new basin would be in the northwest quadrant of the I-105/I-710 interchange. As specified in Mitigation Measure FP-2, Caltrans will coordinate with the Los Angeles County Department of Public Works (LACDPW) to identify a suitable location for replacement of the I-105 retention basin that will provide equal or greater capacity than the basin impacted by the freight corridor

As discussed above, the Dominguez Gap Basin would be impacted by the freight corridor in Alternatives 6A/B/C. As discussed in additional detail in Section 3.9, Water Quality and Stormwater Runoff, several parcels have been identified adjacent to I-710 and the Los Angeles River for relocation of the Dominguez Gap Basin that could be used to mitigate for the loss in recharge areas.

NO BUILD ALTERNATIVE. Alternative 1 would not result in the construction of any improvements to the Los Angeles River. Therefore, Alternative 1 would not result in any adverse impacts related to hydrology and floodplains.

3.8.3.2 PUBLIC HEALTH CONSIDERATIONS

The primary public health considerations related to floodplains and hydrology would be risks to life and property as a result of flooding. As discussed above, construction of the build alternatives is not anticipated to increase the risk of flooding because the build alternatives would not substantially increase the base flood elevations of the Los Angeles River, Compton Creek, or the Rio Hondo Channel. In addition, the build alternatives would not result in flood-

related interruption of emergency services or routes. Operation of the build alternatives would not result in interruption of emergency services or routes and would improve access throughout the region during a flood event. Therefore, there would be no substantial flood-related risks to life or property associated with implementation of the build alternatives.

3.8.4 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Measures to minimize long-term operational impacts on the natural and beneficial floodplain values related to water quality are discussed in Section 3.9, Water Quality. Measures to minimize permanent impacts to jurisdictional waters are discussed in Section 3.17, Wetlands and Other Waters of the United States. In addition, the following measures are required for impacts to the 100-year floodplain and impacts to the I-105 retention basins and the Dominguez Gap Basin.

FP-1 During final project design, and prior to the issuance of any grading permits, the California Department of Transportation (Caltrans) shall process a Conditional Letter of Map Revision and a Letter of Map Revision, if required, for the floodplain and floodway encroachments through the Los Angeles County Flood Control District and Federal Emergency Management Agency (FEMA). This shall include submittal of final detailed applications, certification forms, hydraulic analyses (i.e., Final Los Angeles River Impact Report, including a Location Hydraulic Study), and fee payment to FEMA to obtain a Conditional Letter of Map Revision and a Letter of Map Revision. The portion of the project within the 100-year floodplain shall not be constructed until the Letter of Map Revision is approved by the Los Angeles County Flood Control District and FEMA.

FP-2 Prior to the completion of final design of Alternatives 6A/B/C, Caltrans shall coordinate with the Los Angeles County Department of Public Works (LACDPW) to identify a suitable location for replacement of the Interstate 105 (I-105) freeway retention basin that will provide equal or greater capacity than the basin impacted by the freight corridor..