

PHYSICAL ENVIRONMENT

2.8 Hydrology and Floodplains

2.8.1 Regulatory Setting

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 FHWA requirements for compliance are outlined in 23 CFR 650 Subpart A.

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 affected 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.”

2.8.2 Affected Environment

This section is based on the *Location Hydraulic Study State Route 55 Improvement Project From Interstate 5 to State Route 91* (LHS) (April 2018), the *Water Quality Technical Memorandum* (November 2018), *Stormwater Data Report* (March 2019), and the *Preliminary Drainage Report State Route 55 Widening Project* (October 2018) prepared for the proposed project.

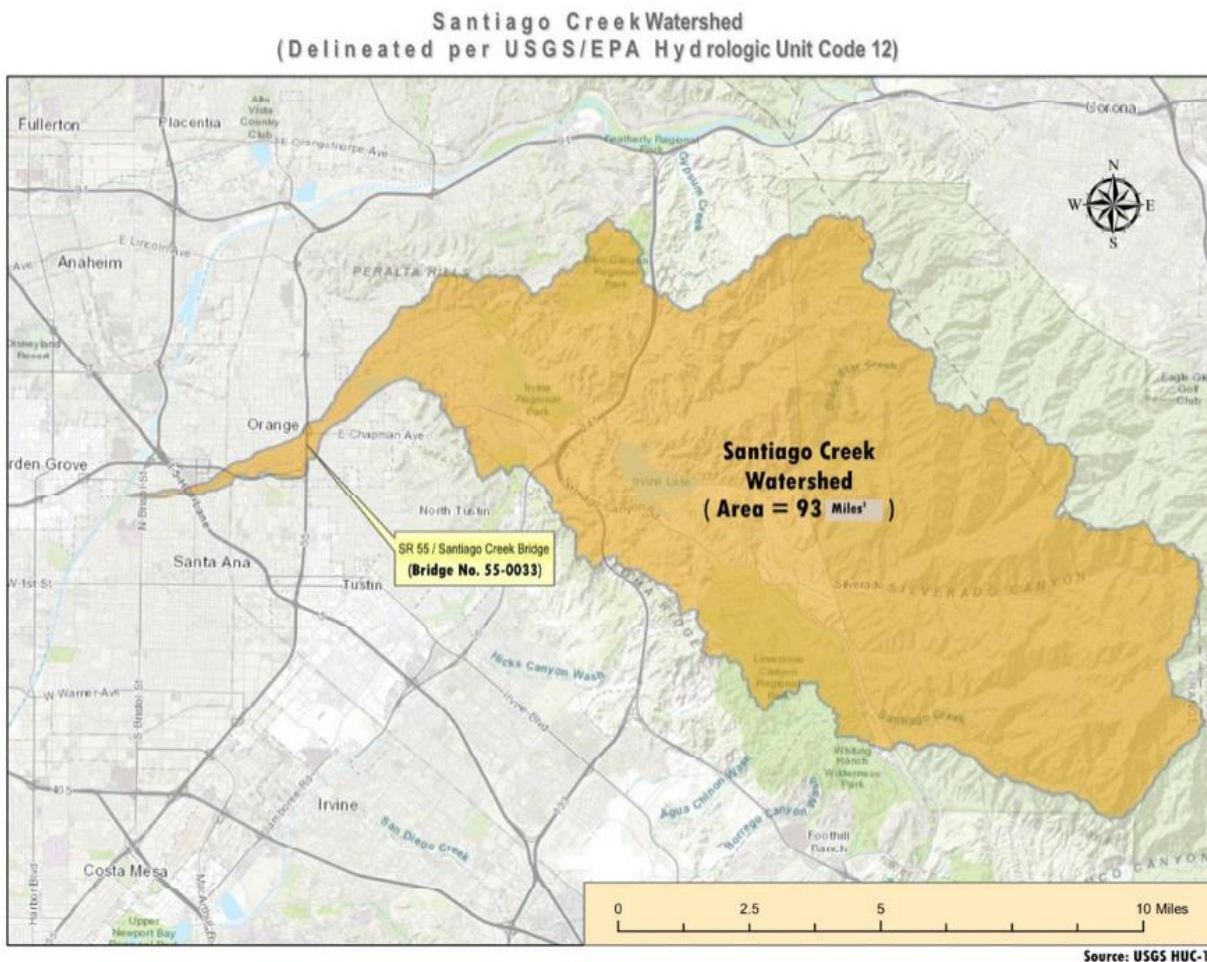
2.8.2.1 Regional Hydrology

The proposed project is located within the Santa Ana River hydrologic unit and within two subhydrologic areas: the Lower Santa Ana River and San Diego Creek, both of which are part of the East Coastal Plain Hydrologic Sub-Area (801.11). In addition, the proposed project is located within three watersheds: the Lower Santa River Watershed, Santiago Creek Watershed, and San Diego Creek Watershed. Specifically, from Chapman Avenue north to SR 91, the project limits are located within the Lower Santa Ana River Watershed. From Chapman Avenue south to I-5, the project limits are located within the San Diego Creek Watershed, which is part of the Newport Bay Watershed.

The project corridor also falls within the Orange County Flood Control Lower Santa Ana River Watershed and San Diego Creek Watershed, as defined by Orange County Watersheds, a division of Orange County Public Works. According to Santa Ana Regional Water Quality Control Board (RWQCB) Basin Plan, the project crosses Santiago Creek Reach 1, which drains to the Santa Ana River Reach 2. Other than Santiago Creek, no natural drainage courses or streams are in the study area. Within the project area, Santiago Creek runs along a channelized

course that ultimately drains into the Santa Ana River. While portions of Santiago Creek downstream of the project area have been concrete lined, the majority is earthen bottom, exhibiting many characteristics of the original natural channel including the presence of riparian vegetation. Figure 2.8-1 illustrates the delineated watershed of the Santiago Creek at the confluence with the Santa Ana River.

Figure 2.8-1. Santiago Creek Watershed



According to Federal Emergency Management (FEMA) Flood Insurance Rate Map (FIRM) Panel Number 06059C0162J (FEMA 2009), the project is located within a 100-year floodplain contained within a concrete channel (Zone AE, areas where base flood elevations are determined) associated with Santiago Creek where the Santiago Creek Bridge (Bridge No. 55-0033) crosses SR 55. In addition, the eastern side of the project area along the SR 55 between Santiago Creek and I-5 is designated as Zone X (areas of 0.2 percent annual chance flood, areas of 1.0 percent annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 1 percent annual chance flood). No Orange County Flood Control District Facility is located within the project limits. The FEMA FIRM panels for the project area are included in Figure 2.8-2 through Figure 2.8-6.

Figure 2.8-2. FEMA FIRM Panel: 06059C0277J

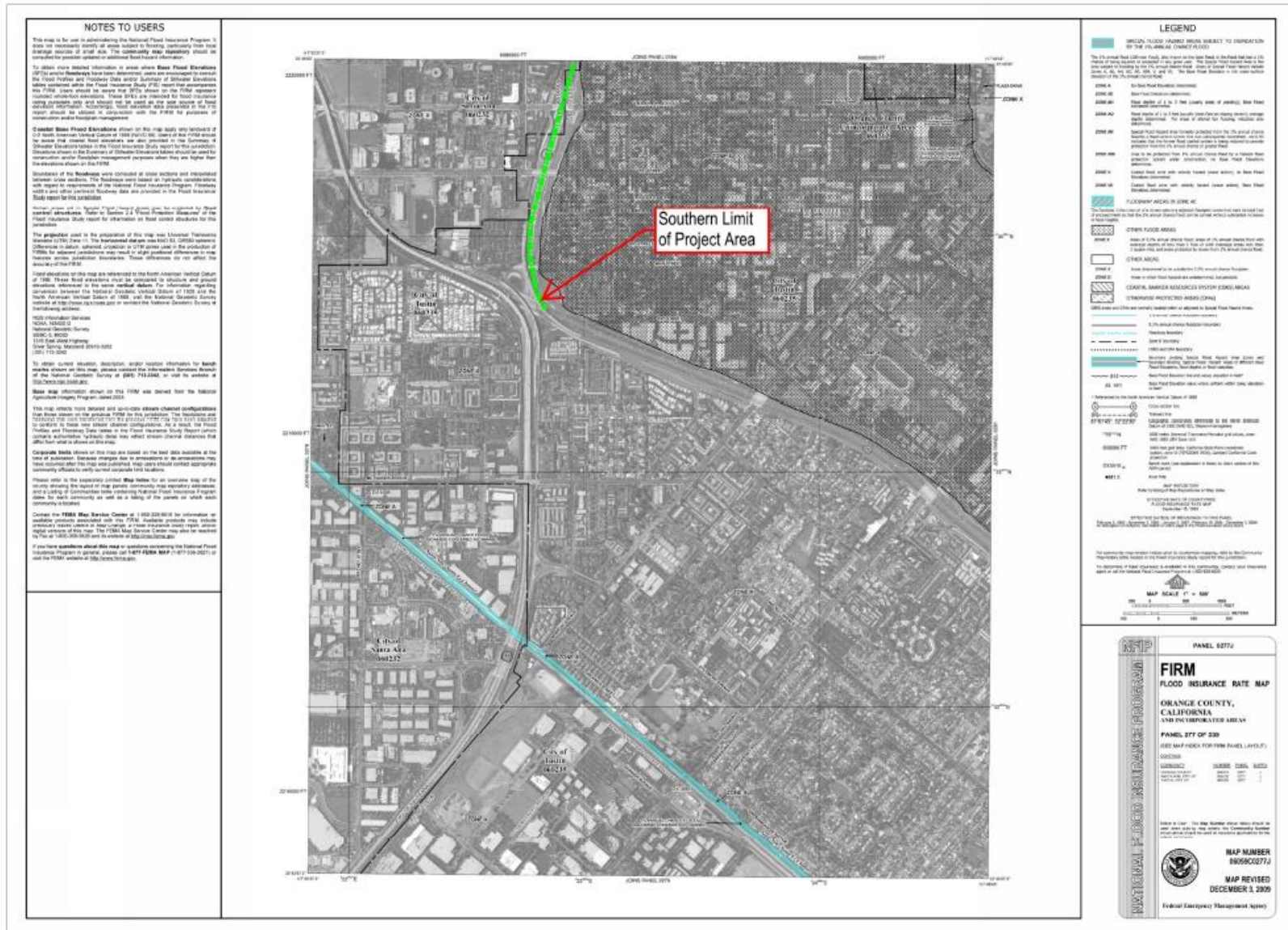


Figure 2.8-4. FEMA FIRM Panel: 06059C0162J

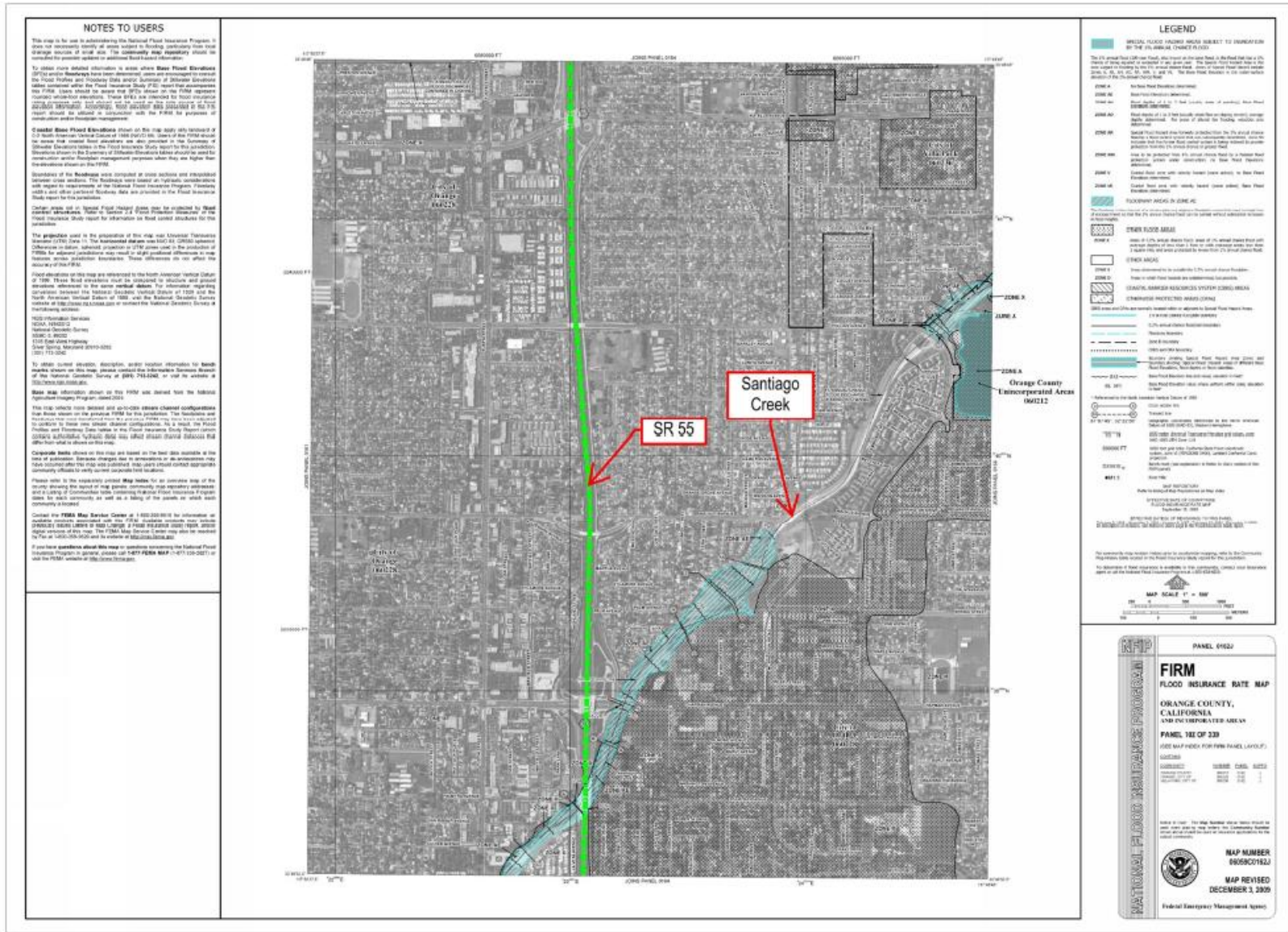


Figure 2.8-5. FEMA FIRM Panel: 06059C0154J

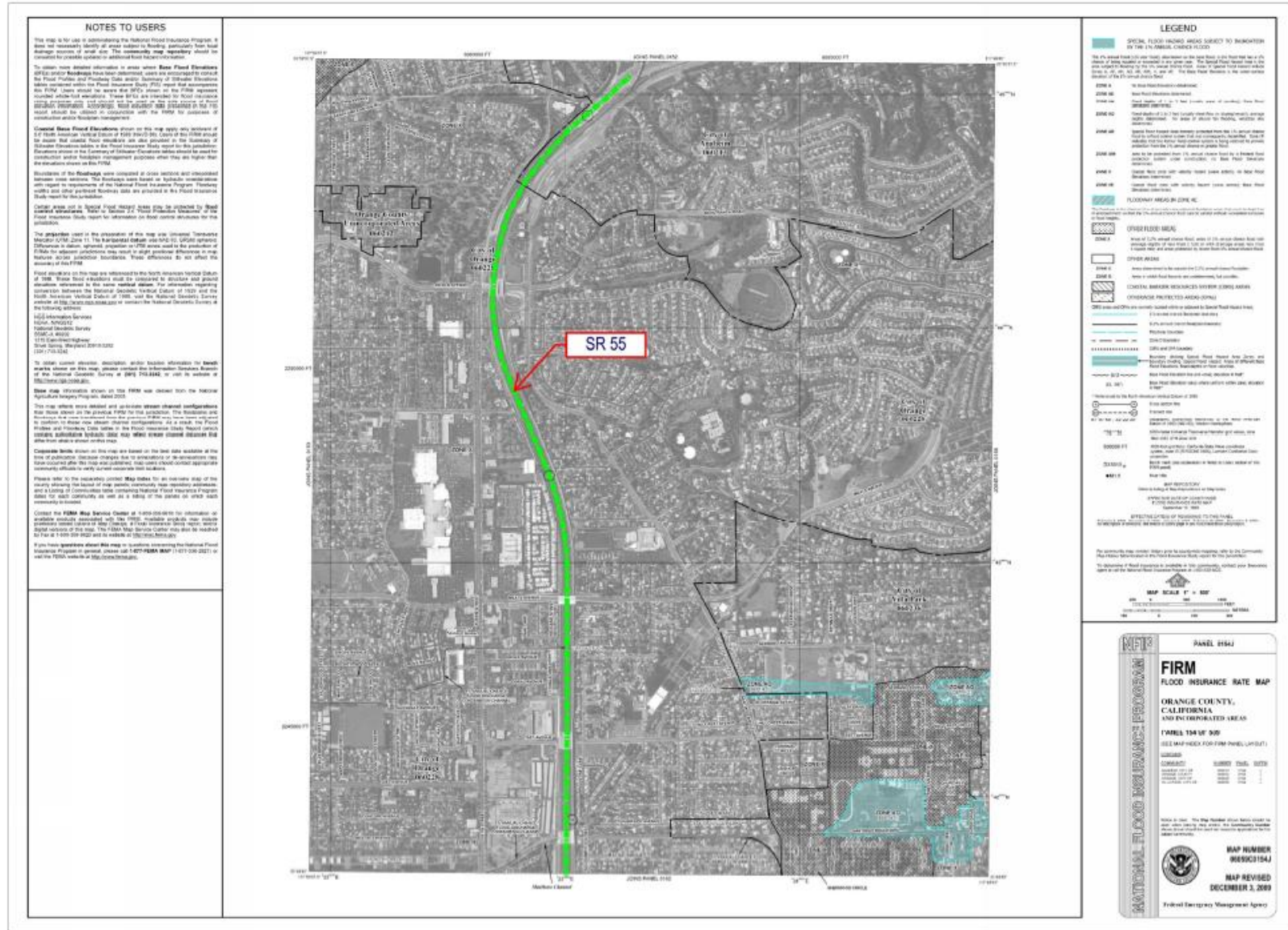


Figure 2.8-6. FEMA FIRM Panel: 06059C0152J

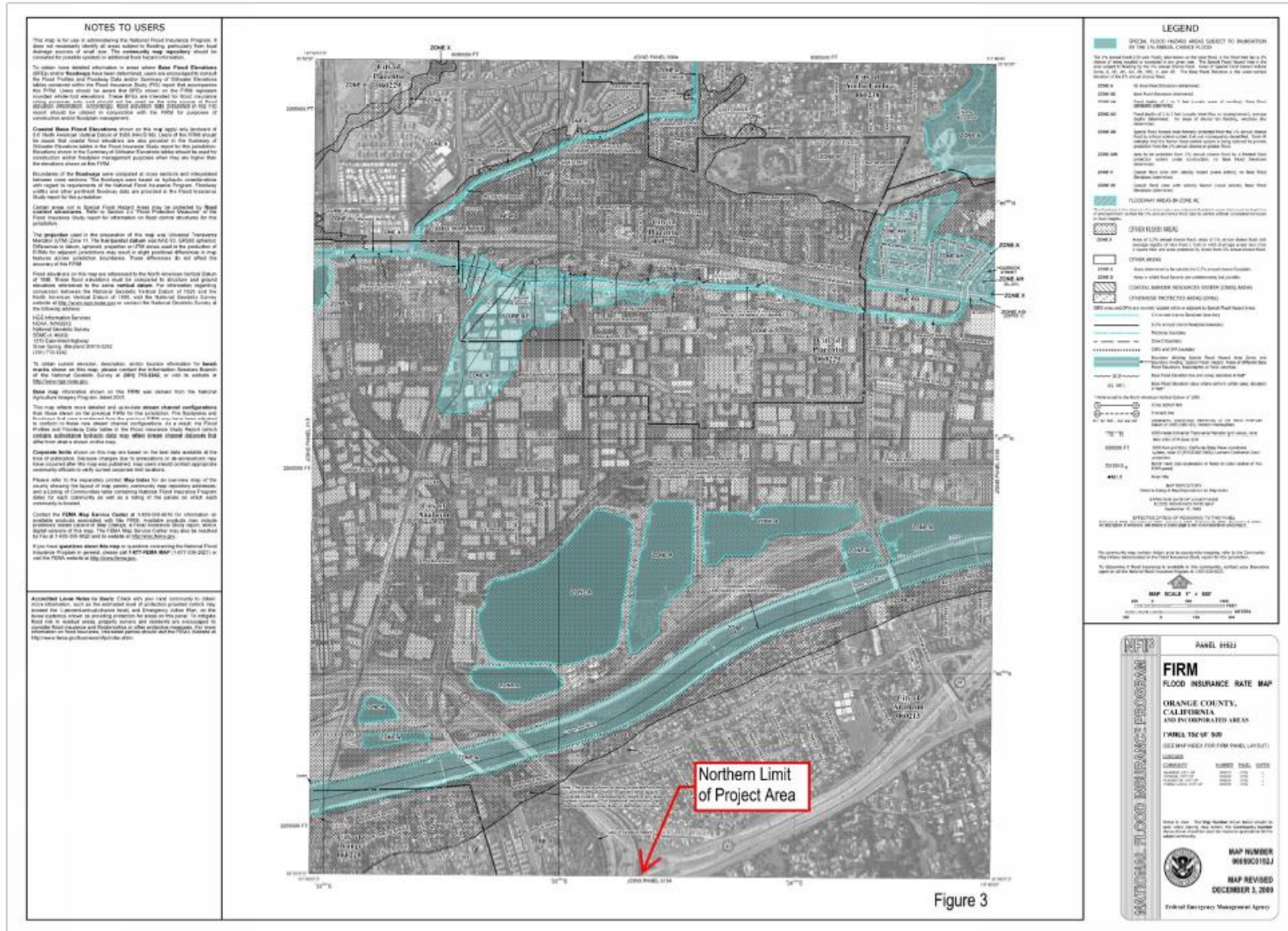


Figure 3

This page intentionally left blank

2.8.2.2 Santiago Creek

The Santiago Creek drainage area is approximately 102 square miles and is the largest waterbody and only 100-year floodplain crossing SR 55 within the project limits. The Santiago Creek floodplain crosses the project area at Post Mile 13.42 through Santiago Creek Bridge (Bridge No. 55-0033).

Santiago Creek's beneficial uses include municipal and domestic water supply, groundwater recharge, wildlife and warm freshwater habitats, and non-contact water recreational uses. Santiago Creek is an intermittent stream, consisting of nuisance flows and groundwater seepage outside the rainy season. Generally, Santiago Creek contains little to no vegetation at the flowline to moderate vegetation along the banks. Low to moderate quality riparian habitat exists between Santiago Creek Bridge and East Chapman Avenue.

Santiago Creek is the main tributary to the Santa Ana River in Orange County. The headwater of the creek is in the vicinity of Santiago Peak of the Santa Ana Mountains in northeastern Orange County. Santiago Creek flows from the headwaters into the Irvine Lake and continues northwest for a distance of approximately 3.5 miles and then turns southwest for approximately 7.0 miles before joining the Santa Ana River in the city of Santa Ana just south of the Garden Grove Freeway (SR 22). Improvements to the Santiago Creek Channel have occurred primarily between Santiago Creek Recharge Basin and the Santa Ana River Confluence to prevent erosion and to protect surrounding residential neighborhoods (USACE 1988).

2.8.2.3 Natural and Beneficial Floodplain Values

Natural and beneficial floodplain values include, but are not limited to, fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge. The proposed project has no impact on the floodplain or its natural and beneficial values.

2.8.3 Environmental Consequences

2.8.3.1 Temporary Impacts

Build Alternative

During construction of Build Alternative, construction activities would occur primarily within the right-of-way. The project construction activities would not reduce or otherwise affect the flood storage capacity and would not modify flood flows. Furthermore, construction activities would be limited to the dry season. Construction activities under the Build Alternative would not result in direct or indirect temporary adverse impacts related to hydrology and floodplains.

No Build Alternative

The No Build Alternative would not include the construction of any of the proposed project improvements. Therefore, the No Build Alternative would not result in direct or indirect temporary impacts to hydrology and floodplains in the project area.

2.8.3.2 Permanent Impacts

Build Alternative

The Build Alternative will add paved areas and realign the freeway ramps, some existing systems may have to be replaced to contain the required design flows within the project limits. Proposed improvements may require abandoning some drainage systems or adjusting some with respect to the finished grade. Others may conflict with proposed retaining walls and will be relocated. These direct impacts may be minimized or avoided by the following:

- Relocation, extension, and adjustment of systems as necessary
- Abandonment or removal of systems which are no longer serviceable

In general, existing drainage patterns will be maintained on the ramps and on the freeway. It is not expected that any major culvert and bridge widening improvements would be required for this project. The roadway widening may affect the number of required inlets. Detailed calculation to determine the spacing and number of inlets will be conducted during the Plans, Specifications, and Estimates (PS&E) phase. The roadway widening will also require relocation of existing inlets to the new edge of pavement. If feasible, storm drain laterals shall be protected in place to prevent unnecessary pavement cuts. Capping the existing inlets can be an alternative to complete removal and/or reconstruction. Visual inspection of these storm drain systems shall be conducted to assess their effectiveness. During the PS&E phase, detailed pavement hydrology and hydraulic analysis will be completed to calculate flows and size the on-site drainage facilities in conformance with Caltrans design criteria.

The areas affected by the SR 55 improvement project include sections of SR 55 in the City of Orange. Within the study limits, an unlined reach of the Santiago Creek crosses underneath SR 55 as State Highway Bridge Number 55-0033 at Post Mile 13.42. According to the FIRM panels 06059C0162J (Figure 2.8-4) and 06059C0164J (Figure 2.8-3) (FEMA 2009), the base Flood Hazard Zone of the proposed reach of the Santiago Creek adjacent to the SR 55 is designated as Zone AE. The FEMA FIRM confirms that the 1-percent annual chance (also known as the 100-year event) floodplain is contained within the creek channel at the project area. No encroachments of the Santiago Creek floodplain are expected within the limits of the proposed project.

The 100-year floodplain associated with Santiago Creek within the project area is contained within the creek channel. The project is not anticipated to encroach upon any 100-year floodplains, including the Santiago Creek floodplain. No natural and beneficial floodplain values are present. No restoration or preservation measures are required. No increases in base flood elevations in reserved areas of the floodplain (floodway) would occur. The project does not support incompatible floodplain development. No horizontal or longitudinal encroachments are within the Santiago Creek floodplain as a result of the project. The project has no potential to result in a significant floodplain encroachment pursuant to 23 CFR 650 Subpart A.

The proposed project has no direct impact on Santiago Creek and does not introduce additional risk for traffic disruptions or loss of life and property. Indirect or secondary impacts are not anticipated to occur.

No Build Alternative

The No Build Alternative would not result in the construction and operation of the improvements in the Build Alternative and, therefore, would not result in adverse permanent impacts to hydrology and floodplains in the proposed project area. No indirect or secondary impacts on hydrology and floodplains would result from implementation of the No Build Alternative.

2.8.4 Avoidance, Minimization, and/or Mitigation Measures

The project would not result in adverse impacts related to floodplains and hydrology. No avoidance, minimization, and/or mitigation measures have been identified.

This page intentionally left blank