

PHYSICAL ENVIRONMENT

2.7 Hydrology and Floodplain

2.7.1 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 are outlined in 23 Code of Federal Regulations (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.”

2.7.2 Affected Environment

The information in this section is based on the *Location Hydraulic Study & Floodplain Evaluation Report* (May 2018) prepared for the project.

2.7.2.1 Regional Hydrology

As discussed in further detail in Section 2.8, Water Quality and Storm Water Runoff, the project area is within the San Juan Hydrologic Unit (HU) and the Laguna Canyon Hydrologic Area (HA). The project area is also located within the 11-square mile Laguna Coastal Streams Watershed, which includes portions of the Cities of Aliso Viejo, Laguna Beach, and Laguna Woods.

Stormwater runoff from the project area discharges to Laguna Canyon Creek which runs parallel to State Route 133 (SR-133, or Laguna Canyon Road) and merges with El Toro Creek at the intersection of Laguna Canyon Road and El Toro Road. Laguna Canyon Creek flows towards downtown Laguna Beach and ultimately discharges to

the Pacific Ocean at Main Beach. Laguna Canyon Creek is an earthen vegetated channel within the project area.

2.7.2.2 100-Year Floodplains

There is one floodplain associated with Laguna Canyon Creek within the project area as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) No. 06059C0409J (December 3, 2009). The FEMA FIRM, which includes the project limits, is provided in Appendix G of this Initial Study/ Environmental Assessment (IS/EA). The Laguna Canyon Creek floodplain is designated as Zone AE, a portion of which is also designated as a regulatory floodway. Zone AE is a special flood zone hazard area subject to inundation by the one percent annual chance flood (i.e., 100-year flood) with base flood elevations determined through detailed hydraulic analyses. A regulatory floodway is the channel of a river and adjacent floodplain areas that must be kept free of encroachments so that the one percent annual change flood can be carried without substantial increases in base flood elevations. FEMA has also established a threshold of a one-foot (ft) increase in base flood elevation for 100-year floodplains. Typically, no increase in base flood elevation is allowed by FEMA from development within a regulatory floodway.

2.7.2.3 Natural and Beneficial Floodplain Values

Floodplains and wetlands in their natural or relatively undisturbed state provide natural and beneficial floodplain values including, but not limited to, fish habitat, wildlife habitat, plant habitat, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge. Beneficial uses for surface waters are defined in the San Diego Regional Water Quality Control Board's (RWQCB) Water Quality Control Plan (Basin Plan) as various ways that water can be used for the benefit of people and/or wildlife. As discussed in further detail in Section 2.8, Water Quality and Storm Water Runoff, existing beneficial uses for Laguna Canyon Creek include Agriculture Supply (AGR), Non-Contact Water Recreation (REC-2), Warm Freshwater Habitat (WARM), and Wildlife Habitat (WILD), and the potential beneficial use includes Water Contact Recreation (REC-1).

2.7.3 Environmental Consequences

2.7.3.1 Temporary Impacts

Alternative 1 (Build Alternative)

During construction of the Build Alternative, activities would occur in the designated Laguna Canyon Creek 100-year floodplain and floodway. An encroachment permit would be required to be obtained from Orange County Flood Control District for work within Laguna Canyon Creek. As discussed in further detail in Section 2.8, Water Quality and Storm Water Runoff, temporary construction activities could result in the introduction of pollutants of concern to the designated floodplain within the project area. Increased erosion and sedimentation could occur from ground disturbing activities. In addition, construction activities could increase the risk of leaks and spills. Pollutants of concern generated during construction could enter receiving water bodies and reduce the function of beneficial uses in the floodplains by degrading water quality. Measure HYD-1 and Project Features PF-WQ-2 and PF-WQ-3 require compliance with the Construction General Permit, preparation of a Storm Water Pollution Prevention Plan (SWPPP) and a Rain Event Action Plan (if applicable), and implementation of Best Management Practices (BMPs) to address the potential temporary effects to water quality.

During construction of the Build Alternative, activities within the designated Laguna Canyon Creek floodplain and floodway would have the potential to alter storm flows. The construction contractor would be required to provide positive drainage during construction and refrain from filling designated floodplains, as also specified in Measure HYD-1. With the implementation of Measure HYD-1 and Project Features PF-WQ-2 and PF-WQ-3, the temporary effects to beneficial floodplain values would not be adverse.

Alternative 2 (No Build Alternative)

The No Build Alternative would not result in construction activities within the designated Laguna Canyon Creek floodplain. Therefore, the No Build Alternative would not result in temporary impacts to the designated Laguna Canyon Creek floodplain or beneficial uses in the project area.

2.7.3.2 Permanent Impacts

Alternative 1 (Build Alternative)

Change in Water Surface Elevation

The *Location Hydraulic Study & Floodplain Evaluation Report* (May 2018) included floodplain modeling at four locations to determine the change in water surface

elevation that would result from placement of structures in the floodplain and floodway. Modeling was conducted using the United States Army Corps of Engineers (USACE) Hydrologic Engineering Center's River Analysis System (HEC-RAS) Version 5.03. The four locations are shown on the FEMA FIRM provided in Appendix G of this IS/EA. The proposed improvements and change in water surface elevation at the four locations are summarized below.

Location 1: Laguna Canyon Creek at SR-73 (Station 156+00)

At Post Mile (PM) 4.1 (SR-133 Station 156+00), Laguna Canyon Creek runs parallel to SR-133 on the west side, crosses State Route 73 (SR-73) under a bridge, and crosses under the on- and off-ramps southwest the interchange through three nine ft culverts. The Build Alternative includes construction of a concrete check dam with dimensions of 20 ft (width) x 10 ft (height) x 200 ft (length) in the area of the southbound SR-133 loop on-ramp to southbound SR-73. A 4 ft diameter pipe would be constructed under the check dam.

The Build Alternative would occur within the FEMA designated 100-year floodplain and floodway (Zone AE), with base flood elevation of 283 ft to 284 ft above sea level. The maximum change in water surface elevation at this location would be an increase of 7.55 ft compared to the existing condition. The increased water surface elevation would continue to be contained within the existing Laguna Canyon Creek channel and would, therefore, not flood new areas outside the existing channel. Additionally, under existing conditions, the velocities in Laguna Canyon Creek at this location are erosive (above five ft per second). Construction of the proposed check dam would reduce velocities to a non-erosive level (below five ft per second).

Because the encroachment at this location would result in an increase in water surface elevation exceeding allowable FEMA requirements (one ft in floodplain and zero ft in a floodway), a Conditional Letter of Map Revision (CLOMR) and a Letter of Map Revision (LOMR) will be processed through FEMA to revise the floodplain map to reflect the proposed condition, as required by Measures HYD-2 and HYD-3.

Location 2: Laguna Canyon Creek at SR-133 (Station 126+00 to Station 153+00)

Between PM 3.4 and PM 4.1, Laguna Canyon is an earthen channel parallel to the west side of southbound SR-133. At this location, the Build Alternative includes

reconstruction of the existing 5 ft x 3 ft (base width x height) earthen trapezoidal channel with an articulated concrete block channel along southbound SR-133 between the SR-133/SR-73 interchange and the SR-133/El Toro Road intersection.

The Build Alternative would be constructed within the FEMA designated 100-year floodplain and floodway (Zone AE), with a base flood elevation of 246 ft to 272 ft above sea level. The maximum increase in water surface elevation within this portion of the designated Laguna Canyon Creek floodplain would be 0.26 ft compared to existing conditions. The velocities in both the existing and proposed condition are erosive (above five ft per second). Although SR-133 would continue to be flooded during 100-year storm events, similar to existing conditions, this increase in water surface elevation at this location would be minimal (0.26 ft) and would not worsen the extent of the existing flooding or flood new areas.

Because the encroachment at this location would result in an increase in water surface elevation exceeding allowable FEMA requirements (zero ft in a floodway), a CLOMR and a LOMR will be processed through FEMA to revise the floodplain map to reflect the proposed condition, as required by Measures HYD-2 and HYD-3.

Location 3: Laguna Canyon at SR-133 (Station 126+00)

At PM 3.4, Laguna Canyon Creek crosses underneath SR-133 through an existing 5 ft x 3 ft (span x height) reinforced concrete box (RCB). At this location, the Build Alternative includes extension of the existing 5 ft x 3 ft RCB on both sides of SR-133 to match the proposed pavement, and construction of a drainage transition structure from the proposed 5 ft x 3 ft articulated concrete block channel to the existing 5 ft x 3 ft RCB (under SR-133). The Build Alternative would occur within the FEMA designated 100-year floodplain and floodway (Zone AE), with base flood elevation of 242 ft to 243 ft above sea level. The maximum increase in water surface elevation would be 0.19 ft compared to existing conditions. The 100-year flood overtops the channel in both the existing and proposed condition. However, the increase in water surface elevation at this location would be minimal (0.19 ft) and would not worsen the extent of the existing flooding or flood new areas.

Because the encroachment at this location would result in an increase in water surface elevation exceeding allowable FEMA requirements (zero ft in a floodway), a CLOMR and a LOMR will be processed through FEMA to revise the floodplain map to reflect the proposed condition, as required by Measures HYD-2 and HYD-3.

Location 4; Laguna Canyon Creek 850 Ft South of the El Toro Road Intersection (Station 114+25)

At PM 3.2, Laguna Canyon Creek runs parallel to SR-133 on the east side. At this location, the Build Alternative includes construction of a storm drain system, a culvert, and an articulated concrete block channel at Station 114+30. The Build Alternative would also include extension of the articulated concrete block channel at Station 114+30. The Build Alternative would occur within the FEMA designated 100-year floodplain and floodway (Zone AE), with base flood elevation of 223 ft above sea level. Because the extended channel would match the existing ground elevation in the floodplain and floodway, no change in the water surface elevation would occur.

Potential Risk from Longitudinal Encroachments

Encroachments, as defined by FEMA, are activities or construction within the floodplain/floodway including fill, new construction, substantial improvements, and other development. A transverse encroachment is an encroachment that is perpendicular or skewed to the direction of flow. A longitudinal encroachment is an encroachment that is oriented parallel to the direction of flow. Projects are required to analyze practicable alternatives to longitudinal encroachments.

The proposed improvements at Locations 1, 3, and 4 would result in transverse encroachments. The proposed improvements at Location 2 along Laguna Canyon Road would result in a longitudinal encroachment. As discussed previously, the longitudinal encroachment at Location 2 would result in a minimal increase in water surface elevation and would not affect the risk of flooding. The small increase in water surface elevation would not worsen the extent of the existing flooding or flood new areas.

Because the proposed improvements are located on an existing highway, an alternative consisting of a new highway location is not feasible and was, therefore, not evaluated. The Build Alternative proposes widening of the existing highway and improvements to the drainage system. The extent of the floodplain encroachment and

disturbance of the floodplain would be limited to the areas necessary to construct the proposed improvement. For these reasons, there are no practicable alternatives to the proposed longitudinal encroachment.

Potential Risk to Life and Property

The *Location Hydraulic Study & Floodplain Evaluation Report* (May 2018) included an evaluation of the potential for risk to life and property from a 100-year flood for residences, other buildings, and crops. Review of the FEMA FIRM and zoning map for the City of Laguna Beach, combined with a field investigation, indicated that there are no buildings or crops between SR-73 and El Toro Road, and no residential buildings from El Toro Road to the southern project limit. The hydraulic results demonstrate that the Build Alternative would result in a minimal change in water surface elevation south of El Toro Road (as described under Location 4 above). Therefore, the Build Alternative would not affect risk to life and properties from flooding.

Potential Risk to Natural and Beneficial Floodplain Values

At Location 1, the maximum increase in water surface elevation would be 7.55 ft. However, the increased floodplain and water surface elevation would still be contained within the existing channel. For Locations 2 and 3, the increases in water surface elevation would be minimal (less than one ft). No increase in water surface elevation would occur at Location 4. Permanent effects on the beneficial uses for surface waters are not anticipated. Water would continue to be conveyed within the Laguna Canyon Creek channel, and therefore, any downstream beneficial uses, including AGR, REC-1, REC-2, WARM, and WILD, would continue to be served with the implementation of the Build Alternative.

Additionally, as discussed in further detail in Section 2.8, Water Quality and Storm Water Runoff, the Build Alternative would result in a small increase (1.6 acres) in impervious surface area. The Build Alternative would not construct additional travel lanes and therefore there would be no additional pollutant loading from vehicles operating on the facility. In addition, Design Pollution Prevention and Treatment BMPs would be implemented in accordance with Caltrans' Storm Water Management Program and Plans Preparation Design Guide, as required by Measures HYD-1 and Project Features PF-WQ-1, PF-WQ-4, and PF-WQ-5. These BMPs would treat pollutants of concern in stormwater runoff so that the beneficial uses of the floodplain are not degraded.

Potential Risk for Support of Incompatible Floodplain Development

A substantial increase in water surface elevation (up to 7.55 ft) would occur at Location 1 from construction of the concrete check dam in the loop on-ramp of SR-73. The check dam is proposed to create an attenuation basin to reduce peak flow rates during high frequent storm events. Although a substantial increase in water surface elevation and incompatible floodplain development would occur because the improvements are located within a floodway where no increase in water surface elevation is allowed by FEMA, 100-year storm events would continue to be contained within the existing channel at this location. Although the change in water surface elevation at Locations 2 and 3 would be minimal, it would exceed the zero ft increase allowable by FEMA in a floodway. No increase in water surface elevation would occur at Location 4. Because the encroachment at Locations 1, 2, and 3 would result in an increase in water surface elevation exceeding allowable FEMA requirements, a CLOMR and a LOMR must be processed through FEMA to revise the floodplain map to reflect the proposed condition in order to be compatible with floodplain development, as required by Measures HYD-2 and HYD-3. Additionally, as required by Measure HYD-1, the Build Alternative would be designed to provide adequate conveyance capacity at stream crossings to ensure no net increase in velocity. Additionally, a hydraulic analysis would be completed during final design to confirm pre-construction and post-construction hydraulic conditions.

Potential for Interruption or Termination of a Transportation Facility in the Event of Flooding

In the existing condition, SR-133 is prone to flooding during 100-year storm events and subject to closure. As a result, SR-133 is often closed to traffic due to flooding and the associated debris. The proposed improvements would not substantially alter water surface elevations of the 100-year flood in a manner that would affect the risk of closures of SR-133 compared to existing conditions. At Location 1, the increase in water surface elevation would be 7.55 ft but would still be contained within the existing channel and would not increase risk of flooding of SR-133, SR-73, or the connecting ramps. At Locations 2 and 3, the increase in water surface elevation would be minimal (less than one ft) and would not worsen the extent of the existing flooding or flood new areas. No increase in water surface elevation would occur at Location 4. For these reasons, the Build Alternative would not affect the potential for interruption or termination of a transportation facility.

Significant Encroachment Determination

A “significant encroachment,” as defined in 23 CFR, Section 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 evacuation, (2) a significant risk, or (3) a significant adverse impact on natural and beneficial floodplain values. Although the Build Alternative would increase water surface elevation within the designated floodplain, there would not be an increased risk of flooding of SR-133, SR-73, or the connecting ramps or adjacent properties. Therefore, the Build Alternative would not result in a significant potential for interruption or termination of a transportation facility or significant risk to life and property. In addition, the Build Alternative includes implementation of BMPs to address adverse impacts on the natural and beneficial floodplain values. For these reasons, the proposed encroachment would not have substantial potential for interruption or termination of emergency services or emergency routes, would not result in a substantial change in flood risks or damage, and would not result in any adverse impacts on the natural and beneficial floodplain values. Therefore, the Build Alternative would not result in a significant floodplain encroachment as defined in 23 CFR 650.105(q).

Alternative 2 (No Build Alternative)

The No Build Alternative would not result in construction of new improvements within the designated Laguna Canyon Creek floodplain and would not result in changes to base flood elevations within Laguna Canyon Creek. Conversely, no drainage improvements or BMPs (such as those incorporated into the Build Alternative) would be implemented to reduce flooding, peak flow rates, and erosive velocities during higher frequency storm events or treat stormwater and these conditions would continue with the No Build Alternative.

2.7.4 Avoidance, Minimization, and/or Mitigation Measures

In addition to Project Features PF-WQ-1 through PF-WQ-5, detailed in Section 2.8, Water Quality and Storm Water Runoff, the following measures avoid and/or minimize potential effects to the designated Laguna Canyon Creek 100-year floodplain/floodway.

HYD-1 Floodplain Design Measures. During the plan, specification, and estimate (PS&E) phase, Caltrans Project Engineer will ensure that the following routine measures are incorporated into the final design and construction plans to minimize potential impacts to the

Laguna Canyon Creek floodplain and floodway and preserve beneficial floodplain values:

- Provide positive drainage during construction and refrain from filling designated floodplains.
- Implement design pollution prevention and treatment Best Management Practices (BMPs) in accordance with Caltrans' Storm Water Management Program and Plans Preparation Design Guide.
- Prepare and implement a Storm Water Pollution Prevention Plan (SWPPP), which includes erosion control and water quality protection during in-stream construction and post-construction.
- Prepare Rain Event Action Plans (REAP) that discuss contractor avoidance and mitigation for high flow events.
- Provide adequate conveyance capacity at stream crossings to ensure no net increase in velocity. A hydraulic analysis shall be completed to assess pre-construction and post-construction hydraulic conditions. If the velocity is increased and becomes erosive, protection shall be provided for the crossings.
- The existing earthen trapezoidal channel along southbound SR-133 from El Toro Road to the SR-73 interchange will be replaced with an articulated concrete block channel.

HYD-2 **Conditional Letter of Map Revision.** During the PS&E phase, Caltrans will process a Conditional Letter of Map Revision (CLOMR) for the designated Laguna Canyon Creek 100-year floodplain and floodway through the Orange County Public Works Flood Division and the Federal Emergency Management Agency (FEMA). The improvements associated with the Build Alternative, within the Laguna Canyon Creek FEMA designated 100-year floodplain and floodway, will not be constructed until the CLOMR is approved by FEMA.

HYD-3 **Letter of Map Revision.** Upon completion of construction, Caltrans will process a Letter of Map Revision (LOMR) for the Laguna Canyon Creek 100-year floodplain and floodway through the Orange County Public Works Flood Division and FEMA.