Section 2.2
Physical Environment

2.2 Physical Environment

2.2.1 Hydrology and Floodplain

The analysis presented in this section is based, in part, upon the Summary Floodplain Encroachment Report (Parsons, 2006a) prepared for the project.

2.2.1.1 Regulatory Setting

Executive Order 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 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; and
- 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."

2.2.1.2 Affected Environment

The project area is located within the jurisdiction of Region 9 - San Diego Regional Water Quality Control Board (RWQCB). Regulations for discharges within this area are included in the Water Quality Control Plan for the San Diego Basin (RWQCB, 1994).

The San Juan Creek Watershed covers approximately 456 square kilometers (176 square miles), extending from the Cleveland National Forest in the Santa Ana Mountains to the Pacific Ocean at Doheny State Beach near Dana Point Harbor. The watershed basin is comprised of 23 canyons with 3 primary watercourses: San Juan Creek, Trabuco Creek, and Oso Creek (see Figure 2.2.1-1).

I-5 overcrosses San Juan Creek at its lower reach, just upstream of its confluence with Trabuco Creek. Four existing piers located within the creek support the I-5 overcrossing (bridge). The 259-meter (m)-long (850-foot [ft]) portion of the creek within the project limits is protected by cement levees and/or rip-rap side slopes to alleviate erosion along the channel wall. The channel is trapezoidal with 2:1 side slopes and a depth of approximately 5.5 m (18 ft) under the bridge and a bottom width of 30.5 m (100 ft). The longitudinal slope is approximately 0.52 percent. The stream bottom contains sparse vegetation and is composed of cobble, gravel, and sand.

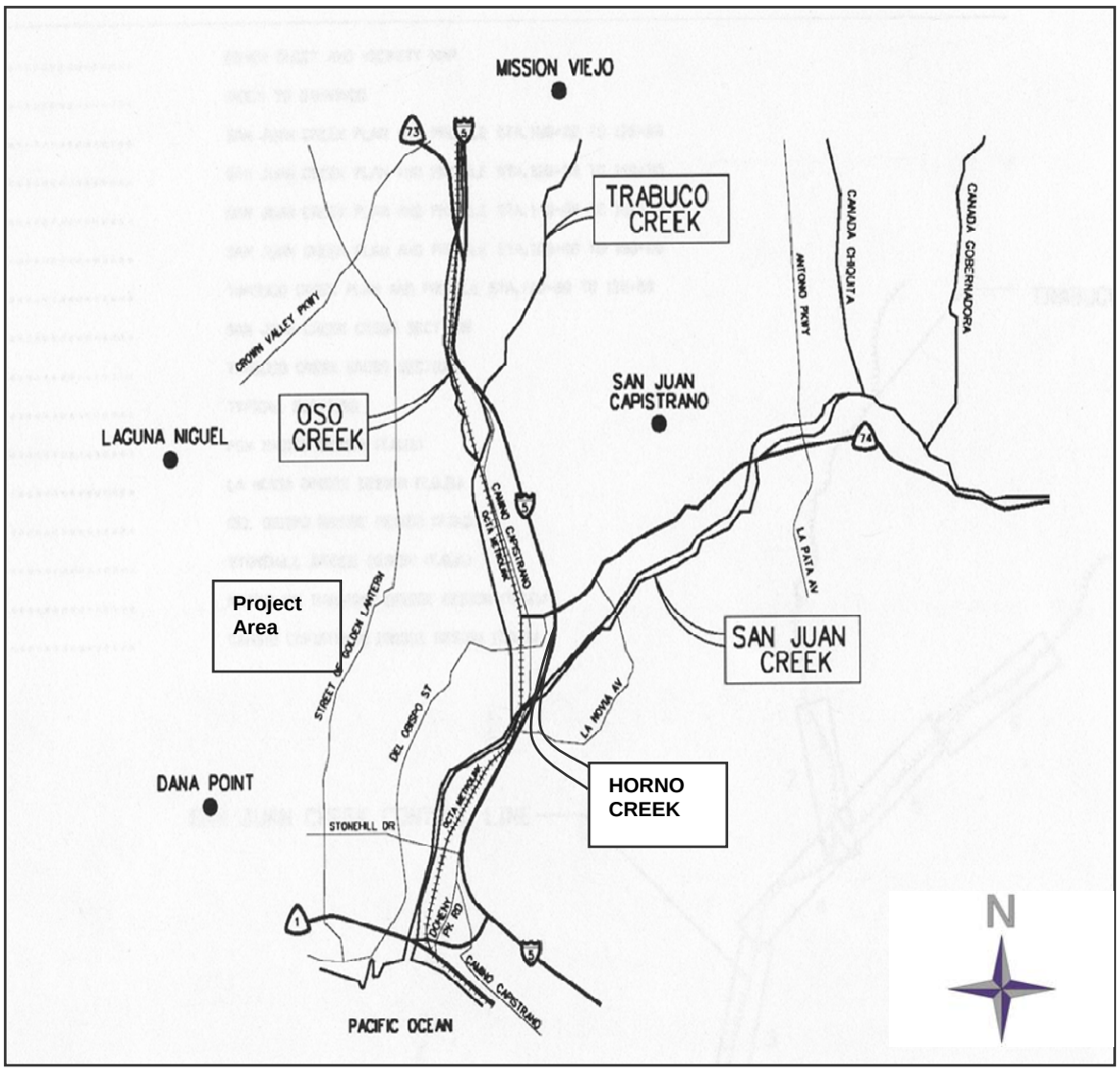

Figure 2.2.1-1
Major Waterways in the Project Vicinity

The watershed area near the I-5 crossing is approximately 109 square miles (282 square kilometers) with a 100-year storm flow of approximately 991 cubic meters per second (35,000 cubic ft per second), resulting in flow depths and velocities of approximately 4.6 m (15 ft) and 5.5 m per second (18 ft per second), respectively (using Manning's equation with a roughness coefficient of 0.03). These results correspond with the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) water surface elevations that show a 100-year water surface elevation of approximately 25 m (82 ft) at the site. Drainage within the project vicinity flows in a westerly direction toward San Juan Creek. The creek flows westerly and discharges to the Pacific Ocean at Doheny State Beach.

Hydrology studies have documented that drainage within the project vicinity flows in a southerly direction toward Horno Creek, which is a tributary of San Juan Creek. Surface

runoff in the I-5/Ortega Highway interchange project area is directed by sheet flow to storm drain systems along Ortega Highway, Del Obispo Street, and I-5 that outlet into Horno Creek. The northern portion of Horno Creek, which bisects the San Juan Elementary School playground, is not channelized. Horno Creek is channelized just south of the San Juan Elementary School playground, where it flows into a box culvert under Ortega Highway. The creek continues southeast, where it flows underground beneath I-5 and the business complex east of the freeway. Eventually, Horno Creek discharges its flows into the lower reaches of San Juan Creek just beyond the business complex. Horno Creek and San Juan Creek are part of Hydrologic Sub-Area (HSA) 901.27. The total watershed area for Horno Creek is approximately 2,800 acres (1,130 hectares). The watershed area for San Juan Creek (at the Horno Creek confluence) is approximately 70,000 acres (28,200 hectares). The FIRM designates Horno Creek as a floodway where it crosses under I-5 at the project site.

2.2.1.3 Environmental Consequences

A Temporary Impacts

Alternatives 3 and 5. With adherence to standard project construction requirements, there would be no temporary flooding impacts associated with project construction.

B Permanent Impacts

Alternative 3. Alternative 3 is anticipated to increase the volume of downstream flow because of the addition of impervious surface area. This alternative would require the conversion of 4,280 square meters (46,070 square feet) of unpaved area into impervious surfaces. The total watershed area for Horno Creek, which is the receiving water body of this runoff, is approximately 2,800 acres (1,130 hectares). The additional impervious area within the watershed makes up only 0.3 to 0.9 percent of this area. This can be expected to translate into minor localized increases in urban runoff within the storm drain system, which will be analyzed during final design. Because of the lag time between the peak runoff from Horno Creek and that from the freeway runoff, the peak flow from the freeway would have substantially subsided by the time the watershed peak occurs. This, coupled with the minor increase in impervious surface, would result in an insignificant increase in peak flow in the overall flow regime for Horno Creek because of this project. The total paved area has been reduced to the maximum extent practicable (MEP). As described in the Caltrans Storm Water Management Plan (SWMP), Best Management Practices (BMPs) that are proposed with this alternative would reduce the discharge of pollutants from the Caltrans storm drain system to the MEP.

Alternative 5. Alternative 5 is also anticipated to increase the volume of downstream flow because of the addition of impervious surface area. This alternative would require the conversion of 10,670 square meters (114,851 square feet) of unpaved area into impervious surfaces. Note that the total watershed area for Horno Creek, which is the receiving water body of this runoff, is approximately 2,800 acres (1,130 hectares). The additional impervious area within the watershed makes up only 0.3 to 0.9 percent of this area. This can be expected to translate into minor localized increases in urban runoff within the storm drain system, which will be analyzed during final design. Because of the

lag time between the peak runoff from Horno Creek and that from the freeway runoff, the peak flow from the freeway would have substantially subsided by the time the watershed peak occurs. This, coupled with the minor increase in impervious surface, would result in an insignificant increase in peak flow in the overall flow regime for Horno Creek because of this project. The total paved area has been reduced to the MEP. As described in the SWMP, BMPs that are proposed with this alternative would reduce the discharge of pollutants from the Caltrans storm drain system to the MEP.

2.2.1.4 Avoidance, Minimization, and/or Mitigation Measures

A Temporary Measures

None required.

B Permanent Measures

The following measures apply to Alternatives 3 and 5, and they would be incorporated to minimize harm related to flooding:

MM HYD-1 The proposed project must be constructed to reduce runoff rate and minimize erosion by incorporating retaining walls to reduce the steepness of slopes or to shorten slopes.

MM HYD-2 The proposed project must be constructed to reduce runoff rate and minimize erosion by providing cut and fill slopes flat enough to allow revegetation and limit erosion to preconstruction rates and by collecting concentrated flows in stabilized drains and channels.

MM HYD-3 Extended detention basins shall be incorporated into the project design, where necessary and appropriate, to reduce potential runoff volumes during peak storm events.