

2.7 HYDROLOGY

The key project-related hydrologic and water impacts were based on the Preliminary Hydraulics Report (CH2M Hill) and the Flooding Study for Suisun Creek at Interstate 80 (WRECO). These reports are available for public which is available at Caltrans District 4, 111 Grand Avenue, Oakland, CA 94610, and the Solano Transportation Authority, One Harbor Center, Suite 130, Suisun City, CA 94585 during normal business hours.

Regulatory Setting

Executive Order 11988 Floodplain Management

Executive Order 11988 addresses floodplain issues related to public safety, conservation, and economics. Under this Order, impacts to floodplains such as increased runoff from additional impervious or impacts to natural resources (biological resources, open space, or hydrological drainage) must be evaluated and, if necessary, mitigated. The Federal Highway Administration and Caltrans have established design procedures pursuant Executive Order 11988 for developments that encroach onto a floodplain.

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 100-year 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 100-year floodplain.”

Federal Emergency Management Administration

FEMA administers the National Flood Insurance Program to provide subsidized flood insurance to communities complying with FEMA regulations. FEMA also produces Flood Insurance Study maps that rate geographic area for risk of flooding.

Title 23, Code of Federal Regulations (CFR), Part 650

Title 23 states that all federal-aid projects be evaluated and diligent efforts be made to be compatible with the National Flood Insurance Program.

Local Regulations

The County of Solano and the City of Fairfield participate in project planning and implementation. The project would discharge water into the city and county stormwater system at Jameson Creek (West End), Suisun Creek, and Raines Drain (East End), and therefore would require connection into city and county systems and consistency with city and county capital plans. The public stakeholders of the Suisun Creek/Raines Drain are Solano County, Solano County Water Agency, Solano Irrigation District, Caltrans and environmental permitting agencies.

Affected Environment

Hydrology Characteristics

The project area is within a Mediterranean subtropical climate zone, characterized by hot, dry summers with an average temperature of 70 °F and by wet, cool winters with an average temperature of 50°F. Rainfall in the area averages about 22 inches annually.

The general topography of the project area ranges from hilly terrain in the West End to generally level land in the Central Section and East End. The project area contains four surface streams and one drainage feature within the project limits: Jameson Creek (West End); Green Valley Creek (Central Section); Dan Wilson Creek (Central Section); and Suisun Creek (East End). A large detention pond is located on the property to the northeast of SR12 West near its intersection with the proposed project.

The project area lies within three hydrologic sub-areas (HSAs): 207.21, which includes Ledgewood Creek and Suisun Slough; and 207.22 and 207.23 which both include Suisun and Green Valley Creeks. Downstream (south) of the projects area these watersheds drain into Cordelia Sough, Suisun Slough, (HSA. 207.23) and ultimately to Suisun Bay (HSA 207.21).

Floodplains Characteristics

West End

Jameson Creek. The current drainage system in the vicinity of the project includes storm drains under the roads (Red Top Road and SR12 West) and buildings with some open channels, detention ponds, and swale ditches. The flows in Jamison Creek are conveyed under Red Top Road in culverts.

Central Section

There are no floodplains or major drainage facilities located in the area of proposed impacts in the Central Section. Local runoff is conveyed via culverts into the City of Fairfield drainage system.

East End

Suisun Creek and Raines Drain. FEMA Flood Insurance Study maps (1982) have been completed for Suisun Creek. The proposed project would cross the 100- and 500-year floodplain boundaries of Suisun Creek. The Suisun Creek drainage area upstream (north) of I-80 is approximately 47.3 square miles. The flood flow varies along the length of the channel within the project study area because of variable capacity and overtopping.

Water that escapes the banks of Suisun Creek upstream of I-80 flows through the Raines Drain watershed and under I-80 until the capacity of the existing I-80 undercrossing drainage system is exceeded. At Raines Drain, hydraulic analysis shows that flood elevations (ponded upstream of I-80) of about 32.1 feet will convey the 50-year peak flow past I-80 in a combination of culvert flow and overtopping. The flood profile indicates that the water depths over I-80 would range from approximately 0.5 foot in the eastbound lanes to 1.5 feet in the westbound lanes.

The flooding problems along I-80 between Suisun Creek and Raines Drain are caused by the highway's low elevation and limited capacity of the existing drainage culverts

under the I-80 freeway . The potential for flooding in this area may be exacerbated because of overgrowth along the Suisun Creek's banks, which can restrict water flow and causing overtopping.

Impacts

Methodology

Evaluation of the hydrology and floodplain impacts was based on professional standards and results from technical reports prepared for the project. This impact analysis assumes that the project proponent will conform to county building standards, grading permit requirements, and erosion control requirements. This impact analysis also assumes that all disclosed project effects apply to both construction at the interchange and bridge sites unless otherwise indicated.

Hydrology and Floodplain Impacts

West End

Based on the length of roadway proposed to be constructed in the West End of the project, about 7,400 feet, there will be an additional 8.1 acres of impervious area. Using the Rational Formula method with the peak 50-year rainfall intensity of 0.51 inches per hour and a runoff coefficient of 0.95 for asphalt, the peak runoff from the roadway is 4 cfs. This increase in runoff would be considered insignificant when compared to the total amount of runoff in this watershed.

At Jameson Creek the project would involve widening Red Top Road where it crosses over the creek. To accommodate this widening, the existing culverts which convey the flow of Jameson Canyon Creek under Red Top Road would be extended. The same capacity would be maintained through the culverts so that no impact to the upstream flows would occur as a result of this widening.

Central Section

In the Central Section the project would involve realigning a portion of Business Center Drive west of Suisun Valley Road. A portion of the existing Mangels Boulevard would be removed to accommodate this realignment. In the finished condition, there would be a negligible change in impervious surface in this area and therefore a negligible change in runoff.

East End

The project would create new impervious surfaces in the form of new roadways. Based on the length of roadway to be constructed East End segment of the project, about 7,900 feet, there would be an additional 12.3 acres of impervious area.¹ Using the Rational Formula method with the peak 50-year rainfall intensity of 0.51 inches per hour and a runoff coefficient of 0.95 for asphalt, the peak runoff from the roadway would be 6 cfs. The added project runoff compares to the East End (Suisun Creek overflow and Raines

¹ To estimate the potential added impervious area, an average 50-foot roadway width (about 4 lanes) and 4-mile length (resulting in 24.2 ac for the full project). Another 10 percent was added for other features such as intersections, drainage features, bridge structures, and sidewalks, to estimate additional impervious area in relation to the entire watershed. This represents an average of the alternative alignments, which had 2-lane, 4-lane, and 6-lane options.

Drain) 50-year flood peak of 925 cfs or less than 1 percent. Since the permanent impact would be less than 1 percent, the impact of the proposed project in the East End would be considered minimal. No mitigation is proposed.

The project would also include construction of a new bridge across Suisun Creek. This bridge would be constructed as a clear span bridge (no supports within the creek channel) and would be designed to be above the 100 year flood elevation. During construction of the clear-span bridge at Suisun Creek, there would be removal of the local riparian vegetation and trees along the creek banks. This may increase water runoff and chances for flooding because of less ground absorption around and within the creek banks.

The road will encroach upon the floodplain in the East End. However, the road will be constructed at-grade and as close as possible to I-80 so as not to encroach on additional land. In the event of a flood, the road has been designed for water to go over the surface of the road.

Avoidance, Minimization, and Mitigation Measures

Impact HYD 1: The proposed project shall include a clear-span bridge (approximately 40 feet in length) at Suisun Creek. The proposed bridge shall span the creek and would not encroach into the 100-year floodplain, and therefore no contraction, abutment, or pier scour is anticipated beyond existing conditions. The proposed bridge would be designed as concrete girder, free-span structures set above the 50-year flood elevation and would not have piers extending into the channel. The bridge is being designed to Solano County standards, which are the 50 year storm + 2 years or the 100-year flood.

Mitigation Measure HYD 1: In order to maintain bank stability in the area of the new bridge across Suisun Creek, riparian trees to be removed shall be cut above grade and the tree stumps shall be left in place. Tree removal and any other necessary limb cutting shall be conducted under the supervision of a certified arborist. To minimize re-sprouting, all stumps shall be painted with Round-up, or a similar product, by a licensed pest control applicator.