4.9 HYDROLOGY AND WATER QUALITY

The information presented below is based on the Water Quality Report, prepared by CH2M Hill, September 2004, the Hydraulics Report, prepared by CH2M Hill, December 2003, and the Flooding Study for Suisun Creek, prepared by WRECO, July 2003. These reports are available for public review at the Solano Transportation Authority (STA), One Harbor Center, Suite 130, Suisun City, CA 94585 during regular business hours.

Methodology

Water Quality
Evaluation of water quality and potential water quality impacts was based on professional standards and results from technical reports prepared for the North Connector Project (Project). The new roadway would primarily be located within the unincorporated portion of Solano County (County). The roadway would be required to conform to County building standards, grading permit requirements, and erosion control requirements.

Hydrology
Evaluation of hydrology and floodplains was based on data from the Federal Emergency Management Agency (FEMA), County, California Department of Transportation (Caltrans), the North Connector design team, and a detailed flood study of the Suisun Creek prepared for Caltrans District 4. No additional hydrologic or hydraulic modeling was performed.

The Project basis of design for drainage and flood impacts was the 10-year storm event; consistent with the latest published FEMA study. (Solano County, May 2001). The goal is to work cooperatively on upstream detention to ultimately provide a greater than 10-year level of protection.

A reconnaissance level site visit was completed on November 4, 2003, to canvass the watershed in the vicinity of the roadway alignment, observe the existing drainage facilities and creeks, and photograph key drainage elements of the Project.

EXISTING CONDITIONS

Regional Setting

The Project area is within a Mediterranean subtropical climate zone, characterized by hot, dry summers with an average temperature of 70 degrees Fahrenheit (°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 East End. There are two surface streams within the Project area and one surface drain:

Suisun Creek is a perennial stream that begins at Lake Curry and empties into the Suisun Marsh. Suisun Creek passes through the East End of the Project area.

Jameson Canyon Creek crosses under the existing Red Top Road south of the SR12 in the vicinity of the proposed intersection of the North Connector with SR12 West. This perennial creek is highly channelized and flows through a box culvert under Red Top Road in the Project area.

Raines Drain is a drain that is owned and operated by the Solano Irrigation District. Raines Drain crosses the Project area east of Suisun Creek. Raines Drain is a concrete lined ditch.

The Project area lies within three hydrologic sub-areas (HSA's). HSA 207.21 includes Ledgewood Creek and Suisun Slough; and HSA's 207.22 and 207.23 include Suisun Creek. Downstream (south) of the Project area these watersheds drain into Cordelia Sough, Suisun Slough, (HSA. 207.23) and ultimately to Suisun Bay (HSA 207.21). Suisun Slough and Suisun Bay are listed by the EPA as impaired water bodies under Section 303(d) of the Clean Water Act.[1]

Stormwater Quality

Contact with representatives of the County and City of Fairfield (City) public water/utility agencies failed to identify local roadway stormwater runoff water quality data. County and City personnel indicated that to their knowledge, no specific stormwater runoff water quality data existed for roadways within their jurisdiction.[2]

In general, water quality depends primarily on the hydrologic characteristics of the surrounding water basin, mineral composition of the soils in the watershed, and sources of contamination in the watershed. The quality of stormwater varies greatly depending on climatic and land use conditions. Urban and industrial runoff is known to contribute significantly to the levels of toxic materials such as metals and organic pesticides transported to surface bodies of water. Stormwater discharges may contain unacceptable levels of total petroleum hydrocarbons such as gasoline and diesel, oils, brake material, organic material, pesticides, heavy metals (copper, lead, cadmium, and zinc), fertilizers, trash, and sediment.

Pursuant to § 303(d) of the Federal Clean Water Act, states, territories and authorized tribes are required to develop lists of water quality limited segments or surface water bodies that do not meet water quality standards due to high levels of pollutants. As described above, stormwater discharge can carry pollutants from a variety of sources into associated surface water bodies. Neither Jameson Creek nor Suisun Creek, the two surface streams within the Project area, were included on the 2004 § 303(d) List of Water Quality Limited Segments compiled by the State Water Resources Control Board.

1 Water bodies on the Section 303(d) list do not meet water quality standards.
[2] Cullen, K. 2004. City of Fairfield, Public Works Department, Water Division. Personal communication with Loretta Meyer on January 7, 2004 and Flores, L. 2004. Solano County Department of Transportation, Engineering Division. Personal communication with Tim Hamaker on January 6, 2004.

Drainage Facilities

West End
The current drainage system in the West End area includes storm drains under Red Top Road and SR12 and some open channels and swale ditches which flow into Jameson Creek. The flows in Jameson Creek are conveyed under Red Top Road in culverts.

East End
The primary drainage facilities in the East End are Suisun Creek and Raines Drain. In the study area, Suisun Creek is heavily vegetated with riparian growth and mature trees. Conveyance capacity for floodwaters would be partially limited because of the overgrowth along the banks. Historical floodwater for extreme events has not been contained within the creek banks and documented overtopping has occurred. Levee development along the creek has increased the capacity in certain locations. However, these levees have experienced failure, according to documentation of a 1986 flood.

Raines Drain
Raines Drain is a trapezoidal-shaped, concrete-lined drain that begins at Rockville Road and extends southerly across the agricultural floodplain to I-80. It passes under I-80 in a 66-inch-diameter reinforced-concrete culvert pipe (RCP) and triple 42-inch diameter cross drains that transitions back into a trapezoidal concrete-lined channel.

The watershed collects local drainage from the surrounding agricultural lands and overbank flows from Suisun Creek.

The Raines Drain lining appears to be in reasonable condition with some cracking and minor weed growth along the side slopes. The bottom of the channel has two to three inches of sediment deposition, occasional weed growth, and some aquatic plants (i.e., algae). Judging from stains on the concrete walls of the channel, the normal drain water flow depth appears to be about 12 to 18 inches.

Flooding problems along I-80 between Suisun Creek and Raines Drain are caused by the low elevation of the highway 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 banks of Suisun Creek, which can restrict water flow and cause overtopping.

Flood Hazards

A Flooding Study for Suisun Creek at I-80 was prepared in July 2003. The segment of I-80 near the Suisun Creek and Raines Drain under-crossings has flooded several times in recent history. The earliest flood was recorded in 1955. In 1961, I-80 was reconstructed to a higher elevation and two 42-inch cross-drainage culverts were installed just west of what is called the Raines Drain under-crossing. In 1973, the Raines Drain under-crossing was upgraded to a 66-inch-diameter RCP.

Flooding problems along I-80 between Suisun Creek and Raines Drain are caused by restrictions in the flow capacity downstream of I-80. The low elevation of the area upstream of I-80 and limitations on increasing the flow capacity of the existing drainage culverts under the I-80 freeway because of downstream deficiencies cause the flooding to be localized in the project vicinity. The potential for flooding in this area may be

intensified because of overgrowth along the banks of Suisun Creek, which can restrict water flow and cause overtopping.

The most significant flooding occurred during the storm events of 1986 (this area also experienced major flooding in 2006). Both Suisun Creek and nearby Dan Wilson Creek, overtopped their banks during the peak-flow period. Overbank flow from Suisun Creek, about two miles upstream from I-80, added excessive inflows to the local Raines Drain watershed, exceeding the capacity of the I-80 cross-drainage system. These past incidents indicate that the East End of project area is subject to periodic flooding.

Suisun Creek
Federal Emergency Management Agency (FEMA) oversees the National Flood Insurance Program (NFIP) which provides flood insurance to communities complying with FEMA regulations, limiting development on floodplains. FEMA Flood Insurance Study (FIS) maps were completed for Suisun Creek in 1982. The Project would cross the 100- and 500-year floodplain boundaries of Suisun Creek. The flood-zone designations for Suisun Creek in the Project area are A4 and A8.[3] The delineated floodplain extends into the Raines Drain watershed as a result of overbank flows from Suisun Creek.

The flood flow varies along the length of the channel within the Project study area because of variable capacity and overtopping. The 50-year flow rate at the I-80 bridge was estimated in the most recent detailed FEMA study conducted in 2001 as 3,610 and 4,900 cubic feet per second (cfs) at Suisun Valley Road.

Raines Drain
The Raines Drain watershed collects local drainage from the surrounding agricultural lands and periodically overbank flows from Suisun Creek that occur when flows overtop the banks/levee of Suisun Creek in areas south of Suisun Valley Road.

Flood flow varies along the length of the Drain because of the overbank flows from Suisun Creek. The 50-year flowrate at the I-80 undercrossing was estimated in a recent flood study for Caltrans as 925 cfs, (this includes overbank flows from Suisun Creek).

Surface Water
There are two surface streams within the Project area:

> Suisun Creek - is a perennial stream lined by a robust riparian forest that begins at Lake Curry and empties into the Suisun Marsh. Suisun Creek passes through the East End of the Project area. This creek provides significant aquatic habitat in the vicinity of the Project. Surface water flow in Dan Wilson Creek has been substantially reduced through channel modification and upstream diversion into Suisun Creek. Existing stream flow in this seasonal creek has been reduced to immediate local runoff through a channel resembling a drainage ditch. These flows pond up in the vicinity of the proposed Project crossing.

[3] The A4 and A8 flood zone designations represent areas with a one percent annual chance of flooding and a 26 percent chance of flooding over the life of a 30-year mortgage. In most instances, base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Jameson Canyon Creek - crosses under the existing Red Top Road south of the SR12 in the vicinity of the proposed intersection of the North Connector with SR12 West. This perennial creek is highly channelized and flows through a box culvert under Red Top Road in the Project area. It provides a small quantity of moderate quality aquatic habitat.

REGULATORY SETTING

State and Federal Regulations

Federal Clean Water Act
The primary federal law regulating water quality is the Clean Water Act. Section 401 of the Act requires a water quality certification from the State Board or Regional Board when a project: 1) requires a federal license or permit, and 2) will result in a discharge to Waters of the United States. Section 402 of the Act establishes the National Pollutant Discharge Elimination System (NPDES) permit system for the discharge of any pollutant (except dredge or fill material) into Waters of the United States.

California Porter Cologne Water Quality Control Act (The Porter Cologne Act)
The Porter-Cologne Act established the California State Water Quality Resources Control Board (SWQRCB) and the nine California Regional Water Quality Control Boards, including the San Francisco Bay Regional Water Quality Control Board (RWQCB). Under the act, the SWQRCB is authorized to formulate, adopt, and revise state water policy, which may include water quality objectives, principles, and guidelines. The Porter-Cologne Act also authorizes the SWQRCB to adopt water-quality control plans on its own initiative. In California, discharge permitting has been delegated to the state and RWQCBs.

San Francisco Bay Regional Water Quality Control Board
The streams and receiving waters in the Project vicinity are within the jurisdiction of the RWQCB (also known as Region 2).[4] The RWQCB's 1995 Water Quality Control Plan (Basin Plan) specifies beneficial water uses, describes water quality objectives, and establishes policies to guide the implementation of programs to achieve Basin Plan objectives. The Basin Plan governs non-point surface water control, including guidance for highway runoff control as part of urban runoff management. In addition, the Basin Plan also includes a program for managing and setting goals for erosion and sediment control.

Local Regulations

Solano County Department of Resource Management
The Department of Resource Management administers the stormwater NPDES permit for maintenance and operational activities for facilities within the county and outside the Caltrans right-of-way (NPDES No. CAS000004). Under this permit, a Storm Water Management Plan (SWMP) and a Storm Water Pollution Prevention Plan (SWPPP) must be prepared. The SWMP must identify and describe the Best Management Practices (BMPs) used to control the discharge of pollutants to Waters of the United States. The proposed Project would be required to meet SWMP and SWPPP

[4] http://www.swrcb.ca.gov/

requirements, which could include implementing BMPs to control pollutants as directed by the RWQCB.

Fairfield – Suisun Sewer District
The Fairfield-Suisun Sewer District oversees wastewater collection and treatment, water recycling, and stormwater management services in the City of Fairfield, Suisun City, and Travis Air Force Base.

Ordinance 93-6, promulgated by the Fairfield-Suisun Sewer District, sets requirements for discharges into the Community Storm Water Drainage System (CSWDS). The objectives of the ordinance include:

- Compliance with federal and state laws concerning the protection of the environment, control of water pollution, and disposal of hazardous wastes as related to discharges into the CSWDS
- To prevent the introduction of non-storm water into the CSWDS
- To control discharge to the CSWDS by protecting from spills, dumping, or disposal of materials other than storm water
- To reduce the introduction of discharge containing pollutants to the CSWDS to the maximum extent possible
- To prevent a public hazard or public nuisance arising from the collection and discharge of storm water through the CSWDS

The Fairfield-Suisun Sewer District has adopted an NPDES permit for stormwater discharge associated with construction activity on sites greater than one acre in size. Conformity with the NPDES permit requires that project applicants file a Notice of Intent (NOI) in each jurisdiction in which the project occurs to comply with the terms of the General Permit and submit an SWPPP to the RWQCB.

HYDROLOGY AND WATER QUALITY IMPACTS ANALYSIS

Significance Criteria

California Environmental Quality Act (CEQA)

Appendix G of the CEQA Guidelines identifies environmental issues to be considered when determining whether a project could have a significant effect on the environment. STA has applied these standards of significance for evaluating the Project.

The Project would have a significant impact to hydrology and water quality if it would:

- Violate any water quality standards or waste discharge requirements,
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted),
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site,
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially

increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site,
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff,
- Otherwise substantially degrade water quality,
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map,
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows,
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam, or
- Inundation by seiche, tsunami, or mudflow.

Issues Not Discussed Further

Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.
The Project does not include the construction of residential housing and therefore would not result in the placement of housing within a 100-year flood hazard area. There are no impacts related to placing housing within a 100-year flood hazard.

Exposure of people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.
Impacts related to flooding are discussed under Impact 4.9-7. The Project is not located adjacent to a levee or dam. Therefore the Project would not result in exposure of people or structures to potential injury or damage resulting from levee or dam failure and no impacts are anticipated.

Result in inundation by seiche, tsunami, or mudflow.
The Project is not located adjacent to the ocean or any other large body of water that could result in impacts caused by inundation by seiche or tsunami. Furthermore, the Project area does not contain any mountains or other geologic features that would make it prone to mudflows. Therefore, there are no impacts related to exposure to seiche, tsunami, or mudflow are anticipated.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Less than Significant Impacts

Depletion of groundwater supplies or substantial interference with groundwater recharge.
No groundwater wells would be included as part of the Project. The Project is the development of a roadway and would not result in depletion of groundwater supplies.

Groundwater recharge is generally accomplished through percolation of surface water to underlying aquifers. The construction of above ground impervious surfaces, such as a roadway, could hinder recharge, resulting in depletion of groundwater supplies and resulting deficits in aquifer volume or a lowering of the groundwater table. Groundwater

within the Project area is contained within the Suisun/Fairfield Valley Groundwater Basin, which is approximately 203 square miles in size with a depth zone ranging between 30 to 400 feet. Based on current design, the Project would add approximately 8 acres of impervious surface to the West End of the Project area and approximately 14 acres of impervious surface to the East End of the Project area, for a total of just over 22 acres, or 0.03 square miles, of impervious surface for the entire area. Furthermore, stormwater runoff from the roadway surface would use existing drainage facilities, such as Suisun Creek, through which water may enter the groundwater basin. The increase in impermeable surface is negligible in comparison to the size of the entire underlying groundwater basin and would not interfere substantially with groundwater recharge. Therefore, potential impacts related to groundwater supplies or groundwater recharge, are considered less than significant.

Place structures within a 100-year flood hazard area which would impede or redirect flood flows.

West End
On the West End, the Project would cross the lower portion of the Jameson Creek watershed just north of the existing SR12 off-ramp from I-80. No floodplain information is available for the Jameson Creek area. Based on calculations, the 50 year flood peak for Jameson Creek would be approximately 265 cfs. The Project includes installation of a combination of three new culverts, local detention storage, and swales to convey flood flows beneath the roadway. The local detention storage in the drainage concept will reduce the peak flows and, therefore, aid in not exceeding the existing capacity of the downstream system.

East End
On the East End, the Project alignment would encroach upon the 100-year floodplain; however, the roadway would be constructed slightly above grade (above the 10-year flood event level) and as close as practical to I-80 so as not to encroach upon additional land. In the event of a flood, the roadway has been designed to allow water to pass over the surface of the road.

The North Connector Bridge across Suisun Creek will be a pre-cast concrete free-span design that would not encroach on the existing conveyance capacity of the creek, and would be constructed at sufficient elevation as to not encroach upon the 100-year floodplain. Therefore, any impact associated with placement of structures within a 100-year flood hazard would area would be less than significant.

Significant and Potentially Significant Impacts and Mitigation Measures

4.9-1: The Project could potentially violate water quality standards or waste discharge requirements. This is considered a potentially significant adverse impact.

The Project may result in an increase of pollutants in local stormwater discharge associated with construction and operation of the proposed Project. This would be in violation of local, regional, and state water quality standards and waste discharge requirements. Pollutants that could arise as a result of the Project would generally be associated with Project construction and Project operations.

Project construction would involve activities such as clearing and grading of land, cutting of slopes, and building roadways and one bridge. Construction activities could lead to the generation of sediments and use of substances containing chemical pollutants. Pollutants commonly associated with roadway construction include oil, motor vehicle fuel, asphalt, cement and concrete, paints, solvents, and adhesives. In addition, construction activities that include demolition of existing buildings can produce pollutants such as asbestos, fiberglass, concrete and sediment.

Typically, sediment may be generated: 1) during and subsequent to grading activities (including cuts and fills, and import and export of soil to and from the construction site), and 2) as a result of erosion of hillsides, slopes, and storm water conveyance channels/ditches. A total of approximately 40,250 cubic meters of soil would be excavated at the West End of the Project area. In addition approximately 20 acres would be cleared and grubbed. In the East End, approximately 33 acres would be cleared and grubbed and approximately 25,600 cubic meters of soil material would be excavated.

Table 4.9-1 provides a list of typical construction activities, typical building materials, and pollutants associated with each building material that could be present in stormwater discharge.

Table 4.9-1. Construction Related Pollutants

Category	Product/Activity	Pollutants
Adhesives	Adhesives, Glues, Resins, Epoxy Synthetics, Caulks, Sealers, Putty, Sealing Agents Coal Tars (Naptha, Pitch)	Phenolics, Formaldehydes, Asbestos, Phenolics, Formaldehydes, Benzene, Phenols, Naphthalene
Cleaners	Polishes (Metal, Ceramic, Tile), Etching Agents, Cleaners, Ammonia, Lye, Caustic Sodas, Bleaching Agents, Chromate Salts	Metals, Acidity/Alkalinity, Chromium
Plumbing	Solder (Lead, Tin), Flux (Zinc Chloride), Pipe Fitting (Cut Shavings), Galvanized Metals (Nails, Fences), Electric Wiring	Lead, Copper, Zinc, Tin, Copper, Zinc, Copper, Lead
Painting	Paint Thinner, Acetone, MEK, Stripper, Paints, Lacquers, Varnish, Enamels, Turpentine, Gum Spirit, Solvents Sanding, Stripping, Pigments, Dyes	VOCs, Metals, Phenolics, Mineral Spirits, VOCs Metals
Woods	Sawdust, Particle Board Dusts, Treated Woods	BOD[1], Formaldehyde, Copper, Creosote
Masonry & Concrete	Dusts (Brick, Cement), Colored Chalks (Pigments), Concrete Curing Compounds, Glazing Compounds, Cleaning Surfaces	Acidity, Sediments, Metals, Asbestos, Acidity
Floors & Walls	Flashing, Drywall, Tile Cutting (Ceramic Dust), Adhesives	Copper, Aluminum, Sediment, Minerals
Remodeling & Demolition	Insulation, Venting Systems, Brick, Cement, Saw Cutting, Drywall	Asbestos, Aluminum, Zinc, Sediments
Operations & Maintenance	Vehicle and Machinery Maintenance, Gasoline, Oils, Additives Marking Paints (Sprays), Grading, Earth Moving Portable Toilets, Fire Hazard Control (Herbicides), Pest Control, Wash Waters	Oils and Grease, Coolants, Benzene & Derivatives, Oils & Grease, Vinyl Chloride, Metals Sediments, BOD1, Disinfectants, pathogens, Sodium Arsenite, Dinitro Compounds, Rodenticides, Insecticides Herbicides, Concrete, Oils, Greases
Landscaping & Earthmoving	Planting, Plant Maintenance, Excavation, Tiling Masonry & Concrete, Solid Wastes (Trees, Shrubs, Green Waste, Mulch), Exposing Mineral Deposits Soils Additives, Re-vegetation of Graded Areas	Pesticides, Herbicides, Nutrients, Erosion (Sediments) BOD1, Acidity/Alkalinity, Metals, Aluminum Sulfate, Sulfur, Fertilizers
Roadway Paving	Asphalt Batching, Concrete Batching, Vehicle and Machinery Maintenance, Gasoline, Oils, Additives Marking Paints (Sprays), Grading, Earth Moving	VOCs, Arsenic, Benzene, Formaldehyde, Cadmium, Oils, Naphthalene, Kerosene, Sediment, Oils and Grease, Coolants, Vinyl Chloride
Materials & Waste Storage	Waste Storage (Used Oils, Solvents, Solid Waste), Hazardous Waste Containment, Raw Material Piles	Heavy Metals, Trash, Sediment, Organic Materials

[1]BOD = Biochemical Oxygen Demand due to the use of oxygen by microorganisms decomposing materials.
Source: CH2M HILL, 2003; USEPA, 2007

Furthermore, the Project would increase the amount of impervious surface area available for contact with storm water runoff (wet and dry weather flows). This type of Project would result in a modest increase in stormwater runoff and an increased potential for storm water pollution. Table 4.9-2 lists sources of typical stormwater pollutants from highways and maintenance activities and the associated pollutants that would be expected in storm water discharges.

Table 4.9-2. Typical Pollutants in Highway Runoff

Product/Source	Pollutants
Exhaust products	Oil and Grease, VOCs
Brake pad dust	Metals
Tire residues	Metals
Leaks and spills of fuels, oil, antifreeze, solvents, degreasers	Oil and Grease, VOCs
Fertilizers and Pesticides	Nutrients (nitrates, phosphates), VOCs
Litter, vegetation debris	Gross solids, sediment

Source: CH2M HILL, 2003.

Projects that disturb one or more acres of soil must obtain a General Permit for discharges of stormwater associated with construction activity. To comply with the permit, a Storm Water Pollution Prevention Plan (SWPPP) will need to be prepared as part of the Project. The SWPPP must identify and describe the Best Management Practices (BMPs) to be used to control the discharge of pollutants to state waters and waters of the United States. The Project would similarly be required to meet any special requirements, which could include implementing BMPs to control pollutants as directed by the RWQCB. Use of BMP's, adherence to the SWPPP, and conformity with the NDPES permit will reduce any impacts to less than significant. The following measures shall be implemented to further reduce any potential impacts:

Mitigation Measure 4.9-1a: The Project will be required to adhere to the conditions of the NPDES Permit, including the C.3 requirements for stormwater discharge treatment measures and appropriate source control and site design measures for the alignment.

Mitigation Measure 4.9-1b: To avoid potential long-term impacts to water quality, the Project shall be designed to include bioswales to retain and treat stormwater runoff from the roadway before entering the City or County's stormwater drainage systems.

Mitigation Measure 4.9-1c: To comply with temporary water quality impact resulting from construction activities, a SWPPP shall be prepared prior to grading activities. The SWPPP must list BMPs that shall be followed to minimize contaminants entering storm drains as a result of storm runoff.

The Project shall implement one or a combination of typical treatment BMPs that have been approved for use by the SWRCB, including:

- Biofiltration strips and swales
- Infiltration basins
- Detention devices
- Dry weather flow diversions
- Gross solid removal devices
- Media Filters
- Multi-chamber Treatment Trains
- Wet Basins

At the current level of design, it is not possible to identify design-specific BMPs for the Project. Design-specific BMPs shall be identified in the SWPPP prepared by the contractors prior to construction.

Implementation of the aforementioned BMPs would reduce impacts related to violation of a water quality standard or waste discharge requirement to a less-than-significant level.

Significance After Mitigation: Less than significant.

4.9-2: The Project could substantially alter the existing drainage pattern of the site or area, through the alteration of the course of a stream or river, in a manner which would result in substantial erosion, siltation, or flooding, on- or off-site. This is considered a potentially significant adverse impact.

Construction of the Project would involve various activities such as clearing and grading of land, cutting of slopes, and building roadways and one bridge. This activity would entail large amounts of earthwork which may potentially change patterns of storm water runoff in some locations along the Project alignment. In addition, construction of impermeable surfaces such as roadways may result in increased stormwater runoff which has the potential to increase erosion both on- and off- site. The clear-span bridge over Suisun Creek would also require removal of local riparian vegetation and trees along the creek banks. This may increase water runoff and chances for flooding due to less ground absorption around and within the creek banks. Removal of ground cover may also lead to increased erosion and siltation within and around the area from which vegetation has been removed.

However, the existing storm drainage system for the segment of I-80 and many of the other surface roadways in the vicinity of the Project were designed and installed prior to recent and more stringent water quality standards. Implementation of the Project would improve functional aspects of the existing storm drainage system. Specifically, the Project would provide the opportunity to incorporate design pollution prevention BMPs, treatment BMPs, and Maintenance BMPs to reduce existing areas of erosion. The Project would also provide for the opportunity to repair existing areas of erosion, especially at the surface-water crossing locations. Table 4.9-3 below provides a summary of potential long-term impacts and water quality benefits that may result from the Project.

Table 4.9-3. Summary of Potential Long-Term Impacts and Water Quality Benefits

Potential Long Term Water Quality Impacts	Type of BMPs Evaluated to Minimize Potential for Impact to the MEP	Potential Water Quality Benefits
Creates additional areas of impervious surfaces and increases in storm water runoff volume.	Design Pollution Prevention BMPs, Treatment BMPs, Maintenance BMPs.	Provides opportunity to improve existing storm drainage system to decrease erosion. Provides opportunity to evaluate feasibility of incorporating storm water treatment into existing system. Provides opportunity to mitigate existing erosion and make improvements to the existing storm water drainage system. Reduce potential for pollutant discharges from storm water runoff.
Will entail large amounts of earthwork, in some locations may potentially change patterns of storm water runoff.	Design Pollution Prevention BMPs, Treatment BMPs.	Provides opportunity to make adjustments to existing storm drainage system to enhance continuity and minimize erosion.
Create additional storm water runoff from bridge decks, with potential to cause downstream localized erosion.	Design Pollution Prevention BMPs, Treatment BMPs.	Provides opportunity to mitigate existing erosion and scour problems in vicinity of crossing. Provide opportunity to evaluate the feasibility of incorporating Treatment BMPs.

Source: CH2M HILL, 2003.

Mitigation Measure 4.9-2a: 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, except as needed to accommodate bridge construction.

Mitigation Measure 4.9-2b: During the design phase of the Project, the Project engineer shall integrate design-specific detailed BMPs to address potential water quality impacts arising from the Project. BMPs shall include, but not be limited to, the following:

- Preservation of existing vegetation is the identification and protection of desirable grasses, plants and trees to retain their erosion and sediment control benefits. The contractor shall preserve existing vegetation at areas on the site where no construction activity is planned. Vegetation to be preserved should be delineated on the plans, included in the contractor's file and included in the SWPPP.
- The Project shall utilize concentrated flow conveyance systems in planning and construction. Concentrated flow conveyance systems consist of permanent design features that are used alone or in combination to intercept

and divert surface flows and to convey discharge concentrated flows with a minimum of soil erosion, both within the Project limits and downstream. These include ditches, berms, dikes and swales; overside drains; flared culvert end sections; outlet protection/velocity dissipation devices.

- Surface protection consists of a system of permanent design measures that are used alone or in a combination to minimize erosion from completed disturbed surfaces. Vegetated surfaces shall be incorporated into the Project to address stabilization of completed slope and surface areas to prevent erosion from storm water and non-storm water runoff. Permanent erosion control will be applied in any specific area where work in that area is determined to be substantially complete. Hard surfaces consist of concrete, rock, or rock mortar placed to achieve slope protection.

Implementation of these measures would reduce impacts related to changes in the drainage pattern, to a less-than-significant level.

Significance After Mitigation: Less than significant.

4.9-3: Project construction activities could potentially create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. This is considered a potentially significant adverse impact.

Construction activities in both the West and East ends could impair water quality temporarily due to the potential for sediment, petroleum products, construction materials, and miscellaneous wastes to be discharged into receiving waters or the storm drainage system. Soils and associated contaminants that enter stream channels can increase turbidity, stimulate growth of algae, increase sedimentation of aquatic habitat, and introduce compounds that are potentially harmful or toxic to aquatic organisms.

Construction materials such as fuels, oils, paints, and concrete are potentially harmful to fish and other aquatic life if released into the environment. Due to the nature and the topography of the Project area, short-term water quality impacts related to erosion and pollutant discharges would be expected to be fully mitigated using appropriate BMPs.

Approximately 14 acres of impervious surface area, including the roadway and the multi-use path, is anticipated to be added in the East End as a result of implementation of the Project. Calculations based on the additional impervious surface determined that peak runoff from the roadway would be six cfs. The added runoff compares to the East End (Suisun Creek overflow and Raines Drain) 50-year flood peak of 925 cfs, representing less than one percent of the 50-year flood peak. Therefore, the impact to the East End flood peak would be less than significant. Similarly, in the West End of the Project area, approximately 8 acres of impervious area would be added. Based on calculations, the 50 year flood peak for Jameson Creek in the West End would be approximately 265 cfs. Calculations determine that the peak runoff from the roadway would be four cfs, or less than one percent of the 50-year flood peak. The impact to the West End flood peak would be less than significant. Regardless, the following measure is recommended to further reduce any potential for impacts:

Mitigation Measure 4.9-3: Existing vegetation shall be preserved as much as practical. Areas of existing vegetation to be preserved shall be identified and delineated on Project plan sheets in the SWPPP. All disturbed areas shall be stabilized with vegetation or hard surface treatments upon completion of construction in any specific area. All inactive disturbed soil areas shall be stabilized with both sediment and temporary erosion control 14 days prior to the onset of the rainy season (October 15th to April 15th). During the Rainy season, Project construction shall minimize soil disturbances and temporary or permanent erosion control measures shall be undertaken to reduce soil erosion impacts to receiving water quality.

Significance After Mitigation: Less than significant.

4.9-4: The Project could substantially degrade water quality. This is considered a potentially significant adverse impact.

As discussed above, the Project may result in an increase of sedimentary and chemical pollutants in storm water discharge, both in the short term due to construction activities, and in the long term due to roadway operation. Construction involves grading and excavation activities that can lead to an increase in sediment introduced to local waters. Use of construction materials such as asphalt and concrete can result also lead to a release of pollutants. Table 4.9-1 above describes typical pollutants produced due to construction activity. In addition, construction of the roadway creates impermeable surface which will result in an increase of stormwater discharge. Roadway operations can result in the introduction of pollutants to storm water, including grease/oil, metals, and sediments. Table 4.9-2 above describes typical pollutants resulting from roadway operations.

Under the terms of the RWQCB's NDPES permit and the General Construction permit, all Projects resulting in a disturbance of greater than one acre of soil area will require the contractor of the proposed Project to develop a SWPPP to minimize or eliminate the potential for a non-storm water discharge to occur to a surface body of water, to the storm drainage system or off of the Project right-of-way (ROW).

At a minimum, the SWPPP must evaluate and provide BMPs to minimize Project-related impacts. The SWPPP must be approved and accepted by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) prior to the commencement of any ground disturbing activities or any activities that have the potential to cause water pollution. The Project contractor would submit a Notice of Construction (NOC) to the RWQCB, 30 days prior to the commencement of construction. During the rainy season (October 15 to April 15), temporary construction site BMPs would be implemented at all times to reduce or eliminate the potential for a non-storm water discharge to occur off of the ROW, to a surface body of water, drainage course or to a storm drainage system. The contractor must also identify, construct, implement, and maintain BMPs in accordance with a time schedule identified in the SWPPP to reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges from the Project site during construction. The schedule would be identified in the SWPPP.

Mitigation Measure 4.9-4a: To reduce or eliminate the potential for stormwater or pollutant stormwater discharge to occur, during the final design phase permanent Project-specific pollution prevention BMPs, treatment BMPs, and

critical temporary construction site BMPs shall be identified and incorporated into the Project plans, specifications, and estimates.

Mitigation Measure 4.9-4b: To reduce or eliminate the potential for a non-storm water or pollutant storm water discharge to occur as a result of construction activities, the Project contractor in accordance with both the requirements under the Statewide Stormwater NPDES and General Construction Permits will implement a site specific SWPPP to control water pollution during all construction activities. The SWPPP will be approved and implemented prior to the commencement of any ground-disturbing activities. The SWPPP will identify BMPs that will be implemented to reduce or eliminate the potential for short-term impacts to water quality as a result of construction.

The types of BMPs that will be utilized to control erosion and sedimentation of drainage channels in disturbed areas are:

- Erosion control barriers such as silt fences, hay bales, and
- Drain inlet protection such as gravel bags, etc.

Significance After Mitigation: Less than significant.