3.2 WATER QUALITY

This section discusses groundwater and surface water quality in the Project Area. The potential changes to water quality as a result of Project activities are analyzed. Information provided in this section is based on the Lower Putah Creek Watershed Management Action Plan, Solano and Yolo County planning documents, and planning documents and information from the Solano County Water Agency (SCWA), and the U.S. Environmental Protection Agency (US EPA), among other sources.

3.2.1 Setting

Environmental Setting

Regional Setting

Putah Creek is among the three major watersheds and surface water features in Yolo County, in addition to Cache Creek, the Sacramento River, and the Yolo Bypass (County of Yolo, p. CO-60). SCWA describes Solano Project water quality as "excellent for both agricultural and urban uses" (SCWA, 2010, p. 31). Factors contributing to the good water quality are the large volume of water contained in Lake Berryessa, which dilutes potential contaminants, and the fact that the Solano Project draws its water supply from the bottom of the reservoir, providing additional decomposition and dilution of contaminants before Solano Project water is released to Putah Creek (County of Solano 2008b, p. 4.5-13). This intake also provides cool water, beneficial for the creek's fisheries. Large storms can create short-term periods of a few days when Solano Project water is naturally high in suspended sediment, which causes turbidity resulting in temporary halting of water diversions from Lake Solano (SCWA 2010, p. 31).

Project Area Water Quality

Overall Water Quality

Water quality in the upper reach of lower Putah Creek is generally classified as "good" (EDAW, 2005, pp. 9-4 to 9-5; SWRCB, 2015b, p. 7; CVRQCB, 2014, p. E-3). Routine water quality monitoring data in the Project Area is limited to samples taken by SCWA in the Putah South Canal and by the University of California, Davis (UC Davis), upstream and downstream of the university wastewater treatment plant (EDAW, 2005, pp. 9-4; SWRCB, 2015a, 2015b). Putah Creek supports a wide variety of existing and potential designated beneficial uses, including:

- municipal and domestic water supply;
- agricultural water supply;
- primary contact (i.e., swimming) and secondary contact (e.g., canoeing) recreation;
- warm freshwater habitat;
- warm water fish habitat, for spawning; and
- wildlife habitat, and cold, freshwater habitat for spawning.

Protecting the beneficial uses of the creek is dependent on ongoing active management of stream flows, regulatory compliance among permitted dischargers, and developing/ maintaining a riparian buffer to protect the creek from indirect (nonpoint) runoff from adjacent land uses (EDAW, 2005, pp. 9-4 to 9-5).

Mercury

Naturally occurring mercury is present in trace quantities in Putah Creek waters, including the Project Area. Cinnabar, a naturally occurring mineral in the Coast Range above Putah Creek, washes down into the creek through erosion upstream of the Project reach. A secondary and lesser source of mercury in the creek is aerial deposition (entering the water through the air). This leads to trace concentrations of mercury in the water column and in sediments of the creek. These concentrations are far lower than those that would impact human health. The total mercury median concentration in Putah Creek is approximately 9.14 nanograms per Liter (ng/L) (CVRWQCB, 2008, p. 126, Table 7.5). This is considerably less than the US EPA's Maximum Contaminant Level (MCL) for inorganic mercury, which is 2,000 ng/L (US EPA, 2014d). The US EPA does not have a regulatory MCL for organic mercury, which typically is a risk to humans through eating contaminated fish rather than through direct ingestion of water (US EPA, 2009, p. 3; US EPA, 2013a).

Dynamic exchange of mercury occurs between the creek water, creek sediments, stream microorganisms, aquatic wildlife, and organisms that eat or consume (predate) them. This exchange leads to *mercury methylation*, a complex process through which bacteria convert mercury into methylmercury, an organic form of mercury that can be absorbed by living organisms, including fish and human beings; *bioconcentration*, by which mercury is accumulated in the tissues of the animal; and, *biomagnification*, by which very low concentrations of mercury can reach dangerous levels in fish that prey on smaller fish. Mercury also demethylates when ultraviolet light (present in sunlight) breaks down the methylmercury into its inorganic, and less toxic form. Methylmercury

production is associated with seasonally flooded wetlands, and there are wetland features in and along the Project Area, as described in the Wetland Delineation for the Project (BSK, 2015).

Due to the presence of methylmercury in the waterway, the California Office of Environmental Health Hazard Assessment (OEHHA) has issued a fish consumption advisory for fish and shellfish from Putah Creek, advising limits on eating certain fish, particularly by children and by women of childbearing age (OEHHA, 2009). The Central Valley Regional Water Quality Control Board (CVRWQCB) has set a 2016 deadline for development of a mercury control program for Putah Creek (CVRWQCB, 2011, p. 13).

Boron

Boron is another naturally occurring contaminant in Putah Creek, including the Project Area. Boron enters groundwater through leaching of rocks and soils that contain borate or borosilicate minerals (City of Davis, 2015). The groundwater then flows into Putah Creek.

Clean Water Act Section 303(d) Listing

Mercury and boron in Putah Creek have resulted in the Creek's listing under California's Clean Water Act Section 303(d) as Impaired. An impaired waterbody for CWA purposes is defined as a "waterbody (i.e., stream reaches, lakes, waterbody segments) with chronic or recurring monitored violations of the applicable numeric and/or narrative water quality criteria" (US EPA, 2012a). This impaired water quality extends from Solano Lake to the Putah Creek sinks in the Yolo Bypass and includes the Project Area. Section 303(d) requires the development of Total Maximum Daily Loads (TMDL) standards for the total amount of boron and mercury allowed to enter Putah Creek so that the creek will meet water quality standards for those pollutants. The creek's expected completion date for development of TMDLs for mercury is 2017 and for boron is 2021 (SWRCB, 2013d; SWRCB, 2010).

Additional discussion of the CWA Section 303(d) listing process is provided below under Regulatory Setting.

Dissolved Oxygen and Biochemical Oxygen Demand

Through its churning action, running water in streams and creeks dissolves oxygen, making it available for organisms living in the water, for decomposition, and for chemical reactions in the water. This dissolved oxygen (DO) can be measured. If more oxygen is consumed than produced, dissolved oxygen levels in the water decline and

some organisms may move away, weaken, or die (US EPA, 2012c). The amount of oxygen consumption in the water is called biochemical oxygen demand (BOD). In addition to being affected by the churning of water flow, DO levels are also dependent on temperature: warmer water holds less oxygen (US EPA, 2012c).

Portions of the Project Area contain long, deep, and overly wide pools that resulted from historic mining activities. Due to the relatively still water in these pools (which limits churning that would dissolve oxygen) and their exposure to sunlight (which heats the water, limiting the amount of DO it can hold), DO levels tend to be lower in these portions of the creek relative to the rest of the Project Area. Reaches containing these pools include Duncan-Giovannoni, Upper McNamara, Lower McNamara, Russell Ranch, Stevenson Bridge, Glide Ranch, Olmo-Hammond-UCD, Old Davis Road to Mace, Mace to Road 106A, and Road 106A to Yolo Bypass Wildlife Area.

For most of the Project Area, there is no systematic monitoring of DO at this time. The one exception to this is in the Interstate 80 (I-80) to Old Davis Road and Old Davis Road to Mace reaches, which are located near the UC Davis Campus Wastewater Treatment Plant (UCD WWTP). As part of State-required water quality monitoring, this plant monitors DO levels 800 feet upstream from where Old Davis Road crosses the Project Area (which is also 800 feet upstream from where flow from the UC Davis Arboretum Waterway is discharged into Putah Creek via pump) (CVRWQCB, 2014, pp. B-1, E-3, F-4). **Table 3.2-1** below presents the monthly average DO levels measured at this point in the Project Area from 2010 to 2015. As shown in Table 3.2-1, monthly average DO levels at this point during the past 5 years range between 7.9 to 11.2, meeting the 7.0 mg/L minimum level set by the CVRWQCB based on Basin Plan water quality objectives (CVRWQCB, 2014, p. 6, F-56).

Water Temperature

High water temperatures affect water quality by lowering the amount of DO that the stream can carry. Stream temperatures can exceed 68 degrees Fahrenheit (°F) during summer months by the time they reach Highway 505 (Yates, 2003; as referenced in Stillwater, 2015, p. 16). This increase in temperature is attributed to the large pools in the Project Area, which slow water down and have less stream shading, allowing for increased solar heating. By the time Putah Creek reaches I-80, summer water temperatures are typically near or above 77°F and continue to warm downstream (Yates, 2003; as referenced in Stillwater, 2015, p. 16). (See Section 3.4, *Biological Resources*, for discussion of existing condition temperature effects on species habitat.)

Table 3.2-1 UC Davis Main Wastewater Treatment Plant Self-Monitoring Report Monthly Averages 2010-2015

Month	Dissolved Oxygen (mg/L)	Electrical Conductivity @ 25°C (µmhos/cm)	Temperature (°F)	pH (SU)
January	10.9	391.3	47.2	7.7
February	11.2	387.6	52.6	8.0
March	9.6	371.3	58.1	7.7
April	8.6	413.5	60.7	7.9
May	7.9	429.8	67.2	7.7
June	8.3	402.2	74.0	7.8
July	8.3	402.1	75.0	8.1
August	8.7	424.8	75.3	8.1
September	8.1	436.7	72.4	8.0
October	8.9	444.0	63.3	7.9
November	9.6	409.3	55.5	7.8
December	10.0	354.7	49.8	7.6

Source: SWRCB, 2015b.

For most of the Project Area, there is no systematic monitoring of water temperature at this time. The one exception to this is in the I-80 to Old Davis Road and Old Davis Road to Mace reaches, which are located near the UCD WWTP. As part of state-required water quality monitoring program described above, the UCD WWTP monitors water temperature levels 800 feet upstream from where Old Davis Road crosses the Project Area (CVRWQCB, 2014, pp. B-1, E-3, F-4). Table 3.2-1 presents the monthly average water temperature levels measured at this point from 2010 to 2015.

Other Water Quality Parameters

The UCD WWTP monitoring point in the Project Area also provides data for two other water quality parameters, electrical conductivity and pH, presented in Table 3.2-1. Electrical conductivity and pH currently meet limits set by the CVRWQCB based on Basin Plan water quality objectives, as follows:

- Electrical conductivity target level is below 1,100 µmhos/cm.; UCD WWTP monthly Project Area measurements from 2010-2015 ranged from 371.3 to 436.7 µmhos/cm.

- pH target level is between 6.5 and 8.5; UCD WWTP monthly Project Area measurements from 2010-2015 ranged from 7.6 to 8.1 (CVRWQCB, 2014, pp. 6, F-56).

Agricultural Runoff

Extensive agriculture occurs immediately outside of most of the Project Area. This activity can result in incidental organic matter blowing or falling into the Project corridor, and potentially, chemical fertilizer or pesticide overspray.

First-flush flows each rainy season also can result in peaks of agricultural contaminants in the Project Area. Systematic monitoring data for agricultural runoff contaminants in the Project Area is not readily available at this time.

Urban Runoff

Stormwater drains associated with a municipal area may carry a variety of human-associated pollutants, including sediment, nutrients, trash, metals, bacteria, oil, grease, organics, pesticides, and oxygen-demanding substances that can deplete oxygen in aquatic environments (US EPA, 2014a, 2014b). Areas generating urban runoff along the Project reach include the Cities of Winters and Davis.

Groundwater

Lower Putah Creek, including the Project Area, overlies the northern end of the Solano Subbasin, a 664-square-mile subbasin of the Sacramento Valley Groundwater Basin (DWR, 2006, p. 1). The Solano Subbasin is the largest groundwater basin in Solano County. Groundwater within the Solano Subbasin is considered to be of generally good quality (SCWA, 2015; County of Solano, 2008b, pp. 4.5-10 to 4.5-11). Total dissolved solids (TDS) range from 250 parts per million (ppm) to 500 ppm in the northern portion of the basin (which includes the Project Area), below or approaching the 500-ppm secondary MCL. Most of the water within the subbasin is classified as hard to very hard. Boron concentrations are less than 0.75 ppm in the Project Area's portion of the basin (levels above 1.0 ppm can affect sensitive tree crops). Basin arsenic concentrations are typically between 0.02 ppm and 0.05 ppm (the primary MCL for arsenic is 0.05 ppm) (County of Solano, 2008b, p. 4.5-11).

Project Area Conditions by Reach

Specific information on water quality conditions along each Project reach is provided below.

NAWCA/Mariani

No unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area.

Duncan-Giovannoni

This reach contains approximately 5 acres of in-channel pools, which increase water temperatures and decrease DO levels, resulting in a lower existing condition of water quality relative to the creek generally. Under flood conditions, this reach receives flows from McCune/Pleasant Creek and Dry Creek, which enter the reach southwest of the City of Winters. Water quality in waterways can be subject to short-term impacts associated with flood water, including bacteria, raw sewage, agricultural and urban runoff, and other hazardous or toxic substances (US EPA, 2014c). However, under such conditions, flows are also greater, which may increase the dilution of such substances. First-flush flows each rainy season also can result in peaks of urban and agricultural contaminants in the Creek. Agricultural effects on water quality are as discussed above in the general setting.

Winters Putah Creek Nature Park

Several municipal storm water drains for the City of Winters are located in this reach. A 2-year study of fish, crayfish, and aquatic insects for mercury effects throughout the length of lower Putah Creek between Monticello Dam and the Yolo Bypass did not indicate contamination related to the City of Winters runoff (EDAW, 2005, p. 4-31). Under flood conditions, water quality in waterways can be subject to short-term impacts associated with flood water, including bacteria, raw sewage, agricultural and urban runoff, and other hazardous or toxic substances (US EPA, 2014c). However, under such conditions, flows also are greater, which may increase the dilution of such substances.

East of 505

No conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Warren

A Yolo County Flood and Irrigation District Canal return outfall is located in this reach. Under excess flow or flood conditions, water entering waterways can result in short-term impacts associated with flood water, including conveying bacteria, raw sewage,

urban runoff, agricultural runoff which could contain herbicide or pesticide residues, and other hazardous or toxic substances into the waterway (US EPA, 2014c). However, under such conditions, flows are also greater, which may increase the dilution of such substances. Otherwise, no unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area.

Upper McNamara

This reach contains approximately 5 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. No other unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Lower McNamara

This reach contains approximately 7 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. No other unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

MacQuiddy (Lester)

No unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Russell Ranch

This reach contains approximately 7 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. No other unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Stevenson Bridge

This reach contains approximately 1.5 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. No other unusual water quality existing conditions exist that would distinguish water quality conditions in this reach

from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Glide Ranch

This reach contains approximately 7 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. No other unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Nishikawa

No unusual water quality existing conditions exist that would distinguish water quality conditions in this reach from the general existing conditions in the Project Area. Agricultural effects on water quality are as discussed above in the general setting.

Olmo-Hammond-UCD

This reach contains approximately 17 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. In the upstream half of this reach, no other unusual water quality existing conditions exist that would distinguish water quality conditions in the Project Area.

In the downstream half of the reach, on the north bank, somewhat east of the middle of the reach, a smaller side branch of the creek splits off along the north bank of the creek. This northern side branch, which runs through the southern edge of UC Davis campus of and then the City of Davis, is part of the historic channel of Putah Creek and is not part of the Project Area. From this point eastward, the main branch of the creek, including the Project Area, enters the engineered, leveed channel. In contrast to the prior, leveed reaches, here the levees limit run-on water (water running into the creek) by blocking lateral flow across the landscape. This buffers the reach from potential water quality impacts from stormwater coming from the north or south.

Agricultural effects on water quality are discussed above in the general setting.

I-80 to Old Davis Road, Old Davis Road to Mace

This reach contains approximately 27 acres of in-channel pools, which have resulted in increased water temperatures and reduced DO levels. As described in Section 3.7, *Hazards and Hazardous Materials*, both of these reaches are located within the engineered, leveed channel, which ends at Mace Boulevard/Road 104, the Solano-Yolo

County line. In contrast to the un-leveed reaches, here the levees limit run-on water by blocking lateral flow across the landscape. This buffers the reaches from water quality impacts from stormwater flows from the north and south. Agricultural effects on water quality are as discussed above in the general setting.

Both of these reaches are in the vicinity of the former Laboratory of Energy-related Health Research (LEHR) (UC Davis, 1995, p. 48, Figure 2). The LEHR site is northeast of the eastern edge of the I-80 to Old Davis Road reach and directly north of the western end of the Old Davis Road to Mace reach. Groundwater monitoring wells are used to measure the movement of contaminants into the shallow aquifer below the site, including chloroform, hexavalent chromium, nitrate, and tritium (UC Davis, 2015a).

These reaches receive treated wastewater from the UCD WWTP, which discharges treated wastewater from an outfall east of Old Davis Road, on the border between the two reaches (UC Davis, 2004, pp. 3-3 to 3-4, Exhibit 3-2). The plant also discharges treated wastewater to the Arboretum Waterway on the UC Davis campus, outside of the Project Area (CVRWQCB, 2014, pp. 24, F-2 to F-3). This waterway is located in the historical channel of the former North Fork of Putah Creek and is confined at both ends and used for storm water management. The flow from the Arboretum Waterway is blended with stormwater and then pumped to Putah Creek (CVRWQCB, 2014, p. F-4).

The plant effluent is tertiary treated, which means it is oxidized, filtered, and disinfected before discharge into the creek, a continuous flow to Putah Creek that averages approximately 2.5 cubic feet per second (cfs) (EDAW, 2005, pp. 4-12, 4-27; SWRCB, 2015a, p. 3; SWRCB, 2015b, p. 3). During drought years when creek flow is low, this tertiary treated water can contribute up to half or slightly less than half the flow of Putah Creek from this point downstream (see Table 3.1-1 in Section 3.9, *Hydrology*). A NPDES permit issued by the CVRWQCB places limits on bacteria, chemicals, sediment, temperature and other potential contaminants in this tertiary treated effluent (CVRWQCB, 2014, pp. 4 to 8). As described above in the general setting, the UCD WWTP performs regular monitoring of water quality for the receiving waters of Putah Creek and for the effluent discharged into the creek; parameters measured include DO, electrical conductivity, temperature, pH, chemicals, and bacteria, among others. Recent monitoring data indicates that the UCD WWTP remains within the effluent contaminant limits set under its NPDES permit (CVRWQCB, 2014, pp. 4 to 8; SWRCB, 2015a; SWRCB 2015b).

Mace to Road 106A, Road 106A to Yolo Bypass Wildlife Area

Both of these reaches contain wide in-channel pools that increase water temperatures and decrease DO levels, resulting in a lower existing condition of water quality. The Mace to Road 106A reach contains approximately 17 acres of pools and Road 106A to Yolo Bypass Wildlife Area reach contains approximately 11 acres of pools.

Both of these reaches are located within the floodplain of the Yolo Bypass and so are subject to flooding both inside and outside of the levee. Under flood conditions, water quality in waterways can be subject to short-term impacts associated with flood water, including bacteria, raw sewage, and other hazardous or toxic substances (US EPA, 2014c). However, under such conditions, flows are also greater, which may increase the dilution of such substances.

Under low flow drought conditions, up to half of the flow in these reaches may consist of tertiary treated water from the UCD WWTP upstream (see Table 3.1-1 in Section 3.1, *Hydrology* for minimum flow releases). As described above, this water is subject to regular monitoring and limits on bacteria, chemicals, sediment, temperature and other potential contaminants in the treated effluent (CVRWQCB, 2014, pp. 4 to 8). Agricultural effects on water quality are as discussed above in the general setting.

Regulatory Setting

Federal Regulations

Federal Clean Water Act

The Federal Clean Water Act (CWA) and related water quality programs and agencies applicable to the Project are discussed below.

CWA Water Quality Standards

Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in the water. The State Water Resources Control Board (SWRCB) is responsible for assuring implementation and compliance with the provisions of the CWA and the Porter-Cologne Act.

As required by CWA Section 303(d), the SWRCB performs a biennial assessment of water quality data on state waters to determine whether their pollutant levels exceed water

quality criteria and standards (SWRCB, 2013c). Waters that exceed the standard after the application of certain technology-based controls are placed on a list and scheduled for development of Total Maximum Daily Loads (TMDLs) (SWRCB, 2004, p. 1). A discussion of Putah Creek's listing for boron and mercury on the SWRCB's 303(d) list of waterbodies is presented in the *Clean Water Act Section 303(d) Listing* in the Environmental Setting, above.

CWA Sections 404 and 301

Any person, firm, or agency planning to alter or work in navigable waters of the U.S., including the discharge of dredged or fill material, must first obtain authorization from the U.S. Army Corps of Engineers (USACE). Section 301 of the Federal Water Pollution Control Act and Amendments of 1972 (CWA) prohibits the discharge of pollutants, including dredged or fill material, into waters of the U.S. without a Section 404 permit from USACE (33 U.S.C. Section 1344).

Under Section 401 of the CWA, an applicant for a Section 404 permit must first obtain a certificate from the appropriate state agency stating that the fill is consistent with the state's water quality standards and criteria (County of Solano, 2008b, p. 4.5-21). Additional discussion of Section 404 and USACE jurisdiction and permitting is in Section 3.1, *Hydrology*, of this PEIR. For additional discussion of Section 401 Water Quality Certification, see below under the discussions of the Central Valley Regional Water Quality Control Board and the National Pollutant Discharge Elimination System.

State and Regional Regulations

Central Valley Regional Water Quality Control Board

In California, the US EPA delegates much of the implementation of the Clean Water Act to the SWRCB (County of Solano, 2008a, p. RS-74). The SWRCB and the nine Regional Water Quality Control Boards (RWQCBs) have the authority in California to protect and enhance water quality, both through their designation as the lead agencies in implementing the federal CWA Section 319 non-point source pollution control program (which regulates pollution from diffuse sources, such as stormwater runoff) and under the state Porter-Cologne Act. Under the Porter-Cologne Act, the state and RWQCBs maintain independent regulatory authority over the placement of waste, including fill, into waters of the state (County of Solano, 2008a, p. RS-73).

The CVRWQCB guides and regulates water quality in streams and aquifers of the region surrounding the Project Area through designation of beneficial uses, establishment of

water quality objectives, administration of the National Pollutant Discharge Elimination System (NPDES) permit program for stormwater and construction site runoff, and Section 401 water quality certification where development results in fill of jurisdictional wetlands or waters of the U.S. under Section 404 of the CWA. The CVRWQCB is responsible for the issuance of NPDES permits under the CWA and on behalf of the SWRCB, and the US EPA is responsible for activities that could cause water quality impacts to surface waters and groundwater.

Water Quality Standards

Project activities may be subject to CWA Section 401 water quality certification for discharges of dredged and fill materials through the CVRWQCB (SWRCB, 2014). This certification would ensure that Project activities are consistent with the state's water quality standards and criteria (County of Solano, 2008b, p. 4.5-21). As part of this certification, CVRWQCB would require erosion controls in all areas disturbed by Project activities. Compliance with, and success of, erosion controls are monitored and measured through required water sampling that tests the water for settleable material and for turbidity as measured in nephelometric turbidity units (NTUs) (US EPA, 2012b). Settleable material is typically limited to no more than 0.1 ml/l in surface waters as measured in surface waters 300 feet downstream from the work area. NTU sampling under the CVRWQCB Section 401 certification typically includes the following limits on turbidity increases:

- where natural turbidity is less than 1 NTU, controllable factors shall not cause downstream turbidity to exceed 2 NTU;
- where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU;
- where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent;
- where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs;
- where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

CWA Section 401 water quality certification also requires monitoring through visual inspections consisting of observations to detect visible construction related pollutants, such as visible plumes of material in the water.

Waste Discharge Requirements

A Storm Water Pollution Prevention Plan (SWPPP) may be required for Project activities under the NPDES General Permit for Construction Storm Water Discharges and under the SCWA Grading Policy. The SWPPP(s) would be prepared by a Qualified SWPPP Developer and would incorporate Best Management Practices (BMPs) designed to protect against erosion and siltation impacts from water running on to the Project Area. BMPs would be developed from the Construction BMP Handbook published by the California Stormwater Quality Association (CASQA). The SWPPP(s) also would incorporate visual, chemical, and sediment monitoring programs as required.

CVRWQCB and the National Pollutant Discharge Elimination System (NPDES)

The purpose of the NPDES program is to establish a comprehensive stormwater quality program to manage urban stormwater and minimize pollution of the environment to the maximum extent practicable. The NPDES program consists of: 1) characterizing receiving water quality, 2) identifying harmful constituents, 3) targeting potential sources of pollutants, and 4) implementing a comprehensive stormwater management program. Each NPDES permit contains limits on allowable concentrations and mass emissions of pollutants contained in the discharge. Permits require the preparation of a SWPPP, which is an operational plan that describes best management practices to be implemented to reduce impacts on water quality and aquatic habitat.

NPDES General Permit for Construction Storm Water Discharges

The NPDES General Permit for Construction Storm Water Discharges sets Waste Discharge Requirements for projects that disturb one or more acres of soil, which the proposed Project would do in some cases when not otherwise exempted. Thus, certain Project activities the Project Area would be required to comply with this permit. Compliance with this permit is also required by the SCWA (see discussion of Local Regulations below). The permit requires that the following general measures be implemented during construction activity:

- Elimination or reduction of non-storm water discharges to storm water systems and other waters of the U.S.
- Development and implementation of a SWPPP prepared by a Qualified SWPPP Developer identifying BMPs the discharger will use to protect stormwater runoff and incorporating visual, chemical, and sediment monitoring programs.
- Inspections of stormwater control structures and pollution prevention measures (SWRCB, 2013a; SWRCB, 2013b, Section XIV).

Water Pollution

According to Fish and Game Code Section 5650, "it is unlawful to deposit in, permit to pass into, or place where it can pass into the waters of the state" any substance or material deleterious to fish, plant life, or bird life, including non-native species. This provision includes application of herbicides that could result in pollution of "Waters or the State" impacting fish and wildlife resources (CDFW, 2015, p. 3).

Local Regulations

Solano County Water Agency

SCWA was established by the state legislature in 1951 as a wholesale water supply agency to provide untreated water to water-service agencies in Solano County from the federal Solano Project and the North Bay Aqueduct of the State Water Project. SCWA also handles flood control matters within its boundaries and monitors efforts to mitigate storm water runoff. SCWA's boundaries encompass the entire County of Solano, the portion of UC Davis in Yolo County, and approximately 2,800 acres of Yolo County Reclamation District No. 2068 (SCWA, 2015; County of Solano, 2008a, p. RS-73).

SCWA Grading Policy

Acting under Chapter 31 of the Solano County Code, the county grading ordinance, SCWA has adopted a Grading Policy that allows the agency an exemption from the requirement to obtain a county grading permit from Solano County when conducting its work (SCWA, 2009). The SCWA Grading Policy incorporates several grading provisions from the Solano County Code, including the following erosion, sediment, and runoff control provisions relevant to analysis of potential water quality impacts of the proposed Project.[1]

31-16 Construction Season

The construction season commences on April 15th and ends on October 15th of each calendar year. Work performed under this Chapter shall not occur at a time outside of the construction season without the written approval of the Director.

All grading plans and permits with land disturbance equal to or greater than 1 acre shall comply with the provisions of this section for NPDES compliance.

[1] The Grading Policy also incorporates County Code provision 31-12 Definitions.

31-31 National Pollution Discharge Elimination System (NPDES)

All grading plans and permits with land disturbance equal to or greater than 1 acre shall comply with the provisions of this section for NPDES compliance.

(a) No grading and drainage permit shall be issued unless the plans for such work include a Storm Water Pollution Prevention Plan with details of best management practices, including desilting basins or other temporary drainage or control measures, or both, as may be necessary to control construction-related pollutants which originate from the site as a result of construction related activities.

(b) All best management practices shall be installed before grading begins. As grading progresses, all best management practices shall be maintained in good working order to the satisfaction of the Director unless final grading approval has been granted by the Director and all permanent drainage and erosion control systems, if required, are in place.

County Code Section 31-30 is a lengthy provision that has been incorporated into the Grading Policy. It is intended to assure that development be accomplished so as to minimize adverse effects upon the existing terrain and to minimize the potential for erosion. Control measures are to apply to all aspects of the proposed grading and are intended to be operational during all stages of development. The following basic design principles and standards shall serve as minimum guidelines for grading plans and erosion, sediment, and runoff control plans. Section 31-30 includes numerous policies relevant to analysis of potential water quality impacts of the proposed Project. Under the SCWA Grading Policy, SCWA applies the relevant Solano County Code provisions whenever it performs acts to "change the topography of any land in such manner that alters or interferes with existing drainage; fill, close, excavate, or clear vegetation" (SCWA, 2009).

Solano County General Plan

The following policies and implementation programs from the Solano County General Plan are relevant to analysis of the proposed Project's potential water quality impacts.

Policies

RS.P-64: Identify, promote, and seek funding for the evaluation and remediation of water resource or water quality problems through a watershed management approach. Work with the regional water quality control board, watershed-focused groups, and stakeholders in the collection, evaluation and use of watershed-specific water resource information.

RS.P-65: Require the protection of natural water courses.

RS.P-66: Together with the Solano County Water Agency, monitor and manage the county's groundwater supplies.

RS.P-70: Protect land surrounding valuable water sources, evaluate watersheds, and preserve open space lands to protect and improve groundwater quality, reduce polluted surface runoff, and minimize erosion.

S.P-71: Ensure that land use activities and development occur in a manner that minimizes the impact of earth disturbance, erosion, and surface runoff pollutants on water quality.

S.P-72: Preserve riparian vegetation along county waterways to maintain water quality.

(County of Solano, 2008a; p. RS-77)

Implementation Programs

RS.I-68: Seek funding opportunities for collaborative watershed planning approaches to water quantity and quality enhancement and protection, where such an approach is the desired method of accomplishing the program objectives.

RS.I-71: Require proposed projects located within the Putah Creek and Ulatis Creek watersheds to minimize project-related stormwater runoff and pollution. Stormwater runoff and pollution loads resulting after development of projects shall not exceed predevelopment conditions.

(County of Solano, 2008a; p. RS-79)

Yolo County General Plan

The following policies and actions from the Yolo County General Plan are relevant to analysis of the proposed Project's potential water quality impacts.

Policy CO-5.6: Improve and protect water quality for municipal, agricultural, and environmental uses. (County of Yolo 2009, p. CO-70)

Policy CO-5.23: Support efforts to meet applicable water quality standards for all surface and groundwater resources. (County of Yolo 2009, p. CO-72)

> Action CO-A75: Participate in regional planning efforts regarding surface water resources, including the Sacramento River, Cache Creek, Putah Creek, Tehama-Colusa Canal, Yolo Bypass, and Sacramento-San Joaquin Delta.

(County of Yolo, 2009, p. CO-74)

3.2.2 Significance Criteria

The following thresholds for measuring a project's environmental impacts are based on CEQA Guidelines Appendix G standards of significance (OPR, 2013). For the purposes of this PEIR, an impact to water quality is considered significant if implementation of the proposed Project may result in any of the following:

- Violate any water quality standards or waste discharge requirements.
- Otherwise substantially degrade water quality.

3.2.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in Table 3.2-2, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.2-1: Water Quality Impacts from Erosion and Sediment Release.

As is discussed in greater detail in Chapter 3.1, *Hydrology*, the Project would not result in long-term adverse water quality changes from erosion or sediment release because Project activities would have no effect on flow regimes that could affect erosion or siltation. However, Project activities could generate short-term erosion and sediments that could affect water quality by increasing short-term turbidity. These activities include bank stabilization, temporary flow diversions (via pipe, trench, or temporary coffer dam), channel reconfiguration (grading and clearing), Project maintenance activities such as weed management, and gravel augmentation, scarification, and maintenance.

Erosion and sediment controls implemented to comply with Section 401 water quality certification, with any required SWPPP(s), and with the SCWA Grading Policy would ensure that Project activities would not result in significant turbidity, erosion, and other water quality impacts.

In some situations, a SWPPP may not be required for certain Project activities, such as activities that are limited in acreage or that otherwise do not trigger SWPPP requirements under NPDES. In those situations, Mitigation Measure 3.1-1 would be implemented (see Section 3.1, *Hydrology*).

Controls implemented to comply with Section 401 Water Quality Certification, with any required SWPPP(s), with the SCWA Grading Policy, and with Mitigation Measure 3.1-1 would ensure that Project impacts related to Water Quality Standards or Waste Discharge Requirements would remain **less than significant**. No additional mitigation is required.

Impact 3.2-2: Construction Equipment Impacts to Water Quality.

Project construction equipment operating in the stream channel area could adversely affect water quality through leaks, spills, or drips of fluids including motor oils, diesel fuel, and lubricants.

Mitigation 3.2-1: Procedures to Prevent Contamination from Construction Equipment.

In order to prevent contamination from vehicle or equipment leaks during Project activities, the Project Applicant shall implement the following actions:

1. Vehicles shall be maintained and operated in a leak-free condition.
2. Project vehicles shall not park or stored on impervious surfaces.
3. No fueling or maintenance of vehicles or equipment shall occur in the channel or floodplain. The exception would be if equipment that cannot be readily relocated (e.g., pumps and generators).
4. All off-site fueling sites (e.g., on access roads above the top-of-bank) shall be equipped with secondary containment and avoid a direct connection to underlying soil, surface water, or the storm drainage system.
5. For any stationary equipment (e.g., pumps and generators) that must be fueled on-site, secondary containment, such as a drain pan, drop cloth or booms, shall be provided in such a manner to prevent accidental spill of fuels to underlying soil, surface water, or the storm drainage system.
6. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials shall not be allowed to enter receiving waters or the storm drainage system.
7. Waste disposal containers shall be covered when they are not in use.

Impact 3.2-3: Impacts of Project on Water Temperature and Dissolved Oxygen/Biological Oxygen Demand (BOD).

Water Temperature

As described in the general setting, high water temperatures affect water quality by lowering the stream of DO (see Section 3.4, *Biological Resources,* for water temperature effects on organisms and habitat). Due to existing large pools in the Project Area, which slow water down and expose it to solar heating, summer stream temperatures can exceed 68°F near Highway 505 and above 77°F near Interstate 80 (Yates, 2003; as referenced in Stillwater, 2015, p. 16). The Project's conversion of these large pools to riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Additionally, the Project would decrease creek water temperatures by facilitating the growth of shade-providing riparian vegetation. Although the reaches containing pools would accrue the most direct temperature benefit (Duncan-Giovannoni, Upper McNamara, Lower McNamara, Russell Ranch, Stevenson Bridge, Glide Ranch, Olmo-Hammond-UCD, Old Davis Road to Mace, Mace to Road 106A, and Road 106A to Yolo Bypass Wildlife Area), the lower water temperatures would benefit the entire creek. Therefore, the Project's impacts would be beneficial.

Dissolved Oxygen and Biochemical Oxygen Demand

As described in Chapter 2, *Project Description*, excessively long, deep, and overly wide pools that resulted from historic mining activities would be converted from open water to floodplain, including new riffles and runs. These new riffles and runs would increase oxygenation of the water and reduce solar heating of the water, both of which would increase DO and diminish BOD imbalances (US EPA, 2012c). Although the reaches containing pools would accrue the most direct benefit (Duncan-Giovannoni, Upper McNamara, Lower McNamara, Russell Ranch, Stevenson Bridge, Glide Ranch, Olmo-Hammond-UCD, Old Davis Road to Mace, Mace to Road 106A, and Road 106A to Yolo Bypass Wildlife Area), the increased levels of DO would benefit the entire creek. Therefore, the Project's impacts would be beneficial.

Impact 3.2-4: Potential Release of other Contaminants into Creek Waters.

The Project could potentially result in release of boron, mercury, herbicides, fertilizers, and pesticides into the creek waters. Impacts of these potential contaminants are described below.

Boron

As identified above under Environmental Setting, boron is a naturally occurring element present in Putah Creek that enters the creek and the Project Area through groundwater leaching of boron-containing rocks and soils. The Project would not alter the amount or the content of groundwater entering the creek and so the Project would have **no impact** on the amount of boron in the creek and the Project Area.

Mercury

As described above, methylmercury production is associated with seasonal wetlands and disturbance of sediments containing mercury. The Project would not significantly increase the acreage of wetlands in the Project Area that are known to methylate mercury. The Project has the potential minimally contribute to mercury methylation through the incidental disturbance of mercury-containing sediments. Based on the experience of the Lead Agency (SCWA) and on 401 water quality certification requirements, construction-related activities generate only a very small temporary increase in sediment resuspension, observed repeatedly in numerous projects in Putah Creek. By contrast, ordinary stream bedload movement has orders of magnitude higher suspended sediment concentrations. Based on the Lead Agency's experience with turbidity monitoring through 401 certification requirements, turbidity monitoring and control is an effective tool, and the CWA Section 401 certification program serves as an effective standard for minimizing sediment disturbance that could directly or indirectly affect mercury methylation or concentrations. As discussed under Impact 3.2-1 above, erosion and sediment controls implemented to comply with Section 401 water quality certification, with any required SWPPP(s) required under the NPDES program, and with the SCWA Grading Policy would minimize sediment disturbance. This approach is consistent with the CVRWQCB Delta Mercury Control Program, which uses NPDES permits as the regulatory mechanism for point sources of the contaminant (CVRWQCB, 2011, p. 4).

Additionally, the Project's proposed conversion of the creek's long, deep, and overly wide pools to floodplain would the amount of bioavailable mercury in the creek by replacing anoxic pools with oxygenated riffles and runs.

The regulatory erosion and sediment control programs identified above and implementation of Mitigation Measure 3.1-1 (see Section 3.1, *Hydrology*) would reduce or eliminate the Project's contribution to methylation in the waterway, resulting in a **less-than-significant** impact. No additional mitigation is required.

Fertilizers and Pesticides

The Project would not utilize fertilizers or pesticides and therefore would have **no impact** on water quality from these pollutant sources.

Herbicides

As described in Chapter 2, *Project Description*, herbicides approved by the California Department of Pesticide regulation may be used in accordance with their labels as part of Project activities to reduce invasive weed species that may be contributing to water quality problems through accelerated erosion, channel roughness and channel deflection. Herbicides anticipated to be used include glyphosate, triclopyr, imazapyr, aminopyralid, chlorsulfuron, dithiopyr, and isoxaben. Some form of chemical weed control is anticipated to be used in every reach for channel maintenance (see Chapter 2, *Project Description*, Table 2-1: Invasive Weed Control).

Section 3.4, *Biological Resources,* includes a discussion of herbicides that may be used as part of Project activities and their potential effects to fish and wildlife (CDFW, 2015, p. 3). Potential Project herbicide impacts specifically related to water quality are discussed below.

Glyphosate

Glyphosate accidentally oversprayed on the water could contaminate surface waters because it would not be broken down readily by water or sunlight (US EPA, 1993, p. 4). Mitigation Measure 3.4-12 would require all Project use of glyphosate to be applied only by a licensed applicator in accordance with label directions and US EPA recommendations to avoid overspray and avoid application to water during non-aquatic uses (US EPA, 1993) (see Section 3.4, *Biological Resources*). Therefore, after mitigation, potential water quality impacts related to Project use of glyphosate would be reduced to **less than significant**.

Triclopyr

US EPA has concluded that use of triclopyr in accordance with product labeling does not pose unreasonable risks of adverse effects to humans or the environment (US EPA, 1998, pp. 3, 6). In water, triclopyr primarily breaks down through exposure to light (photodegradation). US EPA notes that flowing water systems would result in rapid dissipation of triclopyr (US EPA, 1998, pp. 4 to 5).

Given triclopyr's rapid dissipation and US EPA's conclusion that its use in accordance with product labeling does not pose unreasonable environmental risks, Project use of

triclopyr is not considered likely to result in significant impacts to water quality. Mitigation Measure 3.4-12 would reduce the potential impacts further. Therefore, both before and after mitigation, potential Project water quality impacts related to use of triclopyr would be **less than significant**.

Imazapyr

Imazapyr can move via runoff to surface water and to leach to groundwater. Imazapyr breaks down in the environment only through photolysis (breakdown by photons, including visible light, ultraviolet light, x-rays and gamma rays). US EPA considers human health risks from imazapyr to be below the level of concern, and imazapyr is not expected to bioaccumulate in aquatic organisms (US EPA, 2006, pp. 1, 17).

Given imazapyr's low toxicity and its US EPA-registered use for aquatic and semi-aquatic weed control, Project use of imazapyr is not considered likely to result in significant impacts to water quality (US EPA, 2006, p. 33.). Mitigation Measure 3.4-12 would reduce the potential impacts further by requiring all Project application of imazapyr to be only by a licensed applicator in accordance with label directions and US EPA recommendations to prevent overspray and unnecessary aquatic use (US EPA, 1993, pp. 32 to 33) (see Section 3.4, *Biological Resources*). Therefore, both before and after mitigation, potential water quality impacts related to use of imazapyr would be reduced to **less than significant**.

Aminopyralid

The primary way aminopyralid breaks down in by photolysis (breakdown by photons, including visible light, ultraviolet light, x-rays and gamma rays). US EPA has concluded that aminopyralid poses no risk to humans (US EPA, 2005a, p. 2). Given Aminopyralid's low toxicity and lack of persistence in the environment, Project use of imazapyr is not considered likely to result in significant impacts to water quality (US EPA, 2006, pp. 2, 6, 20). Mitigation Measure 3.4-12 would reduce the potential impacts further by requiring all Project application to be only by a licensed applicator in accordance with label directions and US EPA recommendations to apply aminopyralid using hand-spray and spot treatments only (US EPA, 2005a, p. 19) (see Section 3.4, *Biological Resources*). Therefore, both before and after mitigation, potential water quality impacts related to use of aminopyralid would be **less than significant**.

Chlorsulfuron

US EPA has concluded that ecological risks of chlorsulfuron are below the level of concern, provided that chlorsulfuron is applied to minimize spray drift (US EPA, 2005b,

p. 5), therefore, Project use of chlorsulfuron is not considered likely to result in significant impacts to water quality (US EPA, 2006, pp. 2, 6, 20). Mitigation Measure 3.4-12 would reduce the potential impacts further by requiring all Project application to be only by a licensed applicator in accordance with label directions and US EPA recommendations to avoid spray drift and limit use to one application per growing season (US EPA, 2005b, pp. 5 to 6) (see Section 3.4, *Biological Resources*). Therefore, after mitigation, potential water quality impacts related to Project use of chlorsulfuron would be reduced to **less than significant**.

Dithiopyr

In water, dithiopyr breaks down through photodegradation (US EPA, 1991, p. 2). Given dithiopyr's tendency to break down in water, Project use of dithiopyr is not considered likely to result in significant impacts to water quality (US EPA, 1991, p. 2). Mitigation Measure 3.4-12 would reduce the potential impacts further by requiring all Project application of dithiopyr to be only by a licensed applicator in accordance with label directions and US EPA recommendations to refrain from use in or near water (US EPA, 1991, pp. 7 to 8) (see Section 3.4, *Biological Resources*). Therefore, both before and after mitigation, potential water quality impacts related to use of dithiopyr would be **less than significant**.

Isoxaben

This herbicide is considered to have low toxicity (WSDOT, 2006, p. 2). Microbes and sunlight break down isoxaben, and the herbicide has a low potential to leach to groundwater. The herbicide is highly persistent in soil but breaks down quickly in water. Given isoxaben's low toxicity, low potential for groundwater contamination, and tendency to break down quickly in water, Project use of isoxaben is not considered likely to result in significant impacts to water quality (WSDOT, 2006, pp. 2-3). Mitigation Measure 3.4-12 would reduce the potential impacts further by requiring all Project application to be only by a licensed applicator in accordance with label directions and agency recommendations to control spray drift and refrain from use in water or to intertidal areas below the mean high water mark (WSDOT, 2006, p. 3) (see Section 3.4, *Biological Resources*). Therefore, both before and after mitigation, potential water quality impacts related to use of isoxaben would be **less than significant**.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project short-term impacts would remain **less than significant**. Over the long-term, the Project would improve water quality by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 5 acres of pool of from open water to floodplain, riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, it would indirectly benefit from increased levels of DO generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's overall conversion of large pools to new riffles and runs would lower water temperature by increasing flow velocity and by reducing solar heating of the creek. Although this reach does not contain such pools, its water quality would benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

As described above, implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Duncan-Giovannoni

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project impacts would remain **less than significant**, while over the long-term, the Project would improve sediment-related water quality by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 5 acres of pool from open water

to floodplain, riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 5 acres of pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 5 acres of in-channel pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. This reach contains and would directly benefit from water temperature decreases.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use along this reach to **less than significant**.

Winters Putah Creek Nature Park

<u>Erosion/Sedimentation Impacts to Water Quality</u>

Except for a small portion of the reach far upstream, restoration activities have already been completed for this reach, so the only activities anticipated in this reach are maintenance, including weed control. The only potential Project impacts on water quality standards or waste discharge requirements could be from mechanical weed-pulling or the inadvertent over-application of herbicide, in the event either of these activities disturbed and exposed soil that could erode into the creek. Mitigation

Measure 3.1-1 (see Section 3.1, *Hydrology*) would ensure that Project sediment-related water quality impacts would be **less than significant**.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Because restoration activities have already been completed for most of this reach, the only potential water quality impacts resulting from the Project could be from maintenance activities such as mechanical weed-pulling or the inadvertent over-application of herbicide, in the event either of these activities disturbed and exposed soil that could erode into the creek. Mitigation Measure 3.1-1 (see Section 3.1, *Hydrology*) would be implemented to avoid or minimize disturbance of mercury-containing sediments and ensure that Project impacts related to mercury remain **less than significant**.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, its DO levels would benefit from increased DO levels generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large to new riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, its water quality would benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use along this reach to **less than significant**.

East of 505

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project impacts would remain **less than significant**, while over the long-term, the Project would improve sediment-related water quality by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of excessively long, deep, and overly wide pools to new riffles and runs would increase DO and diminish BOD

imbalances (US EPA, 2012c). Although this reach does not contain such pools, it would indirectly benefit from increased levels of DO generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, it would indirectly benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use along this reach to **less than significant**.

Warren

<u>Erosion/Sedimentation Impacts to Water Quality</u>

Potential impacts of proposed Project activities in this reach to turbidity are identical to those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project impacts would be **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, its DO concentrations would benefit from increased DO levels generated in other reaches upstream.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, it would benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Upper McNamara

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert an approximately 5-acre pool of from open water to floodplain, riffles, and runs. This would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 5 acres of pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of about 5 acres of in-channel pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Lower McNamara

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert a 7-acre pool from open water to floodplain, riffles, and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 7 acres of in-channel pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of 7 acres of pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

MacQuiddy (Lester)

<u>Erosion/Sedimentation Impacts to Water Quality</u>

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of excessively long, deep, and overly wide pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, it would benefit from increased DO generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, it would indirectly benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Russell Ranch

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 7 acres of pools from open water to floodplain, riffles, and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 7 acres of pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of 7 acres of pools to new riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Stevenson Bridge

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 1.5 acres of pools from open

water to floodplain, riffles, and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 1.5 acres of pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of 1.5 acres of pools to new floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Glide Ranch

<u>Erosion/Sedimentation Impacts to Water Quality</u>

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert an overly large pool of approximately 15 acres from open water to floodplain, riffles, and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 7 acres of pools to new floodplains, riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 7 acres of pools to new floodplains, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Nishikawa

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of excessively long, deep, and overly wide pools to new riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, it would benefit from increased DO generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, it would indirectly benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Olmo-Hammond-UCD

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert

approximately 17 acres of pool from open water to floodplain, riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 17 acres of in-channel pools to new floodplain, riffles, and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 17 acres of in-channel pools to floodplain, riffles, and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. This reach contains and would directly benefit from water temperature decreases.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

I-80 to Old Davis Road

<u>Erosion/Sedimentation Impacts to Water Quality</u>

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Potential impacts of proposed Project activities in this reach are identical to those analyzed in Impact 3.2-2 above: no unusual conditions exist in this reach, and the Project would not significantly increase the acreage of wetlands that are known to methylate mercury.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new floodplain, riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c). Although this reach does not contain such pools, it would indirectly benefit from increased levels of DO generated in other reaches.

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of large pools to new floodplain, riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek. Although this reach does not contain such pools, it would indirectly benefit from water temperature decreases in other reaches.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Old Davis Road to Mace

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 27-acres of pool from open water to floodplain, riffles and runs. This would significantly reduce anaerobic areas and replace an anoxic pool with oxygenated riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 27 acres of pools to new floodplain, riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 27 acres of in-channel pools to new floodplain, riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Mace to Road 106A

Erosion/Sedimentation Impacts to Water Quality

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 17-acres of pool from open water to floodplain, riffles and runs. This would significantly reduce anaerobic areas and replace an anoxic pool with oxygenated riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 17 acres of pools to new floodplain, riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 17 acres of in-channel pools to new floodplain, riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Road 106A to Yolo Bypass Wildlife Area

<u>Erosion/Sedimentation Impacts to Water Quality</u>

There are no additional potential impacts of proposed Project activities in this reach besides those analyzed in Impact 3.2-1 above: controls implemented to comply with

Section 401 water quality certification and with any required SWPPP(s) would ensure that Project turbidity impacts would remain **less than significant**, while over the long-term, the Project would improve turbidity by reducing bank erosion and maintaining sediment transport capacity and sediment competence.

Impacts to Other Water Quality Constituents

Boron

There are no unusual conditions in this reach that would increase groundwater leaching of boron-containing rocks and soils or that would alter the amount or the content of groundwater entering the creek. Therefore, the Project would have **no impact** related to boron in this reach.

Mercury

Conditions and Project activities in this reach would not significantly increase the acreage of wetlands that are known to methylate mercury, and would not result in greater impacts related to methylation of mercury compared to other reaches. Additionally, the Project would convert approximately 11 acres of pool from open water to floodplain, riffles and runs. This would significantly reduce anaerobic areas and replace an anoxic pool with oxygenated riffles and runs, which would reduce the amount of bioavailable mercury in this reach.

Dissolved Oxygen and Biochemical Oxygen Demand

As analyzed in Impact 3.2-2 above, the Project's conversion of 11 acres of pools to new floodplain, riffles and runs would increase DO and diminish BOD imbalances (US EPA, 2012c).

Water Temperature

As analyzed in Impact 3.2-2 above, the Project's conversion of approximately 27 acres of in-channel pools to new floodplain, riffles and runs would lower water temperature by increasing flow velocity in these areas and by reducing solar heating of the creek.

Additionally, the Project would decrease creek water temperatures in this reach through the removal of invasive species, which would facilitate the growth of shade-providing riparian vegetation.

Fertilizers and Pesticides

As described in the general setting, the extensive agriculture occurring immediately outside of most of the Project Area can result in potential chemical fertilizer or pesticide

overspray and in rainy season peaks of these agricultural contaminants. The Project would not utilize fertilizers or pesticides and would have **no impact** on these existing conditions.

Herbicides

Implementation of Mitigation Measure 3.4-12 would reduce potential impacts related to herbicide use to a **less-than-significant** level.

Table 3.2-2 Summary of Water Quality Impacts and Mitigation Measures

Reach	Impact 3.2-1: Erosion and sedimentation	Impact 3.2-2: Construction Equipment	Impact 3.2-3: Water Temperature and Dissolved Oxygen	Impact 3.2-4 Potential Release of Other Contaminants	Applicable Mitigation Measures
NAWCA/Mariani	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Duncan-Giovannoni	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Winters Putah Creek Nature Park	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
East of 505	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Warren	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Upper McNamara	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Lower McNamara	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
MacQuiddy (Lester)	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Russell Ranch	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Stevenson Bridge	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Glide Ranch	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Nishikawa	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Olmo-Hammond-UCD	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
I-80 to Old Davis Road	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Old Davis Road to Mace	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12

Reach	Impact 3.2-1: Erosion and sedimentation	Impact 3.2-2: Construction Equipment	Impact 3.2-3: Water Temperature and Dissolved Oxygen	Impact 3.2-4 Potential Release of Other Contaminants	Applicable Mitigation Measures
Mace to Road 106A	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12
Road 106A to YBWA	SM	SM	B	SM	MM 3.1-1 MM 3.2-1 MM 3.4-12

Notes: B - Beneficial impact, NI = no impact, LS = LTS = Less than Significant Impact, SM = Significant but mitigatable to less than significant with measures identified in this section, and SU = Significant and Unavoidable, even after mitigation.