



11060 White Rock Road, Suite 200  
Rancho Cordova, CA 95670 ▪ Phone: (916) 363-4210 ▪ Fax: (916) 363-4230

## Memorandum

**To:** Brandon Larsen  
Senior Environmental Planner  
Caltrans Local District 1  
1656 Union Street  
Eureka, CA 95501

**Date:** June 24, 2016

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**Subject:** Water Quality Technical Memorandum for the Wolf Creek Road Bridge Replacement Project

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### Introduction

The purpose of this Water Quality Technical Memorandum is to provide an analysis of potential water quality degradation associated with the Wolf Creek Road Bridge Replacement Project (Project) proposed by the Lake County Department of Public Works (County).

### Project History

The bridge has a sufficiency rating (SR) of 60.1 and has been designated as functionally obsolete (FO) per the Caltrans Structure Maintenance & Investigations, Local Agency Bridge List (July 2015). The functionally obsolete designation is a result of the insufficient deck width. Wolf Creek Road is a two lane road and the clear width of the existing bridge is too narrow to support standard lane and shoulder widths for a two lane facility. Additionally, the existing bridge fails to meet the current Caltrans design standard for freeboard requirements. Hydraulic studies indicate that the existing bridge may be overtopped during a 100-year storm event.

### Project Purpose and Need

The purpose of the proposed project is to provide a replacement structure that is consistent with appropriate Caltrans structural design standards, is placed on a road alignment that meets the appropriate AASHTO roadway geometry standards, and is hydraulically capable of passing and clearing the design storm events (50-year storm plus 2 feet of freeboard and 100-year storm) while minimizing adverse impacts to Upper Wolf Creek and the surrounding area.

## Project Location

The proposed project is located in eastern Lake County approximately 5 miles northeast of the community of Clear Lake Oaks (**Figure 1**) near the intersection of Wolf Creek Road and Spring Valley Road (**Figure 2**). The proposed project is on the Benmore Canyon CA USGS 7.5' Quadrangle within Township 14 North, Range 7 West, Section 12.

## Project Description

The replacement bridge will be wider to comply with current AASHTO standards for local rural roads, including 9-foot travel lanes and 2-foot shoulders, plus crash-tested vehicular barriers. A 5-foot sidewalk (Lake County standard) will also be proposed on the north side of the replacement structure to accommodate school children accessing a nearby bus stop. The replacement bridge will be approximately 84 feet long. This length is appropriate for a single span bridge, which would reduce the construction duration and increase the hydraulic capacity of the channel.

It is anticipated that deep foundations will be needed to support the replacement bridge. The underlying formation of the soil is rock overlaid by alluvial and fan deposits which have washed down from the mountains. The upper materials are subject to scour; this is often best suited for concrete piles, as they can be designed to act as columns if the soil material scours away. The most feasible pile type will be determined during the type selection process, when further geotechnical information is available.

Demolition of the existing bridge structure and construction of the replacement bridge structure will be conducted in accordance with the regulatory agency permitted in-water work window. The project site, and select project features are shown in **Figure 3**.

## Regulatory Setting

### Federal Laws and Requirements

#### Clean Water Act

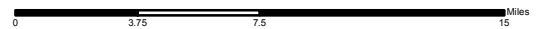
The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into “waters of the United States.” The act specifies a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff.

- Sections 303 and 304, which provide for water quality standards, criteria, and guidelines.
- Section 401 requires every applicant for a federal permit or license for any activity that may result in a discharge to a water body to obtain a water quality certification that the proposed activity will comply with applicable water quality standards.

Section 402 regulates point- and nonpoint-source discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES) program. In California, the State Water

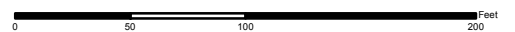


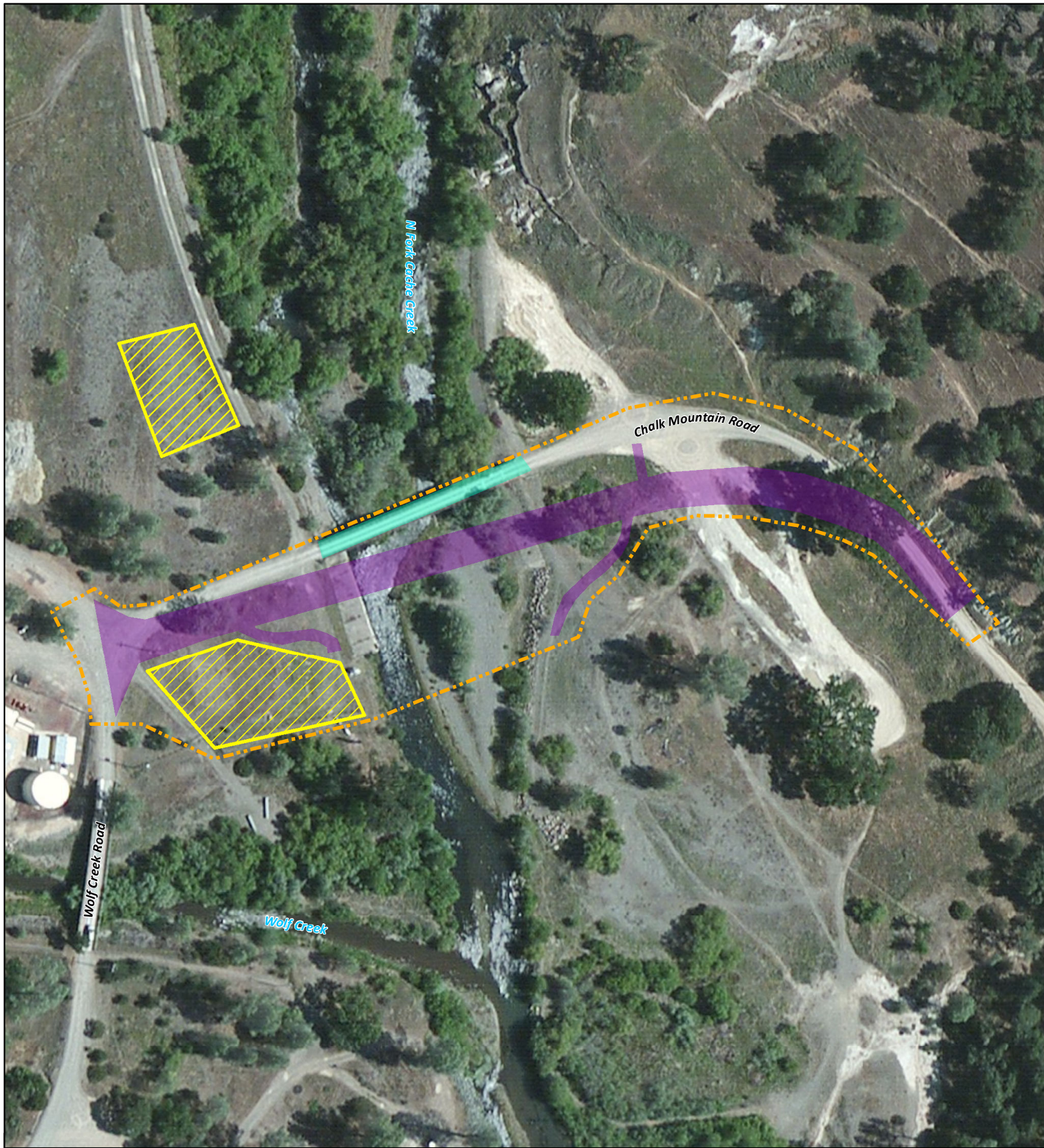
★ Project Location - Wolf Creek Road Bridge





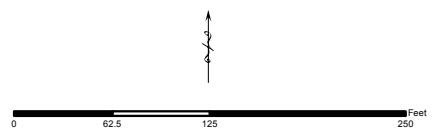
★ Project Location - Wolf Creek Road Bridge





**Legend**

- Project Impact Area
- Proposed Bridge and Roadway
- Existing Bridge
- Proposed Staging Area



Resources Control Board (SWRCB) oversees the NPDES program, which is administered by the Regional Water Quality Control Boards (RWQCBs). The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits. Anti-backsliding requirements provided for under CWA Sections 402(o)(2) and 303(d)(4) prohibit slackening of discharge requirements and regulations under revised NPDES permits. With isolated/limited exceptions, these regulations require effluent limitations in a reissued permit to be at least as stringent as those contained in the previous permit.

- Section 404 of the CWA establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including some wetlands. Activities in waters of the U.S. that are regulated under this program include fills for development, water resource projects (e.g., dams and levees), infrastructure development (e.g., highways and airports), and conversion of wetlands to uplands for farming and forestry.

### **Clean Water Act Section 303(d) Impaired Waters List**

Under Section 303(d) of the CWA, states are required to develop lists of water bodies that would not attain water quality objectives after implementation of required levels of treatment by pointsource dischargers (municipalities and industries). Section 303(d) requires that the state develop a Total Maximum Daily Load (TMDL) for each of the listed pollutants. The TMDL is the amount of loading that the water body can receive and still be in compliance with water quality objectives. After implementation of the TMDL, it is anticipated that the problems that led to placement of a given pollutant on the Section 303(d) list would be remediated. In California, preparation and management of the Section 303(d) list is administered by the RWQCBs.

### **Safe Drinking Water Act**

The Safe Drinking Water Act was established to protect the quality of waters actually or potentially designated for drinking use, whether from aboveground or underground sources. Contaminants of concern in a domestic water supply are those that either pose a health threat or in some way alter the aesthetic acceptability of the water. Primary and secondary Maximum Contaminant Levels (MCL) are established for numerous components of concern including turbidity, total dissolved solids (TDS), chloride, fluoride, nitrate, priority pollutant metals and organic compounds, selenium, bromate, trihalomethane and haloacetic acid precursors, radioactive compounds, and gross radioactivity. All domestic water suppliers must follow the requirements established by this act and its associated amendments.

### **National Pollutant Discharge Elimination System Permit Program**

The NPDES permit program was established by the CWA to regulate municipal and industrial discharges to surface waters of the United States. Federal NPDES permit regulations have been established for broad categories of discharges, including point-source municipal waste discharges and nonpoint-source stormwater runoff. NPDES permits generally identify the following:

- effluent and receiving-water limits on allowable concentrations and/or mass emissions of pollutants contained in the discharge;
- prohibitions on discharges not specifically allowed under the permit; and
- provisions that describe required actions by the discharger, including industrial pretreatment, pollution prevention, self-monitoring, and other activities.

In November 1990, EPA published regulations establishing NPDES permit requirements for municipal and industrial stormwater discharges. Phase 1 of the permitting program applied to municipal discharges of stormwater in urban areas where the population exceeded 100,000 persons. Phase 1 also applied to stormwater discharges from a large variety of industrial activities, including general construction activity, if the project would disturb more than five acres. Phase 2 of the NPDES stormwater permit regulations, which became effective in March 2003, required that NPDES permits be issued for construction activity for projects that disturb between one and five acres. Phase 2 of the municipal permit system (known as the “NPDES General Permit for Small MS4s”) required small municipal areas of less than 100,000 persons to develop stormwater management programs.

## State Laws and Requirements

### **Porter-Cologne Water Quality Control Act**

California’s Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. It predates the CWA and regulates discharges to Waters of the State. Waters of the State include more than Waters of the US, such as groundwater and surface waters not considered Waters of the US. Additionally, the Porter-Cologne Act prohibits discharges of “waste” as defined and this definition is broader than the CWA definition of “pollutant”. Discharges under the Porter-Cologne Act must be regulated by the Waste Discharge Requirements (WDRs) Program, which may regulate the project even when the discharge is already permitted or exempt under the CWA.

The State Water Resources Control Board (SWRCB) and RWQCB are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA and regulating discharges to ensure compliance with the water quality standards. Details regarding water quality standards in a study area are contained in the applicable RWQCB Basin Plan. States designate beneficial uses for all water body segments, and then set criteria necessary to protect these uses. Consequently, the water quality standards developed for particular water segments are based on the designated use and vary depending on such use. In addition, each state identifies waters failing to meet standards for specific pollutants, which are then state-listed in accordance with CWA Section 303(d). If a state determines that waters are impaired for one or more components and the standards cannot be met through point

source controls, the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed.

### **Central Valley Regional Water Quality Control Board**

As authorized by the Porter-Cologne Water Quality Control Act, the Central Valley Regional Water Quality Control Board's (CVRWQCB) primary function is to protect the quality of the waters within its jurisdiction, including the proposed project site, for all beneficial uses. State law defines beneficial uses of California's waters that may be protected against quality degradation to include, but not be limited to: domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. The CVRWQCB implements water quality protection measures by formulating and adopting water quality control plans (referred to as basin plans, as discussed below) for specific groundwater and surface water basins, and by prescribing and enforcing requirements on all agricultural, domestic, and industrial waste discharges. The CVRWQCB oversees many programs to support and provide benefit to water quality, including wastewater discharges (including the NPDES); Water Quality Certification; and Watershed Management.

### **NPDES General Permit for Discharges of Stormwater Associated with Construction Activities**

Construction activities disturbing one acre or more of land are subject to the permitting requirements of the NPDES General Construction Activity Permit for Discharges of Storm Water Runoff Associated with Construction Activity (General Construction Permit). The permit requires a risk-based permitting approach, dependent upon the likely level of risk imparted by a project. The permit also contains several additional compliance items, including (1) mandatory Best Management Practices (BMPs) to reduce erosion and sedimentation, which may include incorporation of vegetated swales, setbacks and buffers, rooftop and impervious surface disconnection, bioretention cells, rain gardens, rain cisterns, implementation of pollution/sediment/spill control plans, training, and other structural and non-structural actions; (2) sampling and monitoring for non-visible pollutants; (3) effluent monitoring and annual compliance reports; (4) development and adherence to a Rain Event Action Plan; (5) requirements for the post-construction period; (6) monitoring of soil characteristics on site; and (7) mandatory training under a specific curriculum. Under the revised permit, BMPs will be incorporated into the action and monitoring requirements for each project site, as compared to the existing permit, where specific BMPs are implemented via a Storm Water Pollution Prevention Plan (SWPPP).

## **Regional and Local Requirements**

In recent years Lake County has taken a more collaborative approach to watershed management, understanding the relationship between each incorporated or unincorporated community within the Clear Lake Watershed. Storm water runoff, wastewater discharge, and ground and surface water contamination and supply are interconnected within the watershed. To address the need to coordinate water related activities, cities and unincorporated communities within Lake County have partnered to



draft regional, countywide plans and programs for watershed management. As provided in the Clearlake General Plan Background Report (2012, p.160) the following is a description of some of the ongoing activity within the County which affects water quality within the Clear Lake watershed. For a more complete list of programs, see the Clear Lake Integrated Watershed Management Plan (2010).

### **Lake County Groundwater Management Plan**

The Lake County Watershed District (Watershed District) led the development and adoption of the Big Valley Groundwater Management Plan in 1999 and the Lake County Groundwater Management Plan in 2006. The Watershed District has developed a Groundwater Management Plan (GMP) to provide guidance in managing the groundwater resources of the County. The Watershed District has initiated a number of efforts to proactively address water resource issues, including documenting the status of water use and supply, identifying areas of need, and developing recommendations to ensure a supply of high quality water into the future. The GMP, together with the Lake County Water Inventory and Analysis (2006) and the Lake County Water Demand Forecast (2006), increases understanding of the water resources in Lake County and provides a framework for the County and other water users to implement effective water resource management programs.

### **Total Maximum Daily Load Monitoring and Implementation Plan**

As Clear Lake is listed as an impaired water body on the State Water Resources Control Board's 303(d) list due to high nutrient levels, the State developed a nutrient total maximum daily load (TMDL) for Clear Lake. The TMDL, adopted by the Central Valley Regional Water Quality Control Board (Regional Water Board) in 2006, recommends a 40% reduction in phosphorous levels of the Lake to reduce algae and increase water clarity. As required by the TMDL, Lake County and Clear Lake TMDL stakeholders developed a monitoring program in 2008 to measure the source and quantity of nutrients entering the lake and a subsequent Monitoring and Implementation Plan (2009) which identifies past, present, and proposed actions to reduce the nutrient loading of Clear Lake, including mercury levels from the Sulphur Bank Mercury Mine and other mercury hotspots within the watershed.

## **Affected Environment**

### **Topography**

Lake County encompasses roughly 1,261 square miles (807,000 acres) of varied topography in the Coastal Range (USDA 1989). Clear Lake is the largest water body in the county, and has an approximate elevation of 1,320 feet above mean sea level (msl). The highest point in Lake County is Snow Mountain with an elevation of 7,038 feet, and the lowest elevation is 500 feet above msl in the southeastern portion of the county in the Cache Creek drainage. The project site lies at an elevation of approximately 1,220 feet above msl.

## Hydrology

### Regional Hydrology

The project site is located within the Upper Cache Watershed (18020116) which is approximately 1,300 square miles with an average annual precipitation of 60 inches. There are numerous lakes, rivers, and streams within the watershed (**Figure 4**). For the purposes of this document only Cache Creek, to which Upper Wolf Creek is a tributary to, is discussed further.

Cache Creek originates from and is the sole outlet of Clear Lake, the largest natural freshwater lake located entirely in California and among the world's oldest lakes (SWRP, 2010). The creek winds its way through a predominantly agricultural setting before entering the Cache Creek Settling Basin, designed to capture sediment and enhance groundwater recharge before ultimately releasing water into the Yolo Bypass of the Sacramento River. The Cache Creek Dam on the main fork, located 5 miles downstream from Clear Lake, was built to increase Clear Lake's capacity and to regulate outflow for downstream users of Cache Creek water (SWRP, 2010). The dam later was modified to include a hydroelectric plant. The stream has a relatively small capacity—less than a quarter of the amount the dam is able to release.

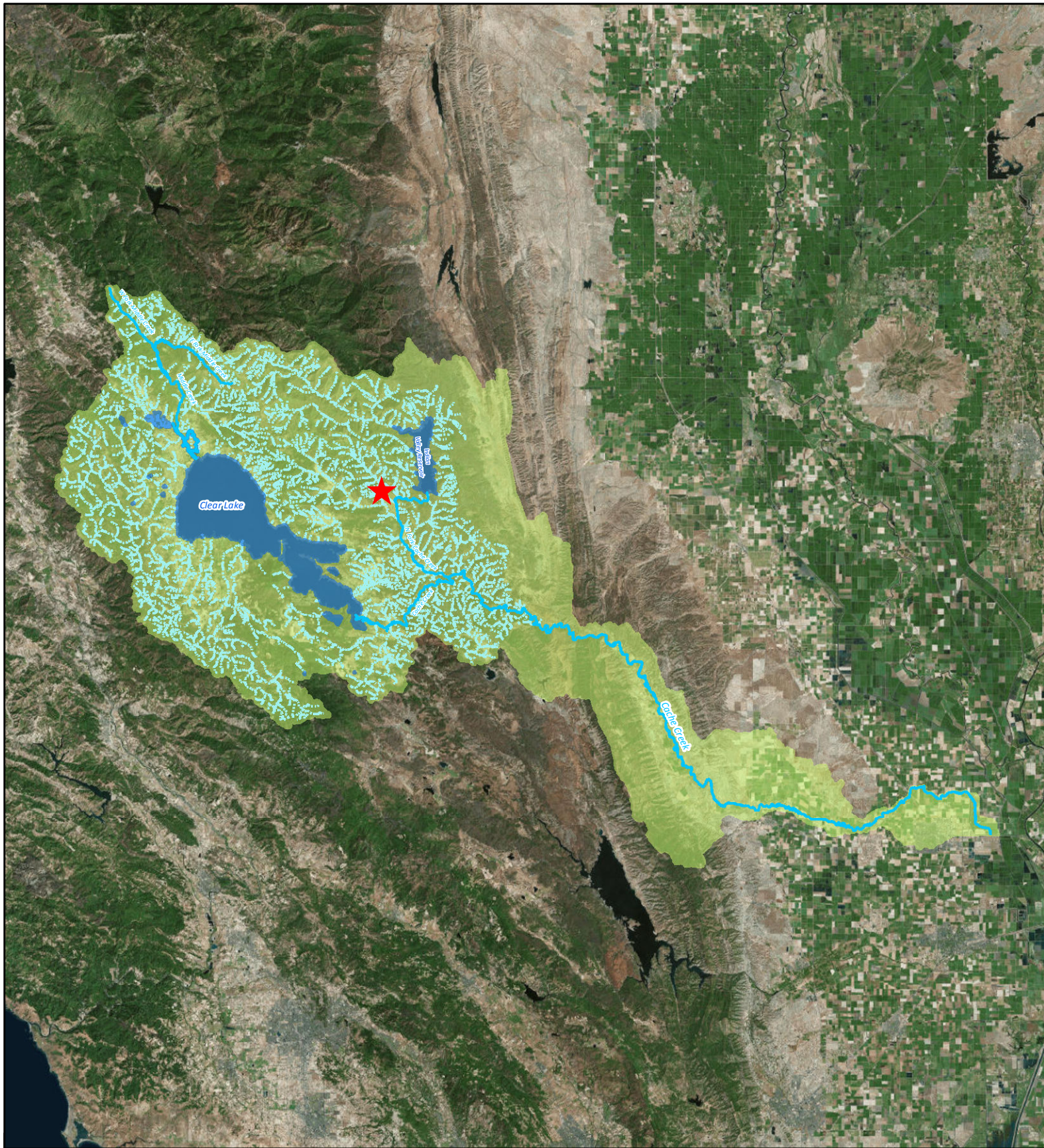
Additionally, a rock ledge 1.5 miles downstream of Clear Lake called the Grigsby Riffle restricts the flow at that point, making it difficult for excess flows to drain from Clear Lake and increasing the chance of flooding for lakeside communities (SWRP, 2010). The Capay Diversion Dam, 49 miles downstream from the Cache Creek Dam, diverts water for distribution to agricultural users throughout Yolo County using a 200-mile network of canals. No minimum flow requirements have been set for Cache Creek below Capay Dam. Levees confine the stream channel in the lower 8 miles of Cache Creek until its terminus at the Cache Creek Settling Basin (SWRP, 2010).

### Local Hydrology

Within the project site, the primary aquatic feature is Upper Wolf Creek. Upper Wolf Creek is a perennial creek and flows in a southerly direction through the project site. North Fork Cache Creek originates at Evans Peak in the Mendocino National Forest and runs 10 miles before flowing into North Fork Cache Creek near the intersection of Chalk Mountain Road and Wolf Creek Road.

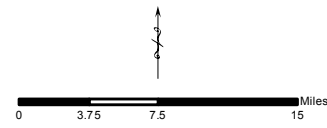
### Groundwater

The project site lies within the Clear Lake Cache Formation Groundwater Basin. The Clear Lake Cache Formation Groundwater Basin is east of Clear Lake and shares a boundary with the Burns Valley Groundwater Basin in the southwest (DWR, 2006). Lower Cretaceous marine and Mesozoic ultrabasic intrusive rocks line the southern portion of the basin, with the Franciscan Formation located to the north and west of the basin. The Cache Formation ranges in age from 1.6 to 1.8 million years old and is over 13,000 feet thick. The Cache Formation overlies the Franciscan Formation and Serpentine Ultramafic Rocks, and is the result of seismic and subsidence activity (DWR, 2006). There is only one water-bearing formation in the Clear Lake Cache Formation Groundwater Basin, the Cache Formation. The Cache Formation, generally of low porosity, is over 13,000 feet thick, and made up of sandstone,



**Legend**

- ★ Project Location - Wolf Creek Road Bridge
  - Upper Cache Watershed
  - Lakes
- Major Creeks
  - Minor Creeks



conglomerate, and gray sandstone. While groundwater levels have not been monitored in this formation, average-year agricultural demand is approximately 90 acre-feet per year (DWR, 2006).

### **Existing Water Quality**

According to the Sacramento River Watershed Program (SRWP), the Cache Creek Watershed was a primary source of mercury used for gold mining in the Sierra and one half of all the mercury entering the Sacramento River system flows from the watershed. It is estimated that over 40 abandoned mines are found in the drainage (SRWP, 2010). The Sulphur Bank mine at Clearlake is a Superfund site undergoing clean-up and the Turkey Run-Abbott mine tailings have been restored. The BLM is currently working to clean up the Rathburn-Petrey Mine. In October 2005, the Central Valley RWQCB adopted a TMDL for mercury in Cache Creek (and tributaries Bear Creek, Sulphur Creek, and Harley Gulch) (SWRP, 2010). Wolf Creek is not listed on the Clean Water Act Section 303(d) list as impaired for mercury toxicity.

### **Water Quality Objectives/Standards and Beneficial Uses**

Beneficial uses are not set in the Basin Plan explicitly for Wolf Creek, but standards are established for Cache Creek, which Wolf Creek is a tributary to. The Basin Plan states that the beneficial uses of any specifically identified water body generally apply to its tributary streams. Therefore, beneficial uses applied to Cache Creek would also apply to Wolf Creek. Beneficial uses are set in the Basin Plan for Cache Creek and include municipal and domestic supply; agricultural irrigation and stock watering; water contact recreation, and other noncontact recreation; warm and cold freshwater habitat; warm spawning habitat; and wildlife habitat (CVRWQCB, 2012).

Water quality objectives for surface waters in the region have been set for bacteria, bioaccumulation, biostimulatory substances, chemical components, mercury and methyl mercury, color, dissolved oxygen (DO), floating material, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, sulfide, tastes and odors, temperature, toxicity, and turbidity.

### **Water Quality Impacts**

#### **Construction-Related Impacts**

Construction of the entire project is anticipated to take approximately six months. The proposed project is subject to Construction General Permit (Order No. 2009-0009-DWQ [as amended by Order No. 2010-0014-DWQ and 2012-006-DWQ]) requirements, which requires preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The proposed project would comply with the National Pollutant Discharge Elimination System (NPDES) Construction General Permit including preparing and implementing a SWPPP that identifies project specific Best Management Practices (BMPs) to protect water quality during project construction. These BMPs must meet the technical standards established by the permit related to conventional (e.g., sediment) and non-conventional (e.g., toxics) pollutants and must be designed and implemented to ensure the proposed project does not cause or contribute to a violation of water quality standards. The Caltrans Storm Water Quality Handbook has published a set of BMPs, which the proposed project must utilize in drafting the SWPPP. Through compliance with the

NPDES program requirements and implementation of a SWPPP, water quality standards would not be violated during project construction.

## **Operation-Related Impacts**

Implementation of the proposed bridge replacement would not substantially modify the character of the project site in terms of sources of water pollutants. Vehicles traveling on Wolf Creek Road and residential land uses would remain the primary sources of water pollutants at the project site. The project would not change the number of vehicles traveling on Wolf Creek Road or other nearby land uses in the watershed.

## **Best Management Practices**

BMP's designed to address water quality (and related special status species) impacts are described below and will be finalized in consultation with the project engineer, Lake County, the Central Valley RWQCB, and other appropriate agencies.

- The contractors will develop and implement a toxic materials control and spill response plan to regulate the use of hazardous materials, such as the petroleum-based products used as fuel and lubricants for equipment and other potentially toxic materials associated with project construction.
- Standard construction BMPs will be implemented throughout construction, in order to avoid and minimize adverse effects to the water quality within the project site. Appropriate erosion control measures will be used (e.g., straw wattles, filter fences, vegetative buffer strips, or other accepted equivalents) to reduce siltation and contaminated runoff from project sites. The specific BMPs to be implemented will be described in full in the project's SWPPP. All erosion control materials, including straw wattles and erosion control blanket material used on-site will be biodegradable. Use of erosion control containing plastic monofilament will not be allowed as wildlife may become entrapped in this material. Wattles should be wrapped with 100 percent biodegradable materials like burlap, jute, or coir.
- Measures would be implemented during ground-disturbing activities to reduce erosion and sedimentation. These measures may include mulches, soil binders/erosion control blankets, silt fencing, fiber rolls, and temporary berms.
- Existing vegetation would be protected, using temporary fencing or other protection devices, where feasible to reduce erosion and sedimentation.
- Exposed soils would be covered by loose bulk materials or other materials to reduce erosion and runoff during rainfall events.
- Exposed soils would be stabilized, through watering or other measures, to prevent the movement of dust at the project site caused by winds and construction activities such as traffic and grading activities.

- All construction roadway areas would be properly protected to prevent excess erosion, sedimentation, and water pollution.
- Temporary berms would be constructed along the tops of slopes to prevent water from running uncontrolled from slopes during construction activities. Water would be collected in these berms and taken down the slopes in an erosion-proof drainage system. Sediment that is collected within these berms would be allowed to “settle out” and would be removed from the site.
- All erosion control measures and storm water control measures would be properly maintained until the site has returned to a pre-construction state.
- All disturbed areas would be restored to pre-construction contours and revegetated, either through hydroseeding or other means, with native or approved non-invasive exotic species.
- All construction materials would be hauled off-site after completion of construction activities.

### **Requirements for Stormwater Pollution Prevention Plans**

- The SWPPP shall be prepared and implemented to address all construction-related activities, equipment, and materials that have the potential to impact water quality.
- The SWPPP shall identify the sources of pollutants that may affect the quality of storm water and include the construction site BMPs to control pollutants such as sediment control, catch basin inlet protection, construction materials management and non-storm water BMPs.
- The SWPPP shall be prepared according to the requirements stated in the *NPDES General Permit for Discharges of Storm Water Runoff Associated with Construction Activities* Construction General Permit (Order No. 2009-0009-DWQ [as amended by Order No. 2010-0014-DWQ and 2012-006-DWQ]), or subsequent permit in effect at the time of construction.
- All construction site BMPs shall follow the latest edition of the *Storm Water Quality Handbooks: Construction Site Best Management Practices (BMPs) Manual* to control and minimize the impacts of construction related activities, material and pollutants on the watershed. These include, but are not limited to temporary sediment control, temporary soil stabilization, scheduling, waste management, materials handling, and other non-storm water BMPs.

### **Agency Coordination and Anticipated Regulatory Permits**

The following agency coordination and regulatory permits are anticipated for the proposed project. All BMP's and other avoidance/minimization measures will be prepared in consultation with the project engineer, Lake County, Central Valley RWQCB, and other appropriate agencies.

- The proposed project would require an NPDES General Construction Permit for Discharges of storm water associated with construction activities (Construction General Permit (Order No. 2009-0009-DWQ [as amended by Order No. 2010-0014-DWQ and 2012-006-DWQ])). A SWPPP would also be developed and implemented as part of the Construction General Permit. In addition, the following NPDES permits may also be required:

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- State Water Resources Control Board Water Quality Order No. 2003-003-DWQ General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality
- CVRWQCB Waiver of Reports of Waste Discharge within the Central Valley Region (Resolution R5-2013-0145).
- U.S. Army Corps of Engineers – Clean Water Act, Section 404, Nationwide Permit #14 (Linear Transportation Projects).
- California Department of Fish and Wildlife – California Endangered Species Act Section 1600-1602 Streambed Alteration Agreement.
- Regional Water Quality Control Board - Clean Water Act, Section 401 Water Quality Certification.

Should you need additional information or have any questions, please do not hesitate to contact me at (916) 363-4210.

Very truly yours,

**Drake Haglan & Associates**



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Lindsay Tisch, CPSWQ, QSD  
Environmental Planner – Biologist

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