Water Quality Study

This Water Quality Study describes aspects of the proposed project from a water quality and stormwater management perspective, including: project description; regulatory setting; project location and receiving water bodies, climatography; topography and soil characteristics; potential temporary and permanent water quality impacts; avoidance, minimization, and/or mitigation.

Project Description

This project proposes two alternatives to remedy structural deficiencies of the Miner Slough Bridge (Department Bridge Number: 23-0035), hereafter "Bridge", along State Route (SR) 84 from post-mile (PM) 12.1 to 12.2, along the northern perimeter of Ryer Island in Solano County. The two alternatives are to either rehabilitate or replace the Bridge. For the rehabilitation alternative, the alignment of SR 84 will remain, though new approach spans will be constructed, along with raising the profile of Holland Road, along the northern bank of Miner Slough. The existing piers, both wood and reinforced concrete piles, will be removed and replaced by new piers with cast-in-steel-shell (CISS) piles. The center swing-span pier will remain, though will be augmented by installation of CISS piles. The replacement alternative will have the new structure be situated parallel to, and west of, the existing. The replacement structure will be similar in type, as a swing-span bridge, though will be composed of three (3) piers with driven steel deep foundations; the center pier will serve the swing mechanism. Whereas the Bridge is to be replaced, the northern and southern approaches will have to be realigned. The southern approach alignment will involve tapered curves from the east and west directions along SR 84, each approximately 87 feet (ft) in length. In contrast, the northern approach will be completely realigned as a straightened traveled-way of approximately 800 ft. Additionally, a control house and parking area will be constructed along the south-side of Holland Road, west of proposed structure. At this time, the control house and parking area are only included as part of the replacement alternative. Please refer to the approved Project Report (PR) for specifics and elaboration of the project description.

Though the alternatives are different, there are many similar attributes. In order to accomplish either of the above scopes, varying construction operations will have to occur, some of particular water quality concern. First, general site access and contractor staging may pose challenges, as this location is within the northern part of the Sacramento-San Joaquin Delta, with an active shipping channel. The southern approach is along the levee surrounding Ryer Island, with the width of SR 84 essentially equivalent to the width of the levee itself. Further, the northern approach may have the presence of plant and/or terrestrial species that will have to be avoided. Considering these, the present proposal is to have staging for bridge operations occur on temporary trestles anchored in Miner Slough (Slough), though without blocking the shipping channel. In addition, strategic staging will occur on the north-side, avoiding, as well as possible, sensitive resources. Second, earthwork is a concern for water quality. The southern and northern approaches will be constructed on fill. At this point, it is assumed that the project will be net-fill, such that import of material will be required. Transport of fill material, and general site management of earthwork will require careful attention. Third, structural material handling and concrete management is paramount, as much of these will occur over the Slough. Fourth, the potential for localized dewatering must be considered. At this time, it is known that it will be required for the swing-span cofferdam, yet it will have to be assessed for other operations, such as pier foundations and approach span construction. Until the design is refined, dewatering is assumed to be necessary beyond the swing-span cofferdam.

Due to the scope of each alternative, the net new impervious surface areas and disturbed soil areas (DSAs) differ. For the replacement alternative, the net new impervious surface area is anticipated to be approximately 1.67 acres, of which 0.57 and 1.10 acres are re-worked and new impervious surfaces, respectively. Bridge replacement will also result in an anticipated DSA of approximately 3.5 acres. For the replacement alternative, the net new impervious surface area is anticipated to be approximately 0.62 acre, of which 0.58 and 0.04 acre are re-worked and new impervious surfaces, respectively. Bridge replacement will also result in an anticipated DSA of approximately 3.25 acres.

Figures 1 and 2, on the following page, depict the existing structure. Figure 1 is viewed in a northeasterly direction from the southern approach, west of the Bridge. Figure 2 is viewed in southwesterly direction from the northern approach, east of the Bridge. Figure 3, on the page following Figures 1 and 2, is viewed southerly along the Bridge, and demonstrates the present state of the Bridge pavement surface.

Figure 1. Looking northeasterly toward Bridge from southern approach.[1]

Figure 2. Looking southwesterly toward Bridge from northern approach.[2]

[1] http://svctenvims.dot.ca.gov/wqpt/wqpt.aspx, accessed March 16, 2015.
[2] Ibid.

Figure 3. Existing pavement surface, looking south along Bridge.[3]

Regulatory Setting

The primary federal law regulating water quality is the Federal Clean Water Act (CWA), issued by the U.S. Environmental Protection Agency (USEPA). The USEPA delegated its authority in California to the State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs). Each RWQCB prepares and adopts a water quality control plan (Basin Plan), which is a master policy document for managing surface and groundwater quality in the respective region. The SWRCB and RWQCBs issue permits that implement the standards included in the Basin Plan as well as other requirements of the State Water Code and the CWA.

Section 401 of the CWA requires a water quality certification from either the SWRCB or RWQCB when a project would require a federal license or permit, resulting from a discharge to water(s) of the U.S. Whereas project activities associated with either alternative will potentially result in impacts to water(s) of the U.S., a Section 404 permit, issued by the U.S. Army Corps of Engineers, is required. As such, a tandem Section 401 certification, issued by the Central Valley RWQCB, hereafter "Region 5S", is also required.

Section 402 of the CWA established the National Pollutant Discharge Elimination System (NPDES) permit system, which directs that stormwater discharges are point-source, and established a framework for regulating municipal and industrial stormwater discharges. To ensure compliance with CWA Section 402, the SWRCB has issued the Department a Statewide NPDES Stormwater Permit to regulate stormwater discharges from Department facilities (Order No. 2012-0011-DWQ), which became effective July 1, 2013 and was/is applicable to projects within the Project Initiation Document (PID) phase on, or after, that date. Whereas this project was beyond the PID phase by July 1, 2013, it is exempt from compliance with the current NPDES permit, and shall follow the previous one (Order No. 99-06-DWQ).

[3] Ibid.

In addition, the SWRCB has issued a statewide Construction General Permit for construction activities (2009-0009-DWQ, CAS000002, as amended by 2010-0014-DWQ and 2012-0006-DWQ), hereafter "CGP", that applies to all stormwater discharges from land where clearing, grading, and excavation result in a DSA of one (1.0) acre or greater. Construction activity that results in a DSA of less than 1.0 acre is subject to the CGP if the construction activity is part of a larger Common Plan of Development totaling 1.0 acre or more, or if there is potential for significant water quality impairment resulting from the activity, as determined by the appropriate RWQCB. All projects that are subject to the CGP require a Stormwater Pollution Prevention Plan (SWPPP). As the DSA is anticipated to range from approximately 3.25 to 3.5 acres, implementation of a SWPPP shall be required.

Project Location and Receiving Water Bodies

The project is located within the jurisdiction of Region 5S, which, as stated above, is responsible for implementation and enforcement of State and Federal laws and regulations concerning water quality.

The project is located within Hydrologic Sub-Area (HSA) 510.00, specifically the Toe Drain – Cache Slough sub-watershed. Miner Slough is the direct receiving water body. From the project site, flow continues for approximately 31,620 ft until discharge to the Sacramento River Deep Water Ship Channel (Channel). From there, flows continues along the Channel for approximately 20,450 ft to the confluence with Steamboat Slough, and then an additional 2,500 ft to the confluence with the Sacramento River. Flow within the Sacramento River continues for approximately 73,760 ft until confluence with the San Joaquin River at the Sacramento-San Joaquin Delta (Delta). Thus, the flowpath from the project site to the Delta is approximately 128,330 ft; see Figure 4 on the following page.[4] These water bodies are included as part of the CWA Section 303(d) List for Water Quality Limited Segments, though rather than being listed separately, are collectively grouped as "Delta Waterways (northern portion).[5,6] This listing includes assigned pollutants/stressors of concern, and associated Total Maximum Daily Loads (TMDLs), for the extensive network of water bodies that constitute Delta Waterways (northern portion). In order to determine what may be more applicable to Miner Slough, the Region 5S Basin Plan was consulted. From Appendix 42, Miner Slough is included with Delta water bodies requiring specific water quality objectives (WQOs) for diazinon and chlorpyrifos, both organophosphate insecticides. Additionally, Appendix 43 lists Miner Slough as requiring a specific allocation for methylmercury, as part of the Delta Mercury Control Program.[7]

[4] http://svctenvims.dot.ca.gov/wqpt/wqpt.aspx, accessed March 9, 2015.
[5] http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml, accessed March 9, 2015.
[6] http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/impaired_waters_list/draft_final_2008_303d/app_i_delta_waterways.pdf, accessed March 9, 2015.
[7] http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/appdx2.pdf, accessed March 9, 2015.

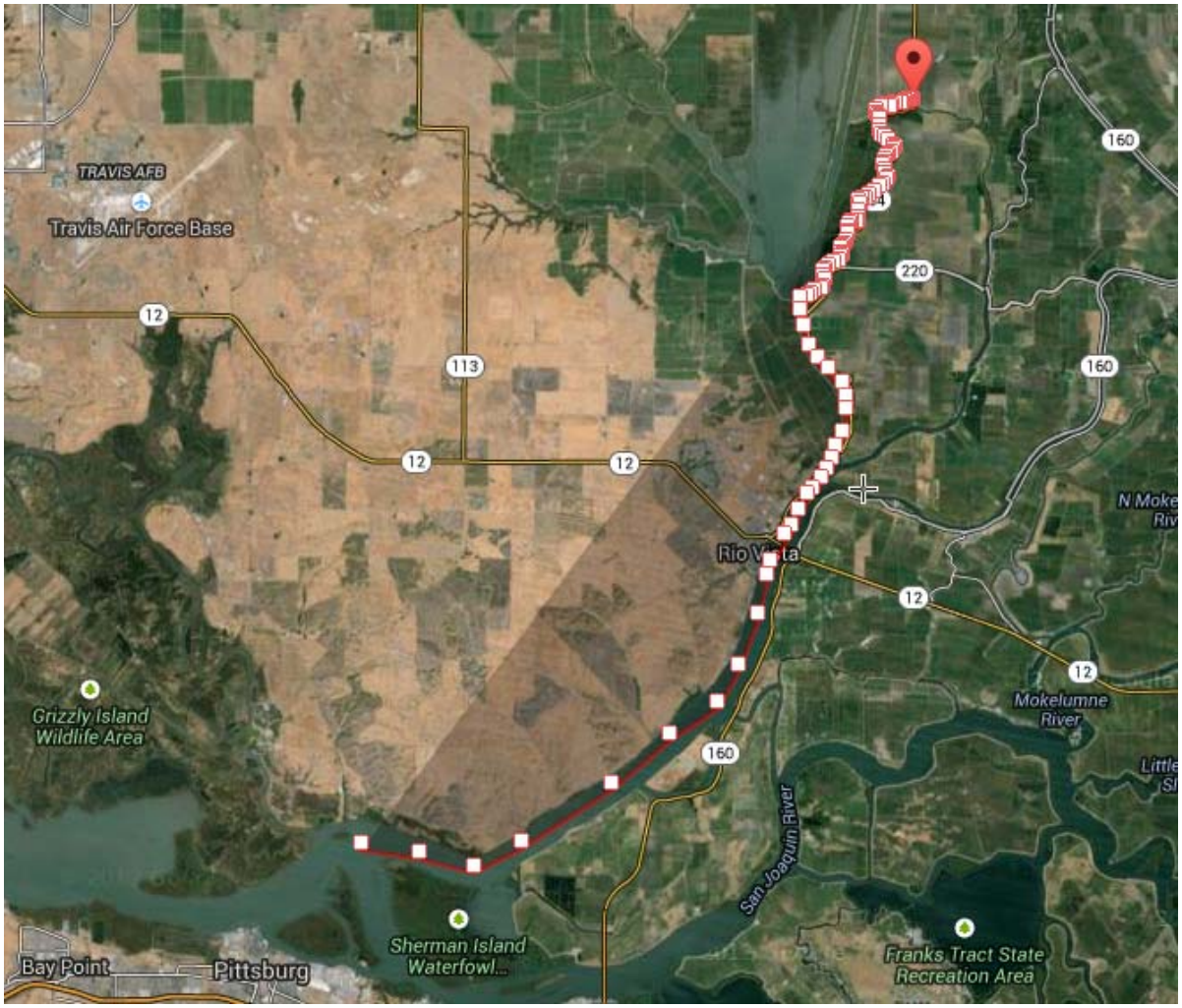

Figure 4. Flowpath from Miner Slough Bridge (red "pin") to Sacramento-San Joaquin Delta.[8]

The Basin Plan also establishes beneficial uses for waterways and water bodies within the region. Beneficial uses include: Agricultural Supply (AGR), Preservation of Biological Habitats of Special Significance (BIOL), Municipal and Domestic Supply (MUN), Freshwater Replenishment (FRSH), Groundwater Recharge (GWR), Industrial Service Supply (IND), Industrial Process Supply (PRO), Commercial and Sport Fishing (COMM), Shellfish Harvesting (SHELL), Cold Freshwater Habitat (COLD), Estuarine Habitat (EST), Migration of Aquatic Organisms (MIGR), Rare, Threatened, or Endangered Species (RARE), Spawning, Reproduction, and/or Early Development (SPWN), Warm Freshwater Habitat (WARM), Wildlife Habitat (WILD), Contact/Non-Contact Water Recreation (REC1/REC2), Aquaculture (AQUA), Hydropower Generation (POW), and Navigation (NAV). The beneficial uses for Miner Slough are assumed to be similar to those reported for "Sacramento San Joaquin Delta" in the Basin Plan, which include: MUN, AGR, PROC, IND, REC-1, REC-2, WARM, COLD, MIGR, SPWN, WILD, and NAV.[9] In addition, Appendix 43 specifically includes Miner Slough amongst Delta water bodies with COMM as a beneficial use.[10]

[8] http://svctenvims.dot.ca.gov/wqpt/wqpt.aspx, accessed March 9, 2015.
[9] http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr.pdf, accessed March 9, 2015.
[10] http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/appdx2.pdf, accessed March 9, 2015.

Climatography

The project is located in a Mediterranean climate region characterized by warm summers and mild wet winters, with the rainy season between October 15 and April 15 (Statewide Stormwater Management Plan 2003). Climatic information was found via the Western Regional Climate Center (WRCC) and National Climate Data Center (NCDC) of the National Oceanic Atmospheric Administration (NOAA) of U.S. Department of Commerce (USDC). In order to facilitate determination of appropriate temperature and precipitation metrics, two weather stations were used, as no station is present at, or near, the project site. The stations used were: "Sacramento Executive Airport" (Station Number 047630; length of record: 1941–2012) and "Rio Vista" (Station Number 047446; length of record: 1893–1977). The station elevations and distances from the project site are 15 and 39 feet, and 16.6 miles (mi) north-northeast and 10.5 mi south-southwest, for "Sacramento Executive Airport" and "Rio Vista", respectively. The stations have reported average annual minimum and maximum temperatures of 48.1 and 73.6, and 48.4 and 71.6 degrees Fahrenheit (°F), with annual average temperatures of 60.8 and 60.0°F; these are stated as for "Sacramento Executive Airport" and "Rio Vista", respectively. Average annual precipitation had been reported as 17.24 and 16.57 inches, again, for "Sacramento Executive Airport" and "Rio Vista", respectively.[11]

Topography and Soil Characteristics

The surrounding land use throughout the project limits is rural and agricultural, with sparse development, along a flat topography.

From the National Resources Conservation Service (NRCS) Web Soil Survey tool, the Hydrologic Soil Group (HSG) throughout the project limits is classified as "A" (Columbia fine sandy loam, map unit symbol "Cm") and "C" (Sacramento silty clay loam, map unit "Sa"); see Figure 5 on the following page.[12] Whereas the Cm designation dominates the project site, it is assumed that the entire project site be classified HSG "A". From Chapter 7 of the "National Engineering Handbook, Part 630," HSG A soils are characteristic as having low runoff potential when thoroughly wet.[13]

Per the Basin Plan, water supply beneficial uses are generically assigned to groundwater resources, unless specifically identified. This location prescribes to the generic assignment, which includes: MUN, PRO, IND, and AGR.[14] Though considered generic per Region 5S, the Department of Water Resources (DWR) Bulletin 118 has designated this area as part of the Solano Sub-Basin of the Sacramento Valley Groundwater Basin (Sub-Basin Number 5-21.66).[15] Further, per the California Statewide Groundwater Elevation Monitoring (CASGEM) program, this sub-basin has been ranked as having "Medium" prioritization.[16]

[11] http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7630 and http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7446 accessed March 9, 2015.
[12] http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx, accessed March 9, 2015.
[13] ftp://ftp.wcc.nrcs.usda.gov/wntsc/H&H/NEHhydrology/ch7.pdf, accessed March 18, 2015.
[14] http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr.pdf, accessed March 17, 2015.
[15] http://www.water.ca.gov/pubs/groundwater/bulletin_118/basindescriptions/5-21.66.pdf, accessed March 9, 2015.
[16] http://www.water.ca.gov/groundwater/casgem/pdfs/basin_prioritization/NCRO%2068.pdf, accessed March 9, 2015.

Figure 5. NRCS Soil Map (from Web Soil Survey).

Potential Temporary and Permanent Water Quality Impacts

As indicated under the "Project Description" heading above, regardless of the alternative selected, potential temporary impacts to existing water quality would result from staging and active construction areas, from the release of fluids, concrete material, sediment, and litter beyond the perimeter of the site. Impacts may include a change in localized pH and turbidity of Miner Slough. In addition to unintended discharge to Miner Slough, potential impacts to active marine transportation must be considered. For anticipated marine staging, via trestles and associated barges, though the shipping channel will remain open, the actual locations of staging elements should be further vetted. For instance, trestle and/or barge locations may affect the turning radius of vessels, or cause an obstruction, especially along the bend in the Slough west of the Bridge.

Potential long-term impacts to existing water quality include those similar to the existing facility; the deposition and transport of sediment and vehicular-related pollutants. In addition, due to deposition of fill material at the southern and northern approaches, and the presence of fewer piers compared to the existing structure, either proposed alternative will alter the floodplain. An assessment of this impact will be included in the Location Hydraulic Study.

Avoidance, Minimization, and/or Mitigation

Temporary Impacts

Of the potential temporary impacts stated above, the primary concern is unintended discharge to Miner Slough. In order to prevent, or reduce, potential impacts, temporary Construction Site BMPs will be deployed for general sediment control and material management; these may include, but are not limited to, the following bid-line items: hydraulic mulch (bonded fiber matrix), cover, fiber roll, construction entrance, concrete wash-out, and street sweeping. Additionally, dewatering will be required for the swing-span cofferdam and potentially for other operations, such as peir foundations and/or approach span construction. Effluent may have to be sampled, and, depending on the results, either discharged to the Slough, or hauled off-site.

Regarding potential impacts from trestles and/or barges, consultation with appropriate stakeholders should occur to fully vet locations.

Permanent Impacts

As indicated above, impervious surface has the potential to cause a permanent impact, via the transport of vehicular-related pollutants. In order to address management of vehicular pollutants in run-off, incorporation of stormwater Treatment BMP(s) shall be investigated. Whereas the project will require procurement of a 401 certification from Region 5S, the stormwater treatment goal should be expected to be equivalent to the net increase of impervious surface, or approximately 0.62 and 1.67 acres for the rehabilitation and replacement alternatives, respectively. The Treatment BMP type will be either biofiltration or bioretention.

In order to address potential permanent impacts via sediment transport, soil stabilization and sediment control BMPs will be incorporated as part of the project design; these may include fiber roll and hydroseed application.

Stormwater Pollution Prevention Plan (SWPPP)

Whereas the project DSA is anticipated to be up to 3.5 acres, a SWPPP will be required. Prior to commencement of construction activities, the SWPPP must be prepared by the Contractor and approved by the Department. The SWPPP addresses potential temporary impacts via implementation of appropriate Construction Site BMPs, such as those mentioned above, to the Maximum Extent Practicable (MEP). In addition, based on the potential sediment risk and the receiving water risk, the project is classified as "Risk Level 1" under the CGP; the requirements for Risk Level 1 projects are presented in Attachment C of the CGP. The Risk Level will also be determined during the subsequent PS&E phase.