Chapter 4
Hydrology, Water Quality, and Flood Control

This chapter discusses the effects the MIAD Modification Project alternatives may have on hydrology, water quality, and flood control. Impacts associated with groundwater are addressed in Chapter 5, Groundwater. Impacts associated with wetlands are addressed in Chapter 7, Biological Resources.

4.1 Affected Environment/Environmental Setting

Existing hydrologic conditions and water resources potentially affected by the alternatives are identified in this section, along with regulatory settings and regional information pertaining to hydrologic resources in the area of analysis.

4.1.1 Area of Analysis

The area of analysis for this section includes MIAD site and the Mississippi Bar mitigation site. Lake Natoma is the receiving body of water in regards to water quality impacts generated at both sites

4.1.1.1 Mormon Island Auxiliary Dam

The MIAD area of analysis includes the MIAD facility, the adjacent Mormon Island Wetland Preserve area, and Humbug Creek as it will receive discharged groundwater generated by dewatering activities.

4.1.1.2 Mississippi Bar

The Mississippi Bar mitigation site includes 80 acres of land on the western shore of Lake Natoma, near the intersection of Sunset Avenue and Main Avenue and south of the community of Orangevale. All proposed mitigation would occur on land parcels currently owned by DPR and Reclamation and managed by DPR as part of the FLSRA. Surface water at this site includes Lake Natoma and various lagoons along the Lake Natoma shoreline.

4.1.2 Regulatory Setting

4.1.2.1 Federal

The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the U.S. and gives the USEPA the authority to implement pollution control programs such as setting wastewater standards for industries (USEPA 2009). In certain States such as California, the USEPA has delegated authority to State agencies.

Section 303(d) of the 1972 CWA requires States, territories and authorized tribes to develop a list of water quality-impaired segments of waterways. The list includes waters that do not meet water quality standards necessary to support the beneficial uses of that waterway, even after point sources of pollution have installed the minimum required levels of pollution control technology.

The law requires that these jurisdictions establish priority rankings for water on the lists and develop action plans, called Total Maximum Daily Loads (TMDLs), to improve water quality (USEPA 2009). A TMDL is a tool for implementing water quality standards and is based on the relationship between pollution sources and in-stream water quality conditions. The TMDL establishes the allowable daily pollutant loadings or other quantifiable parameters (e.g., pH or temperature) for a waterbody and thereby provides the basis for the establishment of water quality-based controls. These controls should provide the pollution reduction necessary for a waterbody to meet water quality standards. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation for establishment of TMDLs for each waterbody must include a margin of safety to ensure that the waterbody can be used for the purposes the State has designated. Additionally, the calculation also must account for seasonal variation in water quality (USEPA 2009).

Sedimentation/siltation impacts are the primary water quality parameters of concern with construction of the alternatives. The lower American River and Folsom Reservoir are not listed on the CVRWQCB 2006 303(d) list of water quality impaired segments for sedimentation/siltation. Therefore, there has not been a TMDL developed for this area concerning sediment impacts (CVRWQCB 2007).

Water quality of waters of the United States subjected to a discharge of dredged or fill material is regulated under Section 401 of the CWA. These actions must not violate Federal or state water quality standards. Specifically in the State of California, the applicable RWQCB administers Section 401 and either issues or denies water quality certifications depending upon whether the proposed discharge or fill material complies with applicable State and Federal laws. In addition, policies and regulations governing the protection of the beneficial uses of the State’s water resources must also be followed.

In order to comply with State and Federal water quality standards, all point sources that discharge into waters of the United States must obtain a NPDES permit under provisions of Section 402 of the CWA. In California, the SWRCB and RWQCBs are responsible for the implementation of the NPDES permitting process at the State and regional levels, respectively. The discharge of groundwater to surface water, including construction dewatering, is considered a point source discharge and requires a permit from the appropriate RWQCB. Several different types of permits are available for construction dewatering, depending on the quantity and quality of the water to be discharged. The NPDES permit process also provides a regulatory mechanism for the control of non-point source pollution created by runoff from construction and industrial activities, and general and urban land use, including runoff from streets. Projects involving construction activities (e.g., clearing, grading, or excavation) involving land disturbance greater than one acre must file a Notice of Intent (NOI) with the RWQCB to indicate their intent to comply with the State General Permit for Storm Water Discharges Associated with Construction Activity (General Permit). The General Permit establishes conditions to minimize sediment and pollutant loadings and requires preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) prior to construction. The SWPPP is intended to help identify the sources of sediment and other pollutants, and to establish Best Management Practices (BMPs) for storm water and non-storm water source control and pollutant control.

The Federal Safe Drinking Water Act (SDWA) was established to protect the quality of drinking water in the United States. This law focuses on all waters actually or potentially designated for drinking use, whether from above ground or underground sources. The SDWA authorized the USEPA to establish water quality standards and required all owners or operators of public water systems to comply with primary (health-related) standards. State governments, which assume this power from the USEPA, also encourage attainment of secondary standards (nuisance-related). 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. These types of contaminants are currently regulated by the USEPA as primary and secondary maximum contaminant levels (MCLs). As directed by the SDWA amendments of 1986, the USEPA has been expanding its list of primary MCLs. MCLs have been proposed or established for approximately 100 contaminants.

The Federal Surface Water Treatment Rule (SWTR) became effective on June 19, 1989. The California Surface Water Treatment Rule (California's SWTR), which implements the Federal SWTR within the State, became effective in June 1991. The California SWTR satisfies the following 3 specific requirements of the SDWA:

- Establishes criteria for determining when filtration is required for surface waters;
- Defines minimum levels of disinfection for surface waters; and
- Addresses Giardia lamblia, viruses, Legionella, turbidity, and heterotrophic plate counts by establishing treatment techniques in lieu of MCLs due to high treatment costs and technological requirements in measuring these contaminants.

The Safety of Dams Act (P.L. 95-578) was enacted in 1978, and later amended in 1984 (P.L. 98-404). According to this Act, Reclamation is responsible for identifying potential risks with all existing Reclamation-owned dams. If unacceptable risks are identified, Reclamation is authorized to take corrective actions to reduce these risks. Section 2 of P.L. 98-404 states:

"In order to preserve the structural safety of Bureau of Reclamation dams and related facilities, the Secretary of the Interior is authorized to perform such modifications as he determines to be reasonably required" (Reclamation 2003).

The objective of Reclamation's Safety of Dams Program is "To ensure Reclamation dams do not present unacceptable risk to public safety and welfare, property, the environment, or cultural resources" (Reclamation 2003). The program includes an in-depth risk analysis that is performed on Reclamation dams to identify and address unacceptable risks.

The Federal Guidelines for Dam Safety require that dams be designed, inspected, and maintained to protect the structural integrity of the dam and appurtenant structures and ensure protection of human life and property. The following documents contain the requirements for design floods for dams that are the responsibility of Federal agencies:

- Federal Guidelines for Dam Safety, Federal Emergency Management Agency (FEMA) Publication FEMA 93, June 1979, reprinted April 2004 (FEMA 2004a).
- Federal Guidelines for Dam Safety: Selecting and Accommodating Inflow Design Floods for Dams, FEMA Publication FEMA 94, October 1998, reprinted April 2004 (FEMA 2004b).

4.1.2.2 State

The Porter-Cologne Water Quality Control Act of 1970 established the SWRCB and nine RWQCBs within the State of California. These groups are the primary agencies responsible for protecting California water quality to meet present and future beneficial uses and regulating appropriative surface rights allocations. The preparation and adoption of water quality control plans, or Basin Plans, and Statewide plans, is the responsibility of the SWRCB. Because beneficial uses, together with their corresponding water quality objectives, can be defined per Federal regulations as water quality standards, the Basin Plans are regulatory references for meeting the State and Federal requirements for water quality control (40 CFR 131.20).

The CVRWQCB Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (CVRWQCB Basin Plan) regulates waters of the State located within the area of analysis. The CVRWQCB Basin Plan covers an area including the entire Sacramento and San Joaquin River basins, involving an area bound by the crests of the Sierra Nevada on the east and the Coast Range and Klamath Mountains on the west. The area covered in the CVRWQCB Basin Plan extends some 400 miles, from the California – Oregon border southward to the headwaters of the San Joaquin River.

4.1.2.3 Local

General Plans for El Dorado and Sacramento Counties each contain provisions aimed at protecting local water resources for future and current use. The El Dorado County General Plan establishes a county-wide water resources program to conserve, enhance, manage, and protect water resources and their quality from degradation. The programs objectives consist of the following: preserving the supply and quality of the county's water resources; protection of critical watersheds, riparian zones, and aquifers; maintenance and where possible improvement of the quality of both surface water and groundwater; wetland area protection; utilization of natural drainage patterns; and encouraging water conservation practices including re-use programs for applicable areas such as agricultural fields (El Dorado County 2009).

The Conservation Element of Sacramento County's General Plan contains measures to implement water conservation and to protect surface water supplies, surface water quality, and groundwater resources. Specific goals include the following: conjunctive use of surface water and groundwater to ensure long-term supplies exist for residents while providing recreational and environmental benefits; protecting surface water quality for both public use and support of aquatic environment health; maintaining quality and quantity of groundwater for the benefit of humans and the natural environment; and promoting water conversation and reuse measures.

4.1.2.4 Beneficial Uses

Beneficial uses are critical to water resource management in California. State law defines beneficial uses of California's waters that may be protected against quality degradation to include (but not 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" (Water Code Section 13050(f)). Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning. Significant points concerning the concept of beneficial uses are:

- All water quality problems can be stated in terms of whether there is water of sufficient quantity or quality to protect or enhance beneficial uses (CVRWQCB 2004).
- Beneficial uses do not include all of the reasonable uses of water. For example, disposal of wastewaters is not included as a beneficial use. This is not to say that disposal of wastewaters is a prohibited use of waters of the State; it is merely a use, which cannot be satisfied to the detriment of beneficial uses. Similarly, the use of water for the dilution of salts is not a beneficial use although it may, in some cases, be a reasonable and desirable use of water (CVRWQCB 2004).

- The protection and enhancement of beneficial uses require that certain quality and quantity objectives be met for surface and ground waters (CVRWQCB 2004).
- Fish, plants, and other wildlife, as well as humans, use water beneficially.

The following beneficial uses have been defined by the CVRWQCB for Folsom Reservoir and Lake Natoma: municipal and domestic water supply; irrigation; industrial power; water contact and non-contact recreation; warm and cold freshwater habitat, warm freshwater spawning habitat; and wildlife habitat, along with potential beneficial uses for industrial service supply (CVRWQCB 2004). Water quality within Folsom Reservoir and Lake Natoma is generally acceptable to meet the beneficial uses currently designated for these waterbodies.

As tributaries of the American River, Humbug Creek and Willow Creek have been determined by the CVRWQCB to share the beneficial uses identified in the Basin Plan for the American River. These beneficial uses include – municipal and domestic supply, agricultural irrigation, industrial service supply, hydro power generation, body contact water recreation, canoeing and rafting, other non-body contact recreation, warm and cold freshwater aquatic habitat, warm fish migration habitat, warm and cold spawning habitat, and wildlife habitat. (CVRWQCB 2004).

4.1.3 Existing Conditions

This section describes the hydrology, water quality, and flood control conditions within the construction area.

4.1.3.1 Hydrology

The American River Basin covers an area of approximately 2,100 square miles, and has an average annual unregulated runoff of 2.7 million acre-feet; however, annual runoff has varied in the past from 900,000 acre-feet to 5,000,000 acre-feet. The major tributaries in the American River system include the North Fork American River, Middle Fork American River, and South Fork American River. These tributaries drain the upper watershed carrying runoff from precipitation and snowmelt into Folsom Reservoir. Figure 4-1 shows the hydrology of the MIAD and Mississippi Bar Project areas including tributaries and streams.

Figure 4-1. MIAD Modification Project Area Hydrology

Folsom Dam and Reservoir is a multipurpose water project constructed by the Corps and managed by Reclamation as part of the Central Valley Project (CVP). At an elevation of 466 feet above mean sea level (msl), Folsom Reservoir is the principal reservoir on the American River impounding runoff from approximately 1,875 square miles of the American River basin. Folsom Reservoir has a normal full-pool storage capacity of approximately 975,000 acre-feet, with a seasonally designated flood management storage space of 400,000 acre-feet. An interim agreement between the SAFCA and Reclamation provides variable flood storage ranging from 400,000 to 670,000 acre-feet.

Flood-producing runoff occurs primarily during the months of October through April and is usually most extreme between November and March. From April to July, runoff is primarily generated from snowmelt from the upper portions of the American River watershed. Runoff from snowmelt usually does not result in flood-producing flows; however, it is normally adequate to fill Folsom Reservoir's available storage. Approximately 40 percent of the runoff from the watershed results from snowmelt.

MIAD was constructed across the Blue Ravine, a historical tributary of the American River that once joined with the American River just south of the City of Folsom. The channel of Blue Ravine was approximately one mile wide where MIAD was constructed. During construction, most of the water draining into Blue Ravine was diverted into the South Fork of the American River (Corps 1992). Stormwater runoff from the downstream side of the MIAD embankment and surrounding area drains through a culvert under Green Valley Road to the Mormon Island Wetland Preserve area. Water from the Preserve eventually drains to Humbug Creek, a tributary of Willow Creek, and discharges to Lake Natoma.

Lake Natoma is downstream of Folsom Dam and serves as an afterbay to Folsom Reservoir. Formed and controlled by Nimbus Dam, the lake is operated to re-regulate the daily flow fluctuations created by the Folsom Powerplant. Consequently, water surface elevations in Lake Natoma may fluctuate between four and seven feet daily. Lake Natoma has a storage capacity of approximately 9,000 acre-feet and a surface area of 500 acres. Nimbus Dam, combined with Folsom Dam, regulates water releases to the lower American River.

The lower American River extends 23 miles from Nimbus Dam to the confluence with the Sacramento River. The upper reaches of the lower American River are unrestricted by levees and are hydrologically controlled by natural bluffs and terraces. Downstream, the river is leveed along its north and south banks for approximately 13 miles from the Sacramento River to the Mayhew drain on the south and to the Carmichael Bluffs on the north.

Mormon Island Wetland Preserve Hydrology The Mormon Island Wetland Preserve is an area south of Green Valley Road that is currently owned by Reclamation and managed by DPR as part of the FLSRA. The Preserve contains a series of wetlands and ponded areas, some of which remain wet for most of the year. Uncertainty currently exists regarding the hydrologic connectivity between MIAD and the wetlands throughout the Mormon Island Wetland Preserve area. Reclamation completed a literature review of prior investigations in their 2006 report entitled MIAD Hydrogeology Report (2006), and determined that data collected throughout the downstream foundation area suggests no reservoir connection to local groundwater levels (Reclamation 2006). There does, however, appear to be a hydraulic connectivity in the dredged alluvium downstream of MIAD in the area between the dam toe and the Preserve.

It is believed that the water source for a small area of wetlands located in the north-central part of the preserve, directly adjacent to Green Valley Road, could be from seepage of the MIAD embankment. The source of this seepage is suspected to be a combination of bank storage of precipitation in the MIAD's downstream toe and seepage via joints in the foundation bedrock. This seepage collects in a drain and then eventually flows through a culvert under Green Valley Road and into the north-central part of the Preserve (Reclamation 2006). The source of water in the wooded area of the Preserve is believed to originate from the higher hillsides to the east due to release of bank storage and surface water runoff following precipitation events (Reclamation 2006).

4.1.3.2 Surface Water Quality

As stated above, snowmelt and precipitation from the upper American River Watershed discharges water into Folsom Reservoir and Lake Natoma. In general, runoff from the relatively undeveloped watershed is of very high quality, rarely exceeding the State of California's water quality objectives (Wallace, Roberts, & Todd et al. 2003).

Water Quality at Lake Natoma Table 4-1 summarizes water quality data measured downstream of Folsom Dam in Lake Natoma at Negro Bar from April to September 2008. In general, water quality in Lake Natoma meets California Basin Plan standards.

The CVRWQCB Basin Plan defines specific water quality objectives that should be attained in order to protect and maintain the beneficial uses of Lake Natoma and the American River.

Table 4-1. Water Quality at Lake Natoma (at Negro Bar) - April to September 2008

Water Quality Parameter	Units	Min	Max	Average	RL
Arsenic (Dissolved)	µg/l	<0.5	<0.5	0.5	0.5
Barium (Dissolved)	µg/l	11	17	13.5	0.5
Calcium (Dissolved)	mg/l	5	9	7	1
Chromium (Dissolved)	µg/l	<0.5	1	0.74	0.5
Copper (Dissolved)	µg/l	0.5	0.8	0.6	0.5
Cyanide	µg/l	<2.0	<2.0	<2.0	2.0
Iron (Dissolved)	µg/l	<100	<100	<100	100
Magnesium (Dissolved)	mg/l	1	3	2	1
Manganese (Dissolved)	µg/l	5	28	15.5	0.6
Mercury	ng/l	<2.0	<2.0	<2.0	2.0
Nickel (Dissolved)	µg/l	<1.0	<1.2	<1.2	1.2
Silver (Dissolved)	µg/l	<0.5	<0.6	<0.6	0.5
TDS	mg/l	40	72	52	10
TSS	mg/l	<1.0	3.4	2.4	1.0
Zinc (Dissolved)	µg/l	<2.0	<2.5	<2.5	2.5

Source: Reclamation 2009a
Note: RL = reporting limit

Bacteria The CVRWQCB Basin Plan has established fecal coliform bacteria standards for waters designated for water contact recreation. The fecal coliform standards are based on a minimum of not less than five samples for any 30-day period, should not exceed a geometric mean of 200 Most Probable Number (MPN)/100 milliliters (ml), nor should more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml. Sampling completed by Reclamation in 2002, 2003, and 2004 show that fecal coliform bacteria samples taken at the California State University Aquatic Center on Lake Natoma may have exceeded the standards in July/August 2002 and June 2003 (Reclamation 2004; Wallace, Roberts, & Todd 2003). Higher levels of fecal coliform bacteria generally occurred during the first substantial storm event of the season (Wallace, Roberts, & Todd 2003).

Total Dissolved Solids Total dissolved solids (TDS) in the American River downstream of Folsom Reservoir shall not exceed 125 milligrams (mg)/liter (l) (90th percentile) as per the CVRWQCB Basin Plan. TDS data are acceptable in Lake Natoma as shown in Table 4-1 which indicates levels are between 40 and 72 mg/l.

Dissolved Oxygen For Lake Natoma and the American River, the CVRWQCB Basin Plan requires the monthly median of the mean daily dissolved oxygen

(DO) concentration should not fall below 85 percent of saturation in the main water mass, and the 95th percentile concentration should not fall below 75 percent of saturation. In addition, the DO concentrations should not be reduced below 7.0 mg/l at any time in waters designated to support cold water ecosystems and spawning, reproduction and/or early development beneficial uses, or 5.0 mg/l in water designated to support warm water ecosystems. Data in Table 4-1 indicate that DO levels from samples taken from surface water flow downstream of MIAD in 2007 are minimum 3.1 mg/l and maximum 10.3 mg/l.

Turbidity Turbidity should be less than or equal to 10 Nephelometric Turbidity Unit (NTUs) in Lake Natoma and the American River, except for periods of storm runoff according to the CVRWQCB Basin Plan. Average turbidity in runoff from the downstream toe of the MIAD, as shown in Table 4-1, are above CVRWQCB Basin Plan objectives.

pH The CVRWQCB Basin Plan states that pH levels should not be less than 6.5 nor above 8.5. In fresh waters with designated cold water or warm water habitat beneficial uses, changes in normal ambient pH levels should not exceed 0.5 (RWQCB 2004). All pH data observed in surface water flow downstream of MIAD are within objectives as presented in Table 4-1.

Water Quality at Mormon Island Wetland Preserve This section presents data describing general water quality parameters for surface water sampled immediately downstream of MIAD and at the American River downstream of Folsom Dam. This data was collected as a part of required sampling efforts for the Folsom DS/FDR Project.

Surface water quality data was collected at two sampling locations (SW-1 and SW-2) downstream of MIAD in the Mormon Island Wetland Preserve (See Figure 4-2) in February and May 2007. The minimum, maximum, and average levels of the chemicals of concern associated with the jet grouting operations (dissolved: metals, chloride, and sulfate; total: mercury, molybdenum, boron, cyanide, selenium, and suspended solids) as well as physical characteristics (temperature, pH, electrical conductivity, dissolved oxygen, and turbidity) observed at the two surface water sampling locations in the Preserve are presented in Table 4-2.

Figure 4-2. Mormon Island Auxiliary Dam Sampling Wells

Table 4-2. Surface Water Quality at Two Sites in the Mormon Island Wetland Preserve - February and May 2007

Water Quality Parameter	Unit	Minimum	Maximum	Average
Aluminum (dissolved)	µg/l	<10.0	<12.5	<12.5
Antimony (dissolved)	µg/l	<0.50	<0.60	<0.60
Arsenic (dissolved)	µg/l	11	17	14
Barium (dissolved)	µg/l	11	17	13
Beryllium (dissolved)	µg/l	<0.50	<0.60	<0.60
Boron	µg/l	79	160	104
Cadmium (dissolved)	µg/l	<0.25	<0.31	<0.31
Calcium (dissolved)	mg/l	5	7	5.8
Chloride (Dissolved)	mg/l	1.2	4.4	2.8
Chromium (dissolved)	µg/l	1.2	1.4	1.3
Copper (dissolved)	µg/l	0.5	1.1	0.8
Cyanide	µg/l	6.1	179	51
Iron (dissolved)	µg/l	<100	640	367
Lead (dissolved)	µg/l	<0.50	<0.60	<0.60
Magnesium (dissolved)	mg/l	4	5	4.5
Manganese (dissolved)	µg/l	25	110	52
Mercury	µg/l	2.4	12	6
Molybdenum	µg/l	<0.60	1.1	<0.80
Nickel (dissolved)	µg/l	<1.0	1.2	<1.2
Potassium (dissolved)	mg/l	<1.0	<1.0	<1.0
Selenium	µg/l	<0.40	<0.40	<0.4
Silver (dissolved)	µg/l	<0.60	<0.60	<0.60
Sodium (dissolved)	mg/l	22	26	23
Sulfate (Dissolved)	mg/l	5.9	13	8.3
Thallium (dissolved)	µg/l	<1.0	<1.2	<1.2
TSS	mg/l	9	790	213
Uranium (dissolved)	µg/l	<0.10	<0.12	<1.2
Zinc (dissolved)	µg/l	<2.0	3.6	<3.3
Temperature	C^o	8.6	25.1	16.6
EC	uS/cm	129	177	150
pH	--	7	7.98	7.52
Turbidity	NTU	19.4	115	52
DO	mg/l	3.1	10.3	7.8

Source: Reclamation 2007

4.1.3.3 Water Quality Issues

Groundwater Quality Groundwater removed from the MIAD excavation would be pumped into detention ponds and then discharged into Humbug Creek. As noted in Subsection 5.1.3.3 of Chapter 5, Groundwater, Reclamation has recent water quality information as a result of sampling 9 wells (OW-1,

OW-2, OW-11, OW-12, OW-13, OW-93, PW-2, PW-06-1, and PW-06-2) installed into the dredge tailings aquifer downstream of MIAD. Iron, and cyanide results exceeded the Fresh Water Aquatic Life standards in three wells (OW-11, 12, and 13). Though there are no standards associated with total suspended solids (TSS), TSS levels were elevated at one sampling site. TSS values averaged 1,950 mg/l at OW-93. The MCL for arsenic has been exceed in 7 samples collected from OW-12 (between 16 micrograms (µg)/l [February 2009] and 29 µg/l [November 2007]), OW-13 (11 µg/l during October and December 2008), and PW-06-1 (17 µg/l [November 2008] and 18 µg/l [August 2008]). Groundwater with constituents exceeding existing water quality objectives may need to be treated prior to any discharge to surface waters.

Mercury and Metals The sediments at Mississippi Bar may contain elemental mercury and metals from historic mining or those naturally occurring within the bedrock of the American River drainage. Mercury is toxic to both aquatic life and human health.

4.1.3.4 Flood Control

Folsom Reservoir serves as flood control storage for the American River Basin and protects the greater Sacramento region from flooding through controlled releases from Folsom Dam. It is unique in that it is located in a highly urbanized area, unlike many other reservoirs managed by Reclamation, which are in rural areas. A comprehensive Facility Review conducted by Reclamation in 2000 identified deficiencies at Folsom Dam and Reservoir, including hydrologic, static, and seismic issues that create a great safety risk to the downstream population. The Folsom DS/FDR Project was initiated by Reclamation, the Corps, SAFCA, and the CVFPB in 2006 to address these concerns at Folsom Reservoir and to provide greater flood protection to the Sacramento region.

MIAD, a component of Folsom Reservoir, is an earthfill dam that was constructed across the historic Blue Ravine river channel. As described in Chapter 1, Section 1.2.2, in the late 1980's Reclamation and the Corps determined, using criteria of the Safety of Dams Act, that corrective action was necessary at MIAD. The maximum credible earthquake (magnitude 6.5 at the East Branch of the Bear Mountain Fault, located 8 miles east of MIAD) could cause liquefaction of dredged tailings beneath the dam and could lead to dam failure. Geotechnical studies indicate MIAD would slump following liquefaction of foundation materials. If a slumping failure were to occur when the water level in Folsom Reservoir was high, substantial flooding (with peak flows of up to 1 million cfs or more) could result. A flood of this magnitude would overtop the levees on the lower American River. The inundation zone would include parts of the south side of the City of Folsom, most of Rancho Cordova, and a large part of Sacramento. The actual inundation zone becomes less defined the farther downstream from the reservoir the water travels (Reclamation 1991). Several modifications were carried out in the 1990's to address the concerns at MIAD but they failed to adequately reduce the risk of upstream and downstream foundation liquefaction. The purpose of the MIAD

Modification Project is to address these issues and reduce the flood risks to the surrounding urban areas. The MIAD Modification Project also includes the installation of filters and drains to address static issues and reduce the potential for failure from seepage.

4.2 Environmental Consequences/Environmental Impacts

In this section, the assessment methods, significance criteria, and effects of the alternatives on surface water and groundwater resources, water quality conditions, and jurisdictional wetlands in the vicinity are evaluated. In regards to wetlands, this section focuses on the hydrologic effects to wetlands due to construction activities. Additional information on jurisdictional wetland impacts, specifically loss of wetland areas and habitat quality, are described in Chapter 7, Biological Resources.

4.2.1 Assessment Methods

Potential impacts associated with each alternative were assessed through a qualitative evaluation. Information presented in the existing conditions as well as construction practices and materials, location, and duration of construction were evaluated during the assessment process.

4.2.2 Significance Criteria

Project implementation would have significant impacts and environmental consequences on water quality and flood control if it would:

- Violate any water quality standards or waste discharge requirements; or
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.

4.2.3 Environmental Consequences/Environmental Impacts of the No Action/No Project Alternative

The No Action/No Project Alternative assumes no action would be taken by any agency. If modifications to the MIAD facility are not completed to improve dam safety and flood damage reduction, public safety would be at risk due to the potential of dam and dike failure associated with seismic, static, and hydrologic concerns. Without the MIAD Modification Project, the static flood risk generated by foundation liquefaction and facility failure at MIAD during a maximum credible earthquake could result in flood-related loss of life, economic losses, and infrastructure damage.

This impact to flood risk would be potentially significant. Based on the analysis presented above, it is anticipated that the environmental impact of the No

Action/No Project Alternative (i.e., future environmental conditions if no action is taken relative to the MIAD Modification Project) would exceed the significance criteria defined herein. However, unlike a significant impact associated with an action alternative, no mitigation can be required for significant impacts associated with the No Action/No Project (i.e., within the regulatory framework of NEPA and CEQA, a project applicant cannot be required to mitigate the impacts that would result from taking no action). As such, the impact identified above for the No Action/No Project Alternative is considered to be significant, adverse, and unmitigable.

4.2.4 Environmental Consequences/Environmental Impacts of Alternative 1

Stormwater runoff from the construction site could degrade water quality in existing waterways.

Construction activities such as clearing, grading, and excavation of the foundation would increase the potential for soil erosion. During the rainy season, stormwater runoff from the areas that have been cleared may contain high levels of suspended sediments. Any discharge of this stormwater to existing waterways such as the wetlands in Mormon Island Wetland Preserve or Humbug Creek, could violate existing water quality laws and could exceed Basin Plan requirements. Mitigation Measure WQ-1 would reduce any potential water quality impacts. After construction, all disturbed areas would be revegetated to reduce erosion.

Impacts to water quality from stormwater runoff would be potentially significant. Impacts would be reduced to a less-than-significant level with Mitigation Measure WQ-1.

Dewatering activities could result in water quality impacts associated with the discharge of groundwater to surface water.

As described in Chapter 2, Project Description, Alternative 1 would require the removal of groundwater to keep the excavated area dry during construction. Prior to construction, dewatering wells would be installed surrounding the entire excavation. Throughout construction the groundwater would be pumped from the wells into a detention pond south of Green Valley Road to allow for sediment settling. This water would then be discharged to Humbug Creek. The discharge of groundwater to Humbug Creek could result in water quality impacts if the groundwater exceeds any existing water quality objectives.

The main constituent of concern in the groundwater surrounding MIAD is arsenic. As noted above, several surface water and groundwater samples exceeded the MCL for arsenic. Other constituents of concern include iron and cyanide. The discharge of groundwater to Humbug Creek that contains elevated levels of constituents above current surface water quality objectives would be considered a significant water quality impact.

Impacts to water quality from dewatering would be potentially significant. These impacts would be reduced to a less-than-significant level with Mitigation Measure WQ-2.

Replacement of the MIAD foundation could alter existing hydrology.

Replacement of the MIAD foundation with a cement modified soil could potentially reduce a source of water for the Mormon Island Wetland Preserve. As discussed in Subsection 4.1.3.4, the water source for a portion of the smaller wetlands directly adjacent to Green Valley Road could be seepage through cracks and fissures in the MIAD foundation. Replacement of the MIAD foundation could potentially reduce seepage, thereby resulting in a reduction in water supply to the wetlands. Because there is some uncertainty as to the hydrologic connectivity between the reservoir and the wetlands of the Mormon Island Wetland Preserve, the long-term effects of the foundation replacement are unknown. Reclamation will assume this impact is potentially significant.

This impact would be potentially significant. Mitigation Measure WQ-3 would reduce impacts to a less-than-significant level.

MIAD modifications would provide beneficial impacts associated with flood control.

The flood risk during construction would be managed by carefully monitoring weather patterns and reservoir conditions. Excavation of the downstream foundation would be timed to coincide with periods when the reservoir is low to reduce flood risk. The excavated area would be backfilled if regional weather patterns change and the reservoir is expected to fill to unsafe levels.

Replacement of the MIAD foundation and placement of the overlay would allow MIAD to withstand the maximum credible earthquake without liquefaction of the upstream and downstream foundations and would substantially reduce the potential risk of dam failure. The placement of new filters and drains would protect MIAD from seepage and piping that could eventually result in dam erosion and failure. The filters and drains are designed to carry water through the dam and away from the dam toe without causing erosion. These measures would decrease the risk of static failure of MIAD and would increase the level of flood protection to the Sacramento region.

This impact would be beneficial to flood control.

Stormwater runoff from the Mississippi Bar mitigation site could degrade water quality.

Construction activities such as grading and placement of new soil would increase the potential for soil erosion. During the rainy season, stormwater runoff may contain high levels of suspended sediments. Any discharge of this stormwater to existing waterways such as Lake Natoma or the adjoining ponds, could violate existing water quality laws and could exceed Basin Plan requirements. Mitigation measure WQ-1 would reduce any potential water quality impacts. After construction, no impacts are expected as the area would be vegetated to address mitigation requirements.

Impacts to water quality from stormwater runoff would be potentially significant during construction. Impacts would be reduced to a less-than-significant level with Mitigation Measure WQ-1.

Installation of the culvert at Mississippi Bar could degrade water quality in Lake Natoma and adjoining ponds.

Construction activities such as culvert replacement and the use of equipment in and around the Lake Natoma shoreline would have the potential to introduce sediment into the water. Dredging and culvert installation may stir up sediments on the lake bottom, temporarily increasing turbidity. To avoid or reduce the potential for adverse water quality effects, dredging and culvert installation would be limited to periods of low stream flow and dry weather (May to October). Work would not be completed in a live (wet and flowing) waterway. If work in a live stream is unavoidable, the work site would be completely dewatered and the entire stream flow diverted around or through the work site until the work is completed. Best management practices would be implemented to reduce erosion and sedimentation, including keeping equipment and vehicles stored away from the water in previously disturbed areas.

Impacts to water quality from installation of the culvert would be less than significant.

Installation of the culvert at Mississippi Bar would alter existing hydrology.

Replacement of the existing 48 inch diameter culvert with a new arch culvert 23 feet high, 14 feet wide, and 50 feet long, would open up a larger connection between Lake Natoma and the existing lagoons at Mississippi Bar and would increase water movement between these two water bodies. The changes to hydrology would be minimal as the area already contains a culvert.

This impact would be less than significant.

Installation of the culvert at Mississippi Bar could change the water levels in the existing ponds.

The new culvert at Mississippi Bar that links the lagoons to Lake Natoma would be much larger than the existing culvert. As a result, the lagoons could experience higher water levels throughout the year then under the affected environment. No residential structures exist near the ponds and therefore there would be no risk of flood damage from higher water levels.

This impact would be less than significant.

4.2.5 Environmental Consequences/Environmental Impacts of Alternative 2

Alternative 2 would have the same affect on hydrology, water quality, and flood control as Alternative 1. Mitigation measures WQ-1, WQ-2, and WQ-3 would reduce any potentially significant impacts to a less-than-significant level.

4.2.6 Environmental Consequences/Environmental Impacts of Alternative 3

Alternative 3 would have the same affect on hydrology, water quality, and flood control as Alternative 1. Mitigation measures WQ-1, WQ-2, and WQ-3 would reduce any potentially significant impacts to a less-than-significant level.

4.2.7 Environmental Consequences/Environmental Impacts of Alternative 4

Alternative 4 would have the same affect on hydrology, water quality, and flood control as Alternative 1. Mitigation measures WQ-1, WQ-2, and WQ-3, would reduce any potentially significant impacts to a less-than-significant level.

4.3 Comparative Analysis of Alternatives

Table 4-3 presents the comparison of impacts under each of the alternatives, including the No Action/No Project Alternative. All the alternatives would have the same impacts on water quality and flood risk, with the exception of the No Action/No Project Alternative, which would have no impacts. Mitigation measures would reduce the potentially significant impacts identified in Section 4.2 to a less-than-significant level for each of the alternatives.

Table 4-3. Comparative Analysis of Alternatives

Impact	Significance					Environmental Commitment/ Mitigation Measure
	No Action/ No Project Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Stormwater runoff from the construction site could degrade water quality	NI	LTSWM	LTSWM	LTSWM	LTSWM	**WQ-1:** NPDES General Construction Permit and Storm Water Pollution Prevention Plan.
Dewatering activities could result in water quality impacts associated with the discharge of groundwater to surface water.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**WQ-2:** Dewatering Permit and Water Quality Monitoring Program
Replacement of the MIAD foundation could alter existing hydrology	NI	LTSWM	LTSWM	LTSWM	LTSWM	**WQ-3:** Water Level Monitoring
MIAD modifications would provide beneficial impacts associated with flood control.	SU	B	B	B	B	None Required
Stormwater runoff from Mississippi Bar mitigation site could degrade water quality.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**WQ-1:** NPDES General Construction Permit and Storm Water Pollution Prevention Plan.
Installation of a larger culvert at Mississippi Bar could degrade water quality in Lake Natoma.	NI	LTS	LTS	LTS	LTS	None Required
Installation of a larger culvert at Mississippi Bar would alter hydrology.	NI	LTS	LTS	LTS	LTS	None Required
Installation of a culvert at Mississippi Bar would change water levels in the lagoons.	NI	LTS	LTS	LTS	LTS	None Required

Key:
LTS = Less Than Significant
SU = Significant and Unavoidable
B = Beneficial
LTSWM = Less than Significant with Mitigation
NI = No Impact
N/A = Not Applicable

4.4 Environmental Commitments/Mitigation Measures

WQ-1:NPDES General Permit for Construction A NPDES permit will be obtained prior to construction activities, commencing by filing a NOI with the CVRWQCB and preparing a SWPPP. As required under the General Permit, the SWPPP will identify implementation measures necessary to mitigate potential water quality degradation as a result of construction. These measures will include BMPs and other standard pollution prevention actions such as erosion and sediment control measures, proper control of non-stormwater discharges, and hazardous spill prevention and response. The SWPPP will also include requirements for BMP inspections, monitoring, and maintenance.

The following items are examples of BMPs that could be implemented during construction to avoid causing water quality degradation:

- Erosion control BMPs such as use of mulches or hydroseeding to prevent detachment of soil following guidance presented in the California BMP Handbooks – Construction (CASQA 2003). A detailed site map will be included in the SWPPP outlining specific areas where soil disturbance may occur, and drainage patterns associated with excavation and grading activities. In addition, the SWPPP will provide plans and details for the BMPs to be implemented prior, during and after construction to prevent erosion of exposed soils and to treat sediments before they are transported offsite.

- Sediment control BMPs such as silt fencing or detention basins that trap soil particles.

- Construction staging areas designed so that stormwater runoff during construction will be collected and treated in a BMP such as a detention basin.

- Management of hazardous material and wastes to prevent spills.

- Vehicle and equipment fueling BMPs so these activities occur only in designated staging areas with appropriate spill controls.

- Maintenance checks of equipment and vehicles to prevent spills or leaks of liquids of any kind.

WQ-2: Dewatering Permit and Water Quality Monitoring Program
Reclamation will obtain the appropriate dewatering permit from the CVRWQCB prior to the discharge of any groundwater to surface waters. It is expected that measures to control groundwater quality will be included in the dewatering permit conditions to ensure the discharge meets the appropriate water quality objectives for the receiving waters. Water quality sampling will be

conducted to determine if the water in the detention basin meets the applicable water quality objectives for discharge to Humbug Creek. If sampling results do not meet applicable water quality objectives, no discharges will occur and Reclamation will determine appropriate corrective measures. These measures may include treating the water, increasing the residency time in the detention ponds, blending the water with an additional water source, and/or using the water as dust control to reduce or eliminate the need for discharge to surface waters. The sampling program and corrective measures will be coordinated with the CVRWQCB.

WQ-3: Water Level Monitoring Reclamation will monitor surface and groundwater levels in wetlands downstream of MIAD and within the Mormon Island Wetland Preserve during and after construction of MIAD. This monitoring will occur in conjunction with mitigation measure BIO-9 in Chapter 9, Biological Resources, and GW-1 in Chapter 5, Groundwater. If water levels decrease, Reclamation will be responsible for completing corrective actions such as supplying additional water to the wetlands or completing appropriate mitigation for any resulting impacts.

4.5 Potentially Significant and Unavoidable Impacts

No potentially significant or unavoidable impacts have been identified for water quality or flood risk. The mitigation measures identified above in Section 4.4 would reduce all impacts to a less-than-significant level.

4.6 Cumulative Effects

Table 22-1 in Chapter 22 presents the projects that were considered in the analysis of cumulative effects.

Construction of the MIAD Modification Project would result in increased dam safety and flood damage reduction. This impact would be beneficial and therefore does not require mitigation. The other remaining components of the Folsom DS/FDR have the potential to collectively increase the flood damage reduction in even greater amounts. These projects would culminate in beneficial cumulative impacts for flood damage reduction and dam safety.

Construction of the MIAD Modification Project, in combination with existing and probable future projects, could affect hydrology and water quality. This cumulative impact would be significant but mitigation such as contained within Mitigation measures WQ-1 through WQ-3 would reduce these impacts to a less than significant level. When combined with construction of the cumulative projects described in Chapter 22, there is a possibility that water resources would be affected. However, each project's associated SWPPPs, BMPs, pertinent permits, and appropriate monitoring and testing would ensure that measures are implemented to avoid hydrologic resource impairment including water quality degradation and detrimental effects to wetlands. This would result in effective mitigation of any potentially significant cumulative impacts.

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Chapter 5
Groundwater

This chapter discusses the potential groundwater effects of the MIAD Modification Project alternatives.

5.1 Affected Environment/Environmental Setting

This section describes the existing groundwater resources in the construction areas potentially affected by the alternatives and the regulatory setting relative to groundwater resources.

5.1.1 Area of Analysis

The area of analysis for groundwater includes MIAD and the Mississippi Bar mitigation site.

5.1.1.1 Mormon Island Auxiliary Dam

The MIAD area of analysis includes the MIAD facility and the surrounding Federally-owned property in Sacramento and El Dorado Counties. It also includes Federally-owned lands south of Green Valley Road and the Mormon Island Wetland Preserve.

5.1.1.2 Mississippi Bar

The Mississippi Bar mitigation site includes 80 acres of land on the western shore of Lake Natoma, near the intersection of Sunset Avenue and Main Avenue and south of the community of Orangevale. All proposed mitigation would occur on land parcels currently owned by DPR and Reclamation and managed by DPR as part of the FLSRA.

5.1.2 Regulatory Setting

5.1.2.1 Federal

The SDWA was established to protect the quality of drinking water in the U.S. and includes all waters, from surface water and groundwater sources, actually or potentially designated for drinking use. The SDWA also gives the USEPA the authority to establish minimum standards to protect drinking water and requires all owners or operators of public water systems to comply with these primary health-related standards. 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. These types of contaminants are currently regulated by the USEPA as primary and secondary MCLs and are legally enforceable. As directed by the SDWA amendments of 1986, the USEPA has been expanding its list of primary MCLs. As of May 2009, primary MCLs have been proposed or established for approximately 90 contaminants (USEPA 2009).

Based on past sampling of groundwater from wells located downstream of MIAD, the only contaminant that exceeds its MCL of 10 µg/l is arsenic.

In California, the USEPA has delegated authority to the State of California for attainment of MCLs, including secondary MCLs (nuisance-related such as taste and appearance).

5.1.2.2 State

Water quality control plans or Basin Plans are required in Section 13240 of the California Water Code and are supported by the CWA. According to Section 13050 of the California Water Code, Basin Plans consist of a designation or establishment for the waters within a specified area of beneficial uses to be protected and water quality objectives to protect those uses. Adherence to Basin Plan water quality objectives protects continued beneficial uses of waterbodies.

Because beneficial uses, together with their corresponding water quality objectives, can be defined per Federal regulations as water quality standards, the Basin Plans are regulatory references for meeting the State and Federal requirements for water quality control (40 CFR 131.20).

One significant difference between the State and Federal programs is that California's Basin Plans establish standards for groundwater in addition to surface water. The Basin Plans include provisions to prevent degradation and require clean up of groundwater quality problems.

The CVRWQCB regulates waters of the state located within the area of analysis for the MIAD Modification Project. *The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region, The Sacramento River Basin and the San Joaquin River Basin* (CVRWQCB Basin Plan 2007) documents the water quality objectives for groundwater in these basins. The CVRWQCB Basin Plan includes water quality objectives for: bacteria, tastes and odors, chemical constituents, toxicity, and radioactivity. California has adopted the Federal primary and secondary MCLs and in some cases has replaced then with more stringent concentrations. Title 22 of the CCR specifies the state MCLs. The State MCL for arsenic is the same as the Federal MCL (10 µg/l).

5.1.2.3 Local

In addition to stipulations regarding protection of county-wide surface water and groundwater resources that may be included in individual Counties' General Plans, many counties in California develop Groundwater Management Plans (GMPs) or place provisions in county ordinances for the protection of groundwater. Such plans and ordinances typically involve provisions to limit or prevent groundwater overdraft, regulate transfers of groundwater, and protect groundwater quality. There are no existing GMPs that cover the project area, either at MIAD or Mississippi Bar.

5.1.3 Existing Conditions

5.1.3.1 Groundwater Basins

The area of analysis, including MIAD and Mississippi Bar, lies close to and within (respectively) the Sacramento Valley groundwater basin, as defined by the California Department of Water Resources' (DWR) Bulletin 118 (2003). Specifically, the Mississippi Bar area lies within the North American groundwater subbasin. MIAD itself lies just north of the South American groundwater subbasin. The Mormon Island Wetland Preserve lies within the South American subbasin. Figure 5-1 shows the location of the North American and South American groundwater subbasins, in relation to MIAD, Mississippi Bar, and the Mormon Island Wetland Preserve.

The area surrounding Folsom Reservoir consists primarily of bedrock formations of the Sierra Nevada foothill complex. Although groundwater is not a major resource in the vicinity of the reservoir, small amounts of groundwater are typically found in the granitic fissures and cracks. Bedrock is close to, or in some areas, at the surface; therefore, high water tables exist in some locations. Due to the presence of this impermeable material near the surface, natural drainage is irregular and low lying areas frequently become water-logged.

Because fractured aquifer systems typically yield low quantities of groundwater, surface water is primarily used as a source for drinking and irrigation water for the Sacramento area.

The bedrock underlying MIAD is composed of amphibolite schist and ranges between approximately 50 to 70 feet below ground surface (bgs) at the project area. Weathering of this rock and the breakdown of two of the accessory minerals associated with this rock, arsenopyrite and arsenian pyrite, have been linked to elevated arsenic levels in groundwater in other regions, and are suspected to be the cause of high arsenic concentrations in groundwater samples collected from test wells near MIAD (Reclamation 2009). The California Maximum Contaminant Level (MCL) for arsenic is 10 µg/l. Groundwater samples collected near MIAD have been reported with arsenic concentrations as high as 29 µg/l. Groundwater quality is discussed further in Section 5.1.3.3.

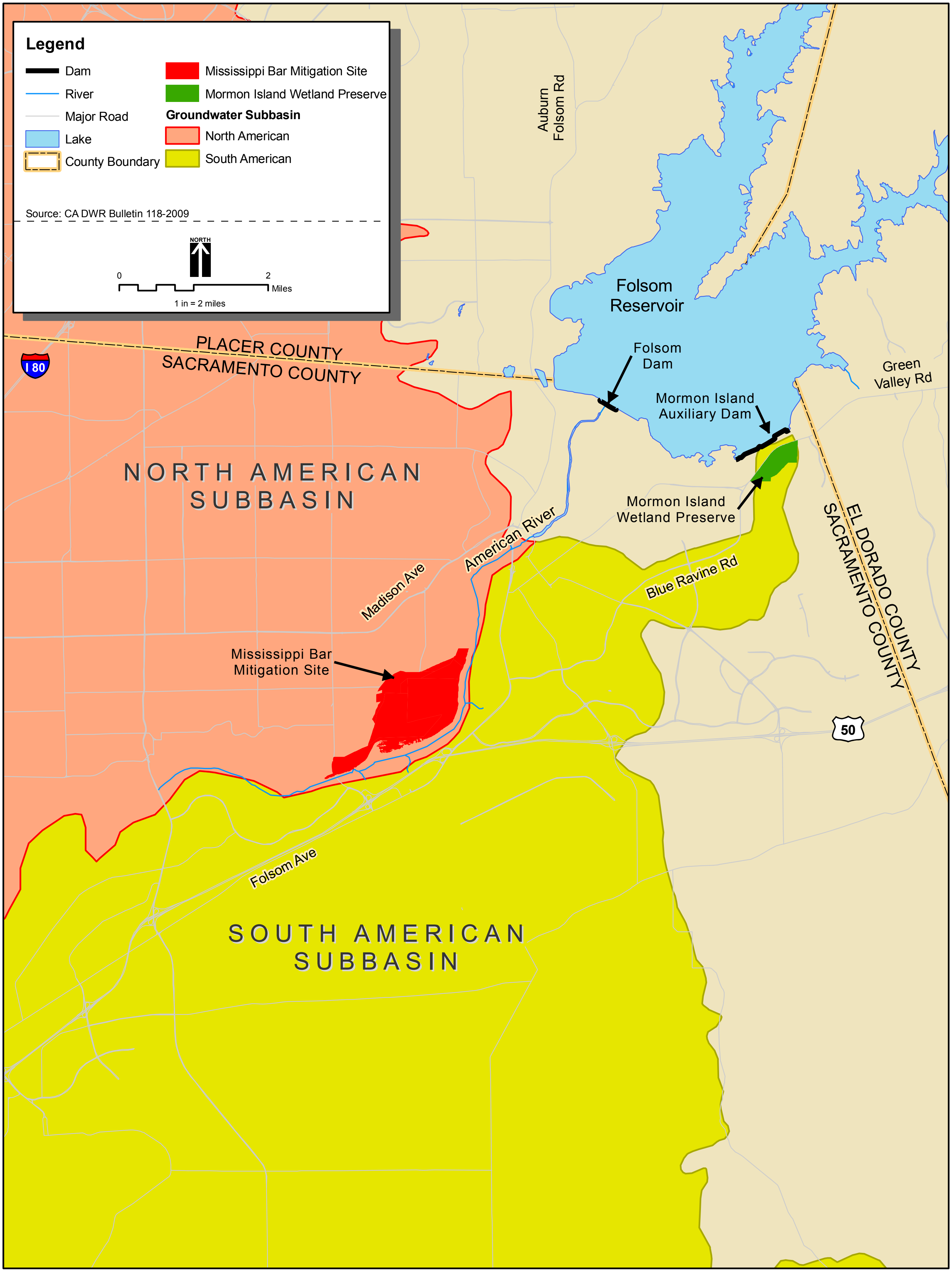

Figure 5-1. Groundwater Subbasins

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The Mehrten Formation at Mississippi Bar consists of an upper, dense claystone unit that serves as an aquitard and overlies the Upper Mehrten aquifer which consists of sandstone with gravel and cobbles. The upper confining unit ranges in thickness between approximately 70 and 100 feet and occurs between approximately 118 and 135 feet above mean seal level (amsl) (20 to 50 feet below land surface (bls). The Upper Mehrten aquifer occurs between approximately 0 and 15 feet amsl (155 to 170 feet bls).

In addition to the Upper Mehrten aquifer, there are also zones of perched groundwater within the dredge tailing piles. Water levels in these perched zones range from approximately 140 to 155 feet amsl (7 to 15 feet bls) and are estimated to yield approximately 20 to 30 gpm (Sherer 2009).

5.1.3.2 Groundwater Levels

Figure 5-2 shows the average groundwater levels to the west of MIAD for Spring (March through June) 2009. These water levels were measured in a number of wells and recorded in DWR's Water Data Library (WDL). The WDL does not contain any groundwater data points in the immediate vicinity of MIAD.

Downstream of MIAD, the Mormon Island Wetland Preserve comprises wetlands south of Green Valley Road. Monitoring data indicates a very shallow and relatively static year round depth to groundwater in the area immediately downstream of MIAD. There are some localized areas of perched water where the area is underlain by undredged alluvium and ponds occur in the wetlands area west of the Blue Ravine channel (Reclamation 2006).

Reclamation completed a literature review of prior investigations into the connectivity between the reservoir and the wetlands and determined that data collected throughout the downstream foundation area suggests no reservoir connection to local groundwater levels (Reclamation 2006). There does, however, appear to be a hydraulic connectivity in the dredged alluvium downstream of MIAD in the area between the dam toe and the preserve.

The source of groundwater that feeds the wetland area is not fully known. The current understanding is that this water in the wetland comes from bank storage of precipitation from the hillside abutment and dam embankment and from seepage through fissures in the underlying foundation bedrock (Reclamation 2006). Reclamation indicates that water levels in the wetlands area are not influenced by water levels in Folsom Reservoir other than showing a seasonal response. Seepage from the embankment is believed to be the source of water in the wetlands area to the south of MIAD.

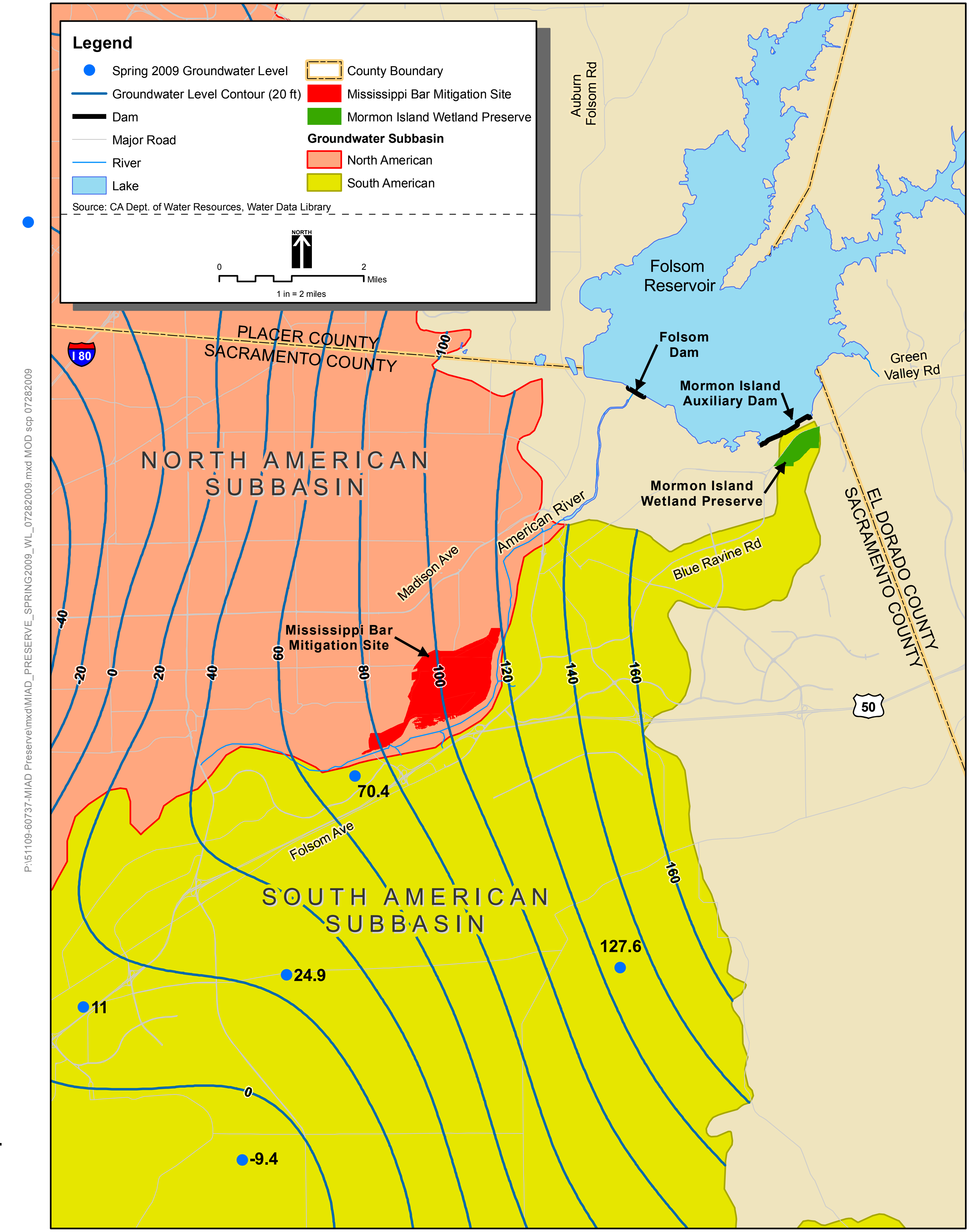

Figure 5-2. Average Spring 2009 Groundwater Levels

There are three groundwater wells near Mississippi Bar that have water level data recorded in the study area. A well on the north edge of the Mississippi Bar shows increasing groundwater levels since 1992. Two wells to the southwest of this area show groundwater levels declining since the early 1980s.

5.1.3.3 Groundwater Quality

Reclamation has recent water quality information as a result of sampling 9 wells (OW-1, OW-2, OW-11, OW-12, OW-13, OW-93, PW-2, PW-06-1, and PW-06-2) installed into the dredge tailings aquifer downstream of MIAD (Figure 5-3). The 9 wells are fairly evenly distributed across the site and are located on both sides of Green Valley Road.

Six of these wells have water quality test results for arsenic either below detection limits or ranging between 2.1 µg/l to 10 µg/l; results that are all at or below the California MCL of 10 µg/L.

The MCL for arsenic has been exceed in 7 samples collected from OW-12 (between 16 µg/l [February 2009] and 29 µg/l [November 2007]), OW-13 (11 µg/l during October and December 2008), and PW-06-1 (17 µg/l [November 2008] and 18 µg/l [August 2008]). The arsenic in the samples exceeding the MCL from PW-06-1 are most likely reflecting leaching of arsenic from amphibolite material mixed into the backfill in a nearby plugged drill hole less than 3 feet away from the well. The wide range of results from OW-12 reflects a compromised sampling protocol that includes results that may have come from a monitoring well drilled into bedrock (Reclamation 2009).

Iron Iron exceeded the EPA standard for the protection of fresh water aquatic life (1000 µg/l; chronic exposure) at wells OW-11, 12, and 13 with results of 1500, 5700, and 5300 µg/l respectively. These results are similar to those measured during May and February 2007. Elevated iron concentrations continue to be detected in these three proximal wells, suggesting a local iron source (Reclamation 2007).

Cyanide Cyanide exceeded the Fresh Water Aquatic Life standard (5.2 µg/l; chronic exposure) at only one well, OW-12, with a result of 18 µg/l. In comparison, May 2007's sampling had cyanide levels exceeding aquatic life standards at four wells, OW-1, -11, -12 and -13. February had only two wells (OW-12 and OW-13) with high cyanide levels (Reclamation 2007).

Total Suspended Solids Though there are no standards associated with TSS, TSS levels were extremely high at three ground water sites. The high TSS values were at well OW-1 (14000 mg/l), OW-2 (11000 mg/l), OW-93 (17000 mg/l). Well OW-11 had measured value of 230 mg/l. For reference, TSS concentration less than 20 mg/l is considered clear, 40 - 80 mg/l is cloudy, and TSS >150 mg/l is dirty (Reclamation 2007).

C:\GIS\MIADM\Figures\Fig 1-1 MIAD Wells Tested for Arsenic 2007-2008.ai AVS 20090127 1434

Figure 5-3. Mormon Island Auxiliary Dam Sampling Wells

Wells OW-1, -2, and -93 were evacuated using a bailer which may have stirred up bottom sediments in the wells, contributing to the excessive concentration of suspended solids in the sample (Reclamation 2007).

5.2 Environmental Consequences/Environmental Impacts

The assessment methods, significance criteria, and effects of the alternatives on groundwater resources in the vicinity are presented in this section.

5.2.1 Assessment Methods

Potential impacts associated with each alternative were assessed through a qualitative evaluation. Information presented in the affected environment/environmental setting as well as construction practices and materials, location, and duration of construction were evaluated to determine potential effects.

There is still uncertainty regarding the groundwater connectivity between the wetlands and the reservoir and the potential for long-term changes in groundwater at MIAD after construction is complete. Because of this uncertainty, monitoring will be necessary for all four alternatives to determine any potential impacts that will then need to be mitigated accordingly. Reclamation has already completed pre-construction monitoring that will serve as the baseline for monitoring that occurs during and after construction.

5.2.2 Significance Criteria

Based on CEQA Guidelines, effects on groundwater resources would be significant if an alternative would:

- Violate any groundwater quality standards or substantially degrades groundwater quality; or
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.
- Result in land subsidence that would have adverse effects on existing structures.

5.2.3 Environmental Consequences/Environmental Impacts of the No Action/No Project Alternative

The No Action/No Project Alternative would not affect groundwater.
The No Action/No Project Alternative assumes no action would be taken to address MIAD. There would be no changes to groundwater; conditions would remain the same as described under the Affected Environment/Environmental Setting.

There would be no impacts to groundwater under the No Action/No Project Alternative.

5.2.4 Environmental Consequences/Environmental Impacts of Alternative 1

Construction activities could degrade groundwater quality.
Construction of Alternative 1 could result in adverse groundwater quality impacts through improper storage and handling of construction materials on site, and improper operation and maintenance of construction equipment and vehicles. These activities could increase the potential for accidental spills of toxic materials (e.g., fuel) that could enter the groundwater. To reduce the potential for groundwater impacts, implementation of mitigation measure PHS-5 would require that all hazardous materials be stored in proper containers and on-site equipment maintained and fueled in a designated area with appropriate control measures to prevent leaks or spills. With such measures in place, impacts to groundwater quality from construction activities are expected to be less than significant.

With the implementation of PHS-5 (preparation of a Spill Plan) described in Chapter 16, Section 16.4, groundwater impacts from construction activities would be less than significant.

Dewatering could cause short-term changes in groundwater levels.

Groundwater levels within the project area would decrease due to continuous dewatering of the project area. The dewatering activities are expected to continue over a period of 22 months with a stabilized flow of 500 gpm. Peak flows would reach 3,000 gpm. To pump the extracted groundwater to the detention ponds would require an additional 800 gpm. Although water levels will decrease within the project area while dewatering occurs, they are expected to recover after dewatering is complete. It is not known to what extent the cone of depression caused by the pumping to dewater the project area would extend. Groundwater level monitoring will be performed as part the project action to assess the groundwater level changes.

The storage of pumped groundwater into the detention ponds may increase groundwater levels in the vicinity of the ponds. The detention pond area is planned to be sited west of the Mormon Island Wetland Preserve and Humbug

Creek (see Figure 2-2). There are no structures in this area that would be affected by a temporary rise in groundwater levels. Groundwater levels are expected to recover after construction is complete and the detention ponds are no longer required. There are no long term impacts to groundwater levels expected as a result of the active dewatering.

Potential effects associated with changes in groundwater levels would be short-term and less than significant.

Replacement of the MIAD foundation could permanently decrease aquifer volume and the rate of groundwater movement.

Construction activities could affect long-term groundwater supplies to the wetlands area in that excavating and replacing groundwater-bearing materials with compacted, lower-yielding materials would decrease the overall aquifer volume.

Excavating and replacing groundwater-bearing materials with compacted, lower-yielding materials would decrease the rate of groundwater movement (hydraulic conductivity) in the area. Conflicting data exist regarding the groundwater source for nearby wetlands. Some investigations conclude that these wetlands are fed primarily by seepage from the reservoir; others conclude that there is a separate source not related to the reservoir (i.e., bank storage). If in fact the wetlands are fed by seepage from the reservoir beneath MIAD, the foundation treatment could substantially reduce groundwater flows to the wetlands and the impact on them could be significant. Monitoring of the water levels in the wetlands would be performed as part of the project action to evaluate any connectivity of reservoir seepage with the source of water feeding the wetlands.

Reductions in the aquifer volume and rate of groundwater movement due to foundation replacement would be considered potentially significant. Mitigation measure GW-1 (development of a Groundwater Monitoring Program) would reduce this impact to a less than significant level.

Dewatering activities could cause land subsidence.

Dewatering activities could cause land subsidence beneath both MIAD and Green Valley Road adjacent to areas of active dewatering. The process of dewatering removes water from the ground, essentially creating void space in the subsurface. As the amount of void space increases, the overlying materials could collapse and compact the void space. Depending on site-specific conditions (soil porosity, degree of cementation, duration and intensity of pumping, etc.), prolonged dewatering could potentially cause land subsidence. Preliminary estimates predict up to 1 foot of subsidence beneath Green Valley Road and up to 2 feet beneath MIAD under Alternative 1. It is expected that this could cause damage to Green Valley Road and MIAD. The extent of subsidence is not known and would need to be assessed during the dewatering action.

Other structures near the project are houses located approximately 1,600 feet south-southeast of the bend in Green Valley Road. These structures are not expected to be affected by subsidence as a result of dewatering activities.

Potential effects associated with land subsidence would be significant. Mitigation Measure GW-2 would reduce this impact to a less-than-significant level.

<u>Use of groundwater for irrigation at Mississippi Bar would affect groundwater levels.</u>

The construction of wetlands at Mississippi Bar would require the use of groundwater for irrigation. It is believed that quantity of groundwater necessary would not substantially impact groundwater levels in the area.

This impact would be less than significant.

5.2.5 Environmental Consequences/Environmental Impacts of Alternative 2

Under Alternative 2, the potential impacts associated with groundwater quality, wetland impacts, groundwater supply, and subsidence would be similar to Alternative 1. The construction of a downstream structural wall could reduce downstream water level impacts, subsidence potential, and wetland impacts, however, mitigation Measures GW-1 and GW-2 would still be needed to reduce impacts to a less than significant level.

5.2.6 Environmental Consequences/Environmental Impacts of Alternative 3

Under Alternative 3, the potential impacts associated with groundwater quality, wetland impacts, groundwater supply, and subsidence would be similar to Alternative 1. The construction of both upstream and downstream structural walls could reduce downstream water level impacts, subsidence potential, and wetland impacts; however, mitigation Measures GW-1 and GW-2 would still be needed to reduce impacts to a less than significant level.

5.2.7 Environmental Consequences/Environmental Impacts of Alternative 4

Alternative 4 employs a cellular wall method of excavation where excavation would occur incrementally, one cell after another. This method would require less intense dewatering than excavating the entire area in one phase.

Under Alternative 4, the potential impacts associated with wetland impacts, groundwater supply, and subsidence would be lower than Alternatives 1, 2, and 3, but still potentially significant. Potential groundwater quality impacts associated with Alternative 4 would be similar to Alternatives 1, 2, and 3. Mitigation Measures GW-1 and GW-2 would still be needed to reduce impacts to a less than significant level.

5.3 Comparative Analysis of Alternatives

The impacts associated with groundwater quality, groundwater movement, and subsidence would be potentially significant under all the alternatives. These potential impacts would be mitigated through mitigation Measures GW-1 and GW-2.

Table 5-1. Comparative Analysis of Alternatives

Impact	Significance					Environmental Commitment/ Mitigation Measure
	No Action/ No Project Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Construction could degrade groundwater quality.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**PHS-5**: Spill Prevention Plan (See Chapter 16, Section 16.4)
Dewatering activities could cause short-term changes in groundwater levels.	NI	LTS	LTS	LTS	LTS	None Required
Replacement of the MIAD foundation could permanently decrease aquifer volume and the rate of groundwater movement.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**GW-1**: Groundwater Monitoring Program
Dewatering activities could cause land subsidence.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**GW-2**: Subsidence Monitoring
Use of groundwater for irrigation at Mississippi Bar would affect groundwater levels.	NI	LTS	LTS	LTS	LTS	None Required

Key:
LTS = Less Than Significant
LTSWM = Less than Significant with Mitigation
SU = Significant and Unavoidable
NI = No Impact
B = Beneficial
N/A = Not Applicable

With exception to the No Action/No Project Alternative, Alternative 4 would have lesser impacts than the remainder of the alternatives. The cellular method of excavation would reduce the amount of dewatering necessary, and thus reduce the extent of associated impacts such as land subsidence and changes in groundwater levels. In contrast, Alternative 1 involves the greatest amount of dewatering and resultant impacts, and would result in the largest potential for adverse effects.

All four action alternatives would require replacement of the MIAD foundation and would therefore have the potential to result in significant long-term impacts associated with aquifer volume and the rate of groundwater movement. If there is connectivity between Folsom Reservoir and the Mormon Island Wetland Preserve from seepage beneath MIAD, then all alternatives would have the potential to decrease groundwater movement to the wetlands.

5.4 Environmental Commitments/Mitigation Measures

Implementation of Mitigation Measures GW-1 and GW-2 would reduce all potentially significant groundwater impacts to a less than significant level.

GW-1: Groundwater Monitoring Program Reclamation will develop a groundwater monitoring program for MIAD and the Mormon Island Wetland Preserve. Groundwater elevations will be monitored via a network of monitoring wells during and after construction. If substantial water level decreases are observed, Reclamation will be responsible for providing sufficient water to maintain groundwater elevations and preserve the existing wetlands. This mitigation will be completed in conjunction with mitigation measures WQ-3 in Chapter 4, Hydrology, Water Quality, and Flood Control, and BIO-9 in Chapter 7, Biological Resources.

GW-2: Subsidence Monitoring Reclamation will develop a subsidence monitoring plan for MIAD and Green Valley Road. Subsidence in the immediate area of MIAD and along Green Valley Road will be monitored during construction via a network of extensometers tied into a global positioning system. If significant indications of subsidence are observed, dewatering will cease until corrective measures are taken. Corrective measures could include decreasing dewatering cell sizes or utilizing groundwater recharge trenches. Additionally, if any damage occurs to Green Valley Road from subsidence, Reclamation will provide adequate compensation to the City of Folsom.

5.5 Potentially Significant and Unavoidable Impacts

There would be no significant and unavoidable impacts related to groundwater resources.

5.6 Cumulative Effects

There are no other known groundwater extraction projects in the vicinity of MIAD that when added to the MIAD dewatering would create a significant impact. Given that the MIAD dewatering action is temporary and mitigation for wetlands impacts is being considered, no cumulative impacts are probable to groundwater resources.

5.7 References

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Chapter 6
Air Quality

This section presents the air quality analysis conducted for the MIAD Modification Project alternatives. The analysis includes discussions of the affected environment/environmental setting, significance thresholds, and impacts for each of the proposed MIAD Modification Project alternatives.

6.1 Affected Environment/Environmental Setting

This section describes the area of analysis, as well as the regulatory and environmental setting for air quality.

6.1.1 Area of Analysis

The air quality area of analysis includes Sacramento and El Dorado counties. The MIAD Modification Project construction equipment, haul trucks, and employee traffic would generate emissions in both counties; however, the majority of the construction activities will occur in Sacramento County. The general region of concern when analyzing air quality impacts in the Sacramento region also includes Yolo County and portions of Placer, Sutter, and Solano Counties.

6.1.1.1 Mormon Island Auxiliary Dam

MIAD is located on the southeastern edge of Folsom Lake near the border of Sacramento and El Dorado Counties. While the majority of MIAD is located in Sacramento County, a small portion of the excavation and the overlay extends into El Dorado County. Emissions associated with construction truck traffic and worker commuting is expected to occur within both counties. MIAD is located in the Sacramento Valley Air Basin (SVAB).

6.1.1.2 Mississippi Bar

The Mississippi Bar habitat mitigation area is located on the shore of Lake Natoma near Highway 50 and Folsom Boulevard. The area is located entirely in Sacramento County and the SVAB.

6.1.2 Regulatory Setting

Air quality management and protection responsibilities exist at Federal, State, and local levels of government. The primary statutes that establish ambient air quality standards and establish regulatory authorities to enforce regulations designed to attain those standards are the Federal Clean Air Act (CAA) and the California Clean Air Act (CCAA)

6.1.2.1 Federal

The CAA, as amended in 1990, is currently comprised of six titles:

- Title I – Air Pollution Prevention and Control
- Title II – Emission Standards for Moving Sources
- Title III – General
- Title IV – Acid Deposition Control
- Title V – Permits
- Title VI – Stratospheric Ozone Protection

Titles I and V contain the provisions that typically address construction projects and stationary source emissions. Title I requirements include, among others, requirements (a) to establish NAAQS for air pollutants that protect the public health with an adequate margin of safety as well as protect the public welfare from any known or anticipated adverse effects, (b) to limit emissions from new stationary sources, (c) to prevent significant deterioration of air quality in regions with air quality that is already better than the NAAQS, and (d) to develop SIPs that establish the steps to be taken to attain and maintain the NAAQS. As part of Title I, Federal agencies cannot engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an approved SIP.

Title V requires that major stationary sources obtain operating permits and pay fees that are based on the quantity of pollutants emitted. Title III of the CAA gives authority to the USEPA to promulgate regulations that implement the CAA requirements.

National Ambient Air Quality Standards As required by the CAA, the USEPA has established and continues to update the NAAQS for specific “criteria” air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), inhalable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead (Pb). The NAAQS for these pollutants are listed in Table 6-1 and represent the levels of air quality deemed necessary by USEPA to protect the public health with an adequate margin of safety and to protect the public welfare. The health effects associated with these pollutants are summarized in Table 6-2.

Table 6-1. National and California Ambient Air Quality Standards

Pollutant	Averaging Time	Standard (ppmv)		Standard (µg/m^3)	
		California[1]	Federal[2]	California[1]	Federal[2]
Ozone (O_3)	1 hour	0.09	NS	180	NS
	8 hour	0.070	0.075	137	147
Carbon monoxide (CO)	1 hour	20	35	23,000	40,000
	8 hour	9.0	9	10,000	10,000
Nitrogen dioxide (NO_2)	1 hour [3]	0.18	NS	339	NS
	Annual	0.030	0.053	57	100
Sulfur dioxide (SO_2)	1 hour	0.25	NS	655	NS
	3 hour	NS	0.5	NS	1,300
	24 hour	0.04	0.14	105	365
	Annual	NS	0.030	NS	80
Inhalable particulate matter (PM_{10})	24 hour	NA	NA	50	150
	Annual	NA	NS	20	NS
Fine particulate matter ($PM_{2.5}$)	24 hour	NA	NA	NS	35
	Annual	NA	NA	12	15.0
Hydrogen sulfide (H_2S)	1 hour	0.03	NS	42	NS
Vinyl chloride	24 hour	0.01	NS	26	NS
Sulfate particles	24 hour	NS	NS	25	NS
Lead particles (Pb)	30 Day Average	NA	NS	1.5	NS
	Rolling 3-Month Average	NS	NA	NS	0.15
	Calendar quarter	NS	NA	NS	1.5

Source: CARB 2008b.

Notes:

[1] California standards for O_3, CO, SO_2 (1 and 24 hour), NO_2, PM_{10}, and $PM_{2.5}$ are not to be exceeded. All others are not to be equaled or exceeded.

[2] National standards (other than O_3, PM_{10}, $PM_{2.5}$, and those based on annual averages) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

[3] In July 2009, the EPA proposed to supplement the current annual NO_2 standard by establishing a new short-term NO_2 standard based on the 4th highest 1-hour daily maximum concentration (74 FR 34404). EPA proposes to set the level of this new standard within the range of 80 to 100 parts per billon by volume (ppbv). For comparison, this would be more stringent than the current California 1-hour standard of 180 ppbv.

Key:

ppmv = parts per million by volume

µg/m^3= micrograms per cubic meter

NS = no standard

NA = not applicable

Table 6-2. Criteria Pollutants

Pollutant	Characteristics	Health Effects	Major Sources
Ozone	A highly reactive photochemical pollutant created by the action of sunshine on ozone precursors (reactive organic gases and oxides of nitrogen).	• Eye irritation • Respiratory function impairment.	Combustion sources, such as factories and automobiles, and evaporation of solvents and fuels.
Carbon Monoxide	Odorless, colorless gas that is highly toxic. Formed by the incomplete combustion of fuels.	• Impairment of oxygen transport in the bloodstream. • Aggravation of cardiovascular disease. • Fatigue, headache, dizziness.	Automobile and diesel truck exhaust
Nitrogen Dioxide	Reddish-brown gas formed during combustion.	Increased risk of acute and chronic respiratory disease.	Automobile and diesel truck exhaust, industrial processes, and fossil-fueled power plants.
Sulfur Dioxide	Colorless gas with a pungent odor.	Increased risk of acute and chronic respiratory disease.	Diesel vehicle exhaust, coal- and oil-fired power plants, industrial processes.
PM_{10} and $PM_{2.5}$	Small particles that measure 10 microns or less in diameter are termed PM_{10} (fine particles less than 2.5 microns in diameter are $PM_{2.5}$). Solid and liquid particles of dust, soot, aerosols, smoke, ash, and pollen and other matter that is small enough to remain suspended in the air for a long period.	Aggravation of chronic disease and heart/lung disease symptoms.	Dust, erosion, incinerators, automobile and aircraft exhaust, and open fires.

The USEPA recently approved changes to the O_3 and PM_{10} NAAQS. On June 15, 2005, the 1-hour O_3 standard was revoked in most parts of the U.S. and was replaced with the 8-hour standard of 0.08 parts per million by volume (ppmv). In 2008, the 1997 8-hour ozone standard was lowered to 0.075 ppmv. In addition to the current PM_{10} standard, the USEPA approved a standard for suspended particulate matter less than or equal to 2.5 micrometers in equivalent aerodynamic diameter ($PM_{2.5}$). Although these changes have been approved, implementation of the new standards and monitoring of ambient conditions relative to these new standards is an ongoing process.

The CAA requires States to designate air quality control regions (or portions thereof) as either “attainment” or “non-attainment” with respect to criteria air pollutants, based on whether the NAAQS have been achieved, and to prepare air quality plans containing emission reduction strategies for those areas designated as "non-attainment." The Lower Sacramento Valley Air Basin, in which the MIAD Modification Project is located, is designated as non-attainment for the O_3 NAAQS, and Sacramento County is designated as non-attainment for the PM_{10} NAAQS, as listed in Table 6-3.

Table 6-3. Federal and State Attainment Status

Pollutant	State Status	Federal Status
O_3	Non-attainment, serious (1-hour and 8-hour standards)	Non-attainment, serious (8-hour standard)[1,2]
PM_{10}	Non-attainment (24-hour and annual mean standards)	Non-attainment, moderate (24-hour standard)
$PM_{2.5}$	Non-attainment (annual standard)	Attainment/Unclassifiable (24-hour and annual standards) [3]
CO	Attainment	Attainment/Maintenance
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment

Source: SMAQMD 2009a; USEPA 2009c.

Notes:

[1] On August 27, 2009, the USEPA proposed to reclassify the Sacramento Metro Ozone non-attainment area from serious to severe-15 (74 FR 43654). The current designation and classification is based on the 1997 8-hour standard of 0.080 ppmv.

[2] On June 15, 2005, the USEPA revoked the 1-hour ozone standard and replaced it with the 8-hour standard (70 FR 44470).

[3] EPA had prepared final area non-attainment designations under the $PM_{2.5}$ NAAQS in January 2009 under the Bush Administration, which indicated that Sacramento County would be designated as a non-attainment area; however, the Obama Administration withdrew the final ruling and it is on hold pending review by the new administration.

State Implementation Plans Counties or regions that are designated as Federal non-attainment areas for one or more criteria air pollutants must prepare a SIP that demonstrates how the area will achieve attainment of the standards by the Federally mandated deadlines. In addition, those areas that have been redesignated as attainment will have maintenance plans that show how the area will maintain the standard.

California's State Strategy for the 2007 SIP was submitted to EPA on November 16, 2007. The revised State Strategy incorporates changes in emission inventories that have occurred since the 1994 SIP. The 2009 Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan, approved by the California Air Resources Board (CARB) on March 26, 2009, contains a strategy for attainment of the 1997 8-hour O_3 NAAQS in the Sacramento Nonattainment Area by 2018.

On November 30, 2005, USEPA published in the Federal Register (70 FR 71776) its direct final rule approving ten CO Maintenance Plans in California, including the Sacramento Urbanized Area CO Maintenance Plan. This plan provides the CO budgets for the next 10 years that will demonstrate continued attainment of the CO NAAQS.

Although the area is designated as non-attainment for the PM_{10} NAAQS, no approved SIP for PM_{10} currently exists. The area has achieved the PM_{10} NAAQS, but the Sacramento Metropolitan Air Quality Management District (SMAQMD) must request redesignation to attainment and submit a maintenance plan to be formally designated as attainment.

General Conformity Section 176 (c) of the Clean Air Act (42 U.S.C. 7506(c)) requires any entity of the Federal government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate that the action conforms to the applicable SIP required under Section 110 (a) of the CAA (42 U.S.C. 7410(a)) before the action is otherwise approved. In this context, conformity means that such Federal actions must be consistent with a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of those standards. Each Federal agency must determine that any action that is proposed by the agency and that is subject to the regulations implementing the conformity requirements will, in fact, conform to the applicable SIP before the action is taken. The MIAD Modification Project is subject to the General Conformity Rule since it is sponsored and supported by the Bureau of Reclamation.

On November 30, 1993, USEPA promulgated final general conformity regulations at 40 CFR 51 Subpart W for all Federal activities except those covered under transportation conformity. On November 3, 1994, the SMAQMD adopted Rule 104 which incorporates the USEPA general conformity regulations in their entirety. The general conformity regulations apply to a proposed Federal action in a non-attainment or maintenance area if the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutants caused by the proposed action equal or exceed certain de minimis amounts, thus requiring the Federal agency to make a determination of general conformity. The de minimis amounts for the region covering MIAD are presented in Table 6-4.

Regardless of the proposed action's exceedance of de minimis amounts, if this total represents 10 percent or more of the non-attainment or maintenance area's total emissions of that pollutant, the action is considered regionally significant and the Federal agency must make a determination of general conformity. By requiring an analysis of direct and indirect emissions, USEPA intended the regulating Federal agency to make sure that only those emissions that are reasonably foreseeable and that the Federal agency can practicably control subject to that agency's continuing program responsibility will be addressed.

Table 6-4. General Conformity de minimis Thresholds

Pollutant	Federal Status	De minimis (tpy)
VOC (as an O_3 precursor)[1]	Non-attainment, serious	50
NOX (as an O_3 precursor)[1]	Non-attainment, serious	50
PM_{10}	Non-attainment, moderate	100
CO	Attainment/Maintenance	100

Source: SMAQMD 2009a; 40 CFR 51.853.

Notes:

[1] On August 18, 2009, the EPA proposed a rule to reclassify the Sacramento Metro non-attainment area from serious to severe-15. This action would decrease the general conformity de minimis threshold from 50 tons per year (tpy) for ozone precursors to 25 tpy. (40 CFR Part 81)

Key:

CO = carbon monoxide
NOx = oxides of nitrogen
O_3 = ozone
PM_{10} = inhalable particulate matter
tpy = tons per year
VOC = volatile organic compounds

Direct emissions are those that are caused or initiated by the Federal action, and occur at the same time and place as the Federal action. Indirect emissions are reasonably foreseeable emissions that are further removed from the Federal action in time and/or distance, and can be practicably controlled by the Federal agency on a continuing basis (40 CFR 51.852). A Federal agency can indirectly control emissions by placing conditions on Federal approval or Federal funding. An example would be controlling emissions by limiting the size of a parking facility or by making employee trip reduction requirements (USEPA 1994).

The general conformity regulations incorporate a stepwise process, beginning with an applicability analysis. According to USEPA guidance (USEPA 1994), before any approval is given for a proposed action to go forward, the regulating Federal agency must apply the applicability requirements found at 40 CFR 51.853(b) to the proposed action and/or determine the regional significance of the proposed action to evaluate whether, on a pollutant-by-pollutant basis, a determination of general conformity is required. The guidance states that the applicability analysis can be (but is not required to be) completed concurrently with any analysis required under NEPA. If the regulating Federal agency determines that the general conformity regulations do not apply to the proposed action (meaning the proposed action emissions do not equal or exceed the de minimis thresholds and are not regionally significant), no further analysis or documentation is required.

If the general conformity regulations do apply to the proposed action, the regulating Federal agency must next conduct a conformity evaluation in accord with the criteria and procedures in the implementing regulations, publish a draft determination of general conformity for public review, and then publish the final determination of general conformity. For a required action to meet the conformity determination emissions criteria, the total of direct and indirect emissions from the action must be in compliance or consistent with all relevant requirements and milestones contained in the applicable SIP (40 CFR 51.858(c)), and in addition must meet other specified requirements, such as:

- For any criteria pollutant, the total of direct and indirect emissions from the action is specifically identified and accounted for in the applicable SIP's attainment or maintenance demonstration (40 CFR 51.858(a)(1)); or
- For ozone or nitrogen dioxide, the total of direct and indirect emissions from the action is determined and documented by the State agency primarily responsible for the applicable SIP to result in a level of emissions which, together with all other emissions in the non-attainment (or maintenance) area, would not exceed the emissions inventory specified in the applicable SIP (40 CFR 51.858(a)(5)(i)(A)); or
- For ozone or nitrogen dioxide, the total of direct and indirect emissions from the action is determined by the State agency responsible for the applicable SIP to result in a level of emissions which, together with all other emissions in the non-attainment (or maintenance) area, would exceed the emissions inventory specified in the applicable SIP and the State Governor or the Governor's designee for SIP actions makes a written commitment to USEPA for specific SIP revision measures reducing emissions to not exceed the emissions inventory (40 CFR 51.858(a)(5)(i)(B)); or
- For ozone or nitrogen dioxide, the total of direct and indirect emissions from the action is fully offset within the same non-attainment (or maintenance) area through a revision to the applicable SIP or a similarly enforceable measure that affects emission reductions so that there is no net increase in emissions of that pollutant (40 CFR 51.858(a)(2)).

6.1.2.2 State

The CCAA substantially added to the authority and responsibilities of the State's air pollution control districts. The CCAA establishes an air quality management process that generally parallels the Federal process. The CCAA, however, focuses on attainment of the California Ambient Air Quality Standards (CAAQS) that, for certain pollutants and averaging periods, are more stringent than the comparable NAAQS. The CAAQS are included in Table 6-1.

The CCAA requires that air districts prepare an air quality attainment plan if the district violates CAAQS for CO, SO_2, NO_2, or O_3. Table 6-3 shows that the Sacramento area is classified as a non-attainment area for the O_3, PM_{10}, and $PM_{2.5}$ CAAQS. The SMAQMD prepared an Air Quality Attainment Plan (AQAP) in 1991 to address the non-attainment status for O_3 and CO. A Triennial Report was adopted by the SMAQMD Board of Directors on April 28, 2005. The most recent Annual Progress Report was released in 2007. No locally prepared attainment plans are required for areas that violate the PM_{10} or $PM_{2.5}$ CAAQS.

The CCAA requires that the CAAQS be met as expeditiously as practicable, but does not set precise attainment deadlines. Instead, the act established increasingly stringent requirements for areas that will require more time to achieve the standards.

The air quality attainment plan requirements established by the CCAA are based on the severity of air pollution problems caused by locally generated emissions. Upwind air pollution control districts are required to establish and implement emission control programs commensurate with the extent of pollutant transport to downwind districts.

Air pollution problems in Sacramento County are primarily the result of locally generated emissions. However, Sacramento's air pollution occasionally includes contributions from the San Francisco Bay Area or the San Joaquin Valley. In addition, Sacramento County has been identified as a source of ozone precursor emissions that occasionally contribute to air quality problems in the San Joaquin Valley Air Basin and the Northern Sacramento Valley Air Basin. Consequently, the air quality planning for Sacramento County must not only correct local air pollution problems, but must also reduce the area's effect on downwind air basins.

CARB is responsible for developing emission standards for on-road motor vehicles and some off-road equipment in the State. In addition, CARB develops guidelines for the local districts to use in establishing air quality permit and emission control requirements for stationary sources subject to the local air district regulations.

6.1.2.3 Local

Multiple air quality management districts (AQMDs) and air pollution control districts (APCDs) have jurisdiction over the O_3 and PM_{10} non-attainment areas. Each county in the area has its own AQMD or APCD. The SMAQMD manages air quality in Sacramento County and coordinates with the other districts to develop SIP updates. The other district most likely to be impacted by the MIAD Modification Project is the El Dorado County Air Quality Management District (EDCAQMD) because a portion of the dam extends into that county.

Both EDCAQMD and SMAQMD have recommended fugitive dust control measures in their CEQA Guidelines (EDCAPCD 2002; SMAQMD 2008). For EDCAQMD, these include street sweeping, dust control for storage piles, and other best management practices (EDCAQMD 2005). SMAQMD added basic construction emission control practices and enhanced fugitive PM dust control practices to the draft California Environmental Quality Act (CEQA) Guide. These measures include watering exposed soil, suspending operation on high wind days, installing wind breaks, and paving roads as soon as possible (SMAQMD 2009b).

In addition to permitting and rule compliance, air quality management at the local level is also accomplished through AQMD/APCD imposition of mitigation measures on project EIRs and mitigated negative declarations (MNDs) developed by project proponents under CEQA. Specific to project construction emissions, CEQA requires mitigation of air quality impacts that exceed certain significance thresholds set by the local AQMD/APCD. In the SMAQMD, the construction significance thresholds are 85 pounds per day (lb/day) for NOx emissions (SMAQMD 2004).

The SMAQMD has established separate thresholds of criteria for project operations, which are long-term emissions, such as motor vehicles, various area sources (e.g., evaporative emissions, farming emissions, etc.), and stationary or point sources. The proposed project only consists of construction-related emissions and emissions of criteria pollutants or other emissions will not occur during the long-term operation of MIAD. As a result, the operational emissions are not applicable to the proposed project.

If project construction NOx emissions exceed 85 lbs/day, then a standard set of construction mitigation measures must be incorporated into the Draft EIR and mitigation monitoring and reporting program (MMRP) per CEQA. The inclusion of these measures allows the applicant to assume a 20 percent reduction in NOx emissions from construction activities. If the mitigated NOx emissions still exceed 85 lbs/day, SMAQMD's policy is to charge a mitigation fee of $16,000/ton of excess (greater than 85 lbs/day) NOx emissions plus a 5 percent administrative fee (SMAQMD 2008).

6.1.3 Existing Conditions

6.1.3.1 Climate and Atmospheric Conditions

Sacramento County is located at the southern end of the Sacramento Valley, which is bounded by the Coast and Diablo Ranges on the west and the Sierra Nevada on the east. The county is about 50 miles northeast of the Carquinez Strait, a sea-level gap between the Coast Range and the Diablo Range. The prevailing winds are from the southwest, primarily because of marine breezes through the Carquinez Strait, although during winter the sea breezes diminish and winds from the north occur more frequently.

The area of analysis experiences episodes of poor atmospheric mixing caused by inversion layers. Inversion layers form in the lower troposphere when temperature increases with elevation above ground level (AGL) or when a mass of warm dry air settles over a mass of cooler air near the ground. Surface inversions (0 to 500 feet AGL) occur most frequently during the winter, while subsidence inversions (1,000 to 2,000 feet AGL) occur most frequently during the summer. Inversion layers limit vertical mixing in the atmosphere, trapping pollutants near the surface.

6.1.3.2 Existing Air Quality Conditions

The existing air quality conditions for a project area are typically the result of meteorological conditions and existing emission sources in an area.

Emission Sources Table 6-5 and Table 6-6 present estimates of existing emissions in Sacramento County and El Dorado County, respectively. There are two main categories of emission sources in any area: stationary and mobile.

On-road motor vehicles are the major sources of reactive organic gases (ROG)[1], CO, and NOx emissions in Sacramento County. Other (off-road) mobile vehicles and equipment are the major sources of SO_2 emissions, and contribute substantially to ROG, CO, and NOx emissions. Fugitive dust primarily from construction sites, paved and unpaved roadways, and farming operations is the major source of PM_{10} and $PM_{2.5}$, with substantial contributions from residential fuel combustion (all of these sources are summarized in the Area-Wide Miscellaneous Processes in Table 6-5).

Table 6-5. Sacramento County 2008 Emission Inventory

Source Type	Category	Average Emissions in Tons per Day (TPD)					
		ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Stationary	Fuel Combustion	0.34	3.73	3.63	0.07	0.43	0.41
Stationary	Waste Disposal	0.34	0.05	0.04	0	0.01	0.01
Stationary	Cleaning and Surface Coatings	3.99	0	0	0	0	0
Stationary	Petroleum Production and Marketing	2.49	0.01	0	0	0	0
Stationary	Industrial Processes	0.9	0.28	0.23	0.07	1.07	0.46
Area-wide	Solvent Evaporation	13.22	0	0	0	0.01	0.01
Area-wide	Miscellaneous Processes	4.04	40.26	3.1	0.12	39.36	10.1
Mobile	On-Road Motor Vehicles	22.68	209.32	44.06	0.17	2.05	1.43
Mobile	Other Mobile Sources	12.95	86.01	24.92	0.18	1.51	1.34
Total		60.95	339.66	75.98	0.61	44.44	13.76

Source: CARB 2009b.

Key:

ROG = reactive organic gases
CO = carbon monoxide
NOx = oxides of nitrogen
SO_2 = sulfur dioxide
PM_{10} = inhalable particulate matter
$PM_{2.5}$ = fine particulate matter

[1] USEPA uses the definition of VOC to incorporate those compounds that are sufficiently reactive in the atmosphere to form O_3; the State of California has defined reactive organic gases (ROG) for the same purpose. Although minor variations exist in the definitions of VOC and ROG, for most sources of concern in this document, those variations are negligible and the terms are interchangeable. ROG will primarily be used when referring specifically to a California standard.

Table 6-6. El Dorado County 2008 Emission Inventory

Source Type	Category	Average Emissions in Tons per Day (TPD)					
		ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Stationary	Fuel Combustion	0.03	0.33	0.29	0.02	0.16	0.15
Stationary	Waste Disposal	0.04	0	0.01	0	0	0
Stationary	Cleaning and Surface Coatings	0.5	0	0	0	0	0
Stationary	Petroleum Production and Marketing	0.32	0	0	0	0	0
Stationary	Industrial Processes	0.03	0.05	0.01	0	0.31	0.16
Area-wide	Solvent Evaporation	2.34	0	0	0	0	0
Area-wide	Miscellaneous Processes	2.93	40.62	0.74	0.17	20.79	7.39
Mobile	On-Road Motor Vehicles	4.06	35.4	4.82	0.02	0.2	0.12
Mobile	Other Mobile Sources	6.17	33.06	3.8	0.06	0.4	0.35
Total		16.42	109.46	9.67	0.27	21.86	8.17

Source: CARB 2009b.

Key:

ROG = reactive organic gases
CO = carbon monoxide
NOx = oxides of nitrogen
SO_2 = sulfur dioxide
PM_{10} = inhalable particulate matter
$PM_{2.5}$ = fine particulate matter

Monitoring Data – Criteria Pollutants Air quality data from a monitoring station near the area of analysis are summarized in Table 6-7. The Sacramento – Del Paso Manor station was used to for the monitoring data because it best represents conditions at the area of analysis, or in the case of ozone, the regional conditions.

Monitored CO levels have been trending down over the last several years. The downward trend is primarily a result of the use of oxygenated gasoline during the winter CO season. The 8-hour CO CAAQS and NAAQS were last exceeded in the early 1990s. The area has attained the standards since then, and Sacramento County was re-designated an attainment/maintenance area for the CO NAAQS in March 1998.

The 1-hour O_3 CAAQS had been exceeded up to 18 times a year between 2006 and 2008 shown on Table 6-7. The recorded 8-hour O_3 concentrations exceeded the NAAQS up to 24 times a year between 2006 and 2008. Substantial year-to-year variations in monitored O_3 levels are common. However, no clear trend in O_3 levels is demonstrated by monitoring results from 2006 through 2008.

The 24-hour and annual PM_{10} and annual $PM_{2.5}$ CAAQS were exceeded during the monitoring period. However, the PM_{10} NAAQS was not exceeded, as shown in Table 6-7.

Table 6-7. Summary of Pollutant Monitoring Data Near MIAD

Criteria Air Pollutant and Station Location	Yearly Monitoring Data		
	2006	2007	2008
Carbon Monoxide			
Highest 8-hour concentration (ppmv)	3.49	2.90	2.49
Days above CAAQS [1]	0	0	0
Days above NAAQS [2]	0	0	0
Ozone 1-hour			
1st High (ppmv)	0.125	0.138	0.113
2nd High (ppmv)	0.12	0.100	0.110
Days above CAAQS [3]	18	6	17
Ozone 8-hour			
1st High (ppmv) [4]	0.102 / 0.102	0.115 / 0.116	0.096 / 0.097
2nd High (ppmv) [4]	0.095 / 0.096	0.086 / 0.086	0.089 / 0.09
Days above CAAQS [5]	35	16	23
Days above NAAQS [6]	24	10	18
PM_{10}			
Highest 24-hour concentration (µg/m^3) [4]	63.0 / 67.0	70.0 / 75.0	71.0 / 72.0
Annual mean (µg/m^3) [4]	24.7 / 24.1	20.7 / 19.6	23.3 / 22.2
Estimated number of days above CAAQS [7,8]	40.3	30.3	12.2
Estimated number of days above NAAQS [8,9]	0	0	0
$PM_{2.5}$			
Highest 24-hour concentration (µg/m^3) [4]	78.0 / 78.0	61.0 / 61.0	74.4 / 93.1
Annual mean (µg/m^3) [4]	13.1 / 15.2	12.3 / 12.3	13.2 / 18.9
Estimated number of days above NAAQS [8,10,11]	19.3	26.1	24.1

Source: CARB 2009a.

Notes:

[1] Days above standard = days above 8-hour CAAQS of 9.0 ppmv.
[2] Days above standard = days above 8-hour NAAQS of 9 ppmv.
[3] Days above standard = days above 1-hour CAAQS of 0.09 ppmv.
[4] Different methods of analyzing monitoring pollutants are used by USEPA and CARB; therefore, both data are provided, respectively, separated by "/."
[5] Days above standard = days above 8-hour CAAQS of 0.070 ppmv.
[6] Days above standard = days above 8-hour NAAQS of 0.075 ppmv.
[7] Days above standard = days above 24-hour CAAQS of 50 µg/m^3.
[8] Most PM measurements are taken every 6 days; therefore, the number of days over the 24-hour standard in any year is estimated mathematically.
[9] Days above standard = days above 24-hour NAAQS of 150 µg/m^3
[10] Days above standard = days above 24-hour NAAQS of 35 µg/m^3.
[11] The days above standard are based on the 24-hour NAAQS standard published in 2006; however, although the Bush Administration proposed final area designations for this standard, the Obama Administration prevented their publication to the Federal Register to enable the new administration to review the previous decisions. Sacramento County is in attainment of the 1997 standard (65 µg/m^3); however, the EPA recommended that it be designated as non-attainment of the 2006 standard.

Key:

ppmv = parts per million by volume
CAAQS = California Ambient Air Quality Standard
NAAQS = National Ambient Air Quality Standard
µg/m^3 = micrograms per cubic meter

Monitoring Data – Toxic Air Contaminants Existing toxic air contaminant (TAC) concentrations are presented in Table 6-8 for pollutants typically associated with mobile sources. The data were collected at the Roseville monitoring station located at 151 North Sunrise Avenue. Most of the TAC concentration trends for the past three years are either flat or declining. From the concentrations of all TACs monitored at the Roseville station, the estimated lifetime cancer risk for existing conditions (without considering diesel particulate matter) was approximately 66 per million in 2007 (CARB 2009c).

The TACs that are the top contributors to this risk level are benzene, formaldehyde, 1,3-butadiene, and hexavalent chromium.

Table 6-8. Summary of Toxic Air Contaminant Monitoring Data in Sacramento (Roseville)

Toxic Air Contaminant	Annual Average (Mean) Concentration		
	2005	2006	2007
Acetaldehyde (ppb)	0.89	0.84	0.79
Acrolein (ppb)	0.43	0.54	0.58
Benzene (ppb)	0.244	0.239	0.194
1,3-Butadiene (ppb)	0.051	0.045	0.029
Ethyl benzene (ppb)	0.11	0.11	0.10
Formaldehyde (ppb)	2.07	2.45	2.46
Methyl ethyl ketone (ppb)	0.07	0.06	0.07
Styrene (ppb)	0.05	0.05	0.05
Toluene (ppb)	0.80	0.51	0.40
Meta- and para-Xylene (ppb)	0.32	0.28	0.18
Ortho-Xylene (ppb)	0.10	0.10	0.06
Benzo(a)pyrene (ng/m^3) [1]	0.80	NA	NA
Benzo(b)fluoranthene (ng/m^3) [1]	0.77	NA	NA
Benzo(k)fluoranthene (ng/m^3) [1]	0.34	NA	NA
Benzo(g,h,i)perylene (ng/m^3) [1]	0.79	NA	NA
Dibenz(a,h)anthracene (ng/m^3) [1]	0.08	NA	NA
Indeno(1,2,3-cd)pyrene (ng/m^3) [1]	0.76	NA	NA
Chromium (hexavalent) (ng/m^3) [1]	0.058	0.045	0.030

Source: CARB 2009c.
Notes:
[1] Reported maximum value
Key:
ppb = parts per billion
ng/m^3 = nanograms per cubic meter
NA = not available

6.2 Environmental Consequences/Environmental Impacts

This section describes the method and results of criteria pollutant and toxic air contaminant (TAC) impacts assessment, as well as the significance criteria applicable to this project. Emissions of greenhouse gases (GHG) are discussed in Section 19 – Climate Change.

6.2.1 Assessment Methods

This section describes the methodology used to develop the emission inventories and the comparison of the analysis results to the significance thresholds discussed above.

Emission Calculation Methodology In general, the construction emissions were estimated from various emission models and spreadsheet calculations, depending on the source type and data availability. The CARB Urban Emissions Model (URBEMIS) - Version 9.2.4, OFFROAD2007 (CARB off-road vehicle emission factor model), and EMFAC2007 (CARB on-road vehicle emission factor model) were used along with emission factors obtained from USEPA AP-42 and Tier 3 engine certification. URBEMIS was developed to estimate emissions from a variety of projects such as residential, commercial and industrial developments. However, URBEMIS does not include specific features associated with dam construction, and many of the emission calculations relied on other methods to estimate construction emissions. Daily and annual emissions for each year of construction were estimated from appropriate emission factors, number of facilities and features being worked and the associated schedules. The following construction sources and activities were analyzed for emissions:

- On-site demolition and grading (cut/fill) fugitive dust – based on URBEMIS modeling.
- On-site construction equipment engine emissions (all pollutants) – based on OFFROAD2007 emission factors and estimated equipment schedules.
- Off-site haul truck engine emissions (all pollutants), including paved road dust – based on EMFAC2007 (engine emission factors), Midwest Research Institute (MRI 1996, paved road dust emission factor), and estimated vehicle miles traveled.
- On-site concrete batch plants – based on AP-42.
- Off-site worker vehicle trips to and from the site, including paved road dust – based on EMFAC2007 (engine emission factors), Midwest Research Institute (MRI 1996, paved road dust emission factors), and estimated vehicle miles traveled.
- Relocation of Green Valley Road – based on SMAQMD Roadway Construction Emissions Model, Version 6.3-2.

The following sections provide additional discussion of emission estimation methodologies used for each source group.

Fugitive Dust Emissions from Importing and Stockpiling of Excavation and Backfill Material URBEMIS was used for fugitive PM emissions from importing or stockpiling of excavation and backfill material. The earth cut/fill activity is included in URBEMIS Phase 2 –Site Grading, which allows the user to select one of four tiers of detail to calculate fugitive dust emissions. Moving of material for wall construction, excavation, excavation backfill, and overlay was treated as grading. The volume of on-site or off-site cut/fill material for each phase and alternative were estimated in cubic yards per day; therefore, the Low Level tier was selected in URBEMIS for fugitive PM_{10} emission estimations.

On-Site Construction Equipment Engine Emissions The emission factors from CARB's OFFROAD model were used to calculate on-site construction equipment engine emissions. Emission factors for diesel pumps used in the detention pond were obtained from the pump engine's Tier 3 certificate and AP-42 (USEPA 1996).

The emission factors were multiplied by the number of pieces of each equipment type that would be used during each phase of the MIAD Modification Project for each year of the analysis. The year with most construction equipment on site is 2011 for Alternatives 1, 2, and 4, and is 2013 for Alternative 3. The peak number of construction equipment on site per day for the peak year of construction is summarized in Table 6-9.

Table 6-9. Peak Daily Construction Equipment Counts in Peak Year[1]

Equipment Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Off-Highway Trucks	16	16	16	16
Dozers	11	11	11	11
Loaders	9	9	9	10
Compactors	6	6	6	6
Scrapers	6	6	4	4
Water Trucks	4	4	4	4
Pump	3	3	3	3
Pile Drill	0	0	0	1
Pile Driver	0	0	0	1
Total	55	55	53	56

Notes:
[1] The peak year of emissions for Alternatives 1, 2, and 4 is 2011. The peak year of emissions for Alternative 3 is 2012. Although the greatest number of equipment for Alternative 4 is in 2013, the peak year of emissions is in 2012 because of the volume of earth moved during that year.

The construction scheduling estimate for the MIAD Modification Project is based on two 10-hour shifts per work day.

Off-Site Haul Truck Engine Emissions and Road Dust The haul truck engine emissions were calculated based on EMFAC2007 emission factors for heavy duty diesel trucks in Sacramento County and estimates of total vehicle miles traveled per day. The model uses a 45-year window in developing the fleet mix for each analysis year; for example, the 2010 fleet mix uses a mixture of vehicle types from 1966 to 2010. Truck emissions decline in the latter years due to improvements in the engines, often related to various state and/or federal emission requirements. As a result, emissions decrease in future years.

The worst-case round trip distance of 106 miles, determined to be the distance between Marysville and Folsom from Google™ Earth Pro, was used. The emission factors used in this analysis are presented in Table 6-10. The average speed for off-site hauling was assumed to be 30 mph.

Table 6-10. Heavy Duty Diesel Truck Emission Factors for Sacramento Valley (g/VMT)

Year	ROG	CO	NOx	SO_2	PM_{10} Total[1]	$PM_{2.5}$ Total[1]
2010	0.953	4.769	15.134	0.018	0.589	0.504
2011	0.878	4.301	13.570	0.018	0.527	0.447
2012	0.801	3.838	12.011	0.018	0.467	0.392
2013	0.729	3.414	10.587	0.018	0.413	0.342

Source: EMFAC2007.

Notes:

[1] PM_{10} and $PM_{2.5}$ totals include primary particulate emissions for engine exhaust, tire wear, and brake wear.

Key:

g/VMT = grams per vehicle mile traveled
CO = carbon monoxide
SO_2 = sulfur dioxide
$PM_{2.5}$ = fine particulate matter
ROG = reactive organic gases
NOx = oxides of nitrogen
PM_{10} = inhalable particulate matter

Re-entrained road dust from haul truck travel was estimated for paved roads using emission factors developed by the Midwest Research Institute (MRI 1996). Table 6-11 presents the paved road emission factors. An emission factor of 0.81 g/VMT was used as average daily trips and average road conditions were assumed. CARB's PM speciation profile was referenced to determine the $PM_{2.5}$ fraction relative to PM_{10} (CARB 2008a).

Table 6-11. Paved Road Re-entrained Dust PM_{10} Emission Factors (g/VMT)

Road condition	Average Daily Trips (ADT)		
	High	Low	Average
Average conditions	0.37	1.3	0.81
Worst-case conditions	0.64	3.9	2.1

Source: Midwest Research Institute 1996.

Key:

g/VMT = grams per vehicle mile traveled

Concrete Batch Plant Dust Concrete batching emissions were estimated using AP-42 emission factors (USEPA 2006a). These emission factors related to materials handling are summarized in Table 6-12. The composition ratio of the aggregate, sand, and cement materials in the concrete was estimated to be 4:3:1 based on AP-42. $PM_{2.5}$ fraction of dust from concrete batching was calculated using CARB's PM speciation profiles (CARB 2008a).

As with materials processing, it was assumed that prime power in the concrete batch plants would be obtained from the electric utility grid, and that on-site diesel engines would not be used for prime movers/generators. It was also assumed that wet suppression of plant dust would be required as a condition of obtaining an air quality permit; therefore, the MIAD Modification Project design would include emission controls in the concrete batch plants.

Table 6-12. Concrete Batch Plant PM_{10} Emission Factors (pounds per ton of concrete)

Batch Plant Source	Uncontrolled	Controlled
Aggregate transfer	0.0033	ND
Sand transfer	0.00099	ND
Cement unloading to elevated storage silo (pneumatic)	0.46	0.00034
Cement supplement unloading to elevated storage silo	1.10	0.0049
Weigh hopper loading	0.0024	ND
Mixer loading (central mix)	0.134	0.0048
Truck loading (truck mix)	0.278	0.0016

Source: USEPA 2006a.

Key:
ND = not determined

All four alternatives included a concrete batch plant; therefore, emissions were estimated for each alternative.

Employee Commute Emissions and Road Dust Emissions from employee commuting were calculated based on EMFAC2007 emission factors for passenger cars and light duty trucks in Sacramento County and estimates of total vehicle miles traveled per day. Consistent with URBEMIS default assumptions, it was assumed that 50 percent of the vehicles are passenger cars and for each vehicle class all fleet types (catalytic, non-catalytic, diesel) were used. Daily roundtrip distance for employee commute was estimated to be 40 miles. The average vehicle speed was assumed to be 55 mph. These emission factors are summarized in Table 6-13.

Table 6-13. Emission Factors for Employee Commuting[1] in Sacramento Valley (g/VMT)

Year	ROG	CO	NO_x	SO_2	PM_{10} Total[2]	$PM_{2.5}$ Total[2]
2010	0.081	2.421	0.309	0.004	0.030	0.015
2011	0.068	2.132	0.274	0.004	0.030	0.015
2012	0.057	1.881	0.242	0.004	0.029	0.015
2013	0.048	1.668	0.215	0.004	0.029	0.015

Source: EMFAC2007.

Notes:
1 Fleet mix for "all" used (i.e., catalytic, non-catalytic, and diesel). Vehicle Class of 50% passenger cars (LDA) and 50% light-duty trucks (LDT1) assumed.
2 PM_{10} and $PM_{2.5}$ totals include primary particulate emissions for engine exhaust, tire wear, and brake wear.

Key:
g/VMT = grams per vehicle mile traveled
CO = carbon monoxide
SO_2 = sulfur dioxide
$PM_{2.5}$ = fine particulate matter
ROG = reactive organic gases
NOx = oxides of nitrogen
PM_{10} = inhalable particulate matter

Re-entrained road dust from employee commute on paved roads was calculated using the same method as described above for haul trucks. It was assumed that all four alternatives would have approximately 100 employees. Details on the number of employees by phase and alternative are provided in Appendix B.

Emissions from Relocation of Green Valley Road Under Alternative 1, Green Valley Road would be temporarily relocated. Emissions from road construction were calculated using SMAQMD's Roadway Construction Emission Model v6.3-2. The Roadway Construction Emissions Model is preferred by the SMAQMD over URBEMIS for linear projects. AP-42 was referenced for the thickness of asphalt roads (USEPA 1995).

Naturally Occurring Asbestos The excavation and other excavation activities occur in areas with the potential for Naturally Occurring Asbestos (NOA). Issues related to NOA are discussed in Chapter 8 – Soils, Minerals, and Geological Resources. The construction activities will comply with any requirements from the SMAQMD and EDCAQMD, including submitting appropriate Asbestos Dust Mitigation Plans for approval.

6.2.2 Significance Criteria

Ozone Precursor Significance Thresholds For CEQA analyses, the SMAQMD has established O_3 precursor emission significance thresholds for NOx and VOC. The thresholds are based on daily emission rates from both construction and operational conditions. If any of the thresholds shown in Table 6-14 are exceeded, then the MIAD Modification Project would be considered significant for that pollutant. Only the NOx construction thresholds are applicable since the MIAD Modification Project would have no operational emissions once completed. The de minimis levels for General Conformity are shown in Table 6-4. Under the General Conformity Rule, NOx and VOC each have a 50 tons per year (tpy) de minimis threshold, PM10 has a 100 tpy de minimis threshold, and CO has a 100 tpy de minimis threshold

Table 6-14. Ozone Precursor Significance Thresholds for CEQA

Pollutant	Pounds per Day
Construction Oxides of Nitrogen (NO_x)	85
Operational Reactive Organic Gases (ROG)	65
Operational Oxides of Nitrogen (NO_x)	65

Source: SMAQMD 2004.

Other Criteria Pollutants Unlike ozone precursors, other criteria pollutants, such as CO, PM_{10}, and $PM_{2.5}$ do not have daily significance thresholds; rather, the pollutants are compared against the CAAQS (CEQA) and NAAQS (NEPA). A project would have a significant adverse air quality impact if it either causes an exceedance of a standard (for pollutants in attainment) or makes a substantial contribution to an existing exceedance of an air quality standard (for pollutants in non-attainment). For the purposes of a CEQA evaluation, a “substantial” contribution is defined as five percent or more of an existing exceedance.

The SMAQMD’s *CEQA Guidelines* (SMAQMD 2004) indicate that it would take an addition of 2,000 cars to result in a project-related CO concentration level of 5.6 ppm (1-hour). Since the existing background concentration is approximately 3 ppm, it would take the addition of these cars to cause the CO concentration to exceed 9 ppm, equivalent to the NAAQS and CAAQS. The maximum number of vehicles associated with the proposed project is not expected to approach the order of magnitude required to exceed the screening level. Since the MIAD Modification Project is not expected to have any significant impacts associated with CO, no further analysis was conducted.

Although the SMAQMD recommends completing dispersion modeling for PM emissions, the magnitude of the daily PM_{10} and $PM_{2.5}$ emissions is conservatively considered to be significant. As a result, dispersion modeling was not completed, but emissions of PM_{10} and $PM_{2.5}$ will be mitigated as appropriate. Mitigation for dust is discussed below.

Offensive Odors Specific significance thresholds are not available for offensive odors; however, a project would be considered to have significant adverse air quality impacts if it causes detriment, nuisance, or annoyance to a considerable number of persons.

Objectionable odors can typically be emitted from sources like agriculture, wastewater treatment, food processing, chemical plans, composting, and landfills. There will be no sources of odors during the operation of MIAD and the construction equipment associated with the construction will not be a substantial source of odors. Since the MIAD Modification Project is not expected to have any short- or long-term impacts associated with offensive odors, no further analysis was conducted.

Toxic Air Contaminants If the proposed action would emit TACs, such as diesel particulate matter from diesel-fueled construction equipment, then the health risk associated with these compounds must be assessed. The California Air Pollution Control Officers Association (CAPCOA) and CARB have developed TAC health risk assessment (HRA) guidelines that must be followed to judge the impacts associated with TAC emissions. If a complete HRA is not completed, then emissions from mobile and stationary sources may be conservatively considered to be significant and unavoidable. The recommended significance thresholds for TACs include:

- Lifetime probability of contracting cancer is greater than 10 in one million;
- Ground-level concentration of non-carcinogenic toxic air pollutants would result in a Hazard Index of greater than 1.

The primary TAC associated with the project construction is expected to be diesel particulate matter generated during the operation of the construction equipment. There is currently no adequate methodology to assess TACs from mobile sources because the existing models and procedures are based on stationary sources that emit at a constant rate. Furthermore, the models typically assume a 70-year lifetime exposure to the pollutants, which does not reflect the temporary and highly variable nature of mobile construction emissions.

Although an HRA could demonstrate that a project is less than significant, an HRA was not completed for the reasons stated in the previous paragraph. As a result, TAC emissions were assumed to be significant and unavoidable and no further analysis was completed.

6.2.3 Environmental Consequences/Environmental Impacts of the No Action/No Project Alternative

Under the No Action/No Project Alternative, there would be no construction at MIAD or Mississippi Bar; therefore there would be no air quality impacts.

6.2.4 Environmental Consequences/Environmental Impacts of Alternative 1

Unmitigated Emission Inventories Emissions of criteria pollutants and TACs would occur during construction activities. Typical construction activities include excavation, soil hauling, and site grading, all of which would contribute to fugitive dust emissions or on- and off-site diesel exhaust emissions. Since no operational sources are part of the MIAD Modification Project, only construction air quality impacts have been analyzed.

Construction impacts were estimated following the methodology described above. Table 6-15 provides a summary of peak daily and annual emission rates for VOC, NOx, CO, SO_2, PM_{10}, and $PM_{2.5}$. In cases where emission factors were only provided for PM_{10}, appropriate CARB PM size profiles were used to estimate $PM_{2.5}$ emissions (CARB 2008a). Detailed calculation tables that provide emissions by month and by general source categories are included in Appendix B.

As discussed in Section 6.2.2, NOx has a short-term (construction) significance threshold of 85 lb/day under CEQA. Under the General Conformity Rule, NOx and VOC each have a 50 tons per year (tpy) de minimis threshold, PM_{10} has a 100 tpy de minimis threshold, and CO has a 100 tpy de minimis threshold. The emission estimates provided in Table 6-15 indicate that the uncontrolled NOx emissions under Alternative 1 would be considered significant under CEQA, and uncontrolled NOx emissions exceed the General Conformity de minimis thresholds. This impact would be potentially significant. Mitigation measures

AQ-1, AQ-3, AQ-4, AQ-5, AQ-6 would be implemented to reduce these impacts to less than significant (See Table 6-16)[2].

Table 6-15. Uncontrolled Construction Emission Inventories

Alternative	VOC	NOx	CO	PM_{10}	$PM_{2.5}$
	Peak Daily Emissions in pounds/day				
1	58	**534**	207	1,416	344
2	54	**482**	204	1,280	312
3	53	**484**	193	993	281
4	60	**565**	233	787	199
	Peak Annual Emissions in tons/year				
1	6.9	**54.6**	21.3	**129.0**	31.0
2	7.0	**54.5**	21.5	**125.7**	27.8
3	7.5	**61.8**	23.9	**110.5**	24.3
4	6.9	**62.0**	24.1	89.3	22.0

Note:
Values shown in bold indicate that a threshold of significance would be exceeded.

The major source of PM (PM_{10} and $PM_{2.5}$) emissions is fugitive dust from stockpiling and moving of sand, cement, and excavated material. In addition to material moved, the specific construction schedule identifying which features are worked simultaneously, how many work days per feature and how many years per feature, affect the peak daily and annual emissions. Alternative 1 exceeds the General Conformity de minimis threshold of 100 tpy for PM_{10}. This impact would be potentially significant. Control of fugitive dust emissions will reduce the PM_{10} emissions. Requirements for fugitive dust prevention for the EDCAQMD include street sweeping, dust control for storage piles, and other best management practices (EDCAQMD 2005). Mitigation measures AQ-2 and AQ-7 in Section 6.4.2 would reduce this impact to a less than significant level.

The major sources of VOC, CO, and NOx emissions are the on-site construction equipment and haul trucks. In Alternative 1, 60 percent of daily NOx emissions are from construction equipment during the peak month. Control of NOx emissions from these mobile sources would not be subject to stationary source permitting requirements. Therefore, the control of NOx from these sources would require mitigation under CEQA. Comparing the daily NOx emissions for each alternative indicates that Alternative 1 has the second highest peak daily emission, as shown in Table 6-15. Control of NOx emissions from the construction equipment and haul trucks would not be subject to stationary source permitting requirements. Therefore, the control of NOx from these sources would be potentially significant and would require mitigation under

[2] Although NOx emissions would be reduced to less than significant under the current general conformity de minimis threshold of 50 tons per year (tpy) for serious O_3 non-attainment, emissions would exceed the de minimis threshold of 25 tpy that will be effective when the air basin is reclassified to severe-15 O_3 non-attainment.

CEQA. Potentially available mitigation options (AQ-3 and AQ-4) for mobile construction equipment are discussed in Section 6.4.2.

Habitat mitigation activities at Mississippi Bar will result in a total of 29 truck trips (58 round trips) to deliver soil material to the site. Up to 10 trucks (20 round trips) would be required to deliver plants and other required materials. A minimal number of worker trips would be required each day of construction. These trips will be spread out over 24 months and would result in minimal daily traffic. Furthermore, 285 cubic yards of topsoil will be removed, which will provide minimal fugitive dust emissions with standard control measures. Any air quality impacts associated with mitigation activities at Mississippi Bar will be negligible and less than significant.

6.2.5 Environmental Consequences/Environmental Impacts of Alternative 2

Unmitigated Emission Inventories As discussed in Section 6.2.2, NOx has a short-term (construction) significance threshold of 85 lb/day under CEQA. Under the General Conformity Rule, NOx and VOC each have a 50 tpy de minimis threshold, PM_{10} has a 100 tpy de minimis threshold, and CO has a 100 tpy de minimis threshold. The emission estimates provided in Table 6-15 indicate that the uncontrolled NOx emissions under Alternative 2 would be considered significant under CEQA, and uncontrolled NOx emissions exceed the General Conformity de minimis thresholds. This impact would be potentially significant. Mitigation measures AQ-1, AQ-3, AQ-4, AQ-5 and AQ-6 would be implemented to reduce these impacts to less than significant (See Table 6-16)[3].

The major source of PM (PM_{10} and $PM_{2.5}$) emissions is fugitive dust from stockpiling and moving of sand, cement, and excavated material. In addition to material moved, the specific construction schedule identifying which features are worked simultaneously, how many work days per feature and how many years per feature, affect the peak daily and annual emissions. Alternative 2 exceeds the General Conformity de minimis threshold of 100 tpy for PM_{10}. This impact would be potentially significant. Control of fugitive dust emissions will reduce the PM_{10} emissions. Requirements for fugitive dust prevention for the EDCAQMD include street sweeping, dust control for storage piles, and other best management practices (EDCAQMD 2005). Mitigation measures AQ-2 and AQ-7 in Section 6.4.2 would reduce this impact to a less than significant level.

The major sources of VOC, CO, and NOx emissions are the on-site construction equipment and haul trucks. In Alternative 2, the peak month contribution of construction equipment to daily NOx emissions is approximately 40 percent. Control of NOx emissions from these mobile sources would not be subject to stationary source permitting requirements. Therefore, the control of NOx from

[3] Although NOx emissions would be reduced to less than significant under the current general conformity de minimis threshold of 50 tons per year (tpy) for serious O_3 non-attainment, emissions would exceed the de minimis threshold of 25 tpy that will be effective when the air basin is reclassified to severe-15 O_3 non-attainment.

these sources would require mitigation under CEQA. Comparing the daily NOx emissions for each alternative indicates that Alternative 2 has the lowest peak daily emission of all the alternatives as shown in Table 6-15; however it would still remain significant. Control of NOx emissions from the construction equipment and haul trucks would not be subject to stationary source permitting requirements. Therefore, the control of NOx from these sources would be potentially significant and would require mitigation under CEQA. Potentially available mitigation options (AQ-3 and AQ-4) for mobile construction equipment are discussed in Section 6.4.2.

The habitat mitigation at Mississippi Bar will be the same as that proposed in Alternative 1. As a result, air quality impacts associated with the habitat restoration will be negligible and less than significant.

6.2.6 Environmental Consequences/Environmental Impacts of Alternative 3

Unmitigated Emission Inventories As discussed in Section 6.2.2, NOx has a short-term (construction) significance threshold of 85 lb/day under CEQA. Under the General Conformity Rule, NOx and VOC each have a 50 tpy de minimis threshold, PM_{10} has a 100 tpy de minimis threshold, and CO has a 100 tpy de minimis threshold. The emission estimates provided in Table 6-15 indicate that the uncontrolled NOx emissions under Alternative 3 would be considered significant under CEQA, and uncontrolled NOx emissions exceed the General Conformity de minimis thresholds. This impact would be potentially significant. Mitigation measures AQ-1, AQ-3, AQ-4, AQ-5 and AQ-6 would be implemented to reduce these impacts to less than significant (See Table 6-16). Even with mitigation, NOx would remain above the de minimis thresholds and would require a full NOx General Conformity Determination (See Table 6-17 and 6-18).

The major source of PM (PM_{10} and $PM_{2.5}$) emissions is fugitive dust from stockpiling and moving of sand, cement, and excavated material. In addition to material moved, the specific construction schedule identifying which features are worked simultaneously, how many work days per feature and how many years per feature, affect the peak daily and annual emissions. Alternative 3 exceeds the General Conformity de minimis threshold of 100 tpy for PM_{10}. This impact would be potentially significant. Control of fugitive dust emissions will reduce the PM_{10} emissions. Requirements for fugitive dust prevention for the EDCAQMD include street sweeping, dust control for storage piles, and other best management practices (EDCAQMD 2005). Mitigation measures AQ-2 and AQ-7 in Section 6.4.2 would reduce this impact to a less than significant level.

The major sources of VOC, CO, and NOx emissions are the on-site construction equipment and haul trucks. In Alternative 3, the peak month contribution of construction equipment to daily NOx emissions is approximately 40 percent. Control of NOx emissions from these mobile sources would not be subject to stationary source permitting requirements. Therefore, the control of NOx from these sources would require mitigation under CEQA. Comparing the daily NOx emissions for each alternative indicates that Alternative 3 has the second lowest peak daily emission of all the alternatives as shown in Table 6-15; however it would still remain significant. Control of NOx emissions from the construction equipment and haul trucks would not be subject to stationary source permitting requirements. Therefore, the control of NOx from these sources would be potentially significant and would require mitigation under CEQA. Potentially available mitigation options (AQ-3 and AQ-4) for mobile construction equipment are discussed in Section 6.4.2.

The habitat mitigation at Mississippi Bar will be the same as that proposed in Alternative 1. As a result, air quality impacts associated with the habitat restoration will be negligible and less than significant.

6.2.7 Environmental Consequences/Environmental Impacts of Alternative 4

Unmitigated Emission Inventories As discussed in Section 6.2.2, NOx has a short-term (construction) significance threshold of 85 lb/day under CEQA. Under the General Conformity Rule, NOx and VOC each have a 50 tpy de minimis threshold, PM_{10} has a 100 tpy de minimis threshold, and CO has a 100 tpy de minimis threshold. Alternative 4 has the highest peak daily NO_X emission which corresponds to the largest number of construction equipment needed. The emission estimates provided in Table 6-15 indicate that the uncontrolled NOx emissions under Alternative 4 would be considered significant under CEQA. Uncontrolled NOx emissions exceed the General Conformity de minimis thresholds. This impact would be potentially significant. Mitigation measures in Section 6.4.2 would be implemented to reduce these impacts to less than significant. Even with mitigation, NOx would remain above the de minimis thresholds and would require a full NOx General Conformity Determination (See Table 6-17 and 6-18).

Alternative 4 is the only alternative that emits less uncontrolled PM_{10} than the General Conformity de minimis threshold of 100 tpy; however it would still contribute to substantial fugitive dust impact and would be potentially significant. Control of fugitive dust emissions will reduce the PM_{10} emissions. Requirements for fugitive dust prevention for the EDCAQMD include street sweeping, dust control for storage piles, and other best management practices (EDCAQMD 2005). Mitigation measures AQ-2 and AQ-7 in Section 6.4.2 would reduce this impact to a less than significant level.

The major sources of VOC, CO, and NOx emissions are the on-site construction equipment and haul trucks. In Alternative 4, the peak month contribution of construction equipment to daily NOx emissions is approximately 40 percent. Control of NOx emissions from these mobile sources would not be subject to stationary source permitting requirements. Therefore, the control of NOx from these sources would require mitigation under CEQA. Potentially available mitigation options (AQ-3 and AQ-4) for mobile construction equipment are discussed in Section 6.4.2.

The habitat mitigation at Mississippi Bar will be the same as that proposed in Alternative 1. As a result, air quality impacts associated with the habitat restoration will be negligible and less than significant.

6.3 Comparative Analysis of Alternatives

Table 6-16 presents the comparative analysis of alternatives for air quality based on unmitigated emissions. All alternatives would exceed the CEQA NOx threshold of 85 lbs/day and the NO_X General Conformity de minimis threshold of 50 tpy. Alternative 4 is the only alternative that would not exceed the PM_{10} General Conformity de minimis threshold of 100 tpy. All alternatives would require a concrete batching plant that would likely require mitigation as part of the stationary source permit to operate the plant. Comparing PM emissions between alternatives, Alternative 1 would have the highest emissions followed by Alternatives 2, 3, and 4. Section 6.4.3 presents the mitigated emissions impact results.

Table 6-16. Comparative Analysis of Alternatives

Environmental Consequence/ Environmental Impact	Significance					Environmental Commitment/ Mitigation Measure
	No Action/ No Project Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Exceed NO_x threshold of 85 lbs per day.	NI	PS	PS	PS	PS	**AQ-3:** Project wide fleet-average 20 percent NO_X reduction and 45 percent particulate reduction **AQ-4:** Equipment Inventory to SMAQMD **AQ-5:** Exhaust Gas Recirculation Systems **AQ-6:** Lean NOX Catalyst in Engine Exhaust Systems

Exceed NO_X and VOC 50 tpy de minimis threshold	NI	LTSWM	LTSWM	PS	PS	**AQ-3:** Project wide fleet-average 20 percent NO_X reduction and 45 percent particulate reduction **AQ-4:** Equipment Inventory to SMAQMD **AQ-5:** Exhaust Gas Recirculation Systems **AQ-6:** Lean NOX Catalyst in Engine Exhaust Systems
Exceed PM_{10} 100 tpy de minimis threshold	NI	LTSWM	LTSWM	LTSWM	LTS	**AQ-7:** Fugitive Dust Control Measures
Exceed CO 100 tpy de minimis threshold	NI	LTS	LTS	LTS	LTS	None Required
Create substantial fugitive dust	NI	LTSWM	LTSWM	LTSWM	LTSWM	**AQ-7:** Fugitive Dust Control Measures
Emissions from stationary sources (concrete batching plant)	NI	LTSWM	LTSWM	LTSWM	LTSWM	**AQ-1:** Electric Power for Batch Plant **AQ-2:** Wet Suppression Dust Control for Batch Plant
Temporary air quality impacts from Mississippi Bar mitigation actions	NI	LTS	LTS	LTS	LTS	None Required

Key:
LTS = Less Than Significant
LTSWM = Less than Significant with Mitigation
SU = Significant and Unavoidable
NI = No Impact
B = Beneficial
N/A = Not Applicable
PS = Remains Potentially Significant (even with mitigation)

6.4 Environmental Commitments/Mitigation Measures

The emissions of unmitigated NOx, primarily from off-road construction equipment and haul trucks, would be above the CEQA significance threshold for construction. Unmitigated NOx and PM_{10} emissions exceed the General Conformity de minimis thresholds for each year of the MIAD Modification Project construction. Therefore mitigation would need to be applied to the emission sources.

6.4.1 Stationary Source Mitigation Options

The stationary sources associated with the MIAD Modification Project would include the concrete batching process. Because the concrete batching process would be subject to air quality permitting by one or more of the local air districts, it is assumed that the following controls will be installed:

- **AQ-1** - Facility power will come from the electric utility grid, not on-site diesel-powered generators and pumps. Using grid power eliminates the on-site emissions associated with both the gaseous pollutants from diesel engines, as well as diesel particulate matter, which is a listed TAC in California.
- **AQ-2** - Wet suppression will be used to reduce plant dust emissions. For this analysis, the controlled emissions are based on AP-42 controlled emission factors for batch plants.

These controls are included as part of the MIAD Modification Project design for the stationary plants.

6.4.2 Mobile Source Mitigation Options

The standard CEQA mitigation measures for construction equipment emissions are (SMAQMD 2004):

- **AQ-3** - The Project Agencies will provide a plan for approval by SMAQMD, demonstrating that the heavy-duty (> 50 horsepower) off-road vehicles to be used in the construction project, including owned, leased and subcontractor vehicles, will achieve a project wide fleet-average 20 percent NOx reduction and 45 percent particulate reduction compared to the most recent CARB fleet average at time of construction; and
- **AQ-4** - The Project Agencies will submit to the SMAQMD a comprehensive inventory of all off-road construction equipment, equal to or greater than 50 horsepower, that will be used an aggregate of 40 or more hours during any portion of the construction project. The inventory shall include the horsepower rating, engine production year, and projected hours of use or fuel throughput for each piece of equipment. The inventory shall be updated and submitted monthly throughout the duration of the project, except that an inventory shall not be required for any 30-day period in which no construction activity occurs. At least 48 hours prior to the use of subject heavy-duty off-road equipment, the project representative shall provide SMAQMD with the anticipated construction timeline including start date, and name and phone number of the project manager and on-site foreman.

NOx Mitigation Options Several mitigation options that may be applicable to mobile construction equipment engines to reduce NOx emissions are described below. The specific measures to be employed will be based on discussions with the SMAQMD.

- **AQ-5** - Use of equipment with engines that incorporate exhaust gas recirculation (EGR) systems. EGR systems would need to be part of the engine design for a substantial portion of the existing construction equipment fleet in the region to be effective. While EGR systems can provide reductions of NOx, PM_{10}, CO, and VOC emissions, it is not likely that enough available construction equipment have EGR engines to provide any real reductions for the MIAD Modification Project. However, the availability of construction equipment with EGR systems will need to be reviewed in detail prior to the final decision to incorporate or drop this option.

- **AQ-6** - Installation of a lean NOx catalyst in the engine exhaust system. Lean NOx catalyst filters may be available for construction equipment exhaust. However, these units would need to be certified by CARB before being installed on specific construction equipment engines.

NOx emissions that exceed 85 lbs/day after installation of control devices and/or implementation of other administrative controls will be subject to a mitigation implementation fee used to control other emission sources in the proposed action region. This fee, currently $16,000 per ton of NOx in excess of the 85 lbs/day significance threshold plus a 5 percent administrative fee, represents the final mitigation measure used to reduce the NOx impact to a level of insignificance.

The EDCAQMD does not provide specific requirements for measures that must be used to mitigate NOx emissions; rather, it provides a menu of options to be considered. The mitigation provided to meet SMAQMD requirements is assumed to be sufficient to meet EDCAQMD requirements and no further action is required.

PM Mitigation Options
AQ-7 Fugitive dust control will be applied to reduce PM_{10} and $PM_{2.5}$ emissions. Typical dust mitigation measures include:

- Wet suppression and soil stabilization
- Wind fencing around active area
- Paving on-site roadways
- Truck wheel washing facilities at site exits onto public roadways

- Maintaining minimum truck bed freeboard or covering haul truck beds

More than half of PM emissions result from exposed grading operations. Fugitive dust from exposed grading operations can be suppressed more effectively than other sources such as hauling roads and operations. The SMAQMD CEQA Guidelines estimate the effectiveness of watering exposed soil in suppressing fugitive dust to be 37 percent if exposed soil is watered twice a day or 75 percent if the exposed soil is continuously moist. The MIAD Modification Project will employ some combination of these measures as appropriate for the area and equipment operating on a given feature. The URBEMIS modeling completed for this project specifically used the following mitigation measures during its analysis:

- Apply soil stabilizers to inactive areas;
- Replace ground cover in disturbed areas quickly;
- Water exposed surfaces twice daily; and
- Equipment loading/unloading

These mitigation measures will fulfill EDCAQMD's requirement for fugitive dust prevention. (EDCAQMD 2005).

The EDCAQMD assumes that fugitive dust emissions from project construction are not significant if the project commits to implementing fugitive dust control measures sufficient to prevent visible dust beyond the project lines. The dust control measures to be implemented to meet SMAQMD requirements are assumed to be sufficient to control visible dust emissions; therefore, not further mitigation is required for EDCAQMD.

6.4.3 Mitigated Emission Inventories

The estimated mitigated emission inventories are presented in Table 6-17. These inventories assume that NOx emissions from off-road equipment are reduced by 20 percent, and that PM emissions from off-road equipment are reduced by 45 percent per standard CEQA mitigation measures for construction equipment. Fugitive dust from cut/fill operations is assumed to be reduced by 50 percent. Also controlled emission factors from AP-42 are used for concrete batching.

Table 6-17. Mitigated Construction Emission Inventories

Alternative	VOC	NOx[1,5]	CO	PM_{10}[2,3,4]	$PM_{2.5}$[2,3,4]
	Peak Daily Emissions in pounds/day				
1	58	**470**	207	695	159
2	54	**440**	204	629	145
3	53	**445**	193	452	107
4	60	**522**	233	399	98
	Peak Annual Emissions in tons/year				
1	6.9	**50.0**	21.3	64.2	14.7
2	7.0	49.8	21.5	65.0	14.7
3	7.5	**56.6**	23.9	56.9	12.7
4	6.9	**57.9**	24.1	45.8	11.0

Notes:
[1] Construction equipment NOx emissions assumed to be reduced by 20 percent compared to unmitigated NOx emissions.
[2] Construction equipment PM emissions assumed to be reduced by 45 percent compared to unmitigated PM emissions.
[3] Fugitive dust assumed to be reduced by 50 percent compared to unmitigated PM emissions.
[4] Controlled emissions from AP-42 used to calculate mitigated concrete batch dust emissions.
[5] Values shown in bold indicate that a threshold of significance would be exceeded.

NOx emissions with all feasible mitigation measures will remain significant under CEQA; therefore, the payment of a mitigation fee to the SMAQMD will be required to offset emissions in another portion of the air basin. Mitigated NOx would be greater than the 50 tpy General Conformity de minimis threshold for Alternatives 1, 3, and 4. Therefore, a full NOx general conformity determination would need to be developed before a ROD could be issued for the MIAD Modification Project if either Alternative 1, 3, or 4 is the preferred alternative.

Because the general conformity requirements stem from the CAA and not from NEPA, air quality analyses developed under these two Federal statutory programs are separate but may be complementary. Therefore, a general conformity evaluation is not integral to this document. The general conformity regulations do not require linking a general conformity evaluation with air quality-related analyses conducted to satisfy NEPA, but such linkage is allowed under the general conformity regulations. According to USEPA general conformity guidance (USEPA 1994), at the point in the NEPA process when the specific Federal action is determined, the general conformity evaluation should then be conducted. Therefore, when a preferred alternative is selected for the MIAD Modification Project, a general conformity evaluation will be completed.

The controlled PM_{10} emissions are below the 100 tons per year General Conformity de minimis threshold. Therefore, the MIAD Modification Project is assumed to conform to any PM_{10} SIP requirements for all action alternatives. Table 6-18 summarizes impacts of the mitigated emissions inventories.

Table 6-18. Comparative Analysis of Alternatives – Mitigated Emissions Inventories

Environmental Consequence/ Environmental Impact	Significance					Environmental Commitment/ Mitigation Measure
	No Action/ No Project Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Exceed NO_x threshold of 85 lbs per day.	NI	SU	SU	SU	SU	NO_X mitigation fee required
Exceed NO_X and VOC 50 tpy de minimis threshold	NI	SU	LTS	SU	SU	NO_x General Conformity Determination Required
Exceed PM_{10} 100 tpy de minimis threshold	NI	LTS	LTS	LTS	LTS	No additional measures required
Exceed CO 100 tpy de minimis threshold	NI	LTS	LTS	LTS	LTS	None Required

Key:
LTS = Less Than Significant
LTSWM = Less than Significant with Mitigation
SU = Significant and Unavoidable
NI = No Impact
B = Beneficial
N/A = Not Applicable

6.5 Significant and Unavoidable Impacts

Daily emissions of NO_X would exceed the SMAQMD's threshold of significance for CEQA for all four alternatives, even with all feasible mitigation. The SMAQMD will allow the project to proceed if a required mitigation fee ($16,000 per ton of emissions plus 5 percent administrative costs) is paid. This air quality impact would be significant and unavoidable for all four alternatives.

Annual emissions of NO_X exceed the general conformity thresholds for three of the alternatives (Alternatives 1, 3, and 4) even with all feasible mitigation. Implementation of any of these three alternatives would result in significant and unavoidable air quality impacts.

6.6 Cumulative Effects

Table 22-1 in Chapter 22 lists projects considered in the cumulative analysis. Many of the projects include construction at or near Folsom Reservoir. Construction of these projects would increase emissions of criteria pollutants from onsite construction and transport of materials. The combination of the significant emissions from the MIAD Modification Project and emissions from the other cumulative projects at Folsom Reservoir and surrounding areas would contribute to cumulatively significant air quality impacts. These cumulative impacts would be significant and unavoidable because they would occur even after all feasible mitigation has been implemented.

6.7 References

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Chapter 7
Biological Resources

This section presents potential impacts to biological resources from construction of the MIAD Modification Project. Biological resources in this document comprise wetlands, aquatic and terrestrial vegetation and habitats, wildlife, and threatened and endangered species within the MIAD project area and at Mississippi Bar.

7.1 Affected Environment/Environmental Setting

This section presents the area of analysis, the regulatory requirements, and the environmental setting for biological resources.

7.1.1 Area of Analysis

The area of analysis for biological resources includes both the MIAD and Mississippi Bar project areas.

7.1.1.1 Mormon Island Auxiliary Dam

The biological area of analysis for MIAD includes only those areas that have not been previously addressed in the Folsom DS/FDR EIS/EIR, including the Federal lands south of Green Valley Road and the Mormon Island Wetland Preserve. Vegetation and wildlife impacts (including impacts to vernal pools, valley elderberry longhorn beetle, and wetlands) that could occur in the area between MIAD and Green Valley Road have been adequately analyzed in the Folsom DS/FDR EIS/EIR and in the USFWS Biological Opinion (BO) (USFWS 2007a) and Coordination Act Report (CAR) (USFWS 2007) for the project. A discussion of these impacts can be found in Chapter 3, Section 3.4 Aquatic Resources, and Section 3.5 Terrestrial Vegetation and Wildlife in the Folsom DS/FDR Draft EIS/EIR.

7.1.1.2 Mississippi Bar

The Mississippi Bar mitigation site includes 80 acres of land on the western shore of Lake Natoma, near the intersection of Sunset Avenue and Main Avenue and south of the community of Orangevale. All proposed mitigation would occur on land parcels currently owned by DPR and Reclamation and managed by DPR as part of the FLSRA.

7.1.2 Regulatory Setting

The following laws, ordinances, and regulations are applicable or potentially applicable to the project in the context of biological resources.

7.1.2.1 Federal

Endangered Species Act The ESA and subsequent amendments provide for the conservation of endangered and threatened species and the ecosystems upon which they depend. Section 7 of the ESA requires Federal agencies to aid in the conservation of listed species, and to ensure that the activities of Federal agencies will not jeopardize the continued existence of listed species or adversely modify designated critical habitat. At the Federal level, the USFWS and the NMFS are responsible for administration of the ESA. To ensure against jeopardy, each Federal agency must consult with the USFWS or NMFS, or both, regarding Federal agency actions.

Fish and Wildlife Coordination Act The FWCA requires Federal agencies to consult with USFWS, or, in some instances, with NMFS and with State fish and wildlife resource agencies before undertaking or approving water projects that control or modify surface water. The purpose of this consultation is to ensure that wildlife concerns receive equal consideration during water resource development projects and are coordinated with the features of these projects. The consultation is intended to promote the conservation of fish and wildlife resources by preventing their loss or damage and to provide for the development and improvement of fish and wildlife resources in connection with water projects. Federal agencies undertaking water projects are required to fully consider recommendations made by USFWS, NMFS, and State fish and wildlife resource agencies in project reports and to include measures to reduce impacts on fish and wildlife in project plans.

Migratory Bird Treaty Act The MBTA decrees that all migratory birds and their parts (including eggs, nests and feathers) are fully protected. Nearly all native North American bird species are protected by the MBTA, and projects that are likely to result in taking of protected birds will require the issuance of take permits from USFWS. Activities that would require such a permit would include destruction of migratory bird nesting habitat during the nesting season when eggs or young are likely to be present. Under the MBTA, surveys are required to determine if nests will be disturbed and, if so, a buffer area with a specified radius around the nest would be established so that no disturbance or intrusion would be allowed until the young had fledged and left the nest.

Bald and Golden Eagle Protection Act The Bald and Golden Eagle Protection Act of 1940 prohibits anyone from “taking” bald or golden eagles or their parts, nests, or eggs, without a permit from the Secretary of the Interior. The “taking” of an eagle refers to anyone who pursues, shoots, shoots at, poisons, wounds, kills, captures, traps, collects, molests or disturbs bald or golden eagles. Additionally, anyone who possesses, sells, purchases, barters, offers to sell, purchase or barter, transports, exports or imports, any bald eagle or any golden eagle, alive or dead, or any part, nest, or egg, can be fined or imprisoned for up to one year, or both.

Rivers and Harbors Act Sections 9 and 10 of the Rivers and Harbors Act of 1899 regulate alteration of (and prohibit unauthorized construction in) any navigable water of the United States. Construction of any bridge, dam, dike or causeway over or in navigable waterways of the U.S. is prohibited without Congressional approval, and construction plans must be submitted and approved by the Corps.

Clean Water Act The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. The CWA establishes regulations for the discharge of pollutants into United States waters. Section 401 of the CWA requires that proposed actions that may result in a discharge of a pollutant into waters of the United States must not violate Federal or State water quality standards, and requires certification from the State in which the discharge originates. Section 402 of the CWA requires that all point sources that discharge pollutants into the waters of the United States must obtain a NPDES permit. Section 404 of the CWA requires a permit to be obtained from the Corps for the discharge of dredged or fill material into jurisdictional waters of the United States or wetlands.

Executive Order 11990, Protection of Wetlands Executive Order 11990 requires Federal agencies to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. Federal agencies must provide opportunities for early public review of any plans or proposals for new construction in wetlands.

7.1.2.2 State

California Endangered Species Act The California Department of Fish and Game (DFG) is responsible for administration of the California ESA. This act includes provisions for the protection and management of species listed by the State as endangered or threatened, or designated as candidates for such listing. For projects that affect both a State and Federal listed species, compliance with the Federal ESA will satisfy the California ESA if DFG determines that the Federal incidental take authorization is "consistent" with the California ESA. Projects that result in a take of a State-only listed species require a take permit pursuant to Section 2080 *et seq* of the California Fish and Game Code.

Native Plant Protection Act Administered by DFG pursuant to California Fish and Game Code §1900 et seq., the NPPA was established to preserve, protect and enhance endangered or rare native plants of the State. The NPPA allows for the designation of endangered and rare native plant species and states that no person shall take any native plant, or any part or product thereof, which the commission has determined to be an endangered native plant or rare native plant, except as otherwise provided in the NPPA. The NPPA lists State-designated rare and endangered plants and provides specific protection measures for identified populations.

California Fish and Game Code §1800-1802 Sections 1800-1802 of the California Fish and Game Code, as administered by DFG, mandates that the "[DFG] has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. DFG, as trustee for fish and wildlife resources, shall consult with lead and responsible agencies and shall provide, as available, the requisite biological expertise to review and comment upon environmental documents and impacts arising from project activities, as those terms are used in the California Environmental Protection Act."

California Fish and Game Code §3503 Section 3503 of the California Fish and Game Code, as administered by DFG, mandates that " it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto."

California Fish and Game Code §3511 and 5050 These sections of the Fish and Game Code regulate the taking of fully protected species. Section 3511 of the California Fish and Game Code, as administered by DFG, mandates that "except as provided in Section 2081.7, fully protected birds or parts thereof may not be taken or possessed at any time." Section 5050 mandates that "except as provided in Section 2081.7, fully protected reptiles and amphibians or parts thereof may not be taken or possessed at any time."

California Fish and Game Code §1602 Section 1602 of the Fish and Game Code requires State, local, and public agencies and private businesses that propose an activity that could modify a river, stream, or lake, or to notify DFG. This includes changing or using material from the bed, channel, or bank of a river, stream, or depositing material into a waterway. If DFG believes the activity will adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement will be prepared by DFG. The Agreement will include measures that need to be implemented by the project proponent to protect fish and wildlife resources.

7.1.2.3 Local

Sacramento County Tree Preservation Ordinance This Ordinance protects trees on public property. Prior to planting, transplanting, moving, separating, trimming, pruning, cutting or disrupting any trees, a permit must be obtained from the Sacramento County Public Works Director. The permit may require new trees to be planted in the place of any damaged or removed trees (Ord. 915 § 10, 1966.). Applications for a variances and/or street modifications should consider avoiding Heritage (oak trees six inches in diameter and 4.5 feet high) and Landmark trees (especially prominent or stately trees on any land in Sacramento County, including privately owned land) whenever feasible (Ord. 915 § 5, 1966).

City of Folsom Tree Preservation Ordinance This Ordinance protects trees of certain species and size, including native oak trees, landmark trees (as designated by the City Council), and street trees growing within 12.5 feet of a public right-of-way and listed on a master tree list of desirable species for the City of Folsom. If such trees are located on a site where they would be affected by the proposed project and are within the City of Folsom limits, a tree permit is required. In addition, mitigation would be required in the form of replacement plantings or the payment of in-lieu fees.

7.1.3 Existing Conditions

This section outlines the existing biological resources within the MIAD and Mississippi Bar areas of analysis, including vegetation communities, wildlife, special-status species (plant and wildlife), and wetlands. This information was obtained from a variety of sources, including the following:

- California Department of Fish and Game's Natural Diversity Database (CNDDB) for the Clarksville and Folsom USGS 7.5-minute quadrangles in which the MIAD and Mississippi Bar areas are located, respectively;
- 2008 Baseline Monitoring Report for Mormon Island Wetland Preserve (Reclamation 2008);
- 2008 Avian Monitoring Study Results, Folsom Dam Safety/Flood Damage Reduction Project (Reclamation, 2009);
- 2009 Wetland Findings Report, Mormon Island Auxiliary Dam Modification and Mississippi Bar Mitigation Project (CDM 2009);
- Supplemental Habitat Evaluation Procedure (HEP) Report for the Kanaka Valley and Mississippi Bar Sites, Folsom Dam Safety and Flood Damage Reduction Project (USFWS 2008);
- Mormon Island Auxiliary Dam Modification Project Vernal Pool Survey Report (ESA 2009);
- 2007 Draft EIR/EIS, Folsom Lake State Recreation Area & Folsom Powerhouse State Historic Park General Plan/Resource Management Plan (California State Parks 2007); and
- 2007 Final EIS/EIR Folsom Dam Safety and Flood Damage Reduction Project (Reclamation Corps CVFPB and DWR 2007).

7.1.3.1 Mormon Island Auxiliary Dam

Vegetation Vegetation at MIAD consists mainly of annual grassland with a small portion of interior live oak woodland and occasional freshwater marsh wetlands at the base of MIAD and along Green Valley Road (CDM 2009). MIAD serves to dam water within an historic river channel, resulting in the creation of several perennial wetlands, including the Mormon Island Wetland Preserve (Preserve) operated by DPR on the east side of Green Valley Road (Reclamation, 2006). Baseline monitoring of the Preserve was initiated in 2008, and consisted of vegetation mapping and classification according to Sawyer and Keeler-Wolf (1995) (Reclamation, 2008). During the baseline survey, two major vegetation communities were identified and evaluated: cattail emergent wetland and cottonwood/willow riparian woodland. In addition, seasonal wetland habitats also exist within the project area (CDM 2009).

Within the Preserve, emergent cattail wetland supports many common plant types, including Baltic rush (*Juncus balticus*), broadleaf cattail (*Typhus latifolia)*, hairy vetch (*Vicia villosa*), water primrose (*Ludwigia peploides*), and narrow-leaved willow (*Salix exigua*).

Common plant species found in the cottonwood/willow riparian woodland include poison oak (*Toxicodendron diversilobum*), baltic rush, clustered field sedge (*Carex praegracilis*), foothill needlegrass (*Nassella lepida*), Himalayan blackberry (*Rubus discolor*), California grape (*Vitis californica*), and horkelia (*Horkelia* spp.). (Reclamation, 2008). Three willow species: narrow-leaved, Goodding's (*Salix gooddingii*), and arroyo (*Salix lasiolepsis*) also occur in the Preserve, along with Fremont cottonwood (*Populus fremontii*), interior live oak (*Quercus wislizeni*), blue oak (*Quercus douglasii)*, and scattered mature foothill pines (*Pinus sabineana*) (Reclamation, 2009).

Seasonal wetlands in the project area consist of depressions with species such as spikerush, water buttercup (*Ranunculus aquatilis*), coyote thistle (*Eryingium vaseyi*), and goldfields (*Lasthenia fremontii*) (CDM 2009).

Environmental Science Associates conducted a vernal pool survey in July 2009 at MIAD just south of Green Valley Road. A total of 13 potential vernal pool features (0.187 acres) were identified in an area proposed for the detention pond. The majority of potential vernal pools identified had cobbles and clay substrates that supported hydrophytic vegetation. Plant species indicative of vernal pools that were observed include: Vasey's coyote-thistle (*Eryngium vaseyi*), pale spike-rush (*Eleocharis macrostachya*), vernal pool goldfields (*Lasthenia fremontii*), rose-veined meadowfoam (*Limnanthes douglasii* ssp. *rosea*), annual hairgrass (*Deschampsia danthonioides*), rabbit's foot (*Polypogon monspeliensis*), dwarf wooly marbles (*Psilocarphus brevissimus*), and curly dock (*Rumex crispus*).

Dominant plant species in the California annual grassland include introduced annual grasses such as wild oat (*Avena fatua*), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), and brachypodium (*Brachypodium distachyon*) (California State Parks, 2007). Herbaceous forbs and wildflowers present in this vegetation include both native species such as fiddle neck (*Amsinckia* spp.), western ragweed (*Ambrosia psilostachya*), and popcornflower (*Plagiobothrys* spp.), and non-native species such as shortpod mustard (*Hirschfeldia incana*), yellow star thistle (*Centaurea solstitialis)*, and dove weed (*Eremocarpus setigerus*) (Reclamation 2006).

Developed/ruderal lands exist within the project area in areas of intensive human use, such as roadsides. Human use in these areas has compacted the soil and impacted vegetation (DPR and Reclamation 2007). Ruderal (weedy) species include non-native grasses, short-pod mustard, telegraph weed (*Heterotheca grandiflora*), yellow star thistle and tree tobacco (*Nicotiana glauca*).

Wildlife The Mormon Island Wetland Preserve supports many species of wildlife dependant on freshwater marsh and/or riparian habitat for foraging and rearing young (Reclamation 2006). Common species include Pacific treefrog (Pseudacris regilla), western toad (*Bufo boreas*), common garter snake (*Thamnophis sirtalis*), beaver (*Castor canadensis*), raccoon (*Procyon lotor)*, and muskrat (*Ondatra zibethicus*).

The Preserve also supports a high level of bird species diversity (Reclamation 2009). Resident bird species most commonly encountered during recent avian monitoring at the Preserve included house wren (*Troglodytes aedon)*, oak titmouse (*Baeolophus griseus)*, black phoebe (*Sayornis nigricans)*, lesser goldfinch (*Carduelis psaltria*), Bewick's wren (*Thryomanes bewickii*), and western scrub-jay (*Aphelocoma californica*). Ruby-crowned kinglet (*Regulus calendula)* and yellow-rumped warbler (*Dendroica coronata*), were the most common local wintering species encountered, while commonly encountered migrant species included tree swallow (*Tachycineta bicolor*), ash-throated flycatcher (*Myiarchus cinerascens*), Bullock's oriole (*Icterus bullockii*), western kingbird (*Tyrannus verticalis*), Wilson's warbler (*Wilsonia pusilla*) and yellow warbler (*Dendroica petechia*). Raptor nests were observed at the Preserve, including one Red-shouldered Hawk (*Buteo lineatus*), one Red-tailed Hawk, one Great-horned Owl, and one American Kestrel (*Falco sparverius*) - all successfully fledged juveniles. Black Phoebe (*Sayornis nigricans*) nests were commonly found below foot bridges and signs throughout the Preserve. An individual White-tailed Kite was detected during an April point count and occasionally observed utilizing the habitat on the eastern edge of the preserve (Reclamation 2009).

Seasonal wetlands in the project area have the potential to contain listed vernal pool species such as branchiopods (CDM 2009). Dry season surveys have indicated the presence of potential vernal pools south of Green Valley Road. Wet season surveys will be completed to identify any listed vernal pool species that may be present.

While not considered sensitive habitat, California annual grassland within the project area provide foraging habitat for wide-ranging species such as red-tailed hawk (*Buteo jamaicensis*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), and bobcat (*Lynx rufus*) (Reclamation, 2006). These species depend on grassland prey species that include California vole (*Microtus californicus*), California ground squirrel (*Spermophilus beecheyi*), gopher snake

(*Pituophis catenifer*), and western fence lizard (*Sceloporus occidentalis*). In addition, many smaller bird species, including western bluebird (*Sialia mexicana*) and western kingbird, and some species of bats may forage in grasslands.

Developed areas commonly support fewer wildlife species since they are dominated by non-native plants and, therefore, may offer sparse cover and reduced food value. In addition, developed areas are typically disturbed on a more or less ongoing basis by human activity, which further reduces their value for wildlife (Reclamation 2006).

7.1.3.2 Mississippi Bar

Vegetation The Mississippi Bar project area is adjacent to Lake Natoma and is part of the FLSRA and American River Parkway. The area has been heavily mined, resulting in dredge tailing piles, compaction of gravel and lack of soil to support vegetation in some areas (USFWS 2008). The project area consists of annual grassland, oak woodland, and wetland/drainage habitats (DPR and Reclamation 2007). Vegetation and wildlife occurring in annual grassland within the Mississippi Bar project area is similar to that described above for the MIAD project area.

Oak woodlands at Mississippi Bar consist of interior live oak, with subdominant species including blue oak, foothill pine, and black oak (*Quercus kellogii*). The shrub layer is dominated by poison oak and California buckeye (*Aesculus californica*), while the understory is dominated by blue wild rye (*Elymus glaucus*), hedgehog dogtail (*Cynosurus echinatus*) and ripgut brome (*Bromus diandrus*) (DPR and Reclamation 2007).

Wetlands at Mississippi Bar occur within dredge tailing ponds and drainages and contain Eurasian milfoil (*Myriophyllum spicatum*) and false loosetrife (*Ludwigia peploides*) (DPR and Reclamation 2007).

Approximately 0.5 miles northwest of Mississippi Bar are the Phoenix Park Vernal Pool Preserve (14 acres), managed by Fair Oaks Recreation and Park District, and the Phoenix Field Ecological Reserve (8 acres), managed by DFG. The Phoenix Park Vernal Pool Preserve is managed as a natural area and is part of Phoenix Park. The Phoenix Field Ecological Reserve was established in 1979 as mitigation for a nearby development, to protect the Sacramento Orcutt-grass as well as the Pincushion Navarretia (*Navarretia myersii*) (Clark et al. 1998). These areas would not be affected by the project.

A vernal pool survey conducted in July 2009 by ESA did not identify any vernal pools in the Mississippi Bar area of analysis (ESA 2009). Wet season vernal pool surveys are planned for the Mississippi Bar area in winter 2010.

Wildlife Oak woodlands at Mississippi Bar support many wildlife species, including acorn woodpeckers (*Melanerpes formicivorus*), western fence lizards, and white-breasted nuthatches (*Sitta carolinensis*), which forage for longhorn beetles (Cerambycids) and underwing moths (*Catocala* spp.) (California State Parks, 2007). Raptors including golden eagle, bald eagle, and red-tailed hawk, utilize large trees for nesting, and great-blue herons (*Ardea herodias*) and great egrets (*Ardea alba*) have established a rookery along the shore of Lake Natoma on the western side of Mississippi Bar (DPR and Reclamation 2007). Other species utilizing oak woodlands include mountain lion (*Felis concolor*) and bobcat.

Numerous small ponds that have been constructed at Mississippi Bar support several introduced wildlife species, such as red-swamp crayfish (*Procambarus clarkii*), catfish (*Ictalurus* spp.), bullfrog (*Ranus catesbeiana*), and muskrat (DPR and Reclamation 2007).

Special-Status Species

Special-Status Plant Species Special-status plant species are plants listed, proposed for listing, or candidates for possible future listing under the Federal ESA or the California ESA. In addition, special-status plants also include those considered rare or endangered by the California Native Plant Society (CNPS). A list of special-status plants that are reported to occur or have potential to occur in the analysis area or vicinity was obtained from the latest version of the CNDDB for the Clarksville and Folsom U.S. Geological Survey 7.5-minute quadrangles in which the MIAD and Mississippi Bar areas are located, respectively. Table 7-1 lists all species from the CNDDB search and describes their potential for occurrence, based on relevant documents and recent surveys within the area of analysis. A total of 12 special-status plant species have the potential to occur in the MIAD and Mississippi Bar project areas.

Special-Status Wildlife Species Special-status wildlife in this document are species that are Federally listed as endangered or threatened, species that are proposed for Federal listing or are candidates for possible future listing under the Federal ESA, species listed or proposed for listing as endangered or threatened under the California ESA, and species identified as State species of concern by DFG.

A list of special-status wildlife that are reported to occur or have potential to occur in the project area was obtained from the latest version of the CNDDB for the Clarksville and Folsom USGS 7.5-minute quadrangles in which the MIAD and Mississippi Bar areas are located, respectively.

Table 7-2 lists all species from the CNDDB search and describes their potential for occurrence within the project area based on relevant documents and recent surveys in the project area. A total of 10 special-status wildlife species have potential to occur in the project area. The section following the table provides a brief life history description of each species that could potentially be found in the project area.

Based on the CNDDB search and the types of habitats present, special-status wildlife species with the potential to occur in the MIAD project area include vernal pool fairy shrimp (*Branchinecta lynchi*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus)*, California red-legged frog (*Rana aurora draytonii)*, western spadefoot toad (*Spea hammondii*), northwestern pond turtle (*Actinemys marmorata marmorata)*, California horned lizard (*Phrynosoma coronatum frontale*), tricolored blackbird (*Agelaius tricolor*), western burrowing owl (*Athene cunicularia*), bald eagle (*Haliaeetus leucocephalus*), and pallid bat *(Antrozous pallidus).* Special-status wildlife species that may occur in the Mississippi Bar project area include vernal pool fairy shrimp, valley elderberry longhorn beetle, western spadefoot toad, northwestern pond turtle, California horned lizard (*Phrynosoma coronatum frontale*), tricolored blackbird, and pallid bat.

Vernal Pool Fairy Shrimp (Branchinecta lynchi) – FT Vernal pool fairy shrimp are currently known to occur in a wide range of vernal pool habitats in the Central Valley and the foothills of the Sierra Nevada in northern California from 10 to 290 meters in elevation (Federal Register 1994). The species can occupy a variant of vernal pool habitats from small, clear, sandstone rock pools, to large, turbid, alkaline, grassland valley floor pools. They tend to mostly occur in small pools (less that 0.05 acre), but have been collected from large vernal pools (including one over 25 acres). The vernal pools they inhabit are usually grass or mud-bottomed swales, or basalt flow depression pools in unplowed grasslands (USFWS 2008b).

Critical habitat has been designated for this species, but includes no land in the Folsom Reservoir area (Federal Register 2003). The project area, particularly the area south of Green Valley Road and in the Mormon Island Wetland Preserve, contains potential vernal pools which could provide habitat for the vernal pool fairy shrimp.

Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus) – FT The valley elderberry longhorn beetle is associated with various species of elderberry (*Sambucus* spp.). This beetle generally occurs along waterways and in floodplains that support remnant stands of riparian vegetation. Both larvae and adult beetle feed on elderberry shrubs (DFG 2003).

Critical habitat has been designated for this species, but does not include the project area (Federal Register, 1980). As the project area contains blue elderberry (*Sambucus mexicana*), there is potential for the valley elderberry longhorn beetle to occur.

All elderberry shrubs have been transplanted from the MIAD area north of Green Valley Road as part of mitigation for the Folsom DS/FDR Project. South of Green Valley Road, no elderberry shrubs were identified. Elderberry shrubs are present in the Mississippi Bar area that is proposed for riparian woodland mitigation. Results of focused elderberry surveys conducted at Mississippi Bar are shown in Figure 7-1.

Table 7-1. Special-Status Plant Species Occurrences in the Project Area

Species	Status	Life Form and Habitat Requirements	Potential for Occurrence
Pine Hill Ceanothus *Ceanothus roderickii*	FE, CNPS 1B.2	Evergreen shrub in the Rhamnaceae family. Chaparral and cismontane woodland with serpentinite or gabbroic soils. Blooms from April through June. Elevation 360-630 m.	Low potential to occur due to lack of chaparral habitat and lower elevation of project area.
Red Hills Soaproot *Chlorogalum grandiflorum*	CNPS List 1B.2	Perennial bulb in the Liliaceae family. Chaparral, cismontane woodland, and lower montane coniferous forest. Blooms May through June. Elevation: 245-1170 m.	Low potential to occur due to lack of chaparral habitat and lower elevation of project area.
Brandegee's Clarkia *Clarkia biloba ssp. brandegeeae*	CNPS List 1B.2	Annual in the Onagraceae family. Chaparral and cismontane woodland. Blooms May through July. Elevation: 73-915 m.	Low potential to occur due to lack of chaparral habitat in project area.
Pine Hill Flannelbush *Fremontodendron californicum* ssp. *decumbens*	FE, CNPS 1B.2	Evergreen shrub in the Sterculiaceae family. Chaparral and cismontane woodland with gabbroic or serpentinite soil. Also rocky areas. Blooms from April through July. Elevation: 425-760 m.	Low potential to occur due to lack of chaparral habitat and lower elevation of project area.
El Dorado Bedstraw *Galium californicum* ssp. *sierra*	FE, CNPS 1B.2	Perennial in the Rubiaceae family. Chaparral, cismontane woodland and lower montane coniferous forest with gabbroic soils. Blooms from May to June. Elevation: 100-585 m.	Low potential to occur due to lack of chaparral habitat in project area.
Bisbee Peak rush-rose *Helianthemum suffrutescens*	CNPS 3.2	Evergreen shrub in the Cistaceae family. Chaparral. On serpentinite, gabbroic, or Ione soils Blooms from April to May. Elevations: 45 to 840 meters.	Low potential to occur due to lack of chaparral habitat in project area.
Pincushion Navarretia *Navarretia myersii ssp. myersii*	CNPS 1B.2	Annual in the Polemoniaceae family. Vernal pools. Blooms May. Elevation: 20-300 m.	Potential to occur in vernal pools within the project area.
Sacramento Orcutt Grass *Orcuttia viscid*	FE, CE, CNPS 1B.2	Annual in the Poaceae family. Vernal pools. Blooms from April through July. Elevation: 30-100 m.	Potential to occur in vernal pools within the project area.
Layne's Ragwort *Packera layneae*	FT, CNPS 1B.2	Perennial in the Asteraceae family. Chaparral and cismontane woodland on serpentinite or gabbroic soils and/or rocky areas. Blooms from April to May. Elevation: 200-1,000 m.	Low potential to occur due to lack of chaparral habitat and lower elevation of project area.
Hartweg's Golden Sunburst *Pseudobahia bahiafolia*	FE, CE, CNPS 1B.1	Annual in the Asteraceae family. Cismontane woodland and valley and foothill grassland. Acidic, clay soils. Blooms March and April. Elevation: 15-150 m.	Low potential to occur due to lack of chaparral habitat in the project area.
Sanford's Arrowhead *Sagitarria sanfordii*	CNPS 1B.2	Rhizomatous emergent in the Alismataceae family. Marshes and swamps. Blooms May-October. Elevation 0-610 m.	Potential to occur in freshwater marsh within the project area.
El Dorado County mule-ears *Wyethia reticulata*	CNPS 1B.2	Perennial in the Asteraceae family. Chaparral, cismontane woodland, and lower montane coniferous forest. Clay or gabbroic soils. Blooms from May to July. Elevations: 185 to 630 meters.	Low potential to occur due to lack of chaparral habitat and lower elevation of project area.

FE = Federal Endangered
FT = Federal Threatened
CE = California Endangered
CT = California Threatened
CNPS 1B.1 = Considered seriously threatened in California by the California Native Plant Society (CNPS)
CNPS 1B.2 = Considered fairly threatened in California
CNPS 3.2 = Considered a species about which more information is needed

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Table 7-2. Special-Status Wildlife Species with the Potential to Occur in the Project Area

Species	Status	Habitat Requirements	Potential for Occurrence
Invertebrates			
Vernal Pool Fairy Shrimp *Branchinecta lynchi*	FT	Endemic to the grasslands of the Central Valley, Central Coast mountains, and South Coast mountains, in rain-filled pools. Inhabit small, clear-water sandstone-depression pools and grassed swales, earth slumps, or basalt-flow depression pools.	Potential to occur in vernal pools within the project area.
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus*	FT	Occurs only in the Central Valley of California, in association with blue elderberry (*Sambucus mexicana*). Prefers to lay eggs in elderberry stems 2-8 inches in diameter; some preference shown for “stressed” elderberry shrubs.	Potential to occur on elderberry shrubs within the project area.
Amphibians			
California Red-Legged Frog *Rana aurora draytonii*	FT, CSC	Lowlands and foothill in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development and must have access to aestivation habitat.	Potential to occur in deep water marsh habitat within the MIAD project area.
Western Spadefoot Toad *Spea hammondii*	CSC	Primarily grasslands and occasionally woodlands where vernal pools exist for breeding.	Potential to occur in grasslands near vernal pools within the project area.
Reptiles			
Northwestern Pond Turtle *Actinemys marmorata marmorata*	CSC	Occurs in perennial ponds, lakes, rivers, and streams with suitable basking habitat (mud banks, mats of floating vegetation, partially submerged logs) and submerged shelter. Require some slack- or slow-water aquatic habitat. Nests upland, on unshaded south-facing slopes with friable soils that have a high percentage of clay or silt.	Potential to occur in suitable habitat within the project area.
California Horned Lizard *Phrynosoma coronatum frontale*	CSC	Occurs in open, sparsely vegetated areas in a variety of habitats, including scrubland, grassland, and woodlands. Often associated with areas containing loose sand and soil such as washes, floodplains and wind-blown deposits, sand dunes, and alluvial fans.	Potential to occur in suitable habitat within the project area.
Birds			
Tricolored Blackbird *Agelaius tricolor*	CSC	Wetland and open water habitats with cattails and other substrates for nesting.	Potential to occur in suitable habitat within the project area.
Western Burrowing Owl *Athene cunicularia*	CSC	Open dry annual or perennial grasslands, deserts, and scrublands with low growing vegetation and burrows or friable soils for denning.	Potential to occur in suitable habitat within the MIAD project area.
Bald Eagle *Haliaeetus leucocephalus*	FD, CE	(Nesting and wintering.) Ocean shore, lake margins and rivers for both nesting and wintering. Most nests within 1 mile of water. Nests in large, old-growth, or dominant live tree with open branches, especially ponderosa pine. Roosts communally in winter.	Potential to occur in suitable habitat within the MIAD project area.
Mammals			
Pallid Bat *Antrozous pallidus*	CSC	Deserts, grasslands, shrublands, woodlands, and forests with rocky areas for roosting.	Potential to occur in suitable habitat within the project area.

FT = Federal Threatened

FD = Federal Delisted

CE = California Endangered

CSC = California Species of Concern

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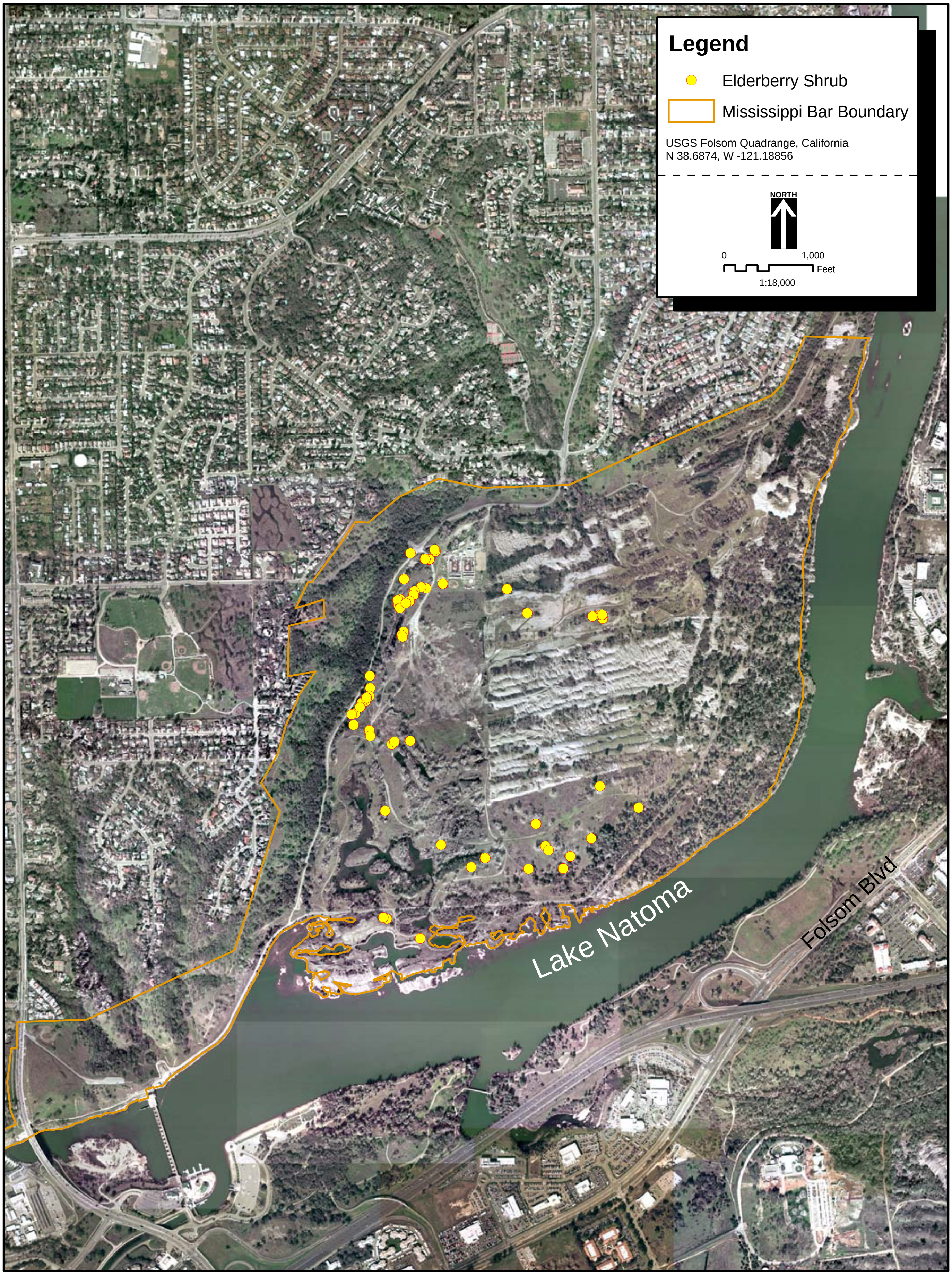

Figure 7-1. Elderberry Shrubs at Mississippi Bar

California Red-Legged Frog (Rana aurora draytonii) - FT, CSC
Historically, the California red-legged frog occurred in coastal mountains from Marin County south to northern Baja California, and along the floor and foothills of the Central Valley from about Shasta County south to Kern County (Jennings et al. 1992). Currently, this subspecies generally only occurs in the coastal portions of its historic range. California red-legged frogs are usually associated with aquatic habitats that have still or slow moving water, such as creeks, streams and ponds, and occur primarily in areas having pools approximately three feet deep, with adjacent dense emergent or riparian vegetation (Jennings and Hayes 1988; USFWS 2002). Adult frogs rarely move large distances from their aquatic habitat. Breeding adults are usually found in deep, still, or slow moving water and dense shrubby riparian or emergent vegetation (USFWS 2002). Ponds and streams that dry up every few years are excellent breeding habitat for the frogs because their predators such as fish and introduced American bullfrogs (*Rana catesbeiana)* (that have tadpoles that require 1 year or longer to metamorphose) do not survive the periodic drying (AmphiWeb 2009).

Critical habitat for this species was designated in 2001 and revised in 2006 (Federal Register 2006). No proposed critical habitat is within the project area. The project area contains aquatic habitats that could be marginally suitable for California red-legged frogs.

Western Spadefoot Toad (Spea [Scaphiopus] hammondii) - CSC
This species ranges throughout the Central Valley and adjacent foothills from sea level to 4,500 feet, primarily in grasslands with shallow temporary pools, and occasionally in valley-foothill hardwoods (Zeiner et al. 1988). The Western spadefoot toad typically lives underground in burrows up to 3 feet deep during most of the year, with the first rains of the year initiating movement to the surface. Terrestrial burrowing sites may be well removed from breeding sites, which consist of shallow, temporary pools formed by heavy winter rains, with sand and gravel substrate, for breeding habitat and tadpole rearing. Sandy, gravelly washes or small streams (often temporary) may also be used. Aquatic breeding habitat is unsuitable in the presence of predators (bullfrogs, fish or crayfish) or in the presence of mosquitofish (Zeiner et al. 1988).

The project area contains grassland and seasonal water that are considered moderately suitable habitat for western spadefoot toads, particularly at the Mormon Island Wetland Preserve. During audio surveys performed by Reclamation in 2008, one western spadefoot toad was heard calling at night in the Preserve.

Northwestern Pond Turtle (Emys [Clemmys] marmorata marmorata) – CSC
This turtle occurs in suitable aquatic habitat throughout California, west of the Sierra-Cascade crest, from sea level to about 6,000 feet (Zeiner et al. 1988). It is found in permanent or nearly permanent water in a wide variety of habitat

types with basking sites such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks. During the spring or early summer, females move overland up to 325 feet to find suitable sites for egg-laying (Zeiner et al. 1988).

The project area contains aquatic habitats that could be suitable for the northwestern pond turtle, particularly at the Mormon Island Wetland Preserve. Visual surveys performed by Reclamation in 2008, identified a western pond turtle basking on logs in the ponds on the eastern edge of the Preserve on three separate occasions.

California Horned Lizard (Phrynosoma coronatum frontale) - CSC
The California horned lizard ranges from Shasta County south, along the Sacramento Valley, east to the Sierra Nevada foothills (below 4,000 feet), west through much of the South Coast Ranges, and in the Southern California deserts and mountains below 6,000 feet (Zeiner et al., 1990). This species occurs in open country in a variety of habitats, including valley foothill hardwood, conifer and riparian habitats, alkali flats, chaparral, pine-cypress, juniper and annual grass habitats. Horned lizards have high site fidelity and a specialized diet, feeding primarily on native harvester ants. They are generally active from April through October, although the reproductive season varies from year to year and geographically depending on local conditions.

Suitable habitat is present for the California horned lizard within the project area. However, the species was not observed during baseline monitoring for reptiles in the project area (Reclamation, 2008).

Tricolored Blackbird (Agelaius tricolor) – CSC
The tricolored blackbird ranges throughout the Central Valley of California, typically nesting in colonies numbering several hundred. An adequate breeding ground for the tricolored blackbird requires open water, protected nesting substrate (emergent wetland vegetation) and a foraging area with insect prey within a few miles of the colony (Zeiner et. al. 1990). Tricolored blackbird foraging habitats in all seasons include pastures, agricultural fields and dry seasonal pools, and occasionally in riparian scrub, marsh boarders and grassland habitats.

Tricolored blackbirds have the potential to occur in emergent vegetation habitats within in the project area.

Western Burrowing Owl (Athene cunicularia hypugaea) –CSC
The western burrowing owl is a year-long resident of open, dry grassland and desert habitats often associated with burrowing animals such as ground squirrels. The species have also been found to inhabit grass, forb, and shrub stages of pinyon and ponderosa pine habitats. Western burrowing owls

commonly perch on fence posts or on top of mounds outside their burrows (Zeiner et al. 1990).

The project area has grassland habitats, particularly at the Mormon Island Wetland Preserve, that could be suitable, although marginal, for burrowing owls.

Bald Eagle (Haliaeetus leucocephalus) –FD, CE
The bald eagle is typically found in coniferous forest habitats with large, old growth trees near permanent water sources such as lakes, rivers, or ocean shorelines. This species requires large bodies of water with abundant fish an adjacent snags or other perches for foraging (Zeiner et al. 1990).

The project area has habitats at Mississippi Bar and the Mormon Island Wetland Preserve that could be suitable for bald eagle. Bald eagles have over wintered in the area. There have been successful fledges of bald eagles for the past two years in nests along the northern shore of Folsom Reservoir.

Pallid Bat (Antrozous pallidus) – CSC
The pallid bat ranges from western Canada to central Mexico. This species is usually found in rocky, mountainous areas near water, and in desert scrub. It roost in buildings, caves, or cracks in rocks (Miller 2002).

The project area has grassland habitats at Mississippi Bar and the Mormon Island Wetland Preserve that could be suitable foraging for pallid bats.

7.2 Environmental Consequences/Environmental Impacts

This section describes the potential impacts of action alternatives on biological resources that are associated with the project area. This analysis is based on the alternatives introduced in Chapter 2.0 of this EIS/EIR and the existing conditions described above.

7.2.1 Assessment Methods

The assessment methods used for this analysis address effects on vegetation and plant communities, wildlife, and special-status species caused by implementation of the proposed project. Both direct and indirect effects are included in this analysis. Examples of potential direct effects include disturbance, injury, or mortality that may occur during construction or maintenance activities. Examples of potential indirect effects on species or habitats could include changes in the quantity or quality of habitat, loss of forage and cover, fragmentation of habitat, and changes in hydrology that affect habitats or surrounding areas.

As noted above, this biological analysis addresses only those impacts that have not been addressed in the Folsom DS/FDR EIS/EIR. Vegetation and wildlife impacts (vernal pools, the valley elderberry longhorn beetle, wetlands, wildlife, and habitat) that could occur in the area between MIAD and Green Valley Road have already been adequately analyzed in the Folsom DS/FDR EIS/EIR. A discussion of these impacts can be found in Chapter 3, Section 3.4 Aquatic Resources, and Section 3.5 Terrestrial Vegetation and Wildlife in the Folsom DS/FDR Draft EIS/EIR. Specifically, this chapter analyzes impacts that could occur south of Green Valley Road, including the construction of detention ponds and the temporary relocation of Green Valley Road. This chapter also analyzes potential effects to biological resources at Mississippi Bar.

The effects of the MIAD Modification Project were identified and evaluated based on the following assumptions pertaining to implementation:

- Where possible, natural resources would be preserved in their existing condition or restored to an equivalent condition upon completion of the work.

7.2.2 Significance Criteria

An alternative would have a significant effect on biological resources if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by DFG or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by DFG or USFWS;
- Have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the CWA (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or

- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan.

7.2.3 Environmental Consequences/Environmental Impacts of the No Action/No Project Alternative

7.2.3.1 Mormon Island Auxiliary Dam

Under the No Action/No Project Alternative, construction activities would not occur. No impacts to biological resources would occur from the No Action/No Project Alternative.

7.2.3.2 Mississippi Bar

Under the No Action/No Project Alternative, mitigation activities would not occur at the Mississippi Bar site. However, Reclamation would still be required to implement the mitigation they agreed to in the Record of Decision for the Folsom DS/FDR Project. Therefore, mitigation would likely occur on a different site, such as those listed in Chapter 2, Subsection 2.8.1, separate and apart from the MIAD Modification Project.

7.2.4 Environmental Consequences/Environmental Impacts of Alternative 1

7.2.4.1 Mormon Island Auxiliary Dam

<u>*Construction could result in impacts on special-status plants at MIAD.*</u>

Construction disturbance including the relocation of Green Valley Road and construction of the dewatering ponds could cause direct removal and would eliminate habitat for a number of special-status plant species, particularly species associated with seasonal wetlands/vernal pools potentially located in the Mormon Island Wetland Preserve.

Impacts would be potentially significant. Mitigation measures BIO,-2, BIO-10, BIO-3 and BIO-4, described in Section 7.4 would reduce the impact to a less-than-significant level.

<u>*Impacts on special-status branchiopods could occur from construction activities at MIAD.*</u>

Construction disturbance could remove habitat for a number of special-status vernal pool branchiopod species, particularly should dewatering ponds be construction within the Mormon Island Wetland Preserve where vernal pool habitats occur. Any direct removal of vernal pools or indirect alterations of vernal pool hydrology could affect vernal pool branchiopods.

This impact would be potentially significant. Mitigation measures BIO-2, BIO-10, BIO-3 and BIO-5, described in Section 7.4 would reduce the impact to a less-than-significant level.

<u>Construction activities could result in impacts to the valley elderberry longhorn beetle.</u>

All elderberry shrubs (the host plant of the valley elderberry longhorn beetle) in the MIAD area north of Green Valley Road have been transplanted as part of mitigation for the Folsom DS/FDR Project. There are no elderberry shrubs south of Green Valley Road in the location of the detention ponds and the area where Green Valley Road would be relocated.

There would be no impacts to the valley elderberry longhorn beetle from construction at MIAD.

<u>Construction activities could result in impacts on special-status amphibians and reptiles.</u>

Construction disturbance could remove habitat for a number of special-status amphibian and reptile species, particularly if the dewatering ponds and Green Valley Road relocation are constructed within the Mormon Island Wetland Preserve where vernal pool habitats occur. Additionally, special-status amphibian and reptile species could be injured or killed should they come into contact with construction equipment or get trapped in excavated areas. Species potentially affected by these actions include the California red-legged frog, western spadefoot toad, northwestern pond turtle, and California horned lizard.

This impact would be potentially significant. Mitigation measures BIO-2, BIO-3, and BIO-7, described in Section 7.4 would reduce the impact to a less-than-significant level.

<u>Construction activities could result in impacts on wildlife including special-status birds and bats.</u>

Construction disturbance could affect wildlife including special-status birds and bats by:

- Direct removal of roosting, nesting, and foraging habitats;
- Disturbance, particularly during nesting, due to construction noise;
- Injury or direct mortality should wildlife come into contact with construction equipment or get trapped in excavated areas.

This impact would be potentially significant. *Mitigation measures BIO-2, BIO-3, and BIO-8, described in Section 7.4 would reduce the impact to a less-than-significant level.*

Direct and indirect impacts to vegetation could occur during construction activities at MIAD.

Construction of the detention ponds would result in direct impacts to annual grassland. The detention ponds would require the removal of approximately 13 acres of annual grassland. Additionally, one cottonwood tree and one willow tree would likely be flooded for the duration of the detention pond operations. After the detention ponds are no longer required, they would either be re-contoured and reseeded with native vegetation or used as a mitigation site to create new wetlands to address project impacts.

The temporary relocation of Green Valley Road would involve the relocation of 2,500 feet of the existing road up to 250 feet south of its existing location, into the Mormon Island Wetland Preserve area. This would result in the loss of up to approximately 6.9 acres vegetation that includes annual grassland and cottonwood/willow riparian woodland.

Indirect effects to the existing vegetation surrounding MIAD would include dust, noise, and vibration from construction activities and vehicles.

This impact would be potentially significant. Mitigation Measures BIO-1, BIO-2, and BIO-3 would reduce the impacts to a less-than-significant level.

Modifications to MIAD could alter existing hydrology and may cause long-term impacts to vegetation and wildlife in Mormon Island Wetland Preserve.

The construction activities at MIAD, including the replacement of the MIAD foundation with cement modified soil, could alter the hydrology of the area and could affect existing wetlands and associated wildlife species. The main concern would be any substantial decrease in water flow towards the wetlands from seepage in the MIAD foundation.

Uncertainty exists regarding the hydrologic connectivity between Folsom Reservoir and the Mormon Island Wetland Preserve area. Reclamation's previous investigations have indicated no reservoir connection to local groundwater levels (Bureau of Reclamation 2006). Standing water in the Mormon Island Wetland Preserve near the willow/cottonwood riparian woodland area is believed by Reclamation to originate in the higher hillsides to the east through bank storage and surface water runoff following precipitation. However, based on observations by Reclamation personnel, the water source for a small area of wetlands directly south of Green Valley Road (referred to in this chapter as the cattail emergent wetlands) is believed to be seepage from the MIAD embankment, which may be a combination of bank storage precipitation (precipitation collected in the MIAD embankment materials) and reservoir seepage via joints in the foundation bedrock. The seepage collects in a gravel-filled drain and then discharges to an area referred to as the "T wetlands". From here the water drains through a culvert under Green Valley Road and into the wetlands.

Due to the uncertainty regarding the long-term effects of the excavation activities and foundation replacement on the existing hydrology and wetlands; Reclamation will assume the long-term effects are potentially significant and will implement a monitoring program to determine if there are any changes to the vegetation and wildlife. Reclamation has already completed vegetation and wildlife surveys of the Mormon Island Wetland Preserve area to document the pre-construction condition. These survey results will serve as the baseline for the monitoring program.

The potential impacts associated with would be potentially significant. Mitigation Measures BIO-9 would reduce this impact to a less-than-significant level.

Construction would result in direct impacts to wetlands and other waters of the U.S.

Detention pond construction and the temporary relocation of Green Valley Road would require the excavation, grading, and/or filling of wetlands and waters of the U.S.

This impact would be potentially significant. Mitigation Measures BIO-2 and BIO-3 would reduce the impacts to a less-than-significant level.

Construction would result in direct impacts to vernal pools.

Detention pond construction would require the removal of approximately 0.187 acres of potential vernal pools.

This impact would be potentially significant. Mitigation measure BIO-10 would reduce the impacts to a less-than-significant level.

Construction activities could interfere with the movement of wildlife species, wildlife corridors, or nursery sites.

Construction of Alternative 1 would involve the relocation of Green Valley Road and construction of detention ponds. These features could interfere with the movement of wildlife, wildlife corridors, and nursery sites and would create a division through the Mormon Island Wetland Preserve area. However, the road and detention ponds would be temporary. After construction is complete, the road detour would be removed and the area would be restored to its previous condition. The detention ponds may be used as mitigation for wetlands and may even increase wildlife movement through the area.

Construction of the MIAD foundation would not be expected to substantially interfere with wildlife movement. The area contains mainly gravel access roads and grasslands. Once construction is complete, the area would be restored.

Impacts associated with wildlife movement, wildlife corridors, and nursery sites would be temporary and less than significant.

Construction activities at MIAD would conflict with local policies or ordinances protecting natural resources.

All construction activities would occur on Federal property; no land under local jurisdiction would be affected by the project.

There would be no impact.

Construction activities could conflict with existing conservation plans.

There are no Habitat Conservation Plans or Natural Community Conservation Plans in effect at the MIAD area.

There would be no impact.

7.2.4.2 Mississippi Bar

Habitat mitigation activities could result in impacts on wildlife including special-status birds and bats from construction activities.

Construction disturbance could affect wildlife including special-status birds and bats by:

- Disturbance, particularly during nesting, due to construction noise;
- A reduction in foraging efficiency of birds such as bald eagle during dredging and culvert installation at Mississippi Bar from increases in turbidity; and
- Injury or direct mortality should wildlife come into contact with construction equipment.

This impact would be potentially significant. Mitigation measures BIO-3 and BIO-8, described in Section 7.4 would reduce the impact to a less-than-significant level.

Habitat mitigation activities could result in impacts on special-status amphibians and reptiles.

Construction of the culvert could disturb habitat for several special-status amphibians and reptiles including the northwestern pond turtle, western spadefoot toad, and California horned lizard. Additionally, these species could be injured or killed should they come into contact with construction equipment.

This impact would be potentially significant. Mitigation measures BIO-2, BIO-3, and BIO-7, described in Section 7.4 would reduce the impact to a less-than-significant level.

Habitat mitigation activities could result in impacts on valley elderberry longhorn beetle from construction activities at Mississippi Bar.

Elderberry shrubs, the host plants of the valley elderberry longhorn beetle, have been surveyed and mapped at Mississippi Bar. Although Reclamation does not anticipate the need to transplant any elderberry shrubs, should construction disturbance occur within 100 feet of any elderberry shrub with stems >1.0 inches in diameter at ground level, then impacts to VELB could occur. Additionally, effects such as dust and vibration may occur to the elderberry shrubs along the access roads during construction.

This impact would be potentially significant. Mitigation measures BIO-2, BIO-3, and BIO-6, described in Section 7.4 would reduce the impact to a less-than-significant level.

Habitat mitigation activities could result in impacts on special-status plants at Mississippi Bar.

Recontouring and construction of culverts has the potential to remove special-status plant species or species habitat during grading and excavation.

Impacts would be potentially significant. Mitigation measures BIO-2, BIO-3 and BIO-4, described in Section 7.4 would reduce the impact to a less-than-significant level.

Impacts on special-status branchiopods could occur from habitat mitigation activities at Mississippi Bar.

While no vernal pools were identified at Mississippi Bar, small seasonal ruts or pools in the area may still contain special status species such as vernal pool fairy shrimp (*Branchinecta lynchi*). Construction activities as well as equipment and vehicles may affect special-status branchiopod species.

This impact would be potentially significant. Mitigation measures BIO-3 and BIO-5, described in Section 7.4 would reduce the impact to a less-than-significant level.

Mitigation efforts could result in direct and indirect impacts to existing habitat at Mississippi Bar.

Phase 1 of the Mississippi Bar mitigation would avoid direct impacts to vegetation. No trees or other existing vegetation would be removed. Excavation and recontouring would only occur in areas with mine tailings that currently do not have vegetation. Any indirect impacts to vegetation would be temporary and would be limited to dust, noise, and vibration associated with construction vehicles and equipment.

Phase 2 of the Mississippi Bar mitigation would involve the installation of a new culvert, the excavation of a new channel and the removal of an existing WAPA access road, and dredging of a portion of the new channel to create the required depth. The installation of the new culvert and the removal of the existing WAPA access road would require the removal of a small amount of existing vegetation, which consists primarily of grasses and shrubs along the shore line. All trees would be avoided. Other habitat impacts could include:

- Dust from all construction areas;
- Impacts to tree roots, particularly during installation of the culvert; and
- Temporary impacts to open water habitats at Mississippi Bar from dredging and culvert construction.

This impact would be potentially significant. Mitigation measures BIO-1, BIO-2, and BIO-3 described in Section 7.4 would reduce the impact to a less-than-significant level.

Habitat mitigation activities for the new culvert and channel would result in direct impacts to wetlands and other waters of the U.S.

Construction of the new culvert, the excavation of a new channel, and the dredging of a portion of the new channel have the potential to result in the placement of fill in wetlands and other waters of the U.S.

This impact would be potentially significant. Mitigation measures BIO-2 and BIO-3 would reduce the impacts to a less-than-significant level.

Habitat mitigation activities at Mississippi Bar would not affect vernal pools.

As noted under the Affected Environment/Environmental Setting, surveys performed by ESA did not identify any vernal pools at Mississippi Bar in the area proposed for mitigation.

There would be no impacts to vernal pools.

Habitat mitigation activities could interfere with the movement of wildlife species, wildlife corridors, or nursery sites.

Habitat mitigation at Mississippi Bar would require temporary fencing to protect the new plants against herbivores. This could interfere with wildlife movement or wildlife corridors that have been established through the area; however it would only be temporary. The fencing would be removed once the plants become established. No known nursery sites would be affected; the existing heron and egret rookery is well outside the project area and would not be affected by construction.

Impacts associated with wildlife movement and wildlife corridors would be temporary and less than significant. No impacts would occur to nursery sites.

Habitat mitigation activities at Mississippi Bar would conflict with local policies or ordinances protecting natural resources.

All construction activities would occur on Federal or State property; no land under local jurisdiction would be affected by the project. Reclamation would work with DPR to ensure the habitat mitigation is consistent with the FLSRA General Plan and future recreation goals for the Mississippi Bar area.

There would be no impact.

Habitat mitigation activities could conflict with existing conservation plans.

There are no Habitat Conservation Plans or Natural Community Conservation Plans in effect at the MIAD area.

There would be no impact.

7.2.5 Environmental Consequences/Environmental Impacts of Alternative 2

Alternative 2 includes the same modifications as Alternative 1 with the exception that the excavation and replacement method would include a single wall system. This system would allow for a smaller excavation footprint including no need for relocation of Green Valley Road and a reduced dewatering system. Therefore, impacts to vegetation, invertebrate, amphibian, and wildlife species and their associated mitigation measures would be generally similar to Alternative 1, but the extent of impacts would be smaller due to the reduced overall footprint and a smaller dewatering system.

Mitigation measures in Section 7.4 would reduce all potentially significant impacts to a less-than-significant level.

7.2.6 Environmental Consequences/Environmental Impacts of Alternative 3

Alternative 3 includes the same modifications as Alternative 1 with the exception that the excavation and replacement method would include a dual wall system. This system would allow for a smaller excavation footprint including no need for relocation of Green Valley Road and a reduced dewatering system. Therefore, impacts to vegetation, invertebrate, amphibian, and wildlife species and their associated mitigation measures would generally be similar to Alternative 1, but the extent of impacts would be smaller due to the reduced overall footprint and a smaller dewatering program.

Mitigation measures in Section 7.4 would reduce all potentially significant impacts to a less-than-significant level.

7.2.7 Environmental Consequences/Environmental Impacts of Alternative 4

Alternative 4 includes the same modifications as Alternative 1 with the exception that the excavation and replacement method would include a cellular system. This system would allow for a smaller excavation footprint including no need for relocation of Green Valley Road and a reduced dewatering system. Therefore, impacts to vegetation, invertebrate, amphibian, and wildlife species and their associated mitigation measures would generally be similar to Alternative 1, but the extent of impacts would be smaller due to the reduced overall footprint and a smaller dewatering program.

Mitigation measures in Section 7.4 would reduce all potentially significant impacts to a less-than-significant level.

7.3 Comparative Analysis of Alternatives

Table 7-3 presents a summary of the potential impacts to terrestrial biological resources. The No-Action/No Project Alternative would have no impacts from project-related construction activities. Impacts to vegetation, plant communities, wildlife, wildlife habitats, and special-status species would be similar under all alternatives, with the exception of Alternative 1 which would require temporary relocation of Green Valley Road into the Mormon Island Wetland Preserve. The major difference would be the magnitude of affects due to varying excavation footprints and dewatering systems. Alternative 1 would require the largest excavation footprint and dewatering system; thereby having greater impacts on biological resources than Alternatives 2-4. Prior to applying mitigation measures, there would be significant impacts on both habitats and species. However, with mitigation, these impacts would be reduced to less than significant under all alternatives.

Table 7-3. Comparative Analysis of Alternatives

Impact	Significance					Environmental Commitment/ Mitigation Measure
	No Action/ No Project Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Mormon Island Auxiliary Dam						
Impacts to special-status plant species	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-2:** Habitat Loss Avoidance and Compensation **BIO-10:**Vernal Pool Mitigation **BIO-3:**Biological Awareness Training **BIO-4:**Special Status Plant Surveys
Impacts on special-status vernal pool branchiopods	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-2:** Habitat Loss Avoidance and Compensation **BIO-10:**Vernal Pool Mitigation **BIO-3:**Biological Awareness Training **BIO-5:** Special Status Vernal Pool Surveys
Impacts to the valley elderberry longhorn beetle	NI	NI	NI	NI	NI	None required
Impacts on special-status amphibians and reptiles	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-2:** Habitat Loss Avoidance and Compensation **BIO-3:**Biological Awareness Training **BIO-7:**Amphibian and Reptile Survey
Impacts on wildlife including special-status birds and bats	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-2:** Habitat Loss Avoidance and Compensation **BIO-3:**Biological Awareness Training **BIO-8:** Bird and Bat Surveys
Direct and indirect impacts to vegetation	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-1:** Tree Protection and Revegetation **BIO-2:** Habitat Loss Avoidance and Compensation **BIO-3:**Biological Awareness Training
Alteration of existing hydrology may cause long-term impacts to vegetation and wildlife in Mormon Island Wetland Preserve	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-9:**Monitoring Program for Mormon Island Wetland Preserve
Construction would result in direct impacts to wetlands and other waters of the U.S.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-2:** Habitat Loss Avoidance and Compensation **BIO-3:**Biological Awareness Training

Table 7-3. Comparative Analysis of Alternatives

Impact	Significance					Environmental Commitment/ Mitigation Measure
	No Action/ No Project Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Construction would result in direct impacts to vernal pools	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-10:**Vernal Pool Mitigation
Interfere with the movement of wildlife species, wildlife corridors, or nursery sites	NI	LTS	LTS	LTS	LTS	None required
Conflict with local policies or ordinances protecting natural resources	NI	NI	NI	NI	NI	None required
Conflict with existing conservation plans	NI	NI	NI	NI	NI	None required
Mississippi Bar						
Impacts to special-status plant species	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-2:** Habitat Loss Avoidance and Compensation **BIO-3:** Biological Awareness Training **BIO-4:**Special Status Plant Surveys
Impacts on special-status vernal pool branchiopods	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-3:**Biological Awareness Training **BIO-5:** Special Status Vernal Pool Surveys
Impacts to the valley elderberry longhorn beetle	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-2:** Habitat Loss Avoidance and Compensation **BIO-3:** Biological Awareness Training **BIO-6:** VELB Avoidance and Compensation
Impacts on special-status amphibians and reptiles	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-2:** Habitat Loss Avoidance and Compensation **BIO-3:** Biological Awareness Training **BIO-7:** Amphibian and Reptile Survey
Impacts on wildlife including special-status birds and bats	NI	LTS	LTS	LTS	LTS	**BIO-3:** Biological Awareness Training **BIO-8:** Bird and Bat Surveys
Direct and indirect impacts to vegetation	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-1:** Tree Protection and Revegetation **BIO-2:** Habitat Loss Avoidance and Compensation **BIO-3:** Biological Awareness Training
Construction would result in direct impacts to wetlands and other waters of the U.S.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-2:** Habitat Loss Avoidance and Compensation **BIO-3:** Biological Awareness Training

Table 7-3. Comparative Analysis of Alternatives

Impact	Significance					Environmental Commitment/ Mitigation Measure
	No Action/ No Project Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Construction would result in direct impacts to vernal pools	NI	NI	NI	NI	NI	None required
Interfere with the movement of wildlife species, wildlife corridors, or nursery sites	NI	LTS	LTS	LTS	LTS	None required
Conflict with local policies or ordinances protecting natural resources	NI	NI	NI	NI	NI	None required
Conflict with existing conservation plans	NI	NI	NI	NI	NI	None required

Key:
LTS = Less Than Significant
LTSWM = Less than Significant with Mitigation
SU = Significant and Unavoidable
NI = No Impact
B = Beneficial
N/A = Not Applicable

7.4 Environmental Commitments/Mitigation Measures

The following mitigation measures will be incorporated into the project to reduce or avoid the biological impacts described above.

BIO-1: Tree Protection and Re-vegetation
In order to minimize direct impacts to trees located within the construction area, tree protection measures will be implemented prior to construction and re-vegetation will occur immediately following construction.

Tree protection measures will reduce impacts to trees during construction and may include the following measures:

- Protective fencing will be installed at the Root Protection Zone of trees that would be directly affected by construction. The Root Protection Zone is defined as the area within a circle with a radius equal to the greatest distance from the trunk to any overhanging foliage in the tree canopy. Posts will be placed where they will not harm tree roots.

- No construction staging or disposal of construction materials or byproducts including but not limited to paint, plaster, or chemical solutions will be allowed in the Root Protection Zone.

- All work conducted in the ground within the Root Protection Zone of any protected tree will be accomplished with hand tools to the extent feasible.

- "Natural" or pre-construction grade will be maintained in the Root Protection Zone.

- In areas where the grade around the protected tree will be lowered, some root cutting may be unavoidable. Cuts will be clean and made at right angles to the roots. When practical, roots will be cut back to a branching lateral root. Any necessary root pruning to be conducted by a certified arborist. Cut roots subject to open air conditions longer than a few hours should be covered with burlap and maintained in a moist condition until covered by soil.

- Root damage and soil compaction caused by heavy equipment traversing the Root Protection Zone in locations where it is unavoidable will be mitigated by applying plywood or mulch in the Root Protection Zone to avoid soil compaction.

- All pruning will be conducted by a certified arborist.

- If necessary, permits for tree removal or trimming will be obtained from appropriate entities.

Once construction has been completed, re-vegetation will occur within the project footprint. Vegetated areas disturbed during construction will be restored to pre-construction conditions, to the extent feasible. Native plant species used for re-vegetation will be selected based on existing vegetation in the project area and consultation with USFWS.

BIO-2: Habitat Loss Avoidance and Compensation
Reclamation will avoid and compensate for habitat loss by:

- Minimizing the project footprint where possible;

- Staging all equipment at least 25 feet from sensitive habitats such as wetlands;

- Fencing all sensitive habitats to be avoided such as vernal pools, elderberry shrubs, and wetlands according to USFWS recommendations;

- Notifying DFG of the work at Mississippi Bar and obtaining a Lake and Streambed Alteration Agreement, if necessary;

- Amending the current Folsom DS/FDR CWA Section 404 permit to address any additional impacts to wetlands and other waters of the U.S.; and

- Amending the current 401 water quality certification or obtaining new 401 water quality certification from the CVRWQCB, as required for the 404 permit; and

- Amending the Folsom DS/FDR CAR to address any new habitat impacts and compensating for impacts at a ratio stipulated in the CAR by USFWS.

BIO-3: Biological Resources Awareness Training
Prior to construction, including clearing of vegetation and grading, mandatory training regarding the biological resources present at the project site will be provided to all construction personnel. The training will be developed and provided by a qualified biologist familiar with the sensitive habitats and species that may occur in the project area and will provide educational information on the natural history of these habitats and species, reporting sightings, required mitigation measures to avoid impacts, and penalties for not complying with biological mitigation requirements. All project personnel will be required to receive training before they start working.

BIO-4: Conduct Special-Status Plant Surveys
Prior to project construction, a qualified biologist will conduct surveys to ensure no special-status plants are present within or near the project area. If any special-status plants are observed within or near the project area, Reclamation will:

- Have survey biologists identify locations of special status plant species;

- Consult with the appropriate resource agency; and

- Take necessary measures to provide protection, including having a biological monitor available to inspect any protection measures such as fencing.

BIO-5: Conduct Special-Status Vernal Pool Branchiopod Surveys
Prior to project construction, a qualified biologist will conduct surveys to ensure no special-status vernal pool branchiopods are present within or near the project area. If any special-status vernal pool branchiopods are observed within or near the project area, Reclamation will consult with the appropriate resource agency.

BIO-6: Implement Appropriate Valley Elderberry Longhorn Beetle (VELB) Avoidance and Minimization Measures

The following measures are subject to and contingent upon a Section 7 consultation with the USFWS. Reclamation will implement the following measures proposed in the VELB Conservation Guidelines (USFWS 1999).

Where possible, complete avoidance of elderberry shrub would be enforced. Avoidance measures would include the establishment and maintenance of a 100 foot buffer zone surrounding elderberry shrubs containing stems measuring 1.0 inches or greater in diameter at ground level. The proposed staging area and access roads contain elderberry shrubs that would be within 20 feet of project activities. These shrubs; however, are currently exposed to ongoing FLSRA operation and maintenance (O&M) activities similar to the proposed project. All elderberry shrubs within 20 feet of project activities will also be flagged or fenced for easy identification. Construction crews will be briefed on the need to avoid elderberry shrubs and no vehicles will enter within the 20 feet buffer zone.

Additionally, the following dust control measures will be implemented:

- Water or otherwise stabilize the soil prior to ground disturbance;
- Cover haul trucks;
- Employ speed limits on unpaved roads;
- Apply dust suppressants;
- Physically stabilize soil with vegetation, gravel, recrushed/recycled asphalt or other forms of physical stabilization;
- Minimize the number of vehicle trips;
- Install one or more grizzlies, gravel pads, and/or wash down pads adjacent to the entrance of a paved public roadway to control carry-out and trackout; and
- Minimize vegetation clearing.

While Reclamation expects to avoid elderberry shrubs, any elderberry shrubs that cannot be avoided would be transplanted if technically feasible. All elderberry shrubs containing stems measuring 1.0 inch or greater in diameter at ground level would be transplanted to a USFWS approved conservation area between November 1 and February 15.

Each elderberry shrub with stem measuring 1.0 inch or greater in diameter at ground level that is adversely affected would be compensated with elderberry seedlings or cuttings in accordance with the USFWS 1999 VELB Guidelines (Guidelines). Elderberry shrubs that cannot be feasibly transplanted will be compensated at a ratio two-times the normal amount. A minimum survival rate of at least 60 percent of the elderberry shrubs would be maintained throughout the monitoring period. If survival drops below this level, additional seedlings would be planted. Stock for plantings would be obtained from local sources.

Native plants associated with elderberry shrubs at the project area or similar reference sites would be planted in accordance with the Guidelines. A minimum survival rate of at least 60 percent of the associated native plants would be maintained throughout the monitoring period. If survival drops below this level, additional seedlings or cuttings would be planted. Only stock from local sources would be used, unless such stock is not available, per the Guidelines.

BIO-7: Conduct Special-Status Amphibian and Reptile Surveys
Prior to project construction, a USFWS-approved biologist will conduct surveys to ensure no special-status amphibians or reptiles are present within or near the project area. If any special-status amphibians or reptiles are observed within or near the project area, Reclamation will:

- Have survey biologists identify locations of special status amphibian and reptile species;
- Consult with the appropriate resource agency; and
- Take necessary measures to provide protection, including having a biological monitor available to oversee construction and remove the species from the construction zone, in consultation with the appropriate agency.

BIO-8: Conduct Nesting Bird Surveys, Roosting Bat Surveys, and Establish No-Disturbance Buffers, as Appropriate, for Special-Status Species
To the extent possible, removal of trees and potential bird breeding habitat in the project area would occur between September 1 and January 31, when birds are not expected to be nesting, in order to comply with the MTBA. Prior to any tree removal and construction, a qualified biologist or ornithologist would conduct preconstruction field surveys in and adjacent to the project area for nesting migratory birds, including raptors. Surveys would be conducted during the season immediately preceding tree removal and grading operations when birds are building and defending nests or when young are still in nests and dependent on the parents. If no nests are found during the surveys, tree removal and grading may proceed.

Additionally, if construction activities, including tree removal, must occur during the breeding season for special-status birds and/or bats (February 1–August 31), the following measures will be implemented:

- Retain a qualified wildlife biologist who is experienced in identifying special-status birds and bats and their habitat to conduct nesting-bird surveys and bat roosting surveys in and within 500 feet of the project site. These surveys must be conducted within one week prior to initiation of construction activities at any time between February 1 and August 31.

- If no active nests or roosts are detected during surveys, then no additional mitigation measures are required.

- If special-status birds or bats are found in the construction area or in the adjacent surveyed area, a no-disturbance buffer will be established around the nesting/roosting location to avoid disturbance or destruction of the nest site/roost site until after the breeding season or after a wildlife biologist determines that the young have fledged (usually late-June through mid-July). The extent of these buffers will be determined by a wildlife biologist in consultation with the applicable resource agencies (i.e., USFWS and/or DFG) and will depend on the level of noise or construction disturbance, line of site between the nest/roost and the disturbance, ambient levels of noise and other disturbances, and other topographical or artificial barriers. These factors will be analyzed and used by a qualified wildlife biologist to assist the USFWS and/or DFG in making an appropriate decision on buffer distances.

BIO-9: Monitoring Program for Mormon Island Wetland Preserve
Reclamation will establish a monitoring program to monitor groundwater levels, vegetation, and wildlife species within the Mormon Island Wetland Preserve, during and after construction. If groundwater levels decline and vegetation and wildlife impacts are observed or anticipated, Reclamation will consult with USFWS to determine appropriate mitigation. This may include supplying additional water to the Mormon Island Wetland Preserve area or completing appropriate mitigation. This mitigation will be completed in conjunction with mitigation measures WQ-3 in Chapter 4, Hydrology, Water Quality, and Flood Control and GW-1 in Chapter 5, Groundwater.

BIO-10: Vernal Pool Mitigation
Adverse impacts to potential vernal pool habitat will be compensated in a manner agreed upon by Reclamation and the USFWS. For example, for habitat that is directly or indirectly affected, vernal pool credits will be dedicated within a USFWS-approved ecosystem preservation bank. Based on a USFWS evaluation of conservation values of the affected habitat, vernal pool habitat will be preserved, or created and monitored, on-site, or on another non-bank site approved by the USFWS. Vernal pool habitat and associated upland habitat used as on-site mitigation will be protected from adverse effects and managed in perpetuity or until Reclamation and USFWS agree on a process to exchange such areas for credits within a USFWS-approved mitigation banking system.

7.5 Potentially Significant and Unavoidable Impacts

There are no potentially significant and unavoidable impacts that cannot be mitigated to a less-than-significant level.

7.6 Cumulative Effects

Table 22-1 provides a list of past, present and reasonably foreseeable future projects that are included in the cumulative effects analysis.

7.6.1 Vegetation and Wildlife

The Raw Water Bypass Pipeline Project, CCAO Building Replacement Project, the Green Valley Road Widening Project, and the MIAD Modifications Project are all expected to result in impacts to vegetation and wildlife, including wetlands. However, each project will implement mitigation measures to reduce effects on vegetation and wildlife to less-than-significant levels. Therefore, the implementation of the MIAD Modification Project, along with the Raw Water Bypass Pipeline Project, CCAO Building Replacement Project, and the Green Valley Road Widening Project would not result in cumulatively considerable impacts.

7.6.2 Special-Status Plant Species

The Raw Water Bypass Pipeline Project will not affect special-status plant species. The CCAO Building Replacement Project, the Green Valley Road Widening Project, and MIAD Modifications Project may result in impacts to special-status plant species. However, each project will implement mitigation measures to reduce effects on special-status plant species to less-than-significant levels. Therefore, implementation of the MIAD Modifications Project, along with the CCAO Building Replacement Project and the Green Valley Road Widening Project would not result in cumulatively considerable impacts.

7.6.3 Special-Status Wildlife Species

The Raw Water Bypass Pipeline Project, CCAO Building Replacement Project, the Green Valley Road Widening Project, and the MIAD Modifications Project are all expected to result in impacts to special-status wildlife species. However, each project will implement mitigation measures to reduce effects on special-status wildlife species to less-than-significant levels. Therefore, the implementation of the MIAD Modification Project, along with the Raw Water Bypass Pipeline Project, CCAO Building Replacement Project, and the Green

Valley Road Widening Project would not result in cumulatively considerable impacts.

Overall, the effects of these projects in combination with the MIAD Modification Project would not be cumulatively considerable for any specific biological resources.

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Chapter 8
Soils, Minerals, and Geological Resources

This section discusses the potential effects of the MIAD Modification Project on soils, minerals, and geologic resources.

8.1 Affected Environment/Environmental Setting

This section describes the soils, minerals, and geological resources in the project area and the regulatory setting relevant to these resources.

8.1.1 Area of Analysis

8.1.1.1 Mormon Island Auxiliary Dam

The area of analysis includes all Federally-owned land surrounding MIAD in Sacramento and El Dorado Counties, and south of Green Valley Road in the Mormon Island Wetland Preserve area.

8.1.1.2 Mississippi Bar

The Mississippi Bar mitigation site includes 80 acres of land on the western shore of Lake Natoma, near the intersection of Sunset Avenue and Main Avenue and south of the community of Orangevale. All proposed mitigation would occur on land parcels currently owned by DPR and Reclamation and managed by DPR as part of the FLSRA.

8.1.2 Regulatory Setting

8.1.2.1 Federal

The CWA includes provisions for reducing soil erosion relevant to water quality. The CWA made it unlawful for any person to discharge any pollutant from a point source (including construction site), into navigable waters, unless a permit was obtained under its provisions. This pertains to construction sites where soil erosion and storm runoff as well as other pollutant discharges could affect downstream water quality.

The NPDES process, established by the CWA, is intended to meet the goal of preventing or reducing pollutant runoff. Projects involving construction activities (e.g., clearing, grading, or excavation) involving land disturbance greater than one acre must file a NOI with the applicable RWQCB to indicate their intent to comply with the State General Permit for Storm Water Discharges Associated with Construction Activity (General Permit). This Permit establishes conditions to minimize sediment and pollutant loading and requires preparation and implementation of a SWPPP prior to construction.

The Federal CAA also includes provisions for reducing soil loss through wind erosion. On construction sites, exposed soil surfaces are vulnerable to wind erosion and small soil particulates are carried into the atmosphere. Suspended particulate matter (PM_{10} and $PM_{2.5}$) is one of the six criteria air pollutants of the CAA. Particulate matter standards and additional details on the CAA are provided in Chapter 6, Air Quality.

8.1.2.2 State

The Porter-Cologne Water Quality Control Act of 1969 (California Water Code, Division 7, Water Quality) established the SWRCB and nine RWQCBs that are responsible for regulating water quality throughout the State of California. The regional boards carry out the NPDES permitting process for point source discharges and the CWA Section 401 certification program.

The 1972 Alquist-Priolo Earthquake Fault Zoning Act (California Public Resources Code [PRC] Section 2621 et *seq*.) requires local agencies to regulate development within earthquake fault zones to reduce the hazards associated with surface fault ruptures. It also regulates construction in earthquake fault zones.

The 1990 Seismic Hazards Mapping Act (PRC Sections 2690-2699.6) addresses strong ground shaking, liquefaction, landslides, or other ground failures as a result of earthquakes. This Act requires Statewide identification and mapping of seismic hazard zones which would be used by cities and counties to adequately prepare the safety element of their general plans and protect public health and safety (California Geological Survey 2003a). Local agencies are also required to regulate development in any seismic hazard zones, primarily through permitting. Permits for development projects are not issued until geologic investigations have been completed and mitigation has been developed to address any issues.

The Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations (Title 17 CCR Section 93105) contains the requirements for construction operations that would disturb any portion of an area that is located in a geographic ultramafic rock unit or that has naturally-occurring asbestos, serpentine, or ultramafic rock. Construction or grading operations on property where the area to be disturbed is greater than one acre, require an Asbestos Dust Mitigation Plan to be submitted and approved by the air quality management district before the start of construction. The Asbestos Dust Mitigation Plan must be implemented at the beginning and must be maintained throughout the duration of the operation. In order to receive an exemption from this Airborne Toxic Control Measure, a registered geologist must conduct a geologic evaluation of the property and determine that no serpentine or ultramafic rock is likely to be found in the area to be disturbed.

This report must be presented to the executive officer or air pollution control officer of the air pollution control or air quality management district, who may then grant or deny the exemption.

8.1.2.3 Local

The General Plans for El Dorado, Placer, and Sacramento Counties have a goal of minimizing threat to life, injury, and property from seismic and geological hazards. El Dorado County plans to accomplish this through the adoption and enforcement of development regulations, including building and site standards that provide protection against seismic and geologic hazards and the continued evaluation of seismic-related hazards such as liquefaction, landslides, and avalanches (El Dorado County 2004).

The Sacramento County General Plan calls for a geotechnical report and appropriate mitigation measures for new development in seismic and geologically sensitive areas; a draft of an ordinance to establish a program for the removal or strengthening of poorly anchored parapets, unreinforced masonry walls, and architectural detailing; support efforts of local, State, and Federal agencies in investigating and mitigating geologic hazards; and prohibits development on slopes that exceed 40 percent (County of Sacramento 1993).

Placer County's General Plan also calls for a variety of policies that focus on minimizing geologic and seismic hazards. These include the preparation of soils reports as well as soils engineering and geologic seismic analysis prior to development in geologic and seismic sensitive areas; appropriate investigation, site selection, and design provisions pertaining to structures that may encounter potential landslides, expansive soils, liquefaction, seismic ground shaking, as well as fault rupture and/or creep; appropriate mitigation for habitual structure and sewage systems located on critically expansive soils; preparation of drainage plans for development in hillside areas; prohibition of activities that may alter land in a manner that increases the potential for landslides; and the support of scientific investigations on geologic and seismic hazards (Placer County 1994).

8.1.3 Existing Conditions

This section describes the geological resources, mineral resources, and soils within the study area. Information on the topography, geology, seismicity, landslides, and subsidence is provided. The mineral resources section focuses on minerals that could be extracted for economically beneficial purposes.

8.1.3.1 Geological Resources

Topography The area of analysis is located in the American River watershed which ranges in elevation from over 10,000 feet in the Sierra Nevada Mountains (Sierras) to 10 feet above mean sea level (amsl) at the confluence with the Sacramento River. Folsom Reservoir is in the foothills of the Sierras, residing in a valley at the confluence of the North and South Forks of the American River. The reservoir extends into the canyons of the North and South Forks of the American River with an elevation of 466 feet at the Main Concrete Dam spillway. The slope surrounding Folsom Reservoir is generally steep to moderate with exception to the flatter areas of the Peninsula Campground area, Goose Flat, and Granite Bay. Folsom Reservoir has a surface area of 11,450 acres and a maximum storage capacity of 1,084,780 acre-feet. Reservoir storage fluctuates seasonally, with an average monthly storage ranging between 838,100 acre-feet in June to 479,200 acre-feet in November.

Lake Natoma, which serves as an afterbay to Folsom Reservoir, is situated in the gully of the American River that has been cut into sedimentary rocks below the Main Concrete Dam spillway. Lake Natoma has a surface area of approximately 500 acres and the water can fluctuate between four and seven feet each day.

The Mississippi Bar area is just north of Lake Natoma is highly disturbed from previous mining activities. In areas that have been mined, land surface has been relatively well graded and ranges in elevation from approximately 155 to 162 feet amsl These mined areas consist mostly of sand at the surface (with lesser amounts of gravel and cobbles) which overlies the Mehrten Formation, and ranges in thickness from approximately 20 to 44 feet. Areas that have not been mined consist primarily of dredge tailing piles. These tailing piles form long, linear features that have relatively consistent composition and thickness for several hundred feet. From land surface to depth, the typical tailing pile consists of gravels and cobbles, sands, silts, and bedrock. The tailing piles have peaks with elevations of approximately 170 feet amsl and valleys with elevations of approximately 150 feet amsl.

Geology The study area is between the Central Sierra Nevada and the Central Valley Geomorphic Provinces. The Sierra Nevada geomorphic region is characterized by a north-northwest trending mountain belt with extensive foothills on the western slope. The Folsom Reservoir geomorphic region primarily consists of rolling hills and upland plateaus between major river canyons. There are three major geologic divisions within the study area. The oldest consists of a north-northwest trending belt of metamorphic rocks. Younger granitic plutons have intruded and obliterated some of the metamorphic belt. The youngest geologic division consists of relatively flat deposits of volcanic ash, debris flows, and alluvial fan deposits which overlie the older rocks. Figure 8-1 shows the local geologic characteristics surrounding Folsom Reservoir.

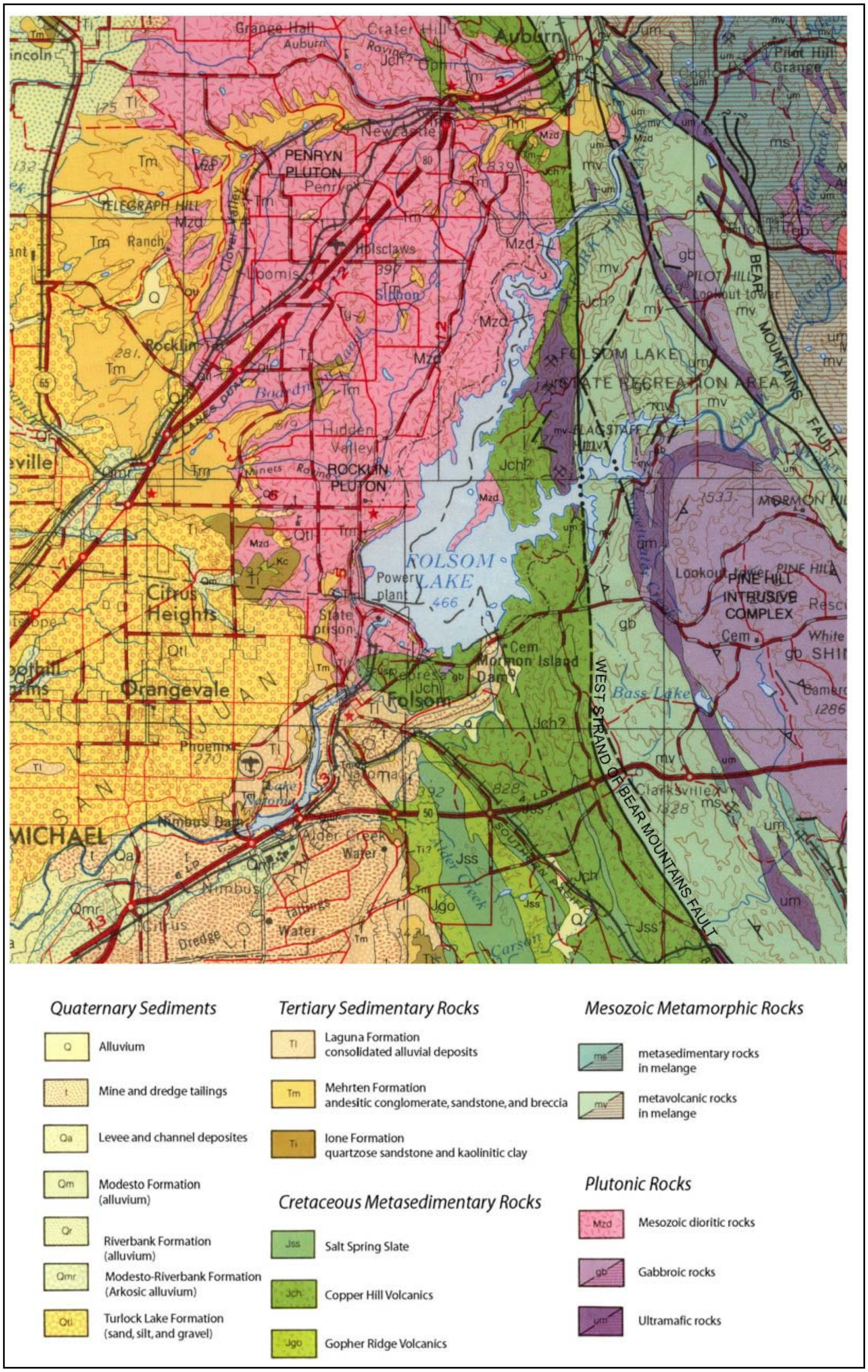

Figure 8-1. Geologic Map of Folsom Reservoir
Source: Wagner et al. 1981 *in* DPR and Reclamation 2007.

Igneous, metamorphic, and sedimentary rock types are present within the study area. The four major rock divisions of the study area include 1) ultramafic intrusive rocks, 2) metamorphic rocks, 3) granodiorite intrusive rocks, and 4) volcanic mud flows and alluvial deposits.

The ultramafic rocks originate from oceanic sediments including volcanic pillow basalts and andesite breccia. These rocks have been lifted from deep beneath the earth's crust through faulting and underthrusting of the earth's crust. Outcrops of ultramafic rock are relatively resistant to erosion and often form topographic highs. The largest exposure occurs on Flagstaff Mountain on the Folsom Reservoir Peninsula. Ultramafic rock consists of serpentine minerals (antigorite, chrysotile, and chlorite) and chromite, minor nickel, talc and naturally-occurring asbestos.

Metamorphic rocks are found in a north-northwest trending band that is east of Rattlesnake Bar through most of the peninsula that is between the two arms of the reservoir. Metamorphic rocks are also a part of the Copper Hill Volcanics along the southern portion of the study area. These rocks originate from an ancient chain of volcanic islands and seafloor sediments that have been subjected to heat and pressure forming metavolcanic and metasedimentary rocks that are mainly composed of metamorphosed basaltic breccia, pillow lava, and ash.

Granodiorite intrusive rocks are similar to granite. They are composed of a coarse grained crystalline matrix with slightly more iron and magnesium-bearing minerals and less quartz than granite. The feldspar and hornblend of the granodiorite is less resistant than the quartz crystals and easily weathers. When weathering occurs, the remaining feldspars separate from the quartz resulting in decomposed granite. The granodiorite intrusive rocks occur in the study area in two intrusive plutons, the Rocklin and Penryn Plutons. The Rocklin Pluton is on both sides of Folsom Reservoir and extends to Lake Natoma. The Penryn Pluton is upstream of the Rocklin Pluton.

Volcanic mud flows and alluvial deposits are found downstream of Folsom Reservoir. These deposits form two major formations, the Merhten and Laguna Formation. The Laguna and Merhten Formations occur in a small area in the southeast corner of the Folsom Reservoir. The Merhten Formation is a complex unit of volcanic sediments mixed with volcanic mudflows. It contains volcanic conglomerate, sandstone, and siltstone, all derived from andesitic sources. Portions of the Merhten are gravels deposited by ancestral streams. The Laguna Formation, deposited on the Merhten Formation is a sequence of gravel, sand and silt derived from granitic sources and was deposited mainly as debris flows.

The western side of Folsom Reservoir is bounded by igneous rocks, primarily granodiorite intrusive rocks. The eastern side of Folsom Reservoir is bounded by a metamorphic intrusive complex that includes the Copper Hill Volcanics and Ultramafic rocks. Naturally-occurring asbestos may be found in both of these formations. Near MIAD in the southeast corner of Folsom Reservoir are the Laguna and Merhten Formations.

The geology of the Mississippi Bar region is characterized by a southward-thickening gravel deposit, the Plio-Pliestocene age Modesto Formation, which overlies the Miocene age Mehrten Formation. The gravel deposit originally ranged in thickness between approximately 10 and 46 feet and had an average thickness of 35 to 46 feet. The mined areas at Mississippi Bar consist mostly of sand at the surface (with lesser amounts of gravel and cobbles) which overlies the Mehrten Formation, and ranges in thickness from approximately 20 to 44 feet. The dredge tailing piles that have not been mined consist of gravels and cobbles, sands, silts, and bedrock.

Seismicity The study area is in the Foothills Fault system which is located in the metamorphic belt. This system consists of northwest trending vertical faults and is divided into two zones, the western Melones Fault zone and the western Bear Mountains Fault zone. The west trace of the Bear Mountains Fault zone transects the upper reaches of the North Fork arm near Manhattan Bar Road, and crosses the South Fork arm in the region of the New York Creek. Figure 8-1 shows the location of the west strand of the Bear Mountains Fault. The last major movement of this system occurred 140 million years ago and the United States Geological Survey has not designated the Bear Mountains Fault as an active fault (Corps 2006).

Faults 11 to 102 miles away could potentially generate earthquakes with a magnitude of 6.5 to 7.9 (Wallace, Roberts, and Todd et al. 2003). However, risk of shaking at the study area is relatively low given the distance, hard bedrock, and thin soil cover. The California Geological Survey Seismic Shaking Hazard Map, Figure 8-2, shows that the project area lies within the 10-20 percent acceleration of gravity zone. This means that within the project area, there is a 10 percent probability that the seismic ground motion will exceed 10 percent to 20 percent of the acceleration of gravity within the next 50 years.

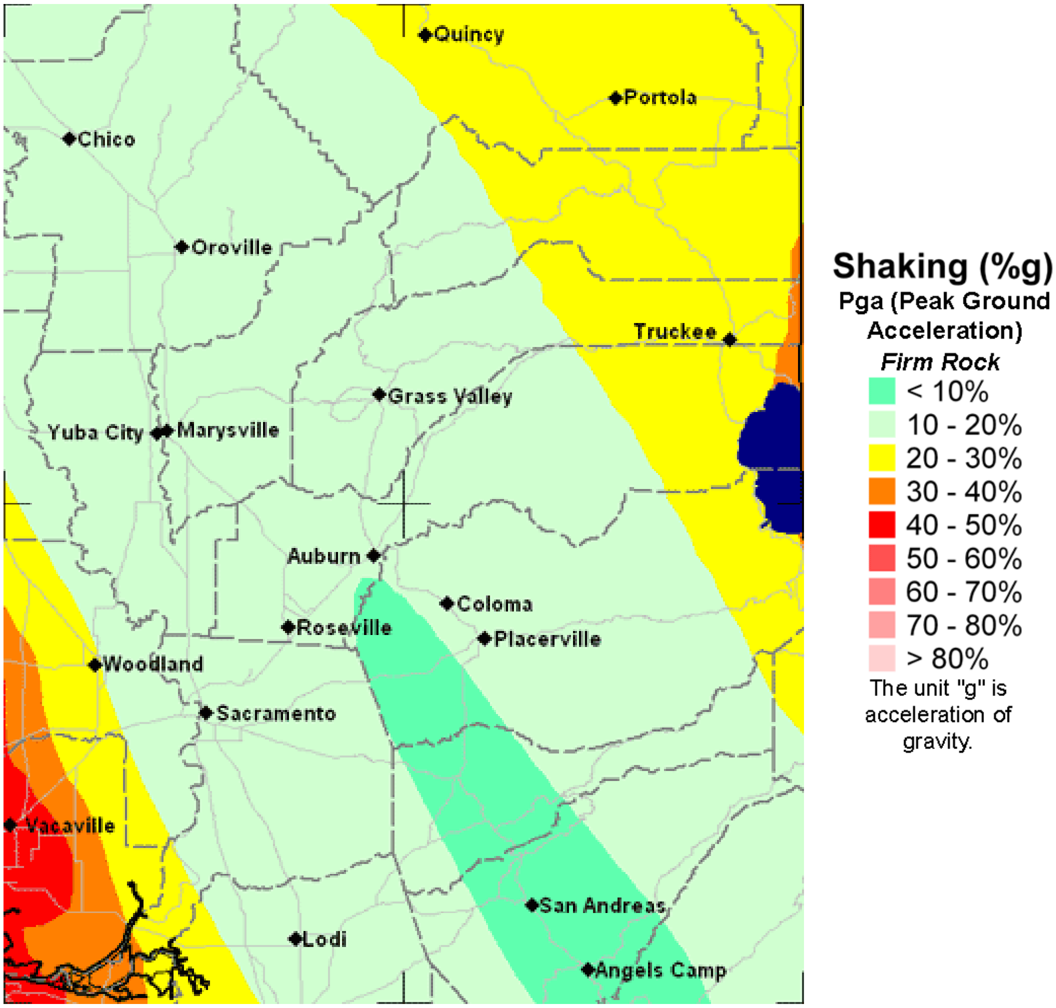

Figure 8-2. California Geological Survey Seismic Shaking Hazard Map
Source: California Geologic Survey 2003b

Although the risk of shaking is relatively low, the seismic safety of the Folsom Facility is critical when considering the large downstream population. Studies in the late 1980s indicated that all features of the Folsom Facility were stable assuming a Maximum Earthquake of Magnitude 6.5 occurring 15 km away on the East Branch of the Bear Mountains Fault Zone with exception of risk to MIAD and the Main Concrete Dam. The Corps identified a potential risk of liquefaction of the foundation materials at MIAD. This portion of MIAD was constructed over an ancient river channel on mine tailings which were determined to be liquefiable during seismic events (Reclamation 2006a). Liquefaction occurs when soils lose their strength and stiffness as a result of earthquake shaking or rapid loading. Soils are not able to support structures resulting in collapse and damage.

In response to risk of liquefaction, Reclamation, in cooperation with the Corps, took actions to reduce this risk through jet grouting. In 1995, after several tests, Reclamation discovered that the lower portion of the foundation was not treated. Although Reclamation has determined the technical risks for liquefaction are low, the foundation at MIAD requires additional treatment to ensure safety.

Land Subsidence Land subsidence is the gradual or sudden sinking, or settling of the ground surface. The potential for a possible hazard as a result of subsidence in the study area is very low. Conditions that generally result in subsidence include natural geologic processes such as a cavern collapse or peat oxidation and human activities involving groundwater extraction as well as oil and gas mining. Local collapse of small mines in the Flagstaff mountain area north of the project site could potentially occur, but is unlikely. The surrounding rocks of the mines appear to be stable and the extent of the mine shaft is limited (Wallace, Roberts, and Todd et al. 2003).

Landslides Factors that influence slope stability include slope inclination, bedrock geology, geologic structure, geomorphology, weathering, vegetation, and granitic rocks. Studies along the Highway 50 corridor have shown slides to occur where metamorphic and granitic rocks are in contact as well as where metamorphic and Tertiary sedimentary rocks are in contact. These geologic conditions are present within the study area where the sedimentary Laguna Formation overlies the metamorphic bedrock and along the north side of Folsom Reservoir where the Mehrten Formation tops the granite hills. Despite these geologic formations, landslides are not a major hazard in the study area because soils are thin and the slopes are not particularly steep (Wallace, Roberts, and Todd et al. 2003).

8.1.3.2 Soils

Soils in higher elevations of the study area are generally thin and have numerous outcroppings of igneous and metamorphic rock. Loose soils of decomposed granite are found on the north and west portions of Folsom Reservoir. These soils are highly erodible and excessive erosion has been observed along the north shore. Clayey and denser soils are concentrated on the south end. Generally, all soils within the study area are of low shrink-swell potential. Serpentine soil and rock are located on the Peninsula between the North and South Forks and south of the South Fork of the American River at Iron Mountain. These soils are high in nickel, chromium, and manganese which limit the variety of plant species that can grow. This soil is also corrosive and generally is not suitable for leach fields (Wallace, Roberts, and Todd et al. 2003).

The Mississippi Bar area has poor soils with only a trace of fines. Dredging in the Mississippi Bar area removed all material to a depth of approximately 40 feet and redistributed sediments into two units; an overlying cobble and gravel unit and an underlying gravel and sand unit. More recent commercial mining operations have removed much of the cobble unit. Currently, the study area in Mississippi Bar mainly contains the underlying sand and gravel. In areas where dredge tailings have not been disturbed, overlying cobble and gravel are present.

8.1.3.3 Mineral Resources

A variety of mineral resources are present within the study area. Resources such as chromite, minor nickel, talc, and asbestos are associated with the ultramific rocks and past mining has occurred within the region. The richest chromite mining area of the western foothill region is located on Flagstaff Hill where sporadic mining occurred from 1894 to 1955. Chromite mining also occurred on the peninsula between the North and South Forks of the American River. Abandoned or idle pit mines of talc and asbestos also occur on the peninsula. Mineral resources associated with the metamorphic belt include disseminated gold, lode gold, copper, limestone, and zinc. Limestone is mined on the north side of the peninsula across from Rattlesnake Bar. Decomposed granite may also be considered a resource within the study area. Although this rock has not been used for commercial purposes, decomposed granite has been used as fill material at the project site.

Placer gold is associated with the Merhten Formation which is exposed in the bluffs northwest of upper Lake Natoma. A substantial amount of gold mining occurred in the area from the early 1900’s through the 1930’s. Mine and dredge tailings left over from gold mining activities are found along Lake Natoma, but they can also be found below and to the south of MIAD. The mine and dredge tailings are made up of well-washed large gravel, cobbles, and boulders that have been left in large piles along the river banks.

In the western portion of Mississippi Bar, commercial aggregate mining operations in the early 1990’s removed the overlying cobble unit for construction gravel. The land was then turned over to DPR and is part of the FLSRA. The eastern portion of Mississippi Bar is owned by Reclamation and contains most of the undisturbed dredge tailings. Reclamation is planning to obtain gravel from these tailings to improve fish spawning and rearing habitat on the Lower American River. There are no future plans to commercially mine the Mississippi Bar area.

8.1.3.4 Naturally Occurring Asbestos

“Asbestos” is a common term used to identify groups of silicate minerals of fibrous or asbestiform habit, which have the properties of high tensile strength, flexibility, chemical resistance, and heat resistance. Naturally Occurring Asbestos (NOA) is the term applied to the natural geologic occurrence of any of the types of asbestos. NOA is commonly associated with ultramafic rocks (igneous rocks with low amounts of silica) and along associated faults.

NOA is known to be present in parts of eastern Sacramento County. The geology of eastern Sacramento County is characterized by a variety of igneous, metamorphic, and sedimentary rocks, some of which have been faulted or sheared. This geologic diversity provides some settings that are favorable for the presence of NOA. The SMAQMD has designated the area around MIAD as "moderately likely to contain NOA" (California Geological Survey 2006). According to the EDCAQMD, NOA has been identified approximately 1 mile south of MIAD in El Dorado County (EDCAQMD 2005). In the MIAD area, NOA may be present in the Copper Hill Volcanics and ultramafic rocks in the southern and eastern portions of Folsom Reservoir, from Dike 7 to MIAD. The Mississippi Bar area is outside the Copper Hill Volcanics and does not have the potential to contain NOA.

Reclamation has conducted extensive field investigations to characterize the type and quantity of rock and soil types in and around Folsom Reservoir. In the south shore areas of Folsom Reservoir, testing to date has not positively identified and confirmed the presence of NOA minerals; however, due to the type of geology and rocks encountered, it cannot be proven conclusively that NOA minerals are not present. As a result, SMAQMD and EDCAQMD have required Reclamation to assume the presence of NOA on the southern shore of Folsom Reservoir (Dike 7 to MIAD) in Sacramento and El Dorado Counties. Reclamation is required to develop a Dust Control Plan and other measures according to the Air Toxic Control Measures for NOA.

8.2 Environmental Consequences/Environmental Impacts

This section describes the assessment methods, the significance criteria, and the potential effects of the MIAD Modification Project on soils, minerals, and geological resources.

8.2.1 Assessment Methods

Potential impacts associated with each alternative were assessed through a qualitative evaluation. Information presented in the existing conditions discussion above as well as the following factors were considered during the evaluation process:

- Proximity to faults and frequency of seismic activity;
- The types of mineral resources that would be excavated;
- The amount and location of on-site material displacement including stripping, borrow, and fill material; and
- Existing regulatory controls in place to offset and/or mitigate adverse effects.

8.2.2 Significance Criteria

Under criteria based on the CEQA Guidelines and agency guidance, the MIAD Modification Project alternatives would be considered to have significant impacts on geology, soils, and mineral resources if it would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, or injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault,
  - Strong seismic ground shaking,
  - Seismic-related ground failure, including liquefaction, or
  - Landslides;
- Result in the loss of availability of a known mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan that would be of value to the region and the residents of the State;
- Result in substantial soil erosion or loss of topsoil;
- Be located on a geologic unit that is unstable or would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- Be located on expansive soil, as defined in Table 18-1 of the Uniform Building Code (1994) creating substantial risk to life or property; or
- Disturb areas known to contain naturally-occurring asbestos.

8.2.3 Environmental Consequences/Environmental Impacts of the No Action/No Project Alternative

The No Action/No Project Alternative assumes that no action would be taken by any agency. As previously described, seismic issues have been identified along the foundation of MIAD. In the early 1980’s Reclamation and the Corps determined, using criteria of the Safety of Dams Act, that corrective action was necessary at MIAD. The maximum credible earthquake (magnitude 6.5 at the East Branch of the Bear Mountain Fault, located 8 miles east of MIAD) could cause liquefaction of dredged tailings beneath the dam and could lead to dam failure. Geotechnical studies indicate the slope of MIAD would slump following liquefaction. If a slumping failure were to occur during a full reservoir, substantial flooding (with peak flows of up to 1 million cubic feet per second or more) could result. A flood of this magnitude would overtop the levees on the American River. The inundation zone would include parts of the south side of the City of Folsom, most of Rancho Cordova, and a large part of Sacramento. The actual inundation zone becomes less defined the farther downstream from the reservoir the water travels (Reclamation 1991). After several attempts were made in the 1990’s to treat the foundation, testing by Reclamation revealed that methods to densify the foundation at MIAD did not fully treat the lower portion of the foundation and the risk for potential liquefaction of the foundation during seismic activity remained great enough to justify further actions (Reclamation 2005). Under the No Action/No Project Alternative, the current seismic risk at MIAD would remain into the future and would have the potential to result in loss of life and significant damage to property in the Sacramento Region.

The No Action/No Project Alternative would retain current risks associated with seismic activity.

The No Action/No Project Alternative would not result in a loss of mineral resources or topsoil, would not construct any new structures on expansive soils, and would not disturb any areas containing naturally-occurring asbestos.

8.2.4 Environmental Consequences/Environmental Impacts of Alternative 1

Construction of Alternative 1 could expose people to adverse effects associated with seismic activity.

No new structures would be constructed that would expose people to adverse effects associated with seismic activity. In order to excavate and replace a portion of the downstream foundation at MIAD, blasting would not be necessary. Only unconsolidated materials overlying the bedrock would need to be excavated; no blasting of the bedrock would be required. Although material compaction equipment and vibratory rollers would be used, the use of this equipment is not anticipated to induce any seismic impacts. Further, the nearest faults are too distant from the MIAD Modification Project site to be affected by any potential blasting or shaking; therefore, construction of Alternative 1 would not induce earthquake activity along the fault.

Construction of Alternative 1 would not expose people to adverse effects associated with seismic activity.

Alternative 1 would address the seismic issues associated with MIAD and would reduce the potential for liquefaction.

Modifications to MIAD would reduce the potential for downstream foundation liquefaction by replacing the downstream foundation with a cement modified soil and adding an overlay to protect against upstream foundation liquefaction. These modifications would allow MIAD to withstand a magnitude 6.5 earthquake at the East Branch of the Bear Mountain Fault, calculated to be the maximum credible earthquake for the area. Stabilization of the dam foundations would reduce the potential for liquefaction and subsequent dam failure and would protect the Sacramento area population and property.

MIAD modifications would reduce the potential for liquefaction and would be beneficial.

Alternative 1 could result in adverse effects associated with landslides.

As previously described, landslides are not a major hazard in the study area because soils are thin and the slopes are not particularly steep. Excavation would be conducted in a manner to further minimize the potential for landslides (e.g., excavation may be terraced to stabilize slopes).

Impacts associated with landslides would be less than significant.

Alternative 1 could result in the loss of availability of a known mineral resource.

Shell material (this includes decomposed granite in addition to impervious soil and miscellaneous shell soil) would be excavated from a portion of the downstream side of MIAD. Shell excavated from the eastern portion of MIAD may have talc, chromite, or asbestos. Although the extraction of these materials as well as decomposed granite (and other shell materials) may be considered a loss of a known resource, there is no known plan for the commercial mining of these materials. Additionally, the excavated material would be replaced back on MIAD after construction is complete.

There would be no loss of availability of a known mineral resource of value to the region.

Alternative 1 would result in the loss of topsoil.

A portion of the downstream shell of MIAD would be stripped of organics prior to excavation. This would result in a loss of topsoil. However, the majority of this soil is not of high ecological or agricultural value. Some or all of the topsoil may be transported to the Mississippi Bar site for use in developing new habitat. All of the material removed from MIAD would be replaced with additional materials and would be re-vegetated after construction.

The loss of topsoil under Alternative 1 would be less than significant.

Alternative 1 would increase the potential for soil erosion.

Construction activities would include removing a portion of the downstream shell of MIAD, stockpiling shell material, and developing construction staging areas (equipment staging, material processing/batch plant areas, etc.). These construction activities would expose bare ground surface through stripping and excavation and through the movement of large construction equipment. These activities could remove the vegetative root structure that stabilizes soil and contributes to the protection of the soil surface from wind and soil erosion. The newly exposed surface would be vulnerable to erosion through storm water runoff during rain events and would remain vulnerable until new vegetation becomes established.

Impacts associated with soil erosion would be significant. Mitigation Measure WQ-1 in Chapter 4 Hydrology, Water Quality, and Flood Control would reduce impacts to a less-than-significant level.

<u>*Alternative 1 would not result in the construction of any structures that would be located on a geologic unit that is unstable or on expansive soil that would create a risk to life or property.*</u>

Alternative 1 would involve the replacement of the downstream foundation at MIAD and placement of an overlay. It would not involve the construction of any new structures on unstable geologic unites or expansive soils that would create a new risk to life or property.

There would be no impact.

<u>*Alternative 1 could result in the disturbance of areas known to contain naturally occurring asbestos.*</u>

Naturally-occurring asbestos may be present in the southern and eastern portions of the reservoir. Construction activities at MIAD would disturb these areas and could increase the potential for health risks to construction workers and the public.

The impacts associated with naturally occurring asbestos would be potentially significant. Mitigation Measure GR-1 would reduce impacts to a less than significant level.

<u>*Mitigation efforts at Mississippi Bar could result in geology and soils impacts..*</u>

Mitigation efforts at Mississippi Bar would not cause any substantial geology and soils related impacts. Some grading may occur however this is mostly to remove cobbles and would be unlikely to remove a substantial amount of topsoil. Additionally, any soil that would be removed would be re-used onsite. Approximately 285 cubic yards of topsoil may be trucked to the site from offsite sources to improve the conditions for vegetation growth. The area would be vegetated and irrigated for the first several seasons, which would reduce the potential for wind and water erosion.

The Mississippi Bar area contains dredge tailings from historic mining activities. Most of the habitat mitigation at Mississippi Bar would occur on DPR property. The dredge tailings on DPR property were previously mined for use as construction aggregates by Teichert; it is believed that almost all of the commercially viable materials have been removed. Portions of Reclamation’s property at Mississippi Bar contain unmined dredge tailings which could be considered mineral resources; however there are no known plans for any commercial mining at this site. The mitigation efforts would not remove these tailings and therefore the alternative would not result in the loss of these potential mineral resources.

No structures would be constructed that would increase the risks to the public associated with seismic activity, landslides, liquefaction, collapse, or spreading. The area is not known to contain naturally-occurring asbestos.

The geology and soils impacts associated with Mississippi Bar would be considered less than significant.

8.2.5 Environmental Consequences/Environmental Impacts of Alternative 2

Under Alternative 2, the geology, soils, and mineral resources impacts would be the same as those described for Alternative 1. Mitigation measures WQ-1 and GR-1 would reduce potentially significant impacts to a less than significant level.

8.2.6 Environmental Consequences/Environmental Impacts of Alternative 3

Under Alternative 3, the geology, soils, and mineral resources impacts would be the same as those described for Alternative 1. Mitigation measures WQ-1 and GR-1 would reduce potentially significant impacts to a less than significant level.

8.2.7 Environmental Consequences/Environmental Impacts of Alternative 4

Under Alternative 3, the geology, soils, and mineral resources impacts would be the same as those described for Alternative 1. Mitigation measures WQ-1 and GR-1 would reduce potentially significant impacts to a less than significant level.

8.3 Comparative Analysis of Alternatives

All off the action alternatives would have the potential to result in the same impacts associated with soils, minerals, and geological resources, as shown in Table 8-1. All alternatives would have potentially significant impacts associated with soil erosion and asbestos disturbance; however, these impacts would be mitigated through mitigation measures WQ-1 and GR-1, respectively. Alternative 4 requires the least amount of material handling and processing. Consequently, Alternative 4 has the least potential for adverse effects associated with asbestos disturbance and erosion. In contrast, Alternative 1 involves the greatest amount of material handling and would result in the largest potential for adverse effects.

The No Action/No Project Alternative would have the potential for adverse effects associated with seismic activity because it would not address the seismic issues associated with the MIAD foundation and could lead to dam failure during an earthquake.

Table 8-1. Comparative Analysis of Alternatives

Environmental Consequence/ Environmental Impact	Significance					Environmental Commitment/ Mitigation Measure
	No Action/ No Project Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Expose people to adverse effects associated with seismic activity.	PS	NI	NI	NI	NI	None Required.
Reduce the potential for liquefaction.	NI	B	B	B	B	None Required.
Result in adverse effects associated with landslides during construction.	NI	LTS	LTS	LTS	LTS	None Required.
Result in the loss of availability of a known mineral resource.	NI	NI	NI	NI	NI	None Required.
Result in the substantial loss of topsoil.	NI	LTS	LTS	LTS	LTS	None Required
Construction could increase the potential for soil erosion.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**WQ-1:** NPDES Permit and SWPPP
Construction of structures located on a geologic unit that is unstable or on expansive soil that would create a risk to life or property.	NI	NI	NI	NI	NI	None Required.
Potential disturbance of areas containing naturally-occurring asbestos.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**GR-1:** Compliance with Airborne Toxic Control Measure and Approved Dust Mitigation Plan
Impacts to geology, soils, and mineral resources at Mississippi Bar.	NI	LTS	LTS	LTS	LTS	None Required.

Key:
LTS = Less Than Significant
LTSWM = Less than Significant with Mitigation
SU = Significant and Unavoidable
NI = No Impact
B = Beneficial
N/A = Not Applicable

8.4 Environmental Commitments/Mitigation Measures

Implementation of mitigation measures WQ-1 in Chapter 4 and GR-1 described below would reduce all potentially significant impacts described above to a less-than-significant level.

GR-1: Compliance with Airborne Toxic Control Measure and Approved Dust Mitigation Plan In order to comply with the Airborne Toxic Control Measure for naturally occurring asbestos, a county approved Dust Mitigation Plan will be prepared and submitted to El Dorado and Sacramento Counties. The Dust Mitigation Plan will specify the activities and best management practices (BMPs) required to minimize disturbance and potential impacts of naturally-occurring asbestos. These BMPs may include, but are not limited to, the following:

- Pre-wet work area and keep area sufficiently wet during construction operations. An approved palliative material may also be used to seal loose fibers to the parent material;
- Limit vehicle access and speed on serpentine and other materials containing asbestos;
- Limit number and size of staging areas and entrances/exits;
- Cover material during transfer and stockpiles of loose material; keep adequately wet, or sealed by an approved palliative;
- Cover areas that are exposed to vehicle travel;
- Visible trackout must be immediately removed from roads using manual wet sweeping or HEPA filter device, or flushing with water where the water will not cause adverse effects on storm drainage systems or violate NPDES permit program;
- For large operations or sites with more than 150 vehicles per day, installation of devices designed to remove dirt/mud from tires, installation of gravel pads, or paving of interior roads;
- Establish vegetative cover after construction is complete; and
- Consider worker safety precautions and monitoring. Written employee notifications should be provided, notifying employees of the potential health risk and requirements of the asbestos dust mitigation plan (El Dorado County 2003).

8.5 Potentially Significant and Unavoidable Impacts

There would be no significant and unavoidable impacts related to soils, geology, and mineral resources for this project. The potentially significant impacts associated with soils, geology, and mineral resources would be mitigated to less-than-significant levels through implementation of mitigation measures WQ-1 and GR-1, respectively.

8.6 Cumulative Effects

Table 22-1 in Chapter 22 presents the list of cumulative projects considered in the cumulative analysis. Although the construction activities associated with the MIAD Modification Project would involve a substantial amount of soil and material displacement, the potential for landslides within the study area is low and construction techniques would be implemented to minimize the potential for landslides. No other cumulative projects would have the potential to induce landslides in the project area. There would be no cumulative effects associated with landslides.

Although the construction of the MIAD Modification Project would involve a substantial amount of soil moving activities, impacts associated with soil erosion and loss of topsoil would be mitigated. Other projects in the vicinity, including other Folsom DS/FDR activities, the CCAO Building Replacement Project, the Bypass Pipeline Project could all result in loss of topsoil and erosion. These projects and the MIAD Modification Project would be responsible for mitigating their effects. Any cumulative effects associated with loss of topsoil resources would be less than significant with proper mitigation by project proponents.

Construction activities for the MIAD Modification Project could expose asbestos-bearing materials through stripping and excavation as well as through the use of staging/processing areas and movement of large construction equipment. No other projects besides the JFP are expected to complete construction in the areas with naturally-occurring asbestos. Both the MIAD Modification Project and the JFP are required to submit and implement a Dust Mitigation Plan to minimize the impacts. Implementation of the Dust Mitigation Plan would reduce any impacts associated with asbestos. Cumulative impacts for naturally-occurring asbestos would be less than significant.

Construction activities associated with the MIAD Modification Project would not result in any significant cumulative effects on soils, minerals, and geological resources.

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Chapter 9
Visual Resources

The aesthetic value of an area is derived from both natural and artificial features. The value is determined by contrasts, forms and textures exhibited by geology, hydrology, vegetation, wildlife, and the built environment. Individuals respond differently to changes in the physical environment, depending on prior experiences and expectations as well as proximity and duration of views. Therefore, aesthetic effects analyses tend to be highly subjective in nature.

This section describes the existing conditions with respect to aesthetic and visual resources in the area of analysis for the MIAD Modification Project. This section also identifies the potential environmental impacts on visual resources that could result from each of the proposed alternatives. Much of the content of these descriptions was taken from the *Folsom Lake State Recreation Area Resource Inventory and the Draft Environmental Impact Report/Environmental Impact Statement* (Wallace, Roberts, and Todd et al. 2003) and *Folsom Powerhouse State Historic Park General Plan/Resource Management Plan* (DPR and Reclamation 2007).

9.1 Affected Environment/Environmental Setting

This section presents the area of analysis, the regulatory requirements, and the environmental setting for visual resources.

9.1.1 Area of Analysis

The study area of aesthetic and visual resources includes MIAD and Federal lands immediately surrounding MIAD, as well as the Mississippi Bar area. Mississippi Bar is an area south of Folsom Reservoir on Lake Natoma that is owned by Reclamation and DPR.

9.1.1.1 Mormon Island Auxiliary Dam

The area for impact analysis includes the immediate MIAD area to Green Valley Road and all of the Federally-owned lands south of Green Valley Road. Since the construction site would be visible to communities southwest of Green Valley Road, these areas are also included in the MIAD area of analysis.

9.1.1.2 Mississippi Bar

The Mississippi Bar mitigation site includes 80 acres of land on the western shore of Lake Natoma, near the intersection of Sunset Avenue and Main Avenue and south of the community of Orangevale. All proposed mitigation would occur on land parcels currently owned by DPR and Reclamation and managed by DPR as part of the FLSRA.

9.1.2 Regulatory Setting

Reclamation and DPR do not have regulations or specific guidance on how to evaluate impacts to visual resources. As a result, this analysis uses the Scenery Management System (SMS) developed by the U.S. Department of Agriculture (USDA) Forest Service as a guide to assess visual impacts.

9.1.2.1 Federal

For the purposes of this environmental impact analysis, the USDA Forest Service SMS is used to categorize the visual resources on the project site and to analyze the significance of potential impacts to these resources from the implementation of the project alternatives. Applicable to both national forest land and land outside national forests in the United States and other parts of the world, the SMS establishes common terminology; consistent procedures for inventory, analysis, and synthesis; standards and guidelines for scenery management; and, techniques for monitoring.

9.1.2.2 State

Since applicable State regulations protecting visual resources stem from the protection of State scenic highways, there are no State regulations that need to be described here in relation to visual impacts as a result of the proposed project alternatives.

9.1.2.3 Regional/Local

The City of Folsom General Plan Land Use and Open Space and Conservation Elements protect existing visual resources in its Land Use Element (Policy 1.2) (City of Folsom 1988).

The Sacramento County General Plan (applicable to the Mississippi Bar area) addresses the protection of visual resources in the County by regulating light pollution (Sacramento County 1993; 2009).

9.1.3 Existing Conditions

Visual resources in this section are described in the context of the SMS, which is used by the USDA Forest Service to evaluate impacts to visual resources. Scenic attractiveness classifications are a key component of the SMS and are used to classify visual features into the following categories:

- Class A “distinctive.” Areas where landform, vegetation patterns, water characteristics, and cultural features combine to provide unusual, unique, or outstanding scenic quality. These landscapes have strong positive attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.
- Class B “typical.” Areas where landform, vegetation patterns, water characteristics, and cultural features combine to provide ordinary or

common scenic quality. These landscapes generally have positive, yet common, attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.

- Class C “indistinctive.” Areas where landform, vegetation patterns, water characteristics, and cultural features have low scenic quality. Often water and rock form of any consequence are missing in Class C landscapes. These landscapes have weak or missing attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance (USDA Forest Service 1995).

Class A and B visual resources typically include State or Federal park, recreation, or wilderness areas, including rivers and reservoirs. Class C resources generally include areas that have low scenic quality and contain more common landscapes.

In addition, the SMS uses three primary distance zones as part of the assessment of visibility. These distance zones, described below, are foreground, middleground, and background.

- Foreground (0 to 0.5 miles): At a foreground distance, people can distinguish small boughs of leaf clusters, tree trunks and large branches, individual shrubs, clumps of wildflowers, medium-sized animals, and medium-to-large birds.
- Middleground (0.5 to 4 miles): At a middleground distance, people can distinguish individual tree forms, large boulders, flower fields, small openings in the forest or tree line, and small rock outcrops. Form, texture, and color remain dominant, and pattern is important.
- Background (4 miles to horizon): At a background distance, people can distinguish groves or stands of trees, large openings in the forest, and large rock outcrops. Texture has disappeared and color has flattened, but large patterns of vegetation or rocks are still distinguishable, and landform ridgelines and horizon lines are the dominant visual characteristics (USDA Forest Service 1995).

9.1.3.1 Mormon Island Auxiliary Dam

Folsom Reservoir represents an important visual and scenic resource within the region. Although the reservoir was created mainly for flood control, water supply and power generation, the waterfront setting visible from MIAD affords visitors with dramatic panoramas of the water and the surrounding landscape.

Views Recreation trails lead up to the trail on top of MIAD. The trails and shoreline in this southeastern area of the reservoir are gently sloping and vegetated with low grasses and trees. This area creates pleasant natural scenery that is experienced by visitors to MIAD as well as the communities situated to the south of Green Valley Road that overlook the reservoir. Figures 9-1 through 9-5 show the visual resources in this area. The scenery in this area is generally classified as Class A and Class B visual resources.

Figure 9-1. View of Recreational Trail from East Side of MIAD

Figure 9-2. View of Path on Top of MIAD and Western Shoreline

Figure 9-3. View of Shoreline from Top of MIAD

Figure 9-4. View of Shoreline and Reservoir from East Side of MIAD

Landscape Features As illustrated in Figures 9-1 through 9-5, landscape features around Folsom Reservoir in the vicinity of MIAD include the vegetated shoreline. In the foreground and middleground there are stands of trees and grasses and clusters of rocks along the short that form a gentle slope towards the water. These area classified are Class A and Class B visual resources.

Figure 9-5 shows a vegetated area bordering Green Valley Road to the south. This area is adjacent to the wetlands along Green Valley Road and could be used for dewatering activities during construction. Existing visual resources in this area are Class B.

Figure 9-5. View of Proposed Area for Dewatering Ponds

Distinctive Built Features MIAD is one of several distinctive built features in the natural landscape at Folsom Reservoir. The aesthetic value of such built features is subject to different interpretations. The contrast of built features with their setting can make determining their aesthetic contribution quite subjective. Large engineering projects such as MIAD can detract from the “natural” character of the setting, and the natural character of Folsom Reservoir is one of its scenic strengths (Wallace Roberts & Todd 2003). These landscape features generally result in Class A and B visual resources.

Visual Intrusion of Urban Development The south side of MIAD is bordered by a visitor parking lot to the east and a large vegetated area stretching from the parking lot towards the west end of MIAD embankment. The view of the south side of MIAD from the visitor parking area is depicted in Figure 9-6. Further south, across Green Valley Road in the area of the Mormon Island Wetland Preserve, a new residential development is clearly visible from the parking area and from the trail on top of the dam (Figure 9-7). Views of the reservoir are a key selling point for such real estate and residential homes with unobstructed views of the reservoir have Class A and Class B visual resources. The residential property in the vicinity of Mormon Island has views out over the reservoir which capture background views, where ridgelines and horizon lines are the dominant visual characteristics. Stands of trees and open grassfields are distinguishable, but specific features (e.g., individual building structures) are barely noticeable. Views of the construction site areas from these homes represent middleground and background views.

For visitors to the reservoir, this residential development may have an adverse effect on views from MIAD and the overall scenic quality of the area. Due to their hillside locations, homes in the area tend to be silhouetted against the sky, significantly altering the skyline and the perception of the reservoir area as a rural, natural area. In the area along Green Valley Road bordering Mormon Island Wetland Preserve, the adjacent development has been noted as visually intrusive (DPR and Reclamation 2007b). These landscape features generally result in Class C visual resources.

Built features within the reservoir can detract from the overall visual quality and ultimately the visitor experience. Specifically, the visitor parking lot at the downstream side of MIAD detracts from the visual quality of the area. In the vicinity of Mississippi Bar (described in more detail below), the WAPA high-tension electrical transmission line between the Nimbus Dam substation to the Folsom Dam substation is clearly visible from several vantage points. The towers and overhead lines are significant foreground features when viewed from Lake Natoma (DPR and Reclamation 2007b).

Figure 9-6. View of MIAD from Visitor Parking Lot

Figure 9-7. View from on Top of MIAD Facing South Towards Green Valley Road

Exposed Shoreline of Folsom Reservoir Given the seasonal fluctuation of water levels in the reservoir, these changes have considerable impacts on the visual quality of Folsom Reservoir. The highest elevations occur in late winter or early spring when storm and snowmelt runoff fill the reservoir; the lowest in late fall or early winter following after water has been released downstream. Throughout this time period, water levels drop continuously – up to 70 feet in normal years – from the start of the peak recreation season around Memorial Day through the season's end at Labor Day. The reservoir does not have habitats that can adapt to such large changes in environmental condition; therefore, as the water levels decline, much of the exposed shoreline is left devoid of vegetation. The relatively gradual slope to the reservoir bottom results in a greater area of exposed shoreline with lower water levels, resulting in the "bathtub ring" effect common to reservoirs. As these effects take place over the course of the recreation season, the quality of views along the shoreline decrease.

Threats to Scenic Resources The primary threat to scenic resources is from continued development around the reservoir. Future development will likely come in the form of residential subdivisions on the hillsides above Folsom Reservoir (DPR and Reclamation 2007a).

Scenic Highways There are no State-designated scenic highways in the vicinity of MIAD. The closest State-designated scenic highways are Routes 160 and 49. Route 160 is a designated State scenic highway from the Contra Costa County line to the southern city limits of the City of Sacramento. This route is over 20 miles from the MIAD project area. Route 49, approximately 17 miles from the MIAD project site, runs through El Dorado County on the northeast end of Folsom Reservoir (California Department of Transportation 2007).

The City of Folsom designated East Natoma Street as a scenic corridor from Oak Avenue Parkway to the El Dorado County Line. At the closest point, East Natoma Street is approximately 0.8 miles from the MIAD site and is not visible (City of Folsom 1988).

9.1.3.2 Mississippi Bar

Mississippi Bar is located approximately one mile below Folsom Reservoir on Lake Natoma, the afterbay of Folsom Reservoir. The long, narrow lake includes approximately 540 acres of water surface area and 14 miles of highly scenic riparian shoreline. The western shore of the lake from Negro Bar to Mississippi Bar is lined by the dramatic Lake Natoma Bluffs that rise 150 feet. The heavily vegetated shoreline along Lake Natoma is also an important landscape feature (Wallace Roberts & Todd, 2003). Mississippi Bar is the largest upland area along Lake Natoma. Some unique aesthetic resources of this undeveloped river terrace include the remains of past mining activities that form cobblestone piles up to several stories high (Figure 9-8) (DPR and Reclamation 2007b). Clearly not part of the natural landscape, these tailings are a distinctive and unusual visual feature. While culturally interesting, the public’s perception of their aesthetic value tends to vary (Wallace Roberts & Todd 2003).

Towards the northern section of Lake Natoma, effective screening of the surrounding urban neighborhoods contributes to a more park-like setting; however, views in the southern portion of the lake tend to be of lower quality due to Nimbus Dam and associated power transmission lines. From some viewing points, office and industrial buildings that abut Lake Natoma in the area of Blue Ravine Road can be seen from trails along the eastern shoreline; however, heavy vegetation and dredger tailings in the area do much to screen this development from view (Wallace, Roberts & Todd 2003).

Figures 9-9 and 9-10 show other views of the scenic resources at Mississippi Bar. Figure 9-11 shows water habitat at Mississippi Bar. Visual resources in the Mississippi Bar area are generally Class A and Class B.

Figure 9-8. Cobblestone Piles on Mississippi Bar

Figure 9-9. View of Mississippi Bar

Figure 9-10. View of Mississippi Bar

Figure 9-11. Aquatic Habitat at Mississippi Bar

State Scenic Highways There are no officially designated State or County scenic highways in the vicinity of Mississippi Bar. Route 50 runs past Mississippi Bar. This road is officially designated as a scenic highway along certain sections; however, at the point where it runs past Mississippi Bar, it is not an officially designated scenic highway.

9.2 Environmental Consequences/Environmental Impacts

Following sections describe the environmental consequences and impacts to existing visual resources and resource values associated with each alternative.

9.2.1 Assessment Methods

Assessment of visual resources; their value and importance to viewers in the area; and, the potential impacts to these resources from implementation of the project alternatives was accomplished through the use of the USDA's SMS, outlined in *Landscape Aesthetics: A Handbook for Scenery Management, Agriculture Handbook Number 701* (USDA Forest Service 1995). Specific classification techniques are described in Section 9.1.3, above. The SMS allows for improved integration of aesthetics with other biological, physical, and social/cultural resources in the planning area. This assessment describes the temporary and permanent visual effects of each alternative.

In assessing the environmental consequences that could result from implementation of the project alternatives, certain assumptions were made:

- Construction activities that could have an impact on visual quality in the project area will be temporary in nature.
- Impacts that are not temporary will be mitigated to the maximum extent practicable.
- Long-term impacts to visual resources from some of the alternatives will be significant and unavoidable.

The SMS-based assessment methods were applied to the alternatives using the following steps:

- <u>Identify visually sensitive areas</u> – Sensitivity is rated highest for views seen by people using recreational trails on and around MIAD and Mississippi Bar.
- <u>Define the landscape character</u> **–** Landscape character gives a geographic area its visual and cultural image and consists of the combination of physical, biological, and cultural attributes that make the landscape. Landscape character embodies distinct landscape attributes that exist throughout an area.
- <u>Identify visually affected resources</u> **–** Potential impacts to visual resources from implementation from any of the alternatives could include the presence of construction equipment, excavated materials and water handling infrastructure; visual changes to the downstream dam face; the possible relocation of Green Valley Road; and, possible impacts to recreation trails at both MIAD and Mississippi Bar.
- <u>Classify scenic attractiveness</u> **–** Scenic attractiveness classifications are a key component of the SMS and were used to classify visual features into the following categories: Class A "Distinctive", Class B "Typical",

and Class C "Indistinctive" (USDA Forest Service 1995). These classifications are described above in Section 9.1.3.

9.2.2 Significance Criteria

Pursuant to the CEQA Guidelines, a proposed alternative would result in potentially significant impacts if it would:

- Have a substantial adverse effect on a Class A or Class B resource;
- Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a State scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or,
- Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

9.2.3 Environmental Consequences/Environmental Impacts of the No Action/No Project Alternative

Under the No Action/No Project Alternative, there would be no excavation and replacement of the downstream foundation and there would be no addition of an overlay or new filters and drains to the upstream foundation. The visual setting would remain the same as described under existing conditions.

The No Action/No Project Alternative would not affect visual resources.

9.2.4 Environmental Consequences/Environmental Impacts of Alternative 1

<u>Construction activities would temporarily affect views of the downstream side of MIAD.</u>

Alternative 1 involves the largest amount of excavation to remove material from the downstream MIAD foundation and would result in the largest "open cut" trench that would be visible from Green Valley Road. A large dewatering well system capable of pumping large volumes of water would be installed below this excavation area. This alternative construction technique would require the most construction equipment to be operating at the same time, with the most construction related traffic. This presence of construction equipment, vehicles, and stockpiled materials would have temporary visual impacts to recreational visitors, drivers on Green Valley Road, and residential communities southeast of MIAD. Excavation and construction-related activities during implementation of Alternative 1 would have temporary adverse impacts to these three groups of resource users.

The portion of East Natoma Street at the intersection of Green Valley Road is designated by the City of Folsom as a scenic corridor. Construction activities could be visible to drivers along this portion of East Natoma Street; however, these visual impacts would be temporary.

Due to the temporary nature of construction activities, construction-related impacts to visual resources would be less than significant.

Removal of vegetation would temporarily affect views of the downstream side of MIAD.

The proposed modifications of MIAD would require the removal of the vegetation currently covering the downstream side of the dam. This would impact views from Green Valley Road.

Removal of existing vegetation on the downstream side of MIAD would result in potentially significant impacts to visual resources. Mitigation measure BIO-1 in Chapter 7, Biological Resources, would reduce this impact to a less than significant level.

Construction activities would affect views from residential developments in the vicinity.

The excavation and replacement method employed in all alternatives would result in the removal of vegetation from the downstream side of the dam (existing visual resources at the downstream side of MIAD are depicted in Figure 9-6). While construction-related impacts would be temporary, the duration of construction is expected to be approximately two years. Also, re-vegetation of the downstream side of MIAD would not be instantaneous and could take approximately one to two additional years to return to existing conditions such as those depicted in Figure 9-6. This would result in temporary impacts to Class B visual resources that would be visible to residents living south of Green Valley Road. Due to the temporary timeframe of this impact and the existing developed nature of the surrounding landscape (e.g., the MIAD parking lot and Green Valley Road) the potential impact to visual resources would be less than significant.

Construction-related impacts to visual resources at residential developments would be temporary and less than significant.

Construction would affect views from the reservoir.

Construction activities on top of MIAD could temporarily impact the views of boaters and other recreationalists; however, construction would take place when the reservoir is at its lowest levels in the off-season for boating and other water recreation. Additionally, most construction work would not be visible from the reservoir because it would take place on the downstream side of MIAD. These temporary impacts would affect Class A and B visual resources.

Construction impacts to views from the reservoir would be temporary and less than significant.

<u>Modification of the MIAD foundation could affect water supply to bordering wetlands and could result in visual impacts.</u>

The modifications proposed for the MIAD foundation would involve the use of cement modified soil to strengthen the foundation and prevent failure during seismic activity. The long term effects of this on the Mormon Island Wetland Preserve just south of Green Valley Road are unknown at this time, but could potentially reduce the amount of seepage beneath MIAD and could affect water levels and vegetation in the Mormon Island Wetland Preserve.

Due to the uncertainty with regards to mitigating the long-term impacts of the wetlands at Mormon Island Wetland Preserve, loss of wetlands and associated vegetation would be considered a significant impact. Mitigation measures WQ-3 in Chapter 4 Hydrology, Water Quality, and Flood Control, GW-1 in Chapter 5, Groundwater, and BIO-9 in Chapter 7, Biological Resources would reduce this impact to a less-than-significant level.

<u>Temporary relocation of Green Valley Road would alter the visual character of the area, including the Mormon Island Wetland Preserve.</u>

Alternative 1 is the only alternative that could result in the temporary relocation of Green Valley Road. The road would likely be relocated into the Mormon Island Wetland Preserve to the south. Relocation of Green Valley Road would require removal of a portion of the vegetation currently in this wetland area. As Green Valley Road would remain in this new location after the modification of MIAD is completed, this impact would be a permanent. Construction of the road through the wetland area would be have significant, unavoidable, and permanent impacts to views from residential properties south of MIAD, to people travelling along Green Valley Road, and to visitors on the MIAD trails for the length of construction.

Relocation of Green Valley Road into the Mormon Island Wetland Preserve would have a potentially significant impact during construction that could not be mitigated to less than significant levels. Therefore, the impact would be significant and unavoidable. After construction, mitigation measure BIO-1 in Chapter 7 Biological Resources would be implemented to reduce this impact to a less-than-significant level.

<u>Construction of dewatering ponds would impact views along Green Valley Road.</u>

Dewatering activities during construction would require the construction of berm-supported pools adjacent to the wetlands just south of Green Valley Road (See Figure 9-5). These would be visible from the road and from the MIAD area of Folsom Reservoir. Once construction is completed, the dewatering ponds would be removed and the land would be recontoured. These impacts would be temporary and less than significant.

Visual impacts from the construction of dewatering ponds would be temporary and less than significant.

Views from MIAD trails would be affected by construction activity.

During construction the trails leading to the top of MIAD as well as the trail on top of MIAD would be closed. Trail closure would result in temporary impacts to recreationalists' views of Folsom Reservoir scenery. Trails would be restored and re-opened after construction is completed; therefore, potential impacts would be temporary and less than significant.

Construction-related impacts to visual resources experienced by visitors from trails in the vicinity of MIAD would be less than significant.

Seasonal wetland and riparian habitat improvements at Mississippi Bar would impact views in the southern portion of Lake Natoma.

Up to 80 acres of seasonal wetland and riparian habitat would be created or enhanced in the Mississippi Bar area near Lake Natoma. This is required as part of the CWA 404 permit and USFWS mitigation from the overall Folsom DS/FDR project. These activities could improve Class B and Class C visual resources. The proposed habitat improvements would be expected to have a longer term beneficial impact to visual resources in the area of Mississippi Bar as they would create new vegetation and improve scenic views.

In order to develop the Mississippi Bar site for habitat mitigation, Reclamation would need to remove several user made trails. These trails are not officially designated or maintained, and DPR considers this a less than significant impact. Temporary fencing would need to be erected to protect new vegetation. This fencing would be removed in several years once the vegetation has been established. This would be a temporary visual impact to the area, but would be less than significant as it would be removed eventually. Other visual impacts include development of an access road and installation of a new well. This area has already been developed with the Shadow Glen concession and has been previously disturbed by historic mining activities. Due to the temporary nature of construction-related impacts as well as the possible beneficial impacts, this impact is considered to be less than significant overall.

Improvements to seasonal wetland and riparian habitat would result in less than significant and possibly beneficial impacts to visual resources in the vicinity of Mississippi Bar.

9.2.5 Environmental Consequences/Environmental Impacts of Alternative 2

Construction activities would temporarily affect views of downstream side of MIAD.

Alternative 2 would have similar temporary construction-related visual impacts as those discussed for Alternative 1. However, this alternative would have slightly less material that would require excavation due to the installation of a downstream wall. Additionally, the dewatering system would be slightly smaller under Alternative 2 compared to Alternative 1.

Due to the temporary nature of construction activities, construction-related impacts to visual resources would be less than significant.

Removal of vegetation would temporarily affect views of the downstream side of MIAD.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Construction activities would affect views from residential developments in the vicinity.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Construction would affect views from the reservoir

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Modification of the MIAD foundation could affect water supply to bordering wetlands and could result in visual impacts.

This impact would be the same as Alternative 1 and would be considered significant and unavoidable.

Relocation of Green Valley Road would permanently alter the visual character of the area, including the Mormon Island Wetland Preserve.

Green Valley Road would not be relocated, there would be no impact.

Construction of dewatering ponds would impact views along Green Valley Road.

These impacts would be the same as those described for Alternative 1 except the dewatering ponds would be smaller under Alternative 2.

Views from MIAD trails would be affected by construction activity.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Seasonal wetland and riparian habitat improvements at Mississippi Bar would impact views in the southern portion of Lake Natoma.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

9.2.6 Environmental Consequences/Environmental Impacts of Alternative 3

Construction activities would temporarily affect views of the downstream side of MIAD.

Visual impacts of Alternative 3 would be similar to those discussed for Alternative 1, with the following exceptions. Alternative 3 involves the construction of both an upstream and downstream wall system, thereby greatly reducing the amount of excavated materials required to be removed. This alternative also reduces the dependency of the excavation on the dewatering, and may eliminate the need to strip off a portion of the downstream dam toe. These differences in Alternative 3 would reduce some of the visual impacts described for Alternative 1.

Due to the temporary nature of construction activities and existing urban development in the vicinity, construction-related impacts to visual resources would be less than significant.

Removal of vegetation would temporarily affect views of the downstream side of MIAD.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Construction activities would affect views from residential developments in the vicinity.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Construction would affect views from the reservoir

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Modification of the MIAD foundation could affect water supply to bordering wetlands and could result in visual impacts.

This impact would be the same as Alternative 1 and would be considered significant and unavoidable.

Relocation of Green Valley Road would permanently alter the visual character of the area, including the Mormon Island Wetland Preserve.

Green Valley Road would not be relocated, there would be no impact.

Construction of dewatering ponds would impact views along Green Valley Road.

These impacts would be the same as those described for Alternative 1 except the dewatering ponds would be smaller under Alternative 3.

Views from MIAD trails would be affected by construction activity.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Seasonal wetland and riparian habitat improvements at Mississippi Bar would impact views in the southern portion of Lake Natoma.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

9.2.7 Environmental Consequences/Environmental Impacts of Alternative 4

Construction activities would temporarily affect views of downstream side of MIAD.

Similar to Alternative 3, the construction methods employed in Alternative 4 would minimize the amount of materials required to be removed and reduce the dependency of the excavation of the dewatering system, thus reducing the need for large pumps to be located in the vicinity of MIAD.

As viewed from the downstream side of MIAD, excavation and construction activities taking place during the implementation of Alternative 4 would have temporary adverse impacts on visual resources.

Due to the temporary nature of construction activities and existing urban development in the vicinity, construction-related impacts to visual resources would be less than significant.

Removal of vegetation would temporarily affect views of the downstream side of MIAD.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Construction activities would affect views from residential developments in the vicinity.

Impacts would generally be the same as those described for Alternative 1; however, the cellular wall excavation construction techniques would be expected to require the use of smaller construction equipment and less excavated material (similar to Alternative 3). Additionally, there is a possibility that the construction techniques proposed under this alternative would allow for the cellular wall block to be shifted downstream of the existing toe, thus eliminating the need for excavation of the face of the existing dam.

Construction-related impacts to visual resources at residential developments would be and less than significant.

Construction would affect views from the reservoir

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Modification of the MIAD foundation could affect water supply to bordering wetlands and could result in visual impacts.

This impact would be the same as Alternative 1 and would be considered significant and unavoidable.

Relocation of Green Valley Road would permanently alter the visual character of the area, including the Mormon Island Wetland Preserve.

Green Valley Road would not be relocated, there would be no impact.

Construction of dewatering ponds would impact views along Green Valley Road.

These impacts would be the same as those described for Alternative 1 except the dewatering ponds would be smaller under Alternative 4.

Views from MIAD trails would be affected by construction activity.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

Seasonal wetland and riparian habitat improvements at Mississippi Bar would impact views in the southern portion of Lake Natoma.

These impacts would be the same as those described for Alternative 1 and would be less than significant.

9.3 Comparative Analysis of Alternatives

Implementation of each of the alternatives would result in short-term, less than significant impacts to visual resources from clearing of vegetation, construction equipment, material stockpiling, and staging. Implementation of Alternative 1 would result in greater visual impacts than Alternatives 2-4 due to the larger amount of excavated materials and greater dewatering system that would be necessary. Additionally, Alternative 1 is the only alternative that would require the permanent relocation of Green Valley Road into the wetlands that are currently south of the existing road. This would result in significant and unavoidable impacts to the visual character of the area and would change views from the road and from the existing trails on MIAD. All alternatives would include improvement of habitat at the Mississippi Bar site that would result in less than significant visual impacts, and may even have beneficial impacts to visual resources over time as the vegetation becomes established. Table 9-1 summarizes the impacts of the alternatives on visual resources.

Table 9-1. Comparative Analysis of Alternatives

Environmental Consequence/ Environmental Impact	Significance					Environmental Commitment/ Mitigation Measure
	No Action/ No Project Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Construction activities would temporarily affect views of downstream side of MIAD.	NI	LTS	LTS	LTS	LTS	None Required
Removal of vegetation would temporarily affect views of the downstream side of MIAD.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**BIO-1:** Tree Protection and Revegetation
Construction activities would affect views from residential developments in the vicinity.	NI	LTS	LTS	LTS	LTS	None Required
Views from MIAD trails would be affected by construction activity.	NI	LTS	LTS	LTS	LTS	None Required
Construction would affect views from the reservoir.	NI	LTS	LTS	LTS	LTS	None Required
Modification of the MIAD foundation could affect water supply to bordering wetlands and could result in visual impacts.	NI	LTSWM	LTSWM	LTSWM	LTSWM	**GW-1**: Groundwater Monitoring Program **WQ-3:** Water Level Monitoring **BIO-9:** Monitoring Program for Mormon Island Wetland Preserve
Relocation of Green Valley Road would temporarily alter the visual character of the area, including the Mormon Island Wetland Preserve.	NI	SU during construction; LTSWM after construction	NI	NI	NI	**BIO-1:** Tree Protection and Revegetation
Construction of dewatering ponds would impact views along Green Valley Road.	NI	LTS	LTS	LTS	LTS	None Required
Views from MIAD trails would be affected from construction activities.	NI	LTS	LTS	LTS	LTS	None Required
Seasonal wetland and riparian habitat improvements at Mississippi Bar would impact views in the southern portion of Lake Natoma.	NI	LTS/B	LTS/B	LTS/B	LTS/B	None Required

Key:
LTS = Less Than Significant
LTSWM = Less than Significant with Mitigation
SU = Significant and Unavoidable
NI = No Impact
B = Beneficial
N/A = Not Applicable

9.4 Environmental Commitments/Mitigation Measures

Mitigation measures in Chapter 7, Biological Resources and Chapter 4, Hydrology, Water Quality, and Flood Control would reduce all potentially significant impacts to a less than significant level.

9.5 Potentially Significant and Unavoidable Impacts

While the relocation of Green Valley Road into the wetland area represents a potentially significant impact to visual resources; it would only remain significant and unavoidable for the duration of construction. After construction is complete, the area would be restored through a revegetation plan (see mitigation measure BIO-1 in Chapter 7, Biological Resources). No other significant and unavoidable impacts are expected.

9.6 Cumulative Effects

Cumulative impacts to visual resources were evaluated based on the past, present, and reasonably foreseeable projects listed in Table 22-1. The only project with the potential to have cumulative impacts on visual resources in the vicinity of MIAD is the Green Valley Road Widening Project.

The Green Valley Road Widening Project is a project being planned by the City of Folsom to widen Green Valley Road from two to four lanes. It is assumed that the road would be widened south of its existing location, into the Mormon Island Wetland Preserve. This would presumably require the removal of vegetation. When taken into consideration with the effects of the MIAD Modification Project's impacts to vegetation through temporary relocation of the road and the potential reduction in the water source for the wetlands, this could lead to a cumulatively significant visual impact. However, Reclamation would implement mitigation to prevent vegetation loss and would revegetate all areas after construction. The City of Folsom would be responsible for mitigating their impacts associated with the road widening project. With mitigation, cumulative impacts to visual resources would be less than significant.

9.7 References

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