RECLAMATION

Managing Water in the West

Mormon Island Auxiliary Dam Modification Project Draft Supplemental Environmental Impact Statement/Environmental Impact Report

to the Folsom Dam Safety and Flood Damage Reduction Project Environmental Impact Statement/Environmental Impact Report

Folsom, California
Mid-Pacific Region

State Clearinghouse # 2006022091

U.S. Department of the Interior, Bureau of Reclamation, Mid-Pacific Region
Sacramento Area Flood Control Agency

December 2009

U.S Department of the Interior, Bureau of Reclamation

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The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Sacramento Area Flood Control Agency

To reduce flood risk, thereby minimizing the impacts of floods on human safety, health, and welfare; and, consistent with these flood risk reduction goals, to preserve and enhance the environmental and aesthetic values that floodways and floodplains contribute to the quality of life in the Sacramento region.

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Folsom, California

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Prepared by:

CDM

Pacific Legacy

U.S. Department of the Interior, Bureau of Reclamation, Mid-Pacific Region
Sacramento Area Flood Control Agency **December 2009**

Mormon Island Auxiliary Dam Modification Project
Draft Supplemental Environmental Impact Statement/ Environmental Impact Report

Sacramento and El Dorado Counties, California

Lead Agencies: U.S. Department of the Interior, Bureau of Reclamation (Reclamation), Mid-Pacific Region, Folsom, California; and
Sacramento Area Flood Control Agency (SAFCA), Sacramento, California.

State Clearinghouse # 2006022091

ABSTRACT

Reclamation has multiple authorized projects addressing hydrologic, seismic, static, and flood management issues at Folsom Dam and its Appurtenant Structures (Folsom Facility). The Mormon Island Auxiliary Dam (MIAD) Modification Project Draft Supplemental Environmental Impact Statement/Environmental Impact Report (EIS/EIR) evaluates implementation of alternatives that modify MIAD to reduce seismic and static risks. The preferred MIAD alternative of jet grouting originally selected in the Folsom Dam Safety and Flood Damage Reduction (DS/FDR) Project EIS/EIR and Record of Decision was determined to be technically and economically infeasible. Four action alternatives analyzed in the Draft Supplemental EIS/EIR address methods to excavate and replace the foundation of MIAD, place an overlay on the downstream side, and install drains and filters. The alternatives differ only in their method of foundation excavation. In addition, the Draft Supplemental EIS/EIR addresses impacts of up to 80 acres of habitat mitigation proposed for Mississippi Bar on the shore of Lake Natoma. The habitat mitigation is required to address impacts from the Folsom DS/FDR Project. All four action alternatives include the same Mississippi Bar mitigation (80 acres). Direct, indirect, and cumulative impacts resulting from the alternatives on the physical, natural, and socioeconomic environment of the region are addressed.

This Draft Supplemental EIS/EIR is prepared in compliance with the National Environmental Policy Act (NEPA), Department of the Interior regulations on the Implementation of NEPA, Reclamation NEPA procedures, and the California Environmental Quality Act (CEQA) and CEQA guidelines.

Comments on this document must be submitted by January 18, 2009. Reclamation and SAFCA will consider comments on the Draft Supplemental EIS/EIR during the 45-day review period.

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Executive Summary

Purpose of Supplemental EIS/EIR

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and the Sacramento Area Flood Control Agency (SAFCA) are proposing changes to the dam safety modifications originally selected for Mormon Island Auxiliary Dam (MIAD) in the March 2007 *Folsom Dam Safety and Flood Damage Reduction* (DS/FDR) *Final Environmental Impact Statement/Environmental Impact Report* (EIS/EIR). Reclamation's preferred alternative for the MIAD modification was to place an overlay and seepage control filters with drains on the downstream (terrestrial) side of MIAD (to address static issues), and to reinforce the MIAD foundation using a construction technique known as jet grouting (to address seismic issues). Subsequent investigations have indicated that jet grouting to stabilize the MIAD foundation is unlikely to meet Reclamation's risk standards. This Supplemental EIS/EIR addresses additional techniques to stabilize the MIAD foundation in order to meet current dam safety standards.

Also proposed in this document is the development of a mitigation site for the Folsom DS/FDR Project. Reclamation is responsible for completing mitigation for habitat impacted by construction of the Folsom DS/FDR Project. When the Records of Decision (RODs) were signed for the project, Reclamation had not identified the location for this mitigation. Reclamation is now proposing to create and/or improve habitat on land owned by the California Department of Parks and Recreation (DPR) at Mississippi Bar, on the west shore of Lake Natoma. SAFCA is proposing to enter into an agreement with Reclamation to accept responsibility for long-term operation and maintenance (O&M) of this mitigation site as part of their role in the overall Folsom DS/FDR Project; however no long-term agreement is currently in place. This Supplement addresses impacts associated with the development of Mississippi Bar as a mitigation site.

Seismic and Static Risks at Mormon Island Auxiliary Dam

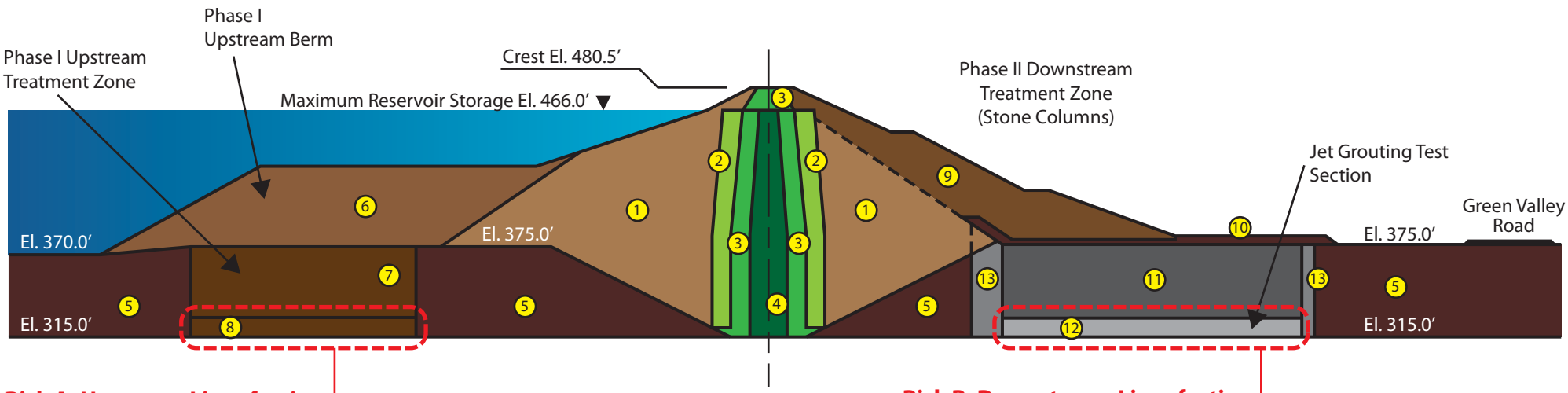
In the early 1980's Reclamation and the Corps determined that corrective action was necessary at MIAD. The maximum credible earthquake (magnitude 6.5 at the East Branch of the Bear Mountain Fault, located 8 miles east of MIAD) could cause liquefaction of dredged tailings beneath the dam and could lead to dam failure. Geotechnical studies indicate the slope of MIAD would slump following liquefaction. If a slumping failure occurs when the water level in Folsom Reservoir is 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 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).

In the 1990s, Reclamation, in cooperation with the Corps, began a program to correct the seismic issues identified at MIAD including placement of a new berm on the upstream side of MIAD and dynamic compaction of the upstream foundation. MIAD Modification Phase II occurred from 1993 to 1994 and involved the treatment of the downstream foundation of MIAD by creating stone columns to solidify the foundation. Figure ES-1 shows the previous modifications that have been completed at MIAD. After this work, 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).

In 2007, Reclamation completed the Final EIS/EIR for the Folsom DS/FDR Project to address static, seismic, and hydrologic risks at the Folsom Facility. The Preferred Alternative selected for the project involved jet grouting to treat the downstream foundation at MIAD, an overlay to address the upstream foundation issues, and filters and drains to address static issues. A series of jet grout test sections was performed in 2007 but analysis of the test results indicated that jet grouting did not adequately solidify the foundation. Jet grouting to treat the MIAD foundation has been determined to be infeasible; therefore this Supplemental EIS/EIR will address other options to treat the downstream foundation at MIAD, mainly variations of excavating and replacing the downstream foundation to prevent failure of MIAD during seismic activity. The downstream overlay and filters with drains remain the same as originally described for the Folsom DS/FDR Project.

In addition to the seismic issues described above, static issues (seepage and piping) have also identified at MIAD. All earth dams have seepage resulting from water percolating slowly through the dam and its foundation. Seepage must, however, be controlled in both velocity and quantity. Seepage, if uncontrolled, can erode fine soil material from the downstream slope or foundation and continue moving towards the upstream slope to form a pipe or cavity to the reservoir, often leading to a complete failure of the embankment. In order to prevent seepage and piping, filters and drains are installed. Filters consist of a layer of processed material that will allow water to safety pass through an embankment such as MIAD without resulting in internal soil erosion. Any water collected by the filter is carried to the toe of the earthen structure for discharge away from the dam through a toe drain. Filters and drains are proposed for MIAD to reduce the risk of failure through seepage and piping.



Risk A: Upstream Liquefaction

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Liquefaction and related phenomena can trigger landslides and cause the collapse of dams.

Risk B: Downstream Liquefaction

Note: Elevations (El.) are shown in Feet

50 0 50 100 150
Feet

Legend

Dam Zones

1. Zone 1 – Shell
2. Zone 2 – Coarse Filter
3. Zone 3 –Fine Filter
4. Zone 4 – Core
5. Untreated dredged tailings

Previous Upstream Modifications

6. Phase I – Berm
7. Phase I – (Dynamic compaction) Upper area
8. Phase I – (Dynamic compaction) Lower area

Previous Downstream Modifications

9. Phase II – Recompacted 1 material
10. Phase II – Drainage blanket
11. Phase II – Upper Bottom Feed Stone Column (BFSC) area
12. Phase II – Lower BFSC area
13. Phase II – BFSC drainage elements

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Figure ES-1. Mormon Island Auxiliary Dam Previous Modifications

Study Area

The study area for this Supplemental EIS/EIR includes Federal property surrounding MIAD and directly south of Green Valley Road in the Mormon Island Wetland Preserve area. The majority of the study area around MIAD is in Sacramento County; however the northeastern end of MIAD crosses into El Dorado County. Figure ES-2 presents a map of the MIAD study area.

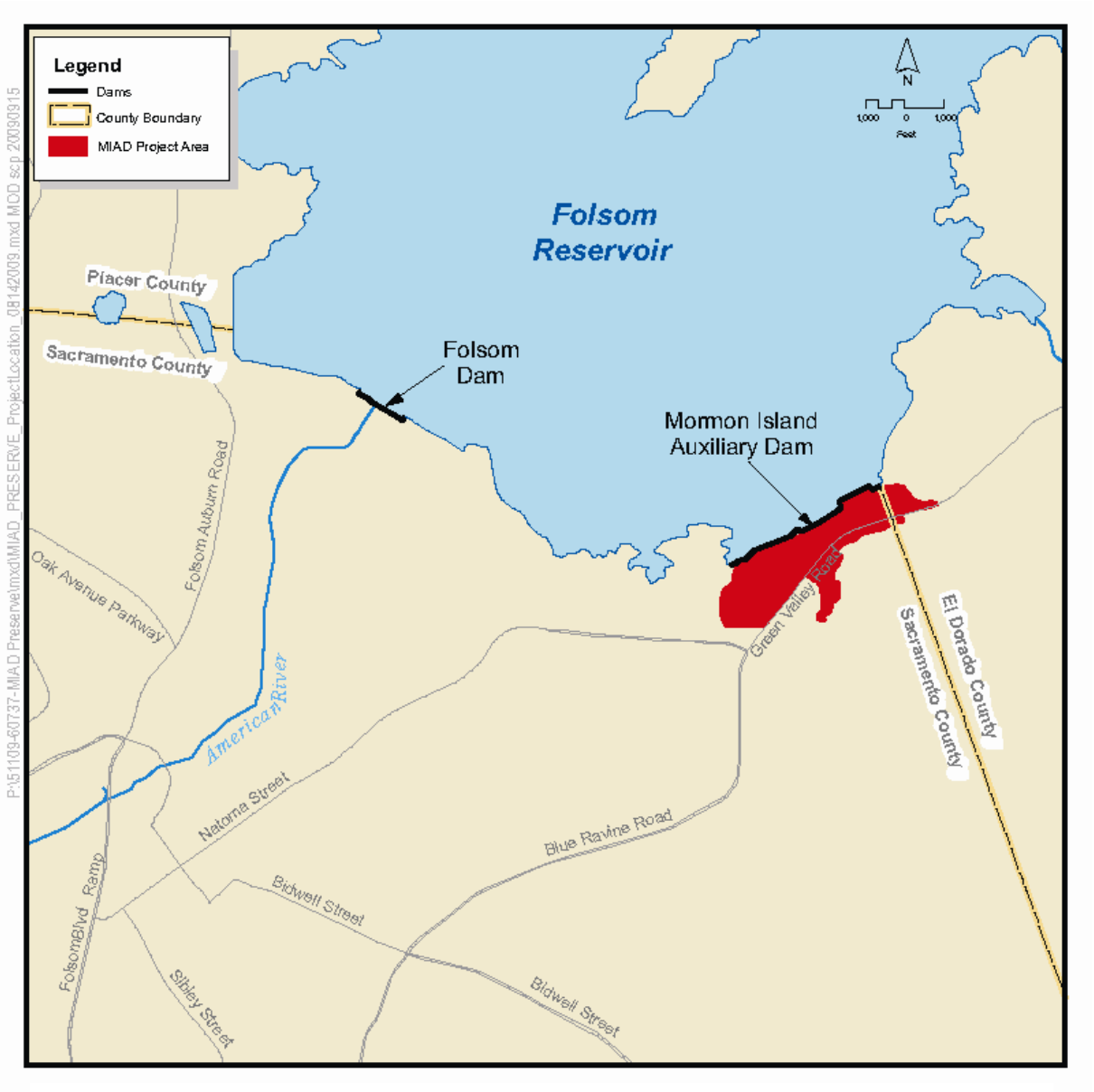

Figure ES-2. Mormon Island Auxiliary Dam Study Area

The study area also includes approximately 141 acres of land at Mississippi Bar on the western shore of Lake Natoma, in Sacramento County. The site is located just east of the Sunset Avenue and Hazel Avenue intersection, south of the community of Orangevale. While only 80 acres of land are proposed for habitat mitigation at this site, the study area for cultural resources was expanded to include 141 acres due to the extent of the historic mine tailings at the site. Figure ES-3 shows the study area for Mississippi Bar.

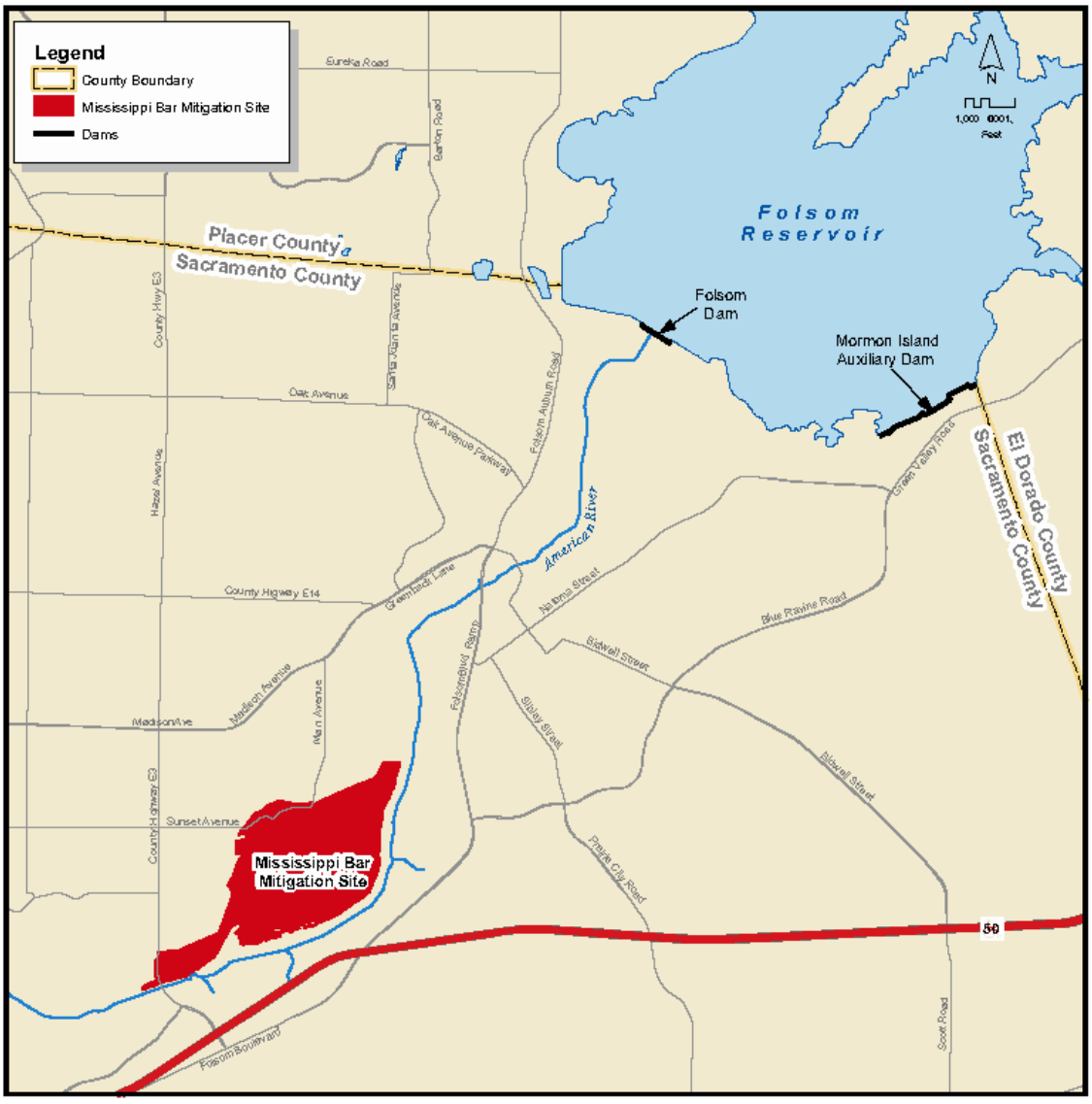

Figure ES-3. Mississippi Bar Study Area

Purpose and Need/Project Objectives

The specific purpose and need for this Supplemental EIS/EIR is presented below. The overall purpose and need for the Folsom DS/FDR Project, including the MIAD Modification Project, remains the same as described in the original Folsom DS/FDR Draft EIS/EIR of December 2006.

Purpose and Need

There is a need to expeditiously implement engineering measures for MIAD in order to reduce potential failure due to seismic and static conditions. There is also a need to complete mitigation measures that Reclamation has committed to in the RODs by developing Mississippi Bar into a habitat mitigation site. The purpose of the MIAD Modification Project is to reduce static and seismic risks associated with MIAD to improve public safety. The purpose of the habitat mitigation at Mississippi Bar is to mitigate for impacts to habitat caused by the overall Folsom DS/FDR Project by improving existing habitat or creating new habitat.

Project Objectives

In addition to the underlying purpose of the project above, specific project objectives were developed to meet California Environmental Quality Act (CEQA) guidelines. The CEQA-related objectives include:

- To reduce the static and seismic risks associated with MIAD.
- To complete a portion of the mitigation requirements adopted in the 2007 RODs.

Development and Screening of Preliminary Alternatives

After years of investigations by both Reclamation and the Corps, a series of engineering measures were developed to address the Safety of Dams objectives of hydrologic, seismic, and static risk reduction at Folsom Reservoir, including risk reduction measures for MIAD. The engineering measures were then combined into a set of preliminary alternatives. Construction risk estimates were completed to evaluate the benefits of the preliminary alternatives and to determine if several of the alternatives could be eliminated from consideration. The following list presents the preliminary alternatives considered to address the seismic and static issues associated with MIAD.

No Foundation Treatment with Large Upstream and Downstream Overlay

This would involve placing a large volume of miscellaneous fill excavated from the new Auxiliary Spillway with filter and drain elements. A very large overlay probably would require realignment of Green Valley Road and would affect the Mormon Island Wetland Preserve.

Large Open Excavation and Overlay

This alternative involves excavation of the foundation down to bedrock and replacement of the foundation with a Cement Modified Soil (CMS). An overlay would be placed on the downstream side to address upstream foundation liquefaction. This option would have the highest construction risk, would require a substantial amount of dewatering, and would need to be completed when the reservoir is low. This option would require the temporary relocation of Green Valley Road.

Open Excavation with Single Wall and Overlay

A variation on the deep excavation being considered includes the construction of a structural wall on the Green Valley Road side of the Large Open Excavation option. The amount of material excavated would be reduced due to construction of the wall and would not require relocation of Green Valley Road.

Open Excavation with a Dual Wall System and Overlay

This variation of the Open Excavation option includes the construction of two walls in an effort to minimize the amount of materials required to be removed, and reduce the amount of dewatering required. This dual wall system could be constructed under the existing toe of the dam or just downstream of the existing toe, thus potentially eliminating the need for excavation of the existing dam. The option would increase the duration of construction but would decrease the time needed for dewatering and subsurface excavation work.

Cellular Open Excavation and Overlay

Using excavation methods similar to those used in top down, coffer box, or shaft construction, cellular or cross-lot bracing could occur. This variation of the walled excavation includes either constructing the dual wall system with excavation from the surface in cellular segments with excavators using alternating cells as insitu ground support, or cellular cross-lot bracing construction of a closed wall (sheet pile or soldier pile) type system. This option would reduce the materials that would need to be removed, reduce the size of the dewatering system, could eliminate the construction risk to the dam, and would have less environmental impacts.

Jet Grouting and Overlay

Jet grouting is a method of increasing the strength of weak or loose materials in the foundation of structures or dams. Jet grouting consists of drilling to the lower zone to be strengthened, and injecting a grout mixture through a rotary nozzle that once sets up, solidifies the material to the foundation.

Alternatives Eliminated from Further Evaluation

The preliminary alternatives were screened and ranked according to cost, feasibility, construction risk, environmental impacts, and ability to meet project objectives. Those that ranked the highest were carried on for further consideration. Jet grouting, large downstream overlay, small downstream overlay, and excavate and replace were the four alternatives that were carried on and analyzed in the Folsom DS/FDR EIS/EIR. After the release of the Folsom DS/FDR EIS/EIR, several additional alternatives were eliminated from further evaluation based on the ranking system and testing that was performed to determine feasibility.

No Foundation Treatment with Large Upstream and Downstream Overlay

The large overlay was determined to be technically infeasible due to the large quantities of material required to construct the large overlay to meet current safety standards. This alternative would still require excavation and replacement of the foundation and would therefore not reduce construction risk. Additionally, the environmental effects of such a large overlay would be high because of the impacts to Mormon Island Wetland Preserve and relocation of Green Valley Road.

Jet Grouting with Overlay

The results of a field program conducted in the summer of 2007 indicated the alternative is technically and economically unviable. A limited field program was initiated in 2007 to optimize design parameters in anticipation of full implementation. Pre-test design assumptions expected the jet grouting method to create overlapping circular cementitious columns with a uniform size from eight to twelve feet in diameter. Actual performance experienced in the field test program was technically insufficient with results of irregular dimensions at less than two feet and significant cracking and migration of the grout under pressure. These results indicated the methodology was not viable at the site, it may have actually increased the dam safety risk, and that the diameters achieved were economically not viable.

Project Description

There are four action alternatives and a No Action/No Project Alternative analyzed in this Supplemental EIS/EIR. Each of the four action alternatives would include the same Mississippi Bar element.

The MIAD modifications would occur in two phases; 1) foundation treatment on the downstream side of MIAD that would involve removal and replacement of the downstream foundation materials, and 2) placement of the overlay with filter and drain elements. The principle difference among the four action alternatives being evaluated is the use of structural walls during excavation to reduce the construction risk, amount of construction water handling, excavated

footprint exposure, and environmental impacts of the excavation. Table ES-1 shows the components of the action alternatives and the No Action/No Project Alternative.

Table ES-1. Alternative Components

Alternative	Excavation Method	Overlay	Temporary Green Valley Road Relocation	Total Duration of Construction (Months)	Maximum Dimension of Open Excavation (at any given time) (LxW in feet)	Maximum Duration of Open Excavation (Months)	Mississippi Bar Mitigation
Alternative 1	Large Open Cut	Yes	Yes	38	2,000 x 350	9	Up to 80 acres
Alternative 2	Open Cut with Single Wall	Yes	No	38	2,000 x 200	9	Up to 80 acres
Alternative 3	Open Cut with Dual Wall System	Yes	No	38	1,500 x 100	18	Up to 80 acres
Alternative 4	Cellular Construction (Multiple Walls)	Yes	No	38	300 x 60[(1)]	18	Up to 80 acres
No Action/ No Project Alternative	None	None	No	None	None	None	Mitigation fulfilled at another site

[(1)] There would be a maximum of 5 cells (60 feet x 60 feet for each cell) open at any given time.

No Action/No Project Alternative

No Action/No Project Alternative would result in no construction and no seismic or static improvements to MIAD. This alternative would not meet the current dam safety objectives of Reclamation. No mitigation efforts would occur at Mississippi Bar under the No Action/No Project Alternative; however mitigation would need to be completed elsewhere in order for Reclamation to meet their Folsom DS/FDR Record of Decision requirements.

Alternative 1 – Large "Open Cut" Excavate and Replace

Alternative 1 – Large "Open Cut" Excavate and Replace and Overlay would require excavation of a very large trench approximately 2,000 feet long and 350 feet wide, with a varying depth (from existing dam surface to bottom of trench) of approximately 50 to 70 feet (See Figure ES-4). The foundation would be replaced with CMS and compacted fill. A large dewatering well system would be constructed to continuously dewater the MIAD foundation throughout excavation and replacement of the foundation. This alternative would result in the largest open trench of the four action alternatives. It is the only alternative that would require the temporary relocation of Green Valley Road south into the

Mormon Island Wetland Preserve area. Excavation under Alternative 1 is expected to take 10 months to complete, but may require up to an eight month break for safety reasons if reservoir water elevations are high. Timing of this alternative would be crucial to ensure public safety as construction would need to be completed when the reservoir is low.

After the foundation replacement, placement of the overlay, filters, and drains would commence. The existing downstream shell would be removed and the filters would be installed by placing a layer of processed fine and coarse filter materials of specified gradation over the exposed slope of the earthen structure. After the filters and drains are installed, placement of material for the overlay would occur. This material would be obtained from existing stockpiles.

Alternative 2 – Single Wall Excavate and Replace

Alternative 2 – Single Wall Excavate and Replace and Overlay involves a variation on the open excavation being considered under Alternative 1; construction of a structural wall on the Green Valley Road side of the open excavation. The wall would prevent relocation of Green Valley Road and would decrease the size of the excavation. The wall would also help to reduce the quantity of groundwater that would need to be removed to keep the excavation dry. The placement of the overlay with filters and drains would remain the same as described for Alternative 1.

Alternative 3 – Open Cut Excavate and Replace with Dual Wall System

Alternative 3 - Open Cut Excavation with Dual Wall System and Overlay includes the construction of two walls (one near Green Valley Road, and one closer to MIAD) in an effort to substantially minimize dewatering and the amount of materials required to be removed. The MIAD wall would contribute to supporting MIAD, and may eliminate the need to strip off a portion of the downstream dam toe, if the block can be shifted south. The Green Valley Road wall would eliminate the need to relocated Green Valley Road. The wall system would require modification of the means and methods of excavation. This would increase the total excavation time (21 months) compared to Alternatives 1 and 2 (10 months), but it could be completed year round regardless of reservoir elevations.

Alternative 4 – Cellular Excavate and Replace

Alternative 4 – Cellular Open Excavation and Overlay would involve the creation of “cells” to close off an area that could be excavated independently of other cells. It is expected that a maximum of five cells would be open at any given time. The cells would allow excavation of one small area of the foundation at a time, rather than the larger open cut excavation described under Alternative 1. This alternative would greatly reduce the construction risk as it would limit the size of the open cut excavation; however, it would increase the duration of the excavation compared to Alternatives 1 and 2.

Mississippi Bar Mitigation Site

The site at Mississippi Bar would be used to complete riparian woodland and wetland habitat mitigation for the Folsom DS/FDR Project and could also be used to address mitigation that may be required for the actions proposed in this Supplement. Each of the four action alternatives discussed above would include the same Mississippi Bar component. The Mississippi Bar mitigation component would be completed in three phases, discussed below.

Phase 1 Riparian Woodland Mitigation

Reclamation would create up to 80 acres of riparian woodland habitat, mainly on DPR property at Mississippi Bar. Mitigation efforts would concentrate on those areas that have not recovered from past mining activities. Reclamation would re-contour the land to establish more natural drainage patterns and would restore native riparian vegetation. This may be accomplished over several seasons.

Phase 2 Culvert Replacement, Channel Widening, Mid-Channel Dredging

Consistent with creating a functional seasonal wetland, Reclamation proposes to develop approximately five acres of seasonal wetlands by replacing an existing 48 inch diameter culvert with a large arch culvert, widening the channel, dredging mid-channel, and breaching an area under an existing road.

Phase 3 Seasonal Wetland Mitigation

Seasonal wetland vegetation would be enhanced along the margins of the proposed channel widening. All areas would be planted with plant communities similar to existing native vegetation found throughout the Lake Natoma shoreline and lagoons.

The new habitat would be irrigated and monitored for up to five years, until it becomes established.

Environmental Consequences/Environmental Impacts

The environmental consequences of the MIAD modifications are presented in Table ES-2 by alternative. The Mississippi Bar impacts would be the same under each of the four action alternatives and are presented in Table ES-3.

Table ES-2. Environmental Impacts of Mormon Island Auxiliary Dam Modifications

Environmental Consequence/ Environmental Impact	No Action/ No Project Alternative	Significance				Potential Environmental Commitment/ Mitigation Measure
		Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Hydrology, Water Quality, and Flood Control						
Stormwater runoff from the construction site could degrade water quality	NI	LTSWM	LTSWM	LTSWM	LTSWM	**WQ-1:** NPDES General Construction Permit and SWPPP.
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
Groundwater						
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

Table ES-2. Environmental Impacts of Mormon Island Auxiliary Dam Modifications

Environmental Consequence/ Environmental Impact	No Action/ No Project Alternative	Significance				Potential Environmental Commitment/ Mitigation Measure
		Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Air Quality						
Unmitigated Emissions						
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 NO_X 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

Table ES-2. Environmental Impacts of Mormon Island Auxiliary Dam Modifications

Environmental Consequence/ Environmental Impact	No Action/ No Project Alternative	Significance				Potential Environmental Commitment/ Mitigation Measure
		Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Mitigated Emissions						
Exceed NO_x threshold of 85 lbs per day.	NI	SU	SU	SU	SU	NO_X mitigation fee required from SMAQMD
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	None Required
Exceed CO 100 tpy de minimis threshold	NI	LTS	LTS	LTS	LTS	None Required
Biological Resources						
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

Table ES-2. Environmental Impacts of Mormon Island Auxiliary Dam Modifications

Environmental Consequence/ Environmental Impact	No Action/ No Project Alternative	Significance				Potential Environmental Commitment/ Mitigation Measure
		Alternative 1	Alternative 2	Alternative 3	Alternative 4	
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
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
Soils, Minerals, and Geological Resources						
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

Table ES-2. Environmental Impacts of Mormon Island Auxiliary Dam Modifications

Environmental Consequence/ Environmental Impact	No Action/ No Project Alternative	Significance				Potential Environmental Commitment/ Mitigation Measure
		Alternative 1	Alternative 2	Alternative 3	Alternative 4	
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
Visual Resources						
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

Table ES-2. Environmental Impacts of Mormon Island Auxiliary Dam Modifications

Environmental Consequence/ Environmental Impact	No Action/ No Project Alternative	Significance				Potential Environmental Commitment/ Mitigation Measure
		Alternative 1	Alternative 2	Alternative 3	Alternative 4	
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
Transportation and Circulation						
Disruption of traffic from relocation of Green Valley Road	NI	LTS	NI	NI	NI	None Required
ADT Increase above 2%	NI	LTS	LTS	LTS	LTSWM	**T-1:** Peak Hour Capacity Analysis, Roadway Improvements, Traffic Modifications **T-2:** Transportation Management Plan **T-3:** Signage
V/C Increase greater than 0.05. for any roads currently experiencing LOS F	NI	NI	NI	NI	NI	None Required
Increase risk of collisions	NI	LTSWM	LTSWM	LTSWM	LTSWM	**T-1:** Peak Hour Capacity Analysis, Roadway Improvements, Traffic Modifications **T-2:** Transportation Management Plan **T-3:** Signage
Noise						
Construction Noise						
Incremental daytime noise increases that exceed 5dBA	SU	LTS	LTS	LTS	LTS	**N-1:**Noise Control Plan
Incremental nighttime noise increases that exceed 5dBA	SU	LTSWM	LTSWM	LTSWM	LTSWM	**N-1:**Noise Control Plan
Exceed local daytime noise standards	SU	LTSWM	LTSWM	LTSWM	LTSWM	**N-1:**Noise Control Plan
Exceed local nighttime noise standards	SU	LTSWM	LTSWM	LTSWM	LTSWM	**N-1:**Sound Attenuation
Result in substantial vibration to nearby sensitive receptors	NI	LTS	LTS	LTS	LTS	None Required

Table ES-2. Environmental Impacts of Mormon Island Auxiliary Dam Modifications

Environmental Consequence/ Environmental Impact	No Action/ No Project Alternative	Significance				Potential Environmental Commitment/ Mitigation Measure
		Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Transportation Noise						
Increase noise levels from construction traffic by 12dBA or increase peak hour noise levels by 5 dBA	LTS	LTS	LTS	LTS	LTS	None Required
Cultural Resources						
Project construction could lead to adverse effects to known historic properties and/or historical resources	NI	NI	NI	NI	NI	None Required
Project construction could lead to the inadvertent discovery of cultural resources	NI	LTSWM	LTSWM	LTSWM	LTSWM	**CR-1:** Inadvertent Discovery Plan
Land Use, Planning, and Zoning						
Conflict with land use plans, policies, or zoning	SU	LTSWM	NI	NI	NI	**BIO-1:** Tree Protection and Revegetation **BIO-2:** Habitat Loss Avoidance and Compensation
Impacts to existing easements or right-of-ways	NI	LTSWM	LTS	LTS	LTS	**LU-1:** Coordination with City of Folsom and PG&E
Recreation						
Temporary closure or restricted access to Folsom-Brown's Ravine Trail atop MIAD	NI	LTSWM	LTSWM	LTSWM	LTSWM	**RC-1***:* Restoration of any damaged trails after construction **RC-3***:* Establish detours with appropriate signage
Temporary closure or restricted access to Mormon Island Wetland Preserve from Green Valley Road temporary relocation	NI	SU during construction, LTSWM after construction.	NI	NI	NI	**RC-1***:* Restoration of any damaged trails after construction
Temporary closure or restricted access to Mormon Island Cove	NI	LTS	LTS	LTS	LTS	None Required
Detention ponds would result in closure or restricted access to trails west of Mormon Island Wetland Preserve	NI	LTSWM	LTSWM	LTSWM	LTSWM	**RC-3***:* Establish detours with appropriate signage

Table ES-2. Environmental Impacts of Mormon Island Auxiliary Dam Modifications

Environmental Consequence/ Environmental Impact	No Action/ No Project Alternative	Significance				Potential Environmental Commitment/ Mitigation Measure
		Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Displace visitors and substantially contribute to overcrowded conditions at other local and regional recreation sites	NI	LTS	LTS	LTS	LTS	None Required
Public Services and Utilities						
Need for electricity during construction	NI	LTS	LTS	LTS	LTS	None Required
Relocation of PG&E gas lines	NI	LTSWM	NI	NI	NI	**UT-1:** Coordination with City of Folsom and PG&E prior to relocation of gas line
Impacts to existing security services	NI	NI	NI	NI	NI	None Required
Impacts to existing fire services	NI	NI	NI	NI	NI	None Required
Impacts to existing recreation services	NI	NI	NI	NI	NI	None Required
Temporary generation of solid waste during construction	NI	LTS	LTS	LTS	LTS	None Required
Public Health and Safety						
Construction hazards to public safety	NI	LTSWM	LTSWM	LTSWM	LTSWM	**PHS-1**: Public Safety Management Plan
Hazards associated with dam safety	SU	LTSWM	LTSWM	LTSWM	LTSWM	**PHS-2:** Evaluation of weather and reservoir conditions
Release of HTRW encountered in soil	NI	LTSWM	LTSWM	LTSWM	LTSWM	**PHS-1**: Public Safety Management Plan **PHS-3:** Worker Health and Safety Plan and **GR-1:** Asbestos Dust Mitigation Plan **WQ-1**: NPDES Permit and SWPPP
Accidental release of construction-related HTRW	NI	LTSWM	LTSWM	LTSWM	LTSWM	**PHS-4:** Spill Plan
Wildland Fires	NI	LTSWM	LTSWM	LTSWM	LTSWM	**PHS-5:** Fire Management Plan
Emit hazardous emissions or handle hazardous materials within one-quarter mile of a school	NI	NI	NI	NI	NI	None Required

Table ES-2. Environmental Impacts of Mormon Island Auxiliary Dam Modifications

Environmental Consequence/ Environmental Impact	No Action/ No Project Alternative	Significance				Potential Environmental Commitment/ Mitigation Measure
		Alternative 1	Alternative 2	Alternative 3	Alternative 4	
Indian Trust Assets						
Impacts to Indian Trust Assets	NI	NI	NI	NI	NI	None Required
Environmental Justice						
Disproportionate impacts to low income and minority populations	NI	NI	NI	NI	NI	None Required
Efforts to include low income and minority populations in public outreach activities	NI	NI	NI	NI	NI	None Required

Key:
NPDES = National Pollution Discharge Elimination System
SWPPP = Storm Water Pollution Prevention Plan
HTRW = Hazardous, Toxic, and Radiological Waste
SMAQMD = Sacramento Metropolitan Air Quality Management District

NI = No Impact
LTS = Less Than Significant
LTSWM = Less Than Significant with Mitigation
SU = Significant and Unavoidable
B = Beneficial
PS = Potentially Significant After Mitigation
ADT = Average daily traffic
V/C = volume to capacity

Table ES-3. Environmental Impacts of Mississippi Bar Habitat Mitigation

Environmental Consequence/ Environmental Impact	Level of Significance	Potential Environmental Commitment/ Mitigation Measure
Hydrology, Water Quality, and Flood Control		
Stormwater runoff from Mississippi Bar mitigation site could degrade water quality	LTSWM	**WQ-1:** NPDES General Construction Permit and SWPPP
Installation of a larger culvert at Mississippi Bar could degrade water quality in Lake Natoma	LTS	None Required
Installation of a larger culvert at Mississippi Bar would alter hydrology	LTS	None Required
Installation of a culvert at Mississippi Bar would change water levels in the lagoons	LTS	None Required
Groundwater		
Use of groundwater for irrigation at Mississippi Bar would affect groundwater levels	LTS	None Required
Air Quality		
Temporary air quality impacts from Mississippi Bar mitigation actions.	LTS	None Required
Biological Resources		
Impacts to special-status plant species	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	LTSWM	**BIO-3:**Biological Awareness Training **BIO-5:** Special Status Vernal Pool Surveys
Impacts to the valley elderberry longhorn beetle	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	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	LTS	**BIO-3:**Biological Awareness Training **BIO-8:** Bird and Bat Surveys
Direct and indirect impacts to vegetation	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.	LTSWM	**BIO-2:** Habitat Loss Avoidance and Compensation **BIO-3:**Biological Awareness Training
Construction would result in direct impacts to vernal pools	NI	None Required
Interfere with the movement of wildlife species, wildlife corridors, or nursery sites	LTS	None Required
Conflict with local policies or ordinances protecting natural resources	NI	None Required
Conflict with existing conservation plans	NI	None Required

Table ES-3. Environmental Impacts of Mississippi Bar Habitat Mitigation

Environmental Consequence/ Environmental Impact	Level of Significance	Potential Environmental Commitment/ Mitigation Measure
Soils, Minerals, Geological Resources		
Impacts to geology, soils, and mineral resources at Mississippi Bar	LTS	None Required
Visual Resources		
Seasonal wetland and riparian habitat improvements at Mississippi Bar would impact views in the southern portion of Lake Natoma	LTS/B	None Required
Transportation and Circulation		
Temporary traffic from Mississippi Bar habitat mitigation	LTS	None Required
Noise		
Temporary construction noise from Mississippi Bar mitigation actions.	LTS	None Required
Temporary transportation noise from Mississippi Bar mitigation actions.	LTS	None Required
Cultural Resources		
Project construction could lead to adverse effects to known historic properties and/or historical resources	LTSWM	**CR-1**: Development of Agreement Document
Project construction could lead to the inadvertent discovery of cultural resources	LTSWM	**CR-2:** Inadvertent Discovery Plan
Land Use, Planning, and Zoning		
Conflict with land use plans, policies, or zoning	NI	None Required
Impacts to existing easements or right-of-ways	LTS	None Required
Recreation		
Temporary area closures at Mississippi Bar during construction.	LTSWM	**RC-2***:* Signage and public announcements of all closures during construction.
Temporary closure of existing bike trail at Mississippi Bar	LTSWM	**RC-3***:* Establish detours with appropriate signage
Installation of fencing may restrict recreation at Mississippi Bar	LTS	None Required
Removal and/or relocation of informal trails at Mississippi Bar	LTSWM	**RC-3***:* Establish detours with appropriate signage
Creation of new recreation opportunities at Mississippi Bar	B	None Required
Public Services and Utilities		
Impacts to utilities and services	NI	None Required
Public Health and Safety		
Construction hazards to public safety	LTSWM	**PHS-1**: Public Safety Management Plan
Release of HTRW encountered in soil	LTSWM	**PHS-1**: Public Safety Management Plan **PHS-3:** Worker Health and Safety Plan
Accidental release of construction-related HTRW	LTSWM	**PHS-4:** Spill Plan
Wildland Fires	LTSWM	**PHS-5:** Fire Management Plan
Emit hazardous emissions or handle hazardous materials within one-quarter mile of a school	NI	None Required

Table ES-3. Environmental Impacts of Mississippi Bar Habitat Mitigation

Environmental Consequence/ Environmental Impact	Level of Significance	Potential Environmental Commitment/ Mitigation Measure
Indian Trust Assets		
Impacts to Indian Trust Assets	NI	None Required
Environmental Justice		
Disproportionate impacts to low income and minority populations	NI	None Required
Efforts to include low income and minority populations in public outreach activities	NI	None Required

Key:
NI = No Impact
LTS = Less Than Significant
LTSWM = Less Than Significant with Mitigation
SU = Significant and Unavoidable
B = Beneficial
NPDES = National Pollutant Discharge Elimination System
SWPPP = Storm Water Pollution Prevention Plan
HTRW = Hazardous, Toxic, and Radiological Wastes

Compliance with Applicable Laws and Regulations

This Supplemental EIS/EIR has been developed to comply with National Environmental Policy Act (NEPA) and CEQA requirements. The MIAD Modification Project would comply with all Federal, State, and local laws and permitting requirements as shown in Table ES-4 below.

Table ES-4. Applicable Laws, Regulations, and Executive Orders, Plans, and Policies

Applicable Laws, Regulations, Executive Orders, Plans, and Policies	Method of Compliance
Federal	
National Environmental Policy Act	Supplemental EIS/EIR
Endangered Species Act	Consultation with USFWS, Amendment to existing Biological Opinion
Fish and Wildlife Coordination Act	Consultation with USFWS, Amendment to existing Coordination Act Report
National Historic Preservation Act	Consultation with SHPO
Clean Air Act	Addressed in Supplemental EIS/EIR
Executive Order 12898 – Environmental Justice	Addressed in Supplemental EIS/EIR
Clean Water Act	CWA 404, 401, 402 permits
Migratory Bird Treaty Act	Addressed in Supplemental EIS/EIR
Bald and Golden Eagle Protection Act	Addressed in Supplemental EIS/EIR
Executive Order 11990 – Protection of Wetlands	Addressed in Supplemental EIS/EIR, CWA 404 permit
State	
California Environmental Quality Act	Supplemental EIS/EIR
California Endangered Species Act	Addressed in Supplemental EIS/EIR
Porter-Cologne Water Quality Control Act	Addressed in Supplemental EIS/EIR, CWA 401, 402 permits
Airborne Toxic Control Measures	Addressed in Supplemental EIS/EIR, Approved Dust Plan
California Fish and Game Code Section 1800-1802	Addressed in Supplemental EIS/EIR
California Fish and Game Code Section 3503	Addressed in Supplemental EIS/EIR
California Fish and Game Code Section 3511 and 5050	Addressed in Supplemental EIS/EIR
Native Plant Protection Act (California Fish and Game Code Section 1900 et Seq.)	Addressed in Supplemental EIS/EIR
Lake and Streambed Alteration Agreement (California Fish and Game Code Section 1602)	Addressed in Supplemental EIS/EIR
California Clean Air Act	Addressed in Supplemental EIS/EIR
Local	
City of Folsom General Plan (Noise and Traffic)	Addressed in Supplemental EIS/EIR
Sacramento County General Plan (Noise and Traffic)	Addressed in Supplemental EIS/EIR
El Dorado County General Plan (Noise and Traffic)	Addressed in Supplemental EIS/EIR
El Dorado County Air Quality Management District Fugitive Dust and Asbestos Rules	Approved Dust Plan
Sacramento Metropolitan Air Quality Management District Fugitive Dust and Asbestos Rules	Approved Dust Plan

Key:
CWA = Clean Water Act
EIS/EIR = Environmental Impact Statement/Environmental Impact Report
SHPO = State Historic Preservation Office
USFWS = U.S. Fish and Wildlife Service

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Abbreviations and Acronyms

AB	Assembly Bill
ACHP	Advisory Council on Historic Preservation
ADT	average daily traffic/average daily trips
AF	acre-foot/acre-feet
AHERA	Asbestos Hazard Emergency Response Act
amsl	above mean sea level
APCD	Air Pollution Control District
APE	Area of Potential Effect
ARPP	American River Parkway Plan
AQMD	Air Quality Management District
ATCM	Airborne Toxic Control Measure
BA	Biological Assessment
BACT	Best Available Control Technology
BLM	Bureau of Land Management
bgs	below ground surface
bls	below land surface
BMPs	best management practices
BO	Biological Opinion
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CAR	Coordination Act Report
CARB	California Air Resources Board
CAS	Corrective Action Study
CCAA	California Clean Air Act
CCAO	Central California Area Office
CCAR	California Climate Action Registry
CCR	California Code of Regulations
CCTS	Central California Taxonomic System
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act

CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CMS	cement modified soil
CNDDB	California Natural Diversity Database
CNEL	community equivalent noise level
CNPS	California Native Plant Society
CO	carbon monoxide
Corps	United State Army Corps of Engineers
CRHR	California Register of Historical Resources
CUPA	Certified Unified Program Agencies
CVFPB	Central Valley Flood Protection Board
CVP	Central Valley Project
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
cy	cubic yards
dB	decibel
dBA	A-weighted decibel
DFG	California Department of Fish and Game
DO	dissolved oxygen
DOI	Department of the Interior
DPR	California Department of Parks and Recreation
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EA/IS	Environmental Assessment/Initial Study
EDCAQMD	El Dorado County Air Quality Management District
EGR	exhaust gas recirculation
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FLSRA	Folsom Lake State Recreation Area
Folsom DS/FDR	Folsom Dam Safety and Flood Damage Reduction
FR	Federal Register
FWCA	Fish and Wildlife Coordination Act
GHG	greenhouse gas
GMP	groundwater management plan

gpm	gallons per minute
GWP	global warming potential
HCM	Highway Capacity Manual
HMTA	Hazardous Materials Transportation Act
HRA	health risk assessment
H_2S	hydrogen sulfide
HTRW	hazardous, toxic, and radiological waste
IPCC	International Panel on Climate Change
ITA	Indian Trust Assets
l	litre
lbs	pounds
LOS	level of service
MCE	maximum credible earthquake
MCL	maximum contaminant level
mg	milligrams
µg	micrograms
$\mu g/m^3$	micrograms per cubic meter
M&I	municipal and industrial
MIAD	Mormon Island Auxiliary Dam
ml	milliliters
Mph	miles per hour
MPN	most probable number
MPO	Metropolitan Planning Organization
msl	mean sea level
MTBA	Migratory Bird Treaty Act
MT CO_2e	metric tons of carbon dioxide equivalent
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAC	Noise Abatement Criteria
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Plan
NCCPA	Natural Community Conservation Planning Act
NCIC	North Central Information Center
NEPA	National Environmental Policy Act
ng/m^3	nanograms per cubic meter
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide

NO_x	nitrogen oxides
NOA	Notice of Availability/Naturally Occurring Asbestos
NOD	Notice of Determination
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NRHP	National Register of Historic Places
NS	no standard
O_3	ozone
O&M	operation and maintenance
OPR	Office of Planning and Research
Pb	lead
PG&E	Pacific Gas and Electric
P.L.	Public Law
$PM_{2.5}$	particulate matter smaller than 2.5 microns
PM_{10}	particulate matter smaller than 10 microns
ppm	parts per million
ppmy	parts per million per year
PRC	public resources code
PRG	Public Remediation Goals
RCRA	Resource Conservation and Recovery Act
Reclamation	United States Department of the Interior, Bureau of Reclamation
RMP	Resource Management Plan
ROD	Record of Decision
ROG	reactive organic gasses
RWD	Right Wing Dam
RWQCB	Regional Water Quality Control Board
SACOG	Sacramento Area Council of Governments
SAFCA	Sacramento Area Flood Control Agency
SARA	Superfund Amendment Reauthorization Act
SCH	State Clearinghouse
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SJWD	San Juan Water District
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMS	Scenery Management System

SMUD	Sacramento Municipal Utility District
SO_2	sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SVAB	Sacramento Valley Air Basin
SWTR	Surface Water Treatment Rule
TAC	toxic air contaminants
TAF	thousand acre feet
TDS	total dissolved solids
TEC	threshold effect level
TMDL	total maximum daily loads
TSS	total suspended solids
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
V/C	volume to capacity
VELB	valley elderberry longhorn beetle
VOC	volatile organic carbon
WAPA	Western Area Power Authority
WDL	Water Data Library
WQCP	Water Quality Control Plan

Chapter 1
Introduction

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and the Sacramento Area Flood Control Agency (SAFCA) are proposing changes to the dam safety modifications originally selected for Mormon Island Auxiliary Dam (MIAD) in the March 2007 *Folsom Dam Safety and Flood Damage Reduction* (DS/FDR) *Final Environmental Impact Statement/Environmental Impact Report* (EIS/EIR).

The analysis in the Folsom DS/FDR EIS/EIR considered several methods to modify MIAD to achieve Reclamation's risk standards for dam safety. Reclamation's May 2007 *Record of Decision (ROD) - Folsom Dam Safety of Dams and Security Upgrades Projects* documented that the preferred alternative for the MIAD modification was to place an overlay and seepage control filters with drains on the downstream (terrestrial) side of MIAD (to address seismic and static issues), and to reinforce the MIAD foundation using a construction technique known as jet grouting (to address seismic issues).

Subsequent investigations into the feasibility of the MIAD Modification Project, as conceived in the Folsom DS/FDR EIS/EIR, have indicated that the design will need to be changed to achieve Reclamation's existing risk standards for dam safety. Specifically, the utilization of jet grouting to stabilize the foundation of MIAD is unlikely to meet those risk standards. This Supplemental EIS/EIR addresses additional techniques to stabilize the MIAD foundation in order to meet current dam safety standards.

Also proposed in this document is the development of a mitigation site for the Folsom DS/FDR Project. As described in the 2007 ROD, Reclamation is responsible for completing mitigation for habitat impacted by construction of the Folsom DS/FDR Project. At the time of the ROD, Reclamation had not identified the location for this mitigation. Reclamation is now proposing to create and/or improve habitat on land owned by the California Department of Parks and Recreation (DPR) at Mississippi Bar, on the western shore of Lake Natoma. SAFCA is proposing to enter into an agreement with Reclamation to accept responsibility for long-term operation and maintenance (O&M) of this mitigation site as part of their role in the overall Folsom DS/FDR Project; however no long-term agreement is currently in place. This Supplement addresses impacts associated with the development of Mississippi Bar as a mitigation site.

Reclamation, the National Environmental Policy Act (NEPA) Lead Agency and SAFCA, the California Environmental Quality Act (CEQA) Lead Agency, have

prepared this Supplemental EIS/EIR to comply with NEPA and CEQA. Both the MIAD dam safety modifications and the Mississippi Bar mitigation site proposed in this document are features of the Folsom DS/FDR Project and this analysis will supplement the March 2007 Folsom DS/ FDR Final EIS/EIR.

1.1 Changes that Require a Supplement

A Supplement is needed because the preferred alternative for MIAD selected in the Folsom DS/FDR Final EIS/EIR and ROD has been determined to be infeasible. Tests show that jet grouting will not be sufficient to stabilize the MIAD foundation and will not meet Reclamation dam safety standards. The new methods proposed in this document to stabilize the MIAD foundation have the potential to generate environmental effects not previously addressed. Additionally, a Supplement is required to address potential environmental effects associated with completing mitigation for the Folsom DS/FDR Project. The environmental effects of the mitigation were not addressed in the previous environmental document as the location for the mitigation had not been determined.

This Supplement has been prepared in accordance with the provisions of NEPA and CEQA. The new and additional information that supplements the 2007 Folsom DS/FDR Final EIS/EIR complies with the Federal Council on Environmental Quality (CEQ) Regulations Section 1502.9(c) regarding preparation of a Supplement to an EIS, and CEQA Guidelines Section 15163(a) regarding preparation of a Supplement to an EIR.

Portions of this Supplement draw directly from the information and analyses contained in the Folsom DS/FDR Final EIS/EIR. The Folsom DS/FDR Final EIS/EIR is hereby incorporated by reference, and is available for review at: http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=1808

1.2 Project Background and History

The MIAD Modification Project and the Mississippi Bar mitigation site are features of the larger Folsom DS/FDR Project currently underway by Reclamation, the U.S. Army Corps of Engineers (Corps), and the Corps' non-Federal sponsors, the Central Valley Flood Protection Board (CVFPB) and SAFCA, to address hydrologic, static, and seismic issues at Folsom Dam and Reservoir. This section discusses the overall Folsom DS/FDR Project and how it relates to the proposed MIAD modifications and the Mississippi Bar mitigation site.

1.2.1 Folsom Dam Safety and Flood Damage Reduction Project

As a part of their responsibilities, Reclamation and the Corps have determined that the Folsom Facility[1] requires structural improvements to increase overall public safety above existing conditions including addressing dam safety and security issues. The improvements will enhance the facility's ability to reduce flood damages posed by hydrologic (flood), seismic (earthquake), and static (seepage) events. These events have a low probability of occurrence in a given year; however, due to the large population downstream of Folsom Dam, modifying the facilities is prudent and necessary to improve public safety above current baseline conditions and meet current safety standards.

Reclamation has identified the need for expedited action to reduce hydrologic, static, and seismic risks under its Safety of Dams (SOD) Program and security issues under its Security Program. These identified risks are among the highest risks for all dams in Reclamation's inventory and the Folsom Facility is among Reclamation's highest priorities within its SOD Program. Additionally, there is a need to upgrade security infrastructure at the Folsom Facility under Reclamation's Safety, Security and Law Enforcement (SSLE) Program. Reclamation's primary interest for participating in the Folsom DS/FDR is to achieve an expedited improvement in overall public protection and the cost sharing benefits of a combined project.

The Corps, in partnership with its non-Federal sponsors, SAFCA and CVFPB, has determined that Folsom Reservoir does not have sufficient release capacity to adequately manage severe flood flows, nor do the downstream levees have sustained capacity to exceed base flood event flows of 145,000 cubic feet per second (cfs). The Corps' non-Federal sponsors have identified the need to reduce the risk of flooding in the Sacramento area. Due to the number and value of the exposed structures and the size of the potentially affected population, Sacramento has been identified as one of the most at risk communities in the nation. Consequently, there is a need to expeditiously reduce this risk through interim and permanent flood damage reduction measures. The goal of the non-Federal sponsors is to safely pass the 200-year computed design flood event, as a minimum objective for Folsom Dam Modifications and Folsom Flood Damage Reduction projects. Pursuit of this goal constitutes the non-Federal sponsors' primary interest for participating in the Folsom DS/FDR actions.

Both Reclamation and the Corps have conducted engineering studies to identify potential corrective measures for the Folsom Facility to alleviate seismic, static, and hydrologic dam safety issues, and flood management concerns. These two Federal agencies have combined their efforts resulting in (1) a Joint Federal Project (JFP) for addressing Reclamation's dam safety hydrologic risk and the

[1] The Folsom Facility refers to Folsom Dam and appurtenant structures, including the Main Concrete Dam, Right and Left Wing Dams, Dikes 1 through 8, and MIAD.

Corps' flood damage reduction objectives and (2) other stand-alone flood damage reduction and dam safety actions to be completed by the respective agencies in a coordinated manner. Table 1-1 shows the actions occurring as part of the overall Folsom DS/FDR Project, the agency responsible for the action, and the concern it addresses at the Folsom Facility.

Table 1-1. Folsom Dam Safety and Flood Damage Reduction Project Elements

Action	Responsible Agency	Concern Addressed	Status
Joint Federal Project - New Auxiliary Spillway	Reclamation and Corps	Dam Safety, Flood Damage Reduction, hydrologic control	Phase 1 complete Phase 2 underway Phase 3 expected to start by Winter 2010
MIAD Foundation Stabilization, Overlay, Filters and Drains	Reclamation	Dam Safety, static and seismic upgrades	Addressed in this document
Left and Right Wing Dams, Dikes 4, 5, and 6 upgrades	Reclamation	Dam Safety, static upgrades	Left and Right Wing Dams, Dikes 5 Complete, Dikes 4 and 6 under construction in Fall 2010
Main Concrete Dam concrete block, pier, and gates reinforcement	Reclamation	Dam Safety, seismic upgrades	In planning stage
Security Improvements	Reclamation	National Security	Ongoing
Existing Spillway Gate Replacement	Corps	Flood Damage Reduction	In planning stage
Facility Raise	Corps	Flood Damage Reduction	In planning stage
Project Mitigation	Reclamation	Dam Safety, Flood Damage Reduction, JFP and MIAD habitat impacts	Addressed in this document; others in planning stage

1.2.1.1 Dam Safety and Security Elements

Reclamation is completing all dam safety and security related elements of the project, which include new filters and drains on Right Wing Dam (RWD), Left Wing Dam (LWD), and Dikes 4, 5, and 6, MIAD foundation stabilization and overlay, and seismic upgrades to the Main Concrete Dam. Reclamation is also upgrading security at the Folsom Facility to meet current National Security requirements as the Folsom Facility has been designated as National Critical Infrastructure. At the time of this document, RWD and LWD work has been completed, work on Dike 5 has been completed, and work on Dikes 4 and 6 is underway. Security upgrades are ongoing.

1.2.1.2 Flood Damage Reduction Elements

The Corps is responsible for completing all flood damage reduction elements of the project, including the replacement of existing spillway gates, and a facility raise. At the time of this document, these actions had not been initiated.

1.2.1.3 Joint Federal Project (Auxiliary Spillway)

The JFP involves construction of a new Auxiliary Spillway to address hydrologic issues at Folsom Reservoir. This action is being completed jointly by Reclamation and the Corps. Phase 1 included excavation of the upper portion of the spillway channel and was completed in 2008 by Reclamation. Phase 2 involves excavation of the lower portion of the channel by Reclamation and is currently underway. Phase 3 will be carried out by the Corps and involves the excavation of the approach channel, lining of the Auxiliary Spillway with concrete, and installation of the six tainter gates. Phase 3 would likely begin while the MIAD modifications proposed in this Supplemental EIS/EIR are under construction.

1.2.1.4 Project Mitigation

Reclamation is responsible for habitat impacts associated with the overall Folsom DS/FDR Project and proposes to complete a portion of project mitigation at Mississippi Bar. The site at Mississippi Bar would be used to complete habitat mitigation for impacts associated with the JFP and could also be used to address mitigation that may be required for the MIAD modifications proposed in this Supplement. At the time of this document, other project mitigation actions are being planned but have not been initiated.

1.2.2 Mormon Island Auxiliary Dam

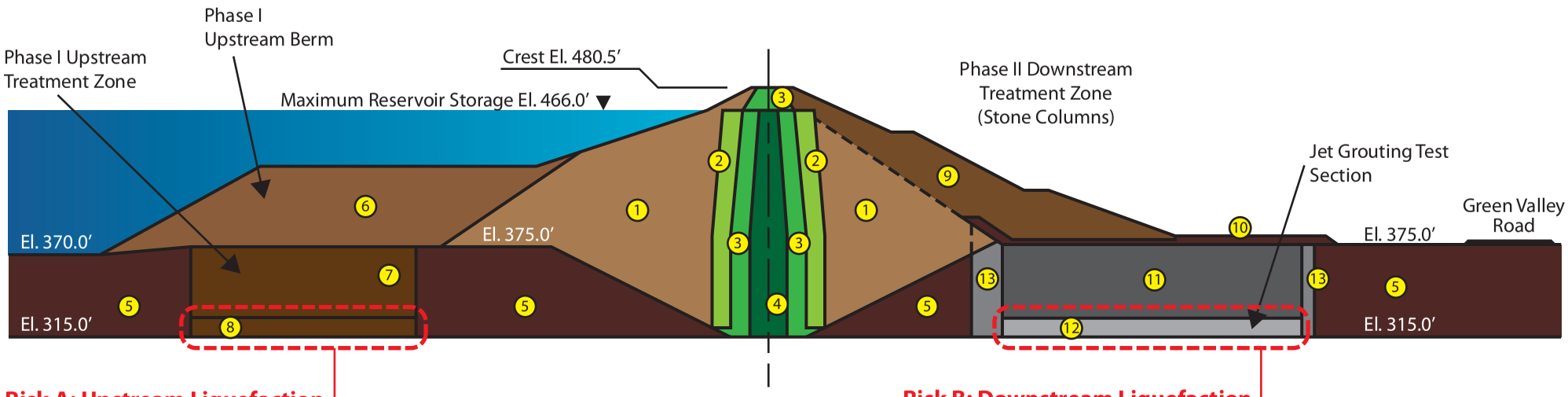
In the late 1980's Reclamation and the Corps determined, using criteria of the Safety of Dams Act, that corrective action was necessary at MIAD. The maximum credible earthquake (magnitude 6.5 at the East Branch of the Bear Mountain Fault, located 8 miles east of MIAD) could cause liquefaction of dredged 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 occurs when the water level in Folsom Reservoir is 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 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).

A detailed history of MIAD and its associated dam safety issues is presented below.

1.2.2.1 Mormon Island Auxiliary Dam Seismic Issues

MIAD was constructed as part of the overall Folsom Dam and Reservoir from 1948 to 1956 by the Corps. O&M of the Folsom Facility was transferred to Reclamation in 1956. 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).

MIAD is classified as a zoned earthfill embankment dam, which means it is a dam constructed of compacted earthen materials with distinct layers or "zones" that contain differing types of materials. The central core of the dam (Zone 4) is a well compacted clay mixture founded on bedrock across the entire length of the dam to prevent seepage (See Figure 1-1). Two transition zones (Zones 3 and 2), both of which are 12 feet wide, are on the upstream and downstream side of the dam and flank the core zone. The first transition zone on either side of the core (Zone 3) consists of decomposed granite, while the second transition zone (Zone 2) is composed of dredge tailings. Zones 2 and 3 make up the filter zones for the dam. Zone 1, on the upstream and downstream side of MIAD, is the outermost part of the dam. This zone is referred to as the shell and is composed of dredged gravels from MIAD core trench excavation and Blue Ravine. Zones 2, 3, and 4 are mainly founded on bedrock. Portions of Zone 1, the upstream and downstream shell, are founded on dredged and undisturbed (undredged) alluvium and weathered rock. Specifically, a 900 foot long segment of the shell is founded on dredged alluvium, a 600 foot long segment has shell founded on undisturbed alluvium, and the remaining length of the dam is founded on weathered rock. The undisturbed alluvial deposits consist of sands and gravels overlain by silty and clayey soils. These were deposited naturally by fluvial processes. The dredged alluvium is a remnant of the gold mining that occurred throughout the area in the early 1900's. Gravels from the river were dredged for their gold content and the tailings were placed back into the channel (Corps 1992).



Risk A: Upstream Liquefaction

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Liquefaction and related phenomena can trigger landslides and cause the collapse of dams.

Risk B: Downstream Liquefaction

Note: Elevations (El.) are shown in Feet

50 0 50 100 150
Feet

Legend

Dam Zones

1. Zone 1 – Shell
2. Zone 2 – Coarse Filter
3. Zone 3 –Fine Filter
4. Zone 4 – Core
5. Untreated dredged tailings

Previous Upstream Modifications

6. Phase I – Berm
7. Phase I – (Dynamic compaction) Upper area
8. Phase I – (Dynamic compaction) Lower area

Previous Downstream Modifications

9. Phase II – Recompacted 1 material
10. Phase II – Drainage blanket
11. Phase II – Upper Bottom Feed Stone Column (BFSC) area
12. Phase II – Lower BFSC area
13. Phase II – BFSC drainage elements

W:\REPORTS\US BoRec\MAID_09\Graphics\Fig1-1_MIAD Previous Mods.ai 07/21/09 JJT

Figure 1-1. Mormon Island Auxiliary Dam Previous Modifications

Beginning in the early 1980's, several investigations were performed to analyze the potential seismic, static, and hydrologic risks at the Folsom Facility. Specific investigations were undertaken at MIAD to study seismic issues associated with the foundation. Phase I of the MIAD investigations occurred in the early 1980's and focused on the shell that was founded on dredged alluvium. Phase II of the MIAD investigations occurred in the early 1990's and focused on the shell material that was founded on the undisturbed alluvium and bedrock. Results of the Phase I MIAD investigations determined that liquefaction[2] could occur in the dredged alluvium beneath MIAD during seismic activity, and could also occur to some extent in the MIAD shell. The Phase II of the MIAD investigations reinforced the Phase I investigation results and concluded that the dredged alluvium underlying the shell in Zone 1, was found to be susceptible to liquefaction during seismic activity. The shell zones founded on undisturbed alluvium and rock were determined not to be susceptible to liquefaction during seismic activity. The MIAD investigation concluded that liquefaction could occur in the dredged alluvium foundation during seismic activity. Remedial action was recommended for the portion of the dam with shells founded on dredged alluvium.

In the 1990s, Reclamation, in cooperation with the Corps, began a program to correct the seismic issues previously identified at MIAD. MIAD Modification Phase I was initiated in 1990 and involved treatment of the upstream foundation materials of MIAD including placement of a new berm on the upstream side of MIAD and dynamic compaction of the upstream foundation. MIAD Modification Phase II occurred from 1993 to 1994 and involved the treatment of the downstream foundation of MIAD by creating stone columns to solidify the foundation. After MIAD Modification Phase II, 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).

In 2007, Reclamation completed the Final EIS/EIR for the Folsom DS/FDR Project to address static, seismic, and hydrologic risks at the Folsom Facility. The Preferred Alternative selected for the project involved jet grouting to treat the foundation at MIAD to address remaining seismic issues. A series of jet grout test sections was performed in 2007 but analysis of the test results indicated that jet grouting did not adequately solidify the foundation. Jet grouting to treat the MIAD foundation has been determined to be infeasible; therefore this Supplemental EIS/EIR will address other options to treat the foundation at MIAD, mainly variations of excavating and replacing the downstream foundation and placement of an overlay to prevent failure of MIAD during seismic activity.

[2] Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Liquefaction and related phenomena can trigger landslides and cause the collapse of dams.

1.2.2.2 Mormon Island Auxiliary Dam Static Issues

In addition to the seismic issues described above, static issues (seepage and piping) have also been identified at MIAD. All earth dams have seepage resulting from water percolating slowly through the dam and its foundation. Seepage must, however, be controlled in both velocity and quantity. If uncontrolled, it can progressively erode soil from the embankment or its foundation, resulting in rapid failure of the dam. Erosion of the soil typically begins at the downstream (dry) side of the embankment, either in the dam proper or the foundation, progressively works toward the reservoir, and eventually develops a "pipe" or direct conduit to the reservoir. This phenomenon is known as "piping".

Seepage failures account for approximately 40 percent of all embankment or dike failures. In order to prevent seepage and piping, filters and drains are installed. Filters consist of a layer of processed material that will allow water to safety pass through an embankment such as MIAD without resulting in internal soil erosion. Drains collect the water and direct it away from the dam structure. New filters and drains are proposed for MIAD to reduce the risk of failure through seepage and piping.

1.2.3 Mississippi Bar Mitigation Site

Mississippi Bar is on the western shore of Lake Natoma, in Sacramento County, California. The Mississippi Bar area has been identified by Reclamation as a potential mitigation site for habitat impacts associated with the overall Folsom DS/FDR Project. Reclamation is currently responsible for the project's impacts to vegetation and wetlands and proposes to complete a portion of this mitigation at Mississippi Bar. This site was chosen because it is already owned by Reclamation and DPR, has the fewest constraints for completion of the mitigation in a reasonable timeframe, and would be consistent the *Folsom Lake State Recreation Area and Folsom Powerhouse State Historic Park Resources Management Plan/General Plan* (Reclamation and DPR 2007) management guidelines for Mississippi Bar. In addition, it is within close proximity to the vegetation and wetlands impacted by the Folsom DS/FDR Project. This site would be used to complete mitigation for impacts associated with the JFP and could also be used to address any potential mitigation that may be required for the MIAD modifications proposed in this Supplement. Reclamation has entered into discussions with DPR for the use of State lands at Mississippi Bar for mitigation purposes, but at this time no formal agreement has been completed. Reclamation and DPR will need to reach a formal agreement on the terms and conditions for the use of State lands, which may or may not include some or all of the proposed actions at Mississippi Bar in this document. If an agreement is not reached, Reclamation will begin to explore alternative mitigation options.

1.2.4 Related Environmental Documents

This section describes related environmental documents that have been completed to date for the overall Folsom DS/FDR Project. Table 1-2 below presents a list of related documents, the agencies associated with them, and the date of their release.

Table 1-2. Related Environmental Documents

Document Title	Agency	Date
Folsom DS/FDR Draft EIS/EIR (Vol. I)	Reclamation, Corps, SAFCA, CVFPB	December 2006
Folsom DS/FDR Draft EIS/EIR (Vol. II Appendices)		
Folsom DS/FDR Final EIS/EIR (Vol. III)	Reclamation, Corps, SAFCA, CVFPB	March 2007
Folsom Dam SOD and Security Upgrades Projects ROD	Reclamation	May 2007
Folsom DS/FDR JFP ROD	Reclamation, Corps	May 2007
Folsom DS/FDR JFP NOD, Statement of Findings, and Findings of Overriding Consideration	CVFPB	July 2007
Draft Supplemental EA/IS to the Folsom DS/FDR EIS/EIR	Reclamation, Corps, SAFCA, CVFPB	February 2008
Final Supplemental EA/IS and FONSI/MND	Reclamation, Corps, SAFCA, CVFPB	April 2008

Key:
CVFPB = Central Valley Flood Protection Board
EA/IS = Environmental Assessment/Initial Study
FONSI = Finding of No Significant Impact
ROD = Record of Decision
NOD = Notice of Determination
JFP = Joint Federal Project
SAFCA = Sacramento Area Flood Control Agency

1.2.4.1 Folsom Dam Safety and Flood Damage Reduction Project Environmental Impact Statement/Environmental Impact Report– March 2007

On December 1, 2006, Reclamation, the Corp, CVFPB, and SAFCA released the Folsom DS/FDR Draft EIS/EIR for public review and comment. The Draft EIS/EIR (State Clearinghouse # 2006022091) identified five alternatives to address dam safety, security, and flood damage reduction objectives for the Folsom Facility. Alternative 3 was selected as the Preferred Alternative/Proposed Action. Alternative 3 includes a JFP Auxiliary Spillway, seismic improvements to the Main Concrete Dam and MIAD, static improvements to specific earthen structures (RWD, LWD, Dikes 4, 5, and 6, and MIAD), security upgrades, reinforcement of the five Main Concrete Dam spillway gates and replacement of the three emergency spillway gates, and a 3.5-foot raise to Folsom Facility structures. Section 2.2 of the Draft EIS/EIR discusses concerns regarding the Folsom Facility and measures considered to address those concerns. A Final EIS/EIR was released to the public in March 2007. Table 1-1 in the Final EIS/EIR lists the components of Alternative 3, the agency responsible for each component, and the issue that each component addresses.

A ROD on the dam safety and security projects was signed in May 2007 by Reclamation. A joint ROD addressing the JFP Auxiliary Spillway was signed in May 2007 by Reclamation and the Corps. A Notice of Determination (NOD) and Statement of Findings were issued by the CVFPB on July 20, 2007 for the JFP Auxiliary Spillway.

1.2.4.2 Supplemental Environmental Assessment/Initial Study – February 2008

On February 28, 2008, Reclamation, the Corps, and the Corps non-Federal sponsors, the CVFPB and SAFCA released the Draft Supplemental Environmental Assessment/Initial Study (EA/IS) to the Folsom DS/FDR Final EIS/EIR for public review and comment. The Supplemental EA/IS described and analyzed the effects of construction actions and revisions to the project since the release of the Folsom DS/FDR Final EIS/EIR. Specifically, the Supplemental EA/IS addressed:

- Dike 5 Construction Site Access and Trail Detour; and
- JFP Auxiliary Spillway Stilling Basin Cofferdam.

A final Supplemental EA/IS and Finding of No Significant Impact (FONSI)/ Mitigated Negative Declaration (MND) were released in April 2008.

1.3 Purpose and Need/Project Objectives

The overall purpose and need for the Folsom DS/FDR Project, including the MIAD Modification Project, remains the same as described in the original Folsom DS/FDR Draft EIS/EIR of December 2006. It is presented below in Section 1.3.1. The specific purpose and need for this Supplemental EIS/EIR is presented in Section 1.3.2.

1.3.1 Overall Folsom Dam Safety and Flood Damage Reduction Project

1.3.1.1 Purpose and Need

There is a need to expeditiously implement engineering measures for the Folsom Facility in order to reduce potential failure due to seismic, static, and hydrologic conditions. There is also a need to incrementally increase minimum flood damage reduction via flood storage capacity and/or reservoir pool release mechanisms. Furthermore, there is a need to implement security improvements at the Folsom Facility consistent with its designation as a National Critical Infrastructure Facility. The purpose of the Folsom DS/FDR is to increase overall public safety, ensure the reliability of local power and water supply, and maintain an important recreational resource by: (1) expediting corrective action to address risks identified with the structural integrity of Folsom Dam and appurtenant structures in accordance with Reclamation's Public Protection Guidelines; (2) incrementally improving the flood management capacity of the

Folsom Facility to meet or exceed the 200-year recurrence level; and (3) upgrading security infrastructure at the Folsom Facility.

1.3.1.2 Project Objectives

In addition to the underlying purpose of the project above, specific project objectives were developed to meet CEQA guidelines. The CEQA-related project objectives are:

- Expeditiously reduce hydrologic (flooding) risk of overtopping-related failure of any retention structure during a probable maximum flood (PMF) event in accordance with Reclamation's Public Protection Guidelines;
- Expeditiously reduce the risk of structural failure of any retention structure during a potential seismic (earthquake) event in accordance with Reclamation's Public Protection Guidelines;
- Expeditiously reduce the risk of structural failure of any retention structure during a potential static (seepage) event in accordance with Reclamation's Public Protection Guidelines;
- Expeditiously improve the security infrastructure at the Folsom Facility in accordance with Reclamation's Public Protection Guidelines; and
- Expeditiously improve the flood management capacity of the facilities in a manner functionally equivalent to the Corps authorized projects.

1.3.2 Mormon Island Auxiliary Dam Modification Project

1.3.2.1 Purpose and Need

There is a need to expeditiously implement engineering measures for MIAD in order to reduce potential failure due to seismic and static conditions. There is also a need to complete mitigation measures that Reclamation has committed to in the RODs by developing Mississippi Bar into a habitat mitigation site. The purpose of the MIAD Modification Project is to reduce static and seismic risks associated with MIAD to improve public safety. The purpose of the habitat mitigation at Mississippi Bar is to mitigate for impacts to habitat caused by the overall Folsom DS/FDR Project by improving existing habitat or creating new habitat.

1.3.2.2 Project Objectives

In addition to the underlying purpose of the project above, specific project objectives were developed to meet CEQA guidelines. The CEQA-related objectives include:

- To reduce the static and seismic risks associated with MIAD.
- To complete a portion of the mitigation requirements adopted in the 2007 RODs.

1.4 Authority

There are two key pieces of legislation that give Reclamation the authority to carry out the proposed project; the Safety of Dams Act and the Energy and Water Development Appropriations Act.

1.4.1 Safety of Dams Act of 1978

The MIAD Modification Project is being undertaken to meet Safety of Dams Act requirements. The Safety of Dams Act (Public Law [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 Safety of Dams Act of 1978, P.L. 5-578, as amended by P.L. 98-404 , 92 Stat 2471).

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. Previous investigations (See Section 1.2.2) have determined that MIAD does pose unacceptable risks due to static and seismic issues; therefore corrective action is warranted.

1.4.2 Energy and Water Development Appropriations Act of 2006

The Energy and Water Development Appropriations Act of 2006 (P.L.109-103) included language supporting Reclamation's and the Corps' collaboration in determining a joint dam safety and flood damage reduction project. According to Section 128 of the Act:

"American River Watershed, California (Folsom Dam and Permanent Bridge)-

(a) COORDINATION OF FLOOD DAMAGE REDUCTION AND DAM SAFETY- The Secretary of the Army and the Secretary of the Interior are directed to collaborate on authorized activities to maximize flood damage reduction improvements and address dam safety needs at Folsom Dam and Reservoir, California. The Secretaries shall expedite technical reviews for flood damage reduction and dam safety improvements. In developing improvements under this section, the Secretaries shall consider reasonable modifications to existing authorized activities, including a potential auxiliary spillway. In

conducting such activities, the Secretaries are authorized to expend funds for coordinated technical reviews and joint planning, and preliminary design activities" (Energy and Water Development Appropriations Act of 2006, P.L. 109-103, 119 Stat 2247).

The MIAD Modification Project is part of the dam safety improvements authorized in the above Act, as is the Mississippi Bar mitigation site, and both are components of the larger Folsom DS/FDR Project.

1.5 Scope of This Supplemental Environmental Impact Statement/Environmental Impact Report

The impact analysis in this Supplemental EIS/EIR includes all reasonably foreseeable modifications to MIAD and mitigation improvements at Mississippi Bar that may occur from the time that the ROD is signed (anticipated Spring 2010) through the end of the construction period (potentially 2013).

In addition to the No Action/No Project Alternative, this Supplemental EIS/EIR presents four action alternatives for implementing the MIAD modifications and mitigation development at Mississippi Bar, termed Alternatives 1 through 4. The alternatives incorporate differing methods related to the excavation and replacement of the MIAD foundation. A common set of improvements proposed for the Mississippi Bar mitigation site is assumed for each of the action alternatives. This Supplemental EIS/EIR analyzes the direct, indirect, and cumulative effects of each alternative.

1.5.1 Scope of Environmental Effects Analysis

This Supplemental EIS/EIR presents the impacts of the four action alternatives described in Chapter 2 and also considers the environmental implications of the No Action/No Project Alternative. The MIAD Modification Project is only one element of the larger Folsom DS/FDR Project. Other approved elements of the project are either ongoing or have the potential to begin during the proposed MIAD modifications. This document does not analyze the previously approved elements of the Folsom DS/FDR Project as they were adequately analyzed in the 2007 EIS/EIR and 2008 Supplemental EA/IS. The elements of the project addressed in the previous EIS/EIR and Supplemental EA/IS are either considered part of the Affected Environment/Environmental Setting (for those actions that are underway or completed at the time of this document) or in the Cumulative Effects analysis (for those actions that are not yet underway but would occur at the same time of the proposed MIAD modifications and mitigation improvements at Mississippi Bar).

1.6 Study Area

The study area for this Supplemental EIS/EIR includes Federal property surrounding MIAD and directly south of Green Valley Road in the Mormon Island Wetland Preserve area. The majority of the study area around MIAD is in Sacramento County; however the northeastern end of MIAD crosses into El Dorado County. Figure 1-2 presents a map of the MIAD study area.

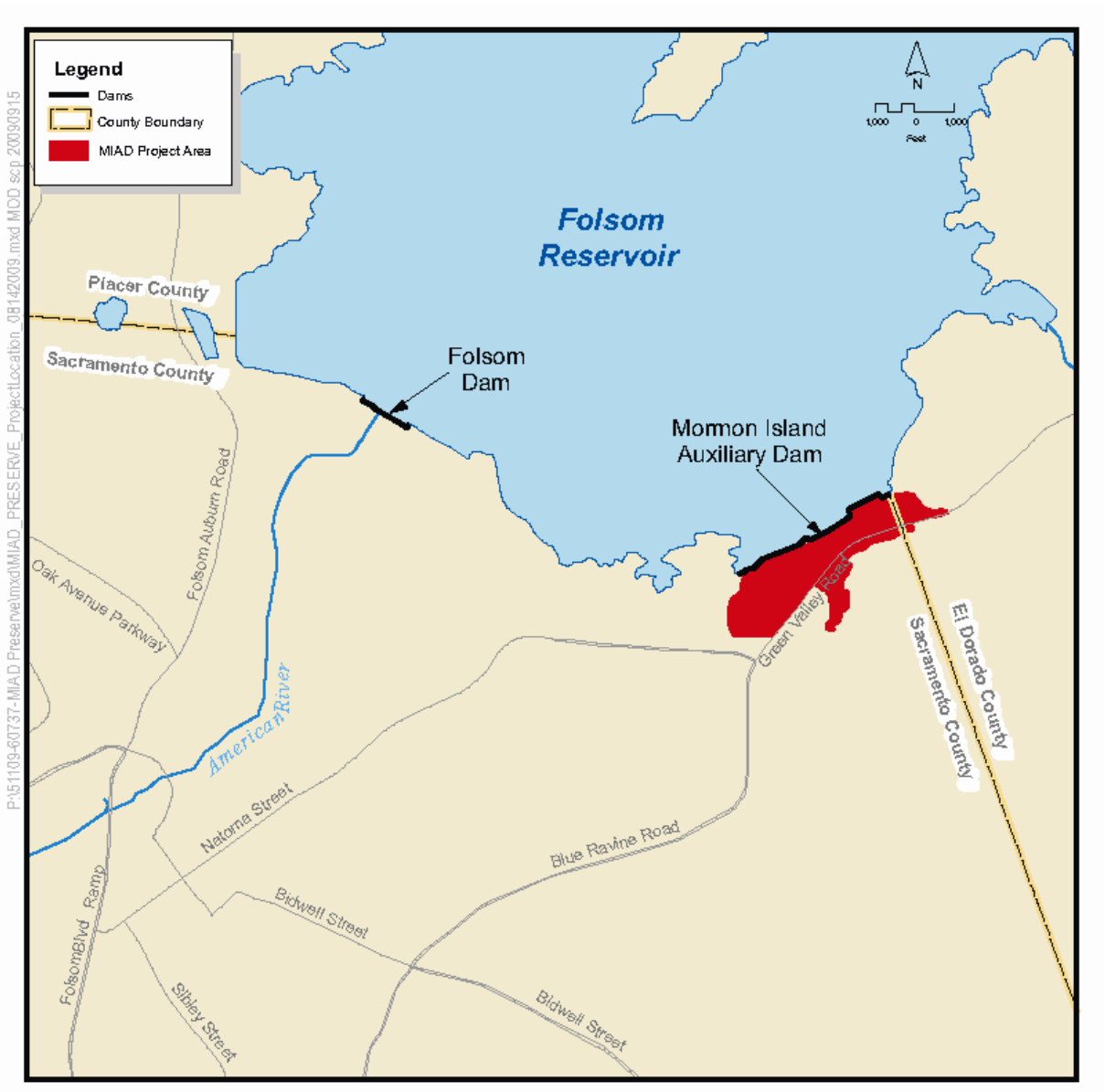


Figure 1-2. Mormon Island Auxiliary Dam Study Area

The study area also includes approximately 141 acres of land at Mississippi Bar on the western shore of Lake Natoma, in Sacramento County. The site is located just east of the Sunset Avenue and Hazel Avenue intersection, south of the community of Orangevale. While only 80 acres of land are proposed for habitat mitigation at this site, the study area for cultural resources was expanded to include 141 acres due to the extent of the historic mine tailings at the site. Figure 1-3 shows the study area for Mississippi Bar.

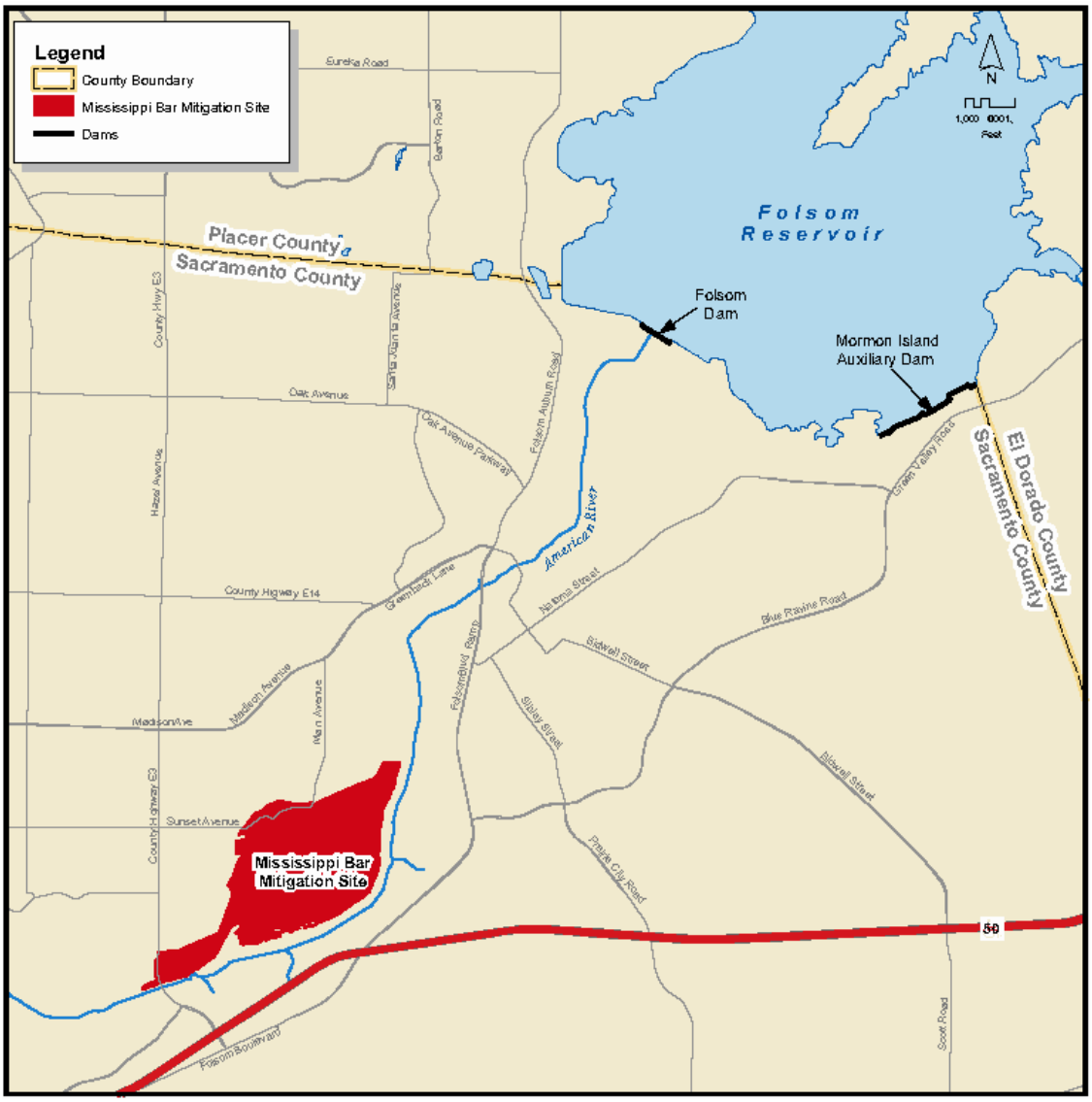


Figure 1-3. Mississippi Bar Study Area

1.7 Summary of Public Scoping

Federal, State, and local agencies, and other interested parties have participated in the NEPA and CEQA process leading to the development of the MIAD Modification Project and the alternatives presented in this EIS/EIR. In December 2008, Reclamation and SAFCA held three public scoping meetings; two in the City of Folsom and one in El Dorado Hills. The results of these scoping meetings, including comments and concerns raised during the meetings, as well as public comments obtained during the public comment period, are presented in the *Mormon Island Auxiliary Dam Modification Project Scoping Meeting Summary Report, 2009* (See Appendix A). Major issues and concerns raised during the public scoping process include:

- The purpose and need for the project;
- Relocation of Green Valley Road;
- Potential impacts to recreation during construction;
- Potential impacts to wetlands at Mormon Island Wetland Preserve;
- Safety risks associated with MIAD; and
- Potential air quality and traffic impacts during construction.

1.8 Environmental Regulations

The MIAD Modification Project and Mississippi Bar mitigation site must comply with a variety of Federal, State, and local laws and regulations. The regulatory requirements applicable to the projects and the general method of compliance are discussed below.

1.8.1 Federal Requirements

1.8.1.1 National Environmental Policy Act

NEPA (42 United States Code [USC] 4321; 40 Code of Federal Regulations [CFR] 1500.1) applies to all Federal agencies that manage, regulate, or fund projects or programs that could have environmental effects. It requires Federal agencies to disclose and consider the environmental implications of their proposed actions. NEPA establishes environmental policies, provides an interdisciplinary framework for preventing environmental damage, and contains "action-forcing" procedures to ensure that Federal agency take environmental factors into account when making decisions to approve a project or program.

NEPA requires the preparation of an appropriate document to ensure that Federal agencies accomplish the law's purposes. The President's CEQ has adopted regulations and other guidance, including detailed procedures that Federal agencies must follow, to implement NEPA. CEQ regulations, Section

1506.6 includes provisions for public involvement. Agency pursuit of public involvement may include:

- Providing public notice of NEPA-related hearings, public meetings, and the availability of environmental documents;
- Holding or sponsoring public hearings or public meetings;
- Soliciting appropriate information from the public;
- Explaining in its procedures where interested persons can get information or status reports on EISs and other elements of the NEPA process; and
- Making EISs, the comments received, and any underlying documents available to the public pursuant to the provisions of the Freedom of Information Act (5 U.S.C. 552).

Reclamation will use this Supplemental EIS/EIR to comply with CEQ regulations and document NEPA compliance.

1.8.1.2 Federal Endangered Species Act

The Endangered Species Act (ESA) requires that both United States Fish and Wildlife Service (USFWS) and NMFS maintain lists of threatened species and endangered species. "Endangered species" are defined as "any species which is in danger of extinction throughout all or a significant portion of its range"; "threatened species" are defined as "any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C. §1532).

Section 9 of the ESA makes it illegal to "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct) any endangered species of fish or wildlife and most threatened species of fish or wildlife (16 U.S.C. §1538). Section 7 of the ESA requires that Federal agencies consult with the USFWS and NMFS on any actions that may directly or indirectly affect a listed species (i.e., a species specifically recognized by USFWS or NMFS as being endangered or threatened), including as related to whether the action may destroy or adversely modify critical habitat.

Critical habitat is defined as the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of the ESA, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of Section 4 of the Act, upon a determination by the Secretary that such areas are essential for the conservation of the species (16 U.S.C.A. §1532). NMFS' jurisdiction under the ESA is limited to the protection of marine mammals and fishes and anadromous fishes (i.e., fish born in fresh

water that migrate to the ocean to grow into adults and then return to fresh water to spawn); all other species are within the USFWS' jurisdiction.

Section 7 of the ESA requires that all Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of habitat critical to such species' survival. To ensure against jeopardy, each Federal agency must consult with the USFWS or NMFS, or both, regarding Federal agency actions. The consultation is initiated when the Federal agency determines that its action may affect a listed species and submits a written request for initiation to the USFWS or NMFS, along with the agency's biological assessment of its proposed action. If the USFWS or NMFS concurs with the action agency that the action is not likely to adversely affect a listed species, the action may be carried forward without further review under the ESA. Otherwise, the USFWS or NMFS, or both, must prepare a written biological opinion describing how the agency action will affect the listed species and its critical habitat.

Reclamation will consult with USFWS and will amend the existing Folsom DS/FDR biological opinion to include potential impacts of the MIAD Modification Project. A draft amended biological opinion will be obtained prior to release of the Final Supplemental EIS/EIR.

1.8.1.3 Fish and Wildlife Coordination Act

The FWCA (16 USC 661 et seq.) 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.

To comply with this Act, Reclamation will coordinate with USFWS to amend the existing Coordination Act Report for the Folsom DS/FDR Project.

1.8.1.4 National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, as amended, is the principal legislation that guides cultural resource management for Federal agencies. Section 106 of NHPA requires that Federal agencies take into account the effects of an undertaking on historic properties and provide the Advisory Council on Historic Preservation (ACHP) an opportunity for comment.

The Section 106 review process is described in 36 CFR 800. The five steps in this process include: 1) initiation of the Section 106 process by identifying interested parties and determine an area of potential effect; 2) identify historic properties; 3) assessments of the effects of the undertaking on historic properties; and 4) preparation of an agreement document to resolve adverse effects on historic properties. The ACHP is notified of any adverse effects to historic properties and invited to participate in the agreement document. The Section 106 process requires consultation throughout each phase with the State Historic Preservation Officer (SHPO), Indian tribes, and interested parties.

The area south of Green Valley Road was not included in the Folsom DS/FDR Area of Potential Affect. Additional cultural surveys are required. Consultation with SHPO will be completed prior to construction of the MIAD Modification Project.

1.8.1.5 Clean Air Act

The Federal Clean Air Act (CAA) established national ambient air quality standards (NAAQS) in 1970 for six pollutants: carbon monoxide, ozone, particulate matter, nitrogen dioxide, sulfur dioxide, and lead. Areas that do not meet the ambient air quality standards are called nonattainment areas. The CAA requires states to submit a State Implementation Plan (SIP) for nonattainment areas. The U.S. Environmental Protection Agency (USEPA) reviews the SIP and must delineate how the Federal standards will be met. States that fail to submit a plan or to secure approval may be denied Federal funding and/or required to increase emission offsets for industrial expansion. The 1990 Amendments to the CAA established categories of air pollution severity for nonattainment areas, ranging from "marginal" to "extreme." SIP requirements vary, depending on the degree of severity.

The conformity provisions of the CAA are designed to ensure that Federal agencies contribute to efforts to achieve the NAAQS. USEPA has issued two regulations implementing these provisions. The general conformity regulation addresses actions of Federal agencies other than the Federal Highway Administration and the Federal Transit Administration. General conformity applies to a wide range of actions or approvals by Federal agencies. Projects are subject to general conformity if they exceed emissions thresholds set in the rule and are not specifically exempted by the regulation. Such projects are required to fully offset or mitigate the emissions caused by the action, including both direct emissions and indirect emissions over which the Federal agency has some control.

A General Conformity Determination will be completed prior to issuance of the MIAD Modification Project ROD.

1.8.1.6 Executive Order 12898 – Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations," requires that Federal agencies identify

and address any disproportionately high and adverse human health or environmental effects of Federal actions on minority and low-income populations and assure that Federal actions do not result directly or indirectly in discrimination on the basis of race, color, national origin, or income. Federal agencies must provide opportunities for input by affected communities into the NEPA process and must evaluate the potentially significant and adverse environmental effects of proposed actions on minority and low-income communities during environmental document preparation. Even if a proposed Federal project would not result in significant adverse impacts on minority and low-income populations, the environmental document must describe how the NEPA process addressed Executive Order 12898.

An environmental justice evaluation has been completed within the context of this Supplemental EIS/EIR analysis, and is presented in Chapter 18.

1.8.1.7 Clean Water Act

The objective of the Clean Water Act (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 Section 401 of the CWA (33 USC 1251 et seq.) requires that proposed actions with federal agency involvement that may result in a discharge of a pollutant into waters of the United States must not violate federal or state water quality standards. In addition, Section 401 states that any applicant for a Federal license or permit to conduct any activity including construction or operation of facilities which may result in discharge to navigable waters must provide the licensing or permitting agency a certification from the state in which the discharge originates stating that the discharge will comply with the applicable provisions of Sections 301 Effluent Limitations, 302 Water Quality Related Effluent Limitations, 303 Water Quality Standards and Implementation Plans, 306 National Standards of Performance, and 307 Toxic and Pretreatment Effluent Standards of the CWA. Section 401 certification will be obtained, as necessary, from the Central Valley Regional Water Quality Control Board (CVRWQCB) prior to initiation of construction activities.

Section 402 Section 402 of the CWA requires that all point sources that discharge pollutants into the waters of the United States must obtain a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits are issued by the state and contain industry specific standards and limits and establish pollutant monitoring and reporting requirements. The NPDES General Construction permit will be obtained by Reclamation's construction contractor prior to construction of the project. Additionally, the construction contractor will be responsible for obtaining the appropriate dewatering permit for the proposed dewatering system.

Section 404 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. It is expected that the existing 404 permit for the Folsom DS/FDR Project will be amended to include any impacts to wetlands or waters of the United States that would occur from the MIAD Modification Project.

1.8.1.8 Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (MBTA) is the domestic law that implements four international treaties and conventions between the U.S. and Canada, Japan, Mexico, and Russia, providing protection of migratory birds. Each of the conventions protects selected species of migratory birds that are common to both the U.S. and one or more of the other involved countries. This act makes it unlawful for any person to hunt, kill, capture, collect, possess, buy, sell, purchase, import, export, or barter any migratory bird, including the feathers, parts, nests, eggs, or migratory bird products. The MBTA does not protect the habitat of migratory birds. With respect to the MIAD Modification Project, compliance with the MBTA will be stipulated as part of the construction requirements of the selected alternative.

Mitigation measures reflecting compliance with this act are provided in Chapter 7.

1.8.1.9 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act of 1940 (16 USC 668-668d) 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.

Compliance with this act is provided in Chapter 7.

1.8.1.10 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.

The discussion of Executive Order 11990 within this Supplemental EIS/EIR evaluates each of the alternatives' potential to result in destruction, loss or degradation of wetlands and determines appropriate mitigation. This Supplemental EIS/EIR will be release to the public for review.

1.8.2 State Requirements

1.8.2.1 California Environmental Quality Act

CEQA (Public Resource Code 21000 et seq.) is regarded as the foundation of environmental law and policy in California. CEQA's primary objectives are to:

- Disclose to decision-makers and the public the significant environmental effects of proposed activities;
- Identify ways to avoid or reduce environmental damage;
- Prevent environmental damage by requiring implementation of feasible alternatives or mitigation measures;
- Disclose to the public the reasons for agency approval of projects with significant environmental effects;
- Foster interagency coordination in the review of projects; and
- Enhance public participation in the planning process.

CEQA applies to all discretionary activities that are proposed or approved by California public agencies, including State, regional, county, and local agencies, unless an exemption applies. CEQA requires that public agencies comply with both procedural and substantive requirements. Procedural requirements include the preparation of the appropriate environmental documents, mitigation measures, alternatives, mitigation monitoring, findings, statements of overriding considerations, public notices, scoping, responses to comments, legal enforcement procedures, citizen access to the courts, notice of preparation, agency consultation, and State Clearinghouse review.

CEQA's substantive provisions require that agencies address environmental impacts, disclosed in an appropriate document. When avoiding or minimizing environmental damage is not feasible, CEQA requires that agencies prepare a written statement of the overriding considerations that resulted in approval of a project that will cause one or more significant effects on the environment. CEQA establishes a series of action-forcing procedures to ensure that agencies accomplish the purposes of the law. In addition, under the direction of CEQA, the California Resources Agency has adopted regulations, known as the State CEQA Guidelines, which provide detailed procedures that agencies must follow to implement the law.

This Supplemental EIS/EIR is intended to document compliance with all relevant CEQA guidelines and CEQA requirements.

1.8.2.2 California Endangered Species Act

The California Endangered Species Act (CESA) (Fish and Game Code Section 2050 to 2097) is similar to the ESA. California's Fish and Game Commission is responsible for maintaining lists of threatened and endangered species under

the CESA. CESA prohibits the "take" of listed and candidate (petitioned to be listed) species. "Take" under California law means to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch capture, or kill." (California Fish and Game Code, Section 86.)

The mitigation measures presented in Chapter 7 when implemented, will comply with this act.

1.8.2.3 Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) established the California State Water Resources Control Board (SWRCB) and nine regional water quality control boards (RWQCBs) as the primary State agencies with regulatory authority over California water quality and appropriative surface water rights allocations. The SWRCB administers the Porter-Cologne Act, which provides the authority to establish Water Quality Control Plans (WQCPs) that are reviewed and revised periodically. The Porter-Cologne Act also provides the SWRCB with authority to establish statewide plans.

The nine RWQCBs carry out SWRCB policies and procedures throughout the State. The SWRCB and the RWQCBs also carry out sections of the Federal CWA -administered by USEPA, including the NPDES permitting process for point source discharges and the CWA Section 303 water quality standards program.

WQCPs, also known as basin plans, designate beneficial uses for specific surface water and groundwater resources and establish water quality objectives to protect those uses. These plans can be developed at the SWRCB or the RWQCB level. RWQCBs issue waste discharge requirements for the major point-source waste dischargers, such as municipal wastewater treatment plants and industrial facilities. In acting on water rights applications, the SWRCB may establish terms and conditions in a permit to carry out WQCPs.

To comply with this act, the MIAD Modification Project, Reclamation's construction contractor will obtain a NPDES Construction General Permit and will submit an appropriate Stormwater Pollution Prevention Plan to the RWQCB. The construction contractor will also be responsible for obtaining the appropriate NPDES discharge permit for the dewatering system.

1.8.2.4 Airborne Toxic Control Measures

The Airborne Toxic Control Measures (ATCMs) have been developed by the California Air Resources Board (ARB) to reduce the potential health and safety and environmental issues associated with various airborne toxics. The air pollution control and air quality management districts in the State of California are generally the agencies responsible for enforcement of the ATCMs. The ATCM regulations are found in Title 13 (Mobile Sources and Fuels) and Title 17 (All Other Sections) of the California Code of Regulations (CCR).

The Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations (See Title 17 CCR Section 93105) contains the requirements for construction operations that will disturb any portion of an area that is located in a geographic ultramafic rock (igneous rock with very little silica content) 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 ATCM, 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.

Reclamation's construction contractor will be required to submit a Dust Mitigation Plan for approval by the Sacramento Metropolitan Air Quality Management District (SMAQMD) and the El Dorado County Air Quality Management District (EDCAQMD).

1.8.2.5 Environmental Justice

State law defines environmental justice in Government Code Section 65040.12(e) as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. Government Code Section 65040.12(a) designates the Governor's Office of Planning and Research (OPR) as the coordinating agency in State government for environmental justice programs, and requires OPR to develop guidelines for incorporating environmental justice into general plans.

While there is no existing State requirement that environmental justice be addressed as part of the environmental (CEQA) review for individual projects, Chapter 18 of this EIS/EIR discusses environmental justice considerations associated with the MIAD Modification Project.

1.8.2.6 California Fish and Game Code Section 1800-1802

Sections 1800-1802 of the California Fish and Game Code, as administered by the California Department of Fish and Game (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."

DFG will review the Draft Supplemental EIS/EIR and provide recommendations for lessening impacts.

1.8.2.7 California Fish and Game Code Section 3503

Section 3503 of the California Fish and Game Code, as administered by the 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."

The Supplemental EIS/EIR addresses potential impacts to nesting birds and recommends appropriate mitigation measures.

1.8.2.8 California Fish and Game Code Section 3511 and 5050

Section 3511 of the California Fish and Game Code, as administered by the 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."

This Supplemental EIS/EIR addresses potential impacts to fully protected species and recommends appropriate mitigation measures.

1.8.2.9 Native Plant Protection Act (California Fish and Game Code Section 1900 et Seq.)

The purpose of the Native Plant Protection Act (NPPA) is 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.

This Supplemental EIS/EIR addresses potential effects on plant species designated as rare or endangered under the NPPA.

1.8.2.10 Lake and Streambed Alteration Agreement (California Fish and Game Code Section 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.

Chapter 7 of this Supplemental EIS/EIR addresses compliance with Section 1602 of the Fish and Game Code.

1.8.2.11 California Clean Air Act

The California Clean Air Act (CCAA) generally parallels the Federal CAA; however, it 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 CCAA requires that air districts prepare an air quality attainment plan if the district violates CAAQS for carbon monoxide, sulfur dioxide, nitrogen dioxide, or ozone. 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.

Chapter 6 of this Supplemental EIS/EIR addresses compliance with the CCAA and CAAQS.

1.8.2.12 California Public Resources Code 5024

According to the California Public Resources Code 5024, all State agencies must preserve and maintain all State-owned historical resources under their jurisdiction that are listed in or potentially eligible for inclusion in the NRHP or registered or eligible for registration as a State historical landmark. Additionally, each State agency is required to submit to the SHPO documentation for any project that has the potential to affect historical resources listed in or potentially eligible for inclusion in the NRHP or registered as or eligible for registration as a State historical landmark.

These requirements apply only to the State-owned lands at Mississippi Bar. If mitigation occurs on State-owned lands at Mississippi Bar, Reclamation will coordinate with DPR to ensure compliance with these requirements.

1.8.3 Local Requirements

The MIAD Modification Project will need to comply with several local requirements. The following lists such requirements and indicates the EIS/EIR section(s) that addresses the requirements.

1.8.3.1 City of Folsom

- City of Folsom General Plan, October 31, 1988 (Noise, Transportation and Circulation)

1.8.3.2 Sacramento County

- Sacramento County General Plan, December 15, 1993 (Noise, Transportation and Circulation)
- Sacramento Metropolitan Air Quality Management District Fugitive Dust and Asbestos Rules (Air Quality)

1.8.3.3 El Dorado County

- El Dorado County General Plan, July 19, 2004 (Noise, Transportation and Circulation)
- El Dorado County Air Quality Management District Fugitive Dust and Asbestos Rules (Air Quality)

1.9 Decisions to be Made

Reclamation and SAFCA decision-makers will use this MIAD Modification Project Supplemental EIS/EIR to help decide on the optimal alternative for meeting the dam safety objectives and mitigation requirements, based on a full understanding of the environmental consequences of each of the alternatives. Possible decision outcomes are:

- Take no action;
- Approve Alternative 1, which includes excavation and replacement of the MIAD foundation using a large open cut excavation, an overlay with new filter and drains, and development of 80 acres of mitigation at Mississippi Bar;
- Approve Alternative 2, which includes excavation and replacement of the MIAD foundation using a single wall structure during excavation, an overlay with new filter and drains, and development of 80 acres of mitigation at Mississippi Bar;
- Approve Alternative 3, which includes excavate and replace the foundation using two walls during excavation, an overlay with new filter and drains, and development of 80 acres of mitigation at Mississippi Bar; and

- Approve Alternative 4, which includes excavation and replacement of the MIAD foundation using cellular construction (multiple walls to form cells), an overlay with new filter and drains, and development of 80 acres of mitigation at Mississippi Bar.

1.10 Uses of this Document

In addition to the decision highlighted above, Reclamation and SAFCA are expected to use this document as the environmental analysis for individual actions to implement the selected alternative, including:

- Issuance of an amendment to the existing Folsom DS/FDR Biological Opinion on the selected alternative;
- Obtaining required environmental permits;
- Completing required mitigation; and
- Obtaining funding.

1.11 Report Organization

The remainder of this document is organized as follows:

- **Chapter 2** – presents the Proposed Action/Proposed Project including the four action alternatives and the No Action/No Project Alternative analyzed in this Supplemental EIS/EIR;
- **Chapter 3** – presents an overview of the impact analysis and describes resources not analyzed in this Supplemental EIS/EIR as they would not be affected by the project;
- **Chapters 4 through 22** – present the Affected Environment/Environmental Setting and Environmental Consequences/ Environmental Impacts of the alternatives by resource area:
  - **Chapter 4** – Water Quality, Hydrology, and Flood Control
  - **Chapter 5** – Groundwater
  - **Chapter 6** –Air Quality
  - **Chapter 7** – Biological Resources
  - **Chapter 8** – Soils, Minerals, and Geological Resources
  - **Chapter 9** – Visual Resources
  - **Chapter 10** – Transportation and Circulation

  - **Chapter 11** – Noise
  - **Chapter 12** – Cultural Resources
  - **Chapter 13** – Land Use, Planning, and Zoning
  - **Chapter 14** – Recreation
  - **Chapter 15** – Public Services and Utilities
  - **Chapter 16** – Public Health and Safety
  - **Chapter 17** – Indian Trust Assets
  - **Chapter 18**– Environmental Justice
  - **Chapter 19** – Climate Change
  - **Chapter 20** – Socioeconomics
  - **Chapter 21** – Growth Inducing
  - **Chapter 22** – Cumulative Effects and Other Disclosures;

- **Chapter 23** – describes the consultation and coordination that occurred during the development of this document;
- **Chapter 24** – presents the distribution list for this document;
- **Chapter 25** – presents the list of preparers; and
- **Chapter 26** – presents the glossary.

1.12 References

42 United States Code 4231 et seq. 1970. "The National Environmental Policy Act".

"Energy and Water Development Appropriations Act, 2006." (P.L. 109-103, 19 November 2005). United States Statue 119 (2005): 2247.

"Reclamation Safety of Dams Act, 1978". (P.L. 95-578, 2 November 1978, as amended by P.L. 98-404, 28 August 1984). United States Statue 92 (1978): 2471.

Bureau of Reclamation (Reclamation). 1991. *Final Environmental Assessment and Finding of No Significant Impact, Mormon Island Auxiliary Dam Modification Phase II Safety of Dams Program, October 1991*.

Reclamation, U.S. Army Corps of Engineers (Corps), Central Valley Flood Protection Board (CVFPB), Sacramento Area Flood Control Agency (SAFCA). 2006. *Folsom Dam Safety and Flood Damage Reduction Project Draft Environmental Impact Statement/Environmental Impact Report, December 2006, Vol. I & II*. State Clearinghouse # 2006022091.

Reclamation, Corps, CVFPB, SAFCA. 2007. *Folsom Dam Safety and Flood Damage Reduction Project Final Environmental Impact Statement/Environmental Impact Report, Vol. III*. State Clearinghouse # 2006022091.

Reclamation, Corps, CVFPB, SAFCA. 2008. *Draft Supplemental Environmental Assessment/Initial Study to the Folsom Dam Safety and Flood Damage Reduction Environmental Impact Statement/Environmental Impact Report, February 2008.*

California Public Resources Code section 21000 et seq. 1970. "California Environmental Quality Act".

U.S. Army Corps of Engineers (Corps). 1992. *Seismic Stability Evaluation of Folsom Dam and Reservoir Project, Report 8 Mormon Island Auxiliary Dam – Phase II*. Technical Report GL-87-14.

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Chapter 2
Project Description

NEPA and CEQA require that environmental documents identify and analyze a reasonable range of feasible alternatives that could be implemented to meet the project objectives to varying degrees. In addition, CEQA focuses on alternatives that would avoid or substantially lessen any of the significant effects of the project. This MIAD Modification Project Supplemental EIS/EIR evaluates four action alternatives and a No Action/No Project Alternative. There are two components to each action alternative analyzed in this Supplemental EIS/EIR; the MIAD modification component and the Mississippi Bar mitigation component. Sections 2.3 through 2.7 describe the MIAD modification component, while Sections 2.8 and 2.9 describe the Mississippi Bar habitat mitigation component. Each action alternative would include the same Mississippi Bar habitat mitigation component.

2.1 Mormon Island Auxiliary Dam Alternatives Development and Screening Process

As described in Chapter 1, the MIAD Modification Project originates from the Folsom DS/FDR Project that was approved in 2007. In conjunction with implementation of the Folsom DS/FDR project, technical investigations into the design and the feasibility of the MIAD improvements envisioned at that time found that the design would need to be changed to achieve Reclamation's existing risk standards for dam safety. Specifically, the utilization of jet grouting to stabilize the foundation of MIAD is unlikely to meet those risk standards. The formulation and screening of alternatives to the originally proposed MIAD improvements focuses, therefore, on additional techniques to stabilize the MIAD foundation in order to meet current dam safety standards. Reclamation completed a comprehensive alternatives development and screening process to identify preliminary alternatives to address the static and seismic issues associated with MIAD. The following subsections describe the formulation and screening of preliminary alternatives.

2.1.1 Alternatives Formulation

After several years of investigations by both Reclamation and the Corps, a series of engineering measures were developed to address the Safety of Dams objectives of hydrologic, seismic, and static risk reduction at Folsom Reservoir, including risk reduction measures for MIAD. These engineering measures were compiled from the documents listed below.

- Folsom Facility – Safety of Dams Requirements and Concepts. Reclamation, February 2005.
- Folsom Dam – Draft Safety of Dams Corrective Action Study Scoping Report. Reclamation, October 2005.
- Folsom Dam Raise and Auxiliary Spillway Project Alternative Solution Study (PASS I). Reclamation and Corps, October 2005.
- Folsom Dam Raise and Auxiliary Spillway Project Alternative Solution Study (PASS II). Reclamation and Corps, February 8, 2006.
- Updated Corrective Action Alternatives Study for Seismic and Static Risk Reduction – Mormon Island Auxiliary Dam. Reclamation, 2009.

2.1.2 Preliminary Alternatives Identification

The engineering measures identified during the formulation phase were then combined into a set of preliminary alternatives. Construction risk estimates were completed to evaluate the benefits of the preliminary alternatives and to determine if several of the alternatives could be eliminated from consideration. The following list presents the preliminary alternatives considered to address the seismic and static issues associated with MIAD.

2.1.2.1 No Foundation Treatment with Large Upstream and Downstream Overlay

A larger overlay berm may substantially reduce or eliminate the need for foundation excavation. If Dam Safety risk reduction can be met, this alternative would have the potential to be the lowest cost alternative with very low construction risk because it would eliminated the need for excavation and foundation replacement. This would involve placing a large volume of miscellaneous fill excavated from the new Auxiliary Spillway with filter and drain elements. This alternative would likely still require excavation and replacement of the foundation and would therefore not reduce construction risk. A very large overlay probably would require realignment of Green Valley Road and would affect the Mormon Island Wetland Preserve.

2.1.2.2 Large Open Excavation and Overlay

A fully open excavation with no structural walls option represents the largest excavation dimension and volume in terms of both earthen materials removed, replaced and amount of water handled. This alternative is an openhole key trench located partially beneath the existing toe of the embankment. Material would first be removed from the lower half of the existing dam face, which would leave a steeper lower face of the dam for construction. Below this excavation a bench would be constructed for access around the deep excavation and installation of dewatering wells. The foundation would then be excavated down to bedrock. The base of the key trench would be excavated into competent rock prior to placement of compacted material. Cement modified soil (CMS)

would be placed and compacted in the lower portion of the excavation. The remaining portion of the open excavation and dam face would be replaced with granular material compacted in lifts up to the current ground surface. It is anticipated that once the excavation was backfilled up to the current elevation of the dam toe the dewatering system would be dismantled. An overlay would then be placed on the downstream face of dam. This would involve placing a large volume of miscellaneous fill excavated from the new Auxiliary Spillway with filter and drain elements. This option would have the highest construction risk and would need to be completed when the reservoir is low. This option would require the temporary relocation of Green Valley Road.

2.1.2.3 Open Excavation with Single Wall and Overlay

A variation on the deep excavation being considered includes the construction of a structural wall on the Green Valley Road side of the Large Open Excavation option. The top 5 to 20 feet could be removed by conventional scraper type operations with the remainder moving to smaller sized equipment based on number of walls and length of open segments. The size of this wall and type has not been determined; however, the current area available for design requires a wall system for most of the length of the excavation so as to not require relocation of Green Valley Road. It is anticipated that the wall would be constructed either prior to and/or during excavation of the key trench depending on the selected wall type and design. The method for construction of the key trench would follow the same sequencing as for the Open Excavation discussed above. The amount of material excavated would be reduced due to construction of the wall.

2.1.2.4 Open Excavation with a Dual Wall System and Overlay

This variation of the Open Excavation option includes the construction of two walls in an effort to minimize the amount of materials required to be removed, and reduce the dependency of the excavation on the dewatering system. This dual wall system could be constructed under the existing toe of the dam or just downstream of the existing toe, thus potentially eliminating the need for excavation of the existing dam. The method for construction of the key trench would follow the same sequencing as for the Open Excavation discussed above. The excavation could be performed in one long trench, or completed in smaller segments. The addition of the dual walls would likely increase the total duration of construction at the site, but likely decrease the time needed for dewatering and subsurface excavation work.

2.1.2.5 Cellular Open Excavation and Overlay

Using excavation methods similar to those used in top down, coffer box, or shaft construction, cellular or cross-lot bracing could occur. This variation of the walled excavation includes either constructing the dual wall system with excavation from the surface in cellular segments with excavators using alternating cells as insitu ground support, or cellular cross-lot bracing construction of a closed wall (sheet pile or soldier pile) type system.

Advantages of this type of system include less amount of materials required to be removed, reduced dependency of the excavation on the dewatering system, elimination of construction risk to the dam, and substantial reductions in environmental impacts. This cellular system could be constructed just downstream of the existing toe, thus eliminating the need for excavation of the existing dam. The method for construction of the key trench would follow the same general sequencing as for the Open Excavation discussed above. The amount of material excavated would be substantially reduced compared to the open excavation.

2.1.2.6 Jet Grouting and Overlay

Jet grouting is a method of increasing the strength of weak or loose materials in the foundation of structures or dams. In the case of MIAD, significant densification of the downstream foundation has previously been accomplished with the use of stone columns. The jet grouting would be used to increase the shear strength of the lower foundation that is still susceptible to liquefaction. Jet grouting consists of drilling to the lower zone to be strengthened, and injecting a grout mixture through a rotary nozzle that once sets up, solidifies the material to the foundation. It is anticipated that the grout would be mixed at the site of MIAD. The cement and other components for the grout would be transported to the site from local suppliers in the Sacramento area.

2.1.3 Alternatives Screening Criteria and Process

The preliminary alternatives were screened and ranked according to cost, feasibility, construction risk, environmental impacts, and ability to meet project objectives. Those that ranked the highest were carried on for further consideration. Jet grouting, large downstream overlay, small downstream overlay, and excavate and replace were the four alternatives that were carried on and analyzed in the Folsom DS/FDR EIS/EIR.

2.1.4 Alternatives Eliminated from Further Evaluation

After the release of the Folsom DS/FDR EIS/EIR, several alternatives were eliminated from further evaluation based on the ranking system and testing that was performed to determine feasibility.

2.1.4.1 No Foundation Treatment with Large Upstream and Downstream Overlay

The large overlay was determined to be technically infeasible due to the large quantities of material required to construct the large overlay to meet current safety standards. Additionally, the environmental effects of such a large overlay would be high because of the impacts to Mormon Island Wetland Preserve and relocation of Green Valley Road.

2.1.4.2 Jet Grouting with Overlay

The Folsom DS/FDR EIS/EIR identified two foundation treatment alternatives at MIAD identified as 1) Excavate and Replace and 2) Jet Grouting. Jet grouting was further identified as the preferred alternative due to being an *in situ* method with lower construction risk and less environmental impacts. Upon further review, jet grouting has been eliminated from further consideration. The results of a field program conducted in the summer of 2007 indicated the alternative is technically and economically unviable. A limited field program was initiated in 2007 to optimize design parameters in anticipation of full implementation. Pre-test design assumptions expected the jet grouting method to create overlapping circular cementitious columns with a uniform size from eight to twelve feet in diameter. Actual performance experienced in the field test program was technically insufficient with results of irregular dimensions at less than two feet and significant cracking and migration of the grout under pressure. These results indicated the methodology was not viable at the site, it may have actually increased the dam safety risk, and that the diameters achieved were economically not viable.

2.2 Mormon Island Auxiliary Dam Alternatives Overview

This section presents a general overview of the four action alternatives analyzed in this Supplemental EIS/EIR. Each of the four action alternatives would include the same Mississippi Bar element, which is described in Sections 2.8 and 2.9.

The MIAD modifications would occur in two key phases: 1) foundation treatment on the downstream[1] side that would involve removal and replacement of the downstream foundation materials, and 2) placement of the overlay with filter and drain elements.

Treatment of the MIAD foundation would include removal of a portion of the downstream foundation material followed by inspection of the bedrock foundation and replacement with a mixture of soil and cementitious material in a block approximately 900 feet long by 60 feet wide. Backfill of the remaining trench would occur with compacted soil material from the original excavation and/or from materials previously stockpiled. The principle difference among the four action alternatives being evaluated is the use of structural walls during excavation to reduce the construction risk, amount of construction water handling, excavated footprint exposure, and environmental impacts of the excavation. Conceptually the alternatives are grouped as “open cut” excavate and replace (Alternative 1) and “walled” excavate and replace alternatives (Alternatives 2 through 4). Construction duration is expected to require as little

[1] Note: Downstream refers to the dry side of MIAD near Green Valley Road. Upstream refers to the wet side of MIAD that is seasonally submerged by water stored in Folsom Reservoir.

as 16 months up to 38 months dependent on annual funding ability, single vs. multiple contracts, reservoir conditions, and materials supply. Table 2-1 shows the assumptions used for components of each of the action alternatives and the No Action/No Project Alternative.

Table 2-1. Alternative Components

Alternative	Excavation Method	Overlay	Temporary Green Valley Road Relocation	Total Duration of Construction (Months)	Maximum Dimension of Open Excavation (at any given time) (LxW in feet)	Maximum Duration of Open Excavation (Months)	Mississippi Bar Mitigation
Alternative 1	Large Open Cut	Yes	Yes	38	2,000 x 350	9	Up to 80 acres
Alternative 2	Open Cut with Single Wall	Yes	No	38	2,000 x 200	9	Up to 80 acres
Alternative 3	Open Cut with Dual Wall System	Yes	No	38	1,500 x 100	18	Up to 80 acres
Alternative 4	Cellular Construction (Multiple Walls)	Yes	No	38	300 x 60[(1)]	18	Up to 80 acres
No Action/ No Project Alternative	None	None	No	None	None	None	Mitigation fulfilled at another site.

[(1)] There would be a maximum of 5 cells (about 60 feet x 60 feet) open at any given time.

The second portion of the modifications proposed at MIAD would include increasing the mass of MIAD by placing an overlay over the downstream side. Although the upstream toe of MIAD was treated with dynamic compaction in the 1990s, the lower portion of MIAD was too deep to have been effectively treated by that procedure. Therefore, there still is some risk for large sliding or deformation to occur due to upstream liquefaction. Because the presence of the reservoir makes it difficult to treat the upstream toe, a downstream overlay is being proposed with the key block construction. The downstream overlay would not prevent upstream sliding and deformation, but it would afford MIAD with adequate mass to withstand a seismic event (See Figure 2-1).

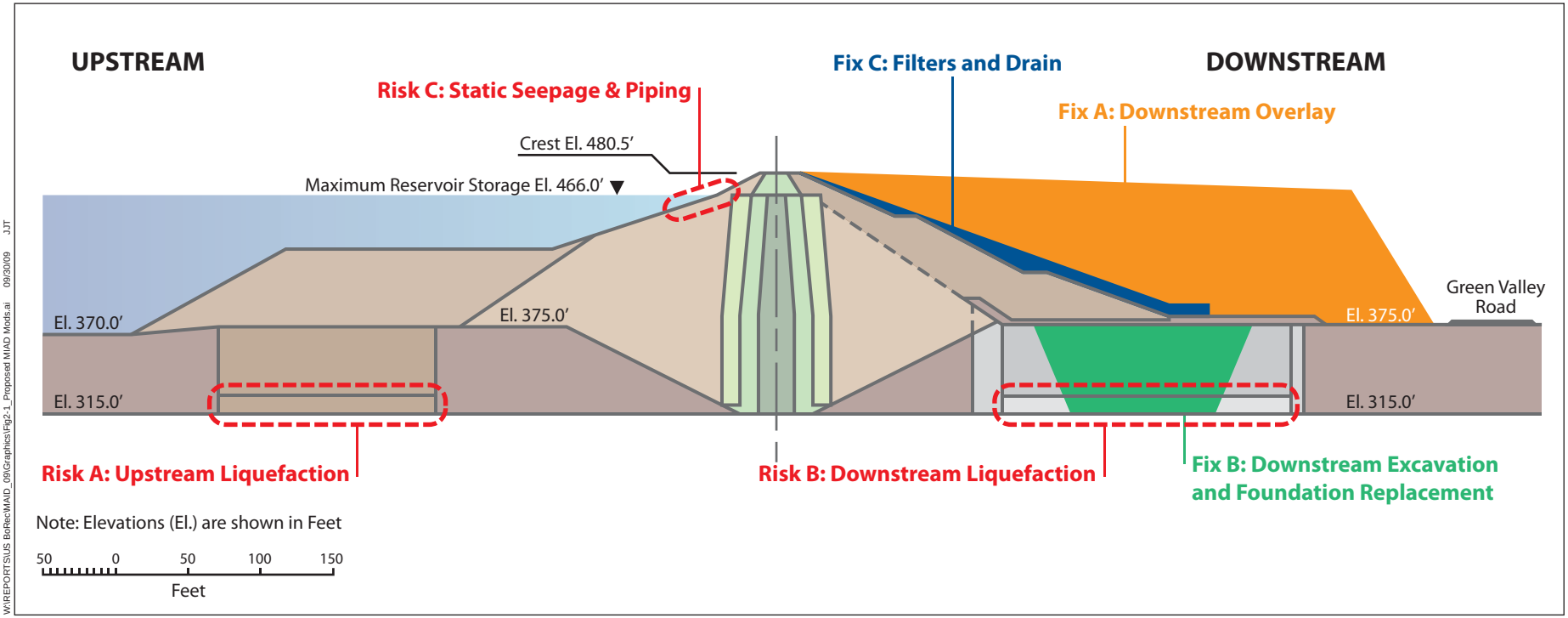

Figure 2-1. Proposed Mormon Island Auxiliary Dam Modifications

The overlay would be accomplished following replacement of the downstream foundation and key block construction by widening the crest and downstream portion of the dam with large quantities of soil material. The downstream shell of MIAD would be removed by excavating material on the face of the dam. This material would be stockpiled at local staging areas around MIAD. The next portion of the work would be placement of the overlay. A portion of the MIAD shell would be re-used and placed back on MIAD as part of the overlay. The remaining material would be obtained from existing MIAD stockpiles that were deposited during excavation of the Joint Federal Project Auxiliary Spillway. The material would be compacted as it is placed and would extend the downstream slope of MIAD to near Green Valley Road. As noted above, the purpose of the MIAD overlay would be strictly for seismic and static concerns, and would not provide additional hydrologic control.

The overlay would also incorporate the installation of processed material for the filter zones. The filters would extend upward from the downstream toe of the facility to the crest of the dam. Any water collected by the filters would be carried to the toe of the structure for discharge away from the dam through the toe drain. The filters would reduce the risk of static failure of MIAD by seepage and piping.

Figure 2-2 presents the construction zones for Alternative 1 and Figure 2-3 presents the construction zones for Alternatives 2, 3, and 4. The entire affected area (construction zones, contractor use areas, stockpiling areas, and detention pond) would be closed to the public during construction to ensure public safety.

2.3 No Action/No Project Alternative

The No Action/No Project Alternative would result in no construction and no seismic or static improvements to MIAD. This alternative would not meet the current dam safety objectives of Reclamation.

2.4 Alternative 1 – Large "Open Cut" Excavate and Replace and Overlay

Alternative 1 – Large "Open Cut" Excavate and Replace and Overlay would require excavation of a very large trench approximately 2,000 feet long and 350 feet wide, with a varying depth (from existing dam surface to bottom of trench) of approximately 50 to 70 feet. The foundation would be replaced with cement modified soil and compacted fill. A large dewatering well system would be constructed to continuously dewater the MIAD foundation throughout excavation and replacement of the foundation. This alternative would result in the largest open trench of the four action alternatives. It is the only alternative that would require the temporary relocation of Green Valley Road south into the Mormon Island Wetland Preserve area. Excavation under Alternative 1 is

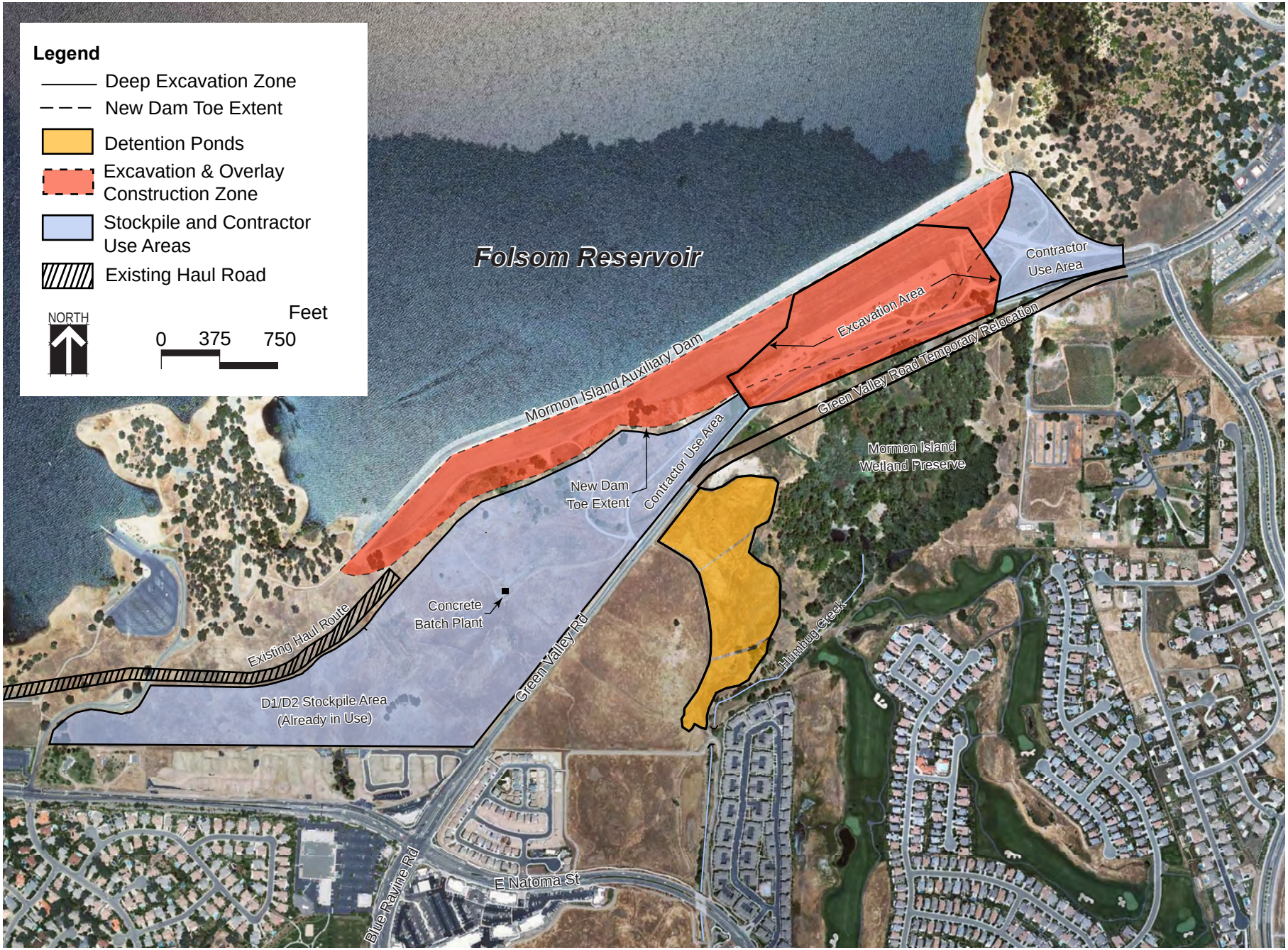

Figure 2-2. Alternative 1 - Mormon Island Auxiliary Dam Modifications

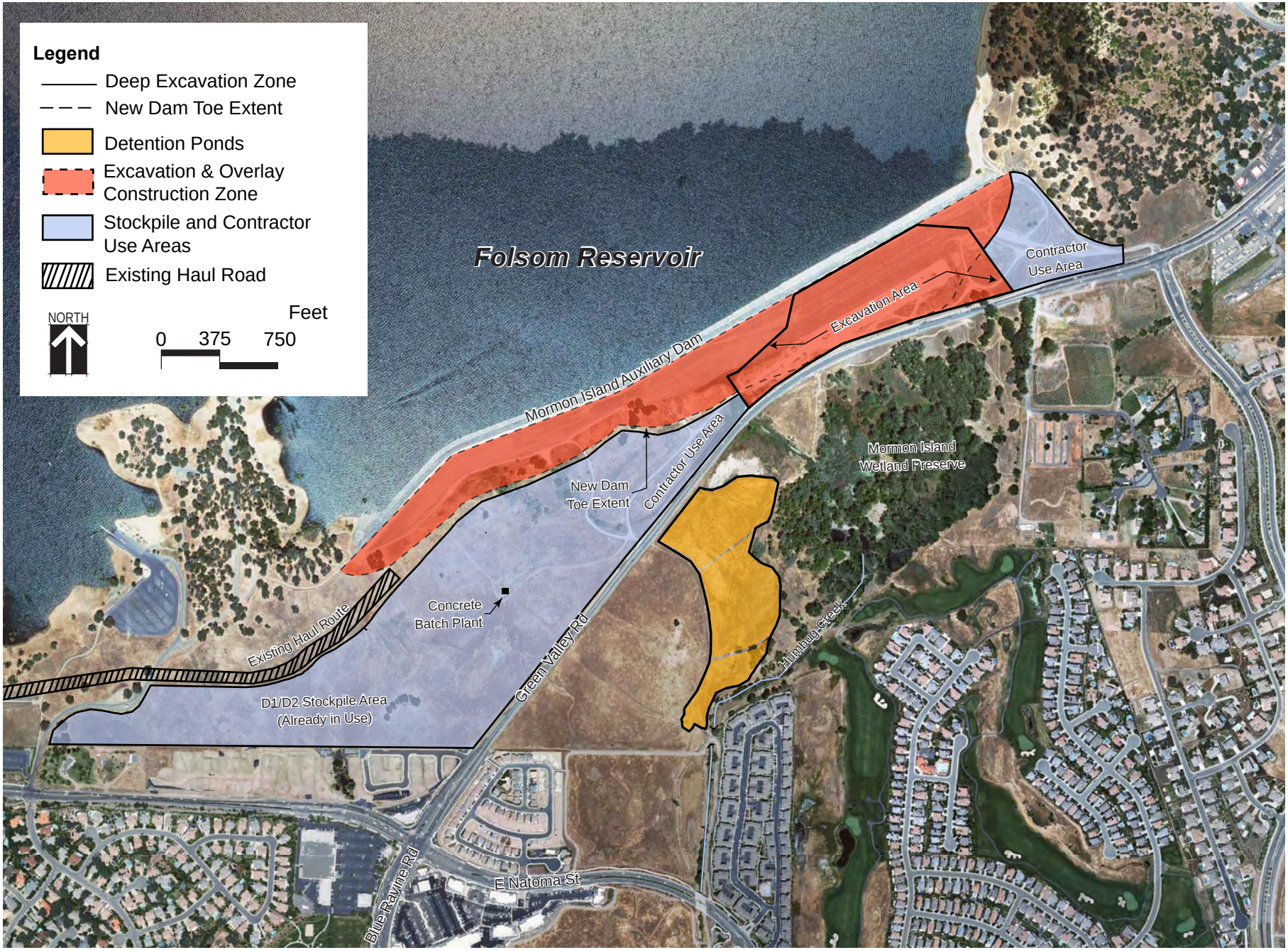

Figure 2-3. Alternatives 2, 3 and 4 - Mormon Island Auxiliary Dam Modifications

expected to take 10 months to complete, but may require up to an eight month break for safety reasons if reservoir water elevations are high. Timing of this alternative would be crucial to ensure public safety; construction would need to be completed when the reservoir is low.

2.4.1 Site Preparation, Well Installation, and Dewatering System Operation

The first two months of construction would involve clearing of vegetation and general site preparation, followed by installation of the dewatering system. The dewatering system for Alternative 1 would be the largest system of all the alternatives and designed to handle a peak flow of 3,000 gallons per minute (gpm), and a sustained flow of 500 gpm. An additional 800 gpm of capacity would be needed for the waste process water outflow from excavation activities. A series of wells would be installed using drill rigs. Up to 84 50-150 gpm electric pump wells and three large 1,000 gpm diesel powered pumps would be required. Approximately 13 acres of detention ponds would be created at the stockpiling areas or south of Green Valley Road. The 20,000 cubic yards of material would be excavated to create the ponds would be placed around the edges create berms. Groundwater in the trench would be pumped from the wells into the detention ponds to allow settling. The water would then be discharged to the Humbug Creek south of Green Valley Road, which drains to Willow Creek and the Lower American River. The dewatering system is expected to run continuously during the excavation of the foundation. When the trench is backfilled with material, the dewatering system would be shut off and dismantled. The dewatering system and detention ponds would be in use for approximately 22 months. Reclamation is currently evaluating the possibility of modifying the dewatering ponds after the completion of modifications to MIAD, to provide long-term riparian and seasonal wetland habitat to satisfy MIAD or overall project mitigation requirements. Consultation from the appropriate regulatory agencies will be completed before the modifications occur.

2.4.2 Temporary Relocation of Green Valley Road

After the dewatering system has been installed, approximately 2,500 feet of Green Valley Road directly south of MIAD would need to be temporarily relocated. This would begin with grading and paving of a new portion of Green Valley Road up to 250 feet south of the existing road, in the Mormon Island Wetland Preserve area (See Figure 2-2). Traffic on Green Valley Road would then be re-routed onto the new portion of the road. The old portion of Green Valley Road would be removed. After construction is complete, the temporary detour would be removed and Green Valley Road would be restored to its previous condition. Alternative 1 is the only alternative that would require the relocation of Green Valley Road due to the large size of the excavation.

2.4.3 Excavation, Foundation Replacement, and Backfilling

2.4.3.1 Construction Methods

Excavation activities would start with the removal of approximately 136,400 cubic yards of material from the lower half of the existing dam face, which would leave a steeper lower face of the dam for construction. Below this excavation a bench would be constructed for access around the deep excavation and the large dewatering well system would be installed. Replacement of the foundation would require an open-hole key trench located partially beneath the existing toe of the MIAD embankment (See Figure 2-4). The existing surface elevation at the toe is approximately 370 feet. The target area for foundation replacement, referred to as the block, is about 900 feet long at an elevation between approximately 300 feet and 320 feet (as the bedrock is sloped and irregular). The foundation would then be excavated down to bedrock, with a base width of the key trench on bedrock of about 70 feet. This deep excavation would remove an additional 500,000 cubic yards of material. The base of the key trench would be excavated into competent rock, inspected, and then backfilling would commence.

Backfilling of the block would require a CMS that would be placed and compacted in the lower portion of the excavation, about 30 feet thick, up to about elevation 340 feet. About 77,000 cubic yards of CMS are estimated to be mixed with soil and placed in the trench. The remaining portion of the open excavation (approximate elevation 340-370 feet or 30 feet thick) and dam face would be replaced with approximately 559,400 cubic yards of granular soil material compacted in lifts up to the current ground surface. Material obtained from the initial excavation and/or previously stockpiled materials would be used to backfill the trench (previously stockpiled materials would be from Phase II of the JFP Spillway). Once the excavation was backfilled up to the toe of the dam, the dewatering system would no longer be required.

2.4.3.2 Equipment

This alternative would be constructed with a fleet of scrapers and dozers, along with support compaction equipment, a soil cement batch plant, a dewatering system, and compaction with vibratory rollers. It could also be completed with a shovel/excavator/loader and truck operation. This alternative is expected to result in the largest quantity of construction equipment operating at the same time.

2.4.3.3 Materials

Alternative 1 would have the largest quantity of materials to excavate and replace. The offsite materials required for this alternative would be concrete for the key block and filter materials. Table 2-2 presents the material quantities needed to implement Alternative 1.

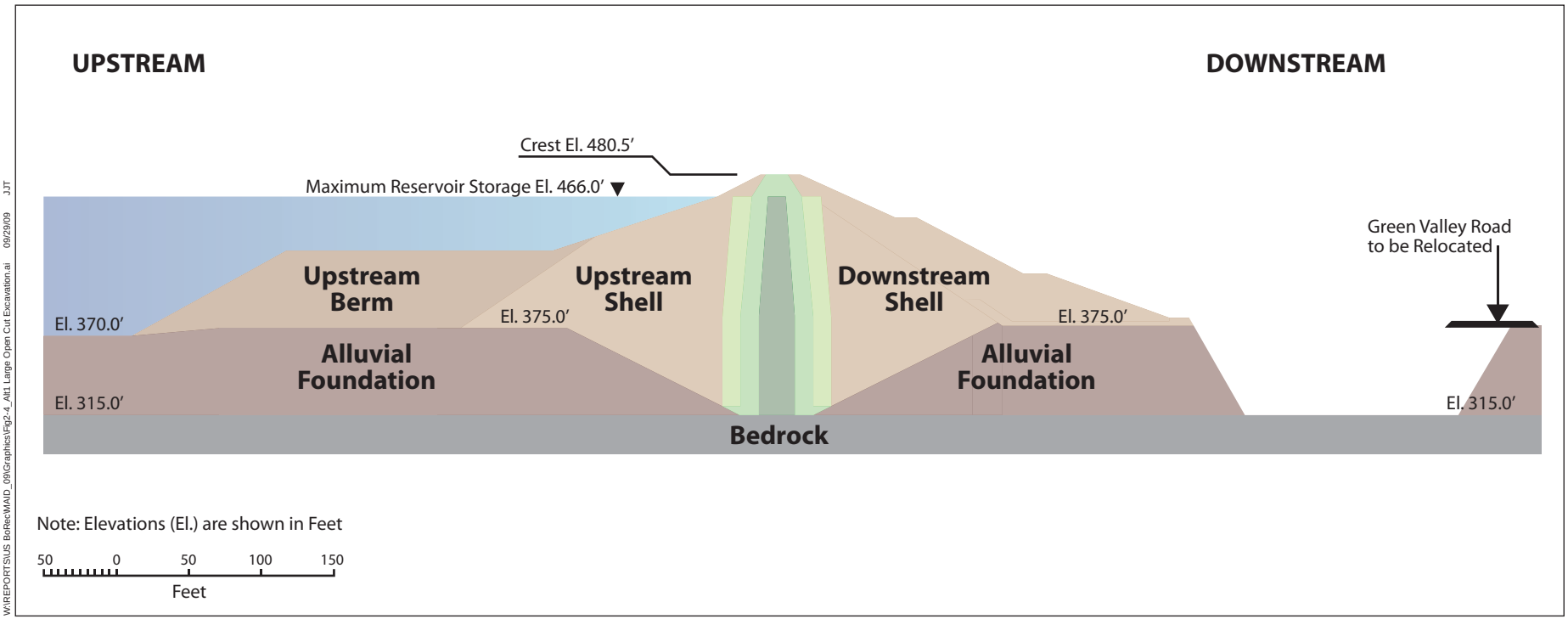

Figure 2-4. Alternative 1 – Large Open Cut Excavation

Table 2-2. Quantity of Materials Handled under Alternative 1

Material Type	Quantity (Cubic Yards)
Total Excavated Material	
Embankment material	136,400
Deep Excavation	500,000
Detention Pond Excavation	20,000
Trench Backfill Material	
Material from existing stockpiles (from Phase II Excavation of JFP Spillway)	95,460
Re-used excavated material	463,940
Other Materials	
Imported Sand	9,000
Cement (foundation replacement)	77,000
Temporary road construction materials (Green Valley Road)	30,000
Road Removal Materials (Green Valley Road)	30,000
Overlay	
Filter Materials (imported)	350,000
Total Excavated Material	250,000
Overlay Placement: Existing stockpiles from Phase II Excavation of JFP Spillway	775,000
Overlay Placement Re-used excavated material	225,000
Total Materials Handled:	**2,961,800**

2.4.3.4 Reservoir Elevation Constraints

This excavation method requires the largest open trench of all the alternatives; therefore, it has the highest risk of failure if reservoir levels suddenly rise. To reduce this risk, emphasis on timing, weather, and reservoir conditions would be critically evaluated and would affect the duration of excavation. If reservoir levels are too high (the reservoir reaches its highest elevation March to June), a four month break may be required. In this case, the excavated area would be backfilled and the site would be closed until reservoir levels are low enough to continue, generally in July. If a seasonal break is required, the amount of materials handling would increase as the trench would have to be excavated after the reservoir levels have declined. The maximum construction length for this alternative, assuming two seasonal breaks are required, would be three construction seasons.

2.4.4 Overlay Placement with Filters and Drains

Construction of the overlay would commence with any needed clearing of vegetation and pre-stripping, which is expected to take approximately one month. The downstream shell of MIAD would be removed by excavating the first three to five feet of material on the face of the dam. A total of approximately 250,000 cubic yards of material would be removed and stockpiled at either the northeast or southwest of MIAD. This amount of material would likely be placed on top of existing stockpiles.

The next portion of the work would be placement of the filters and the shell for the overlay. The filters would be installed by placing a layer of processed fine and coarse filter materials of specified gradation over the exposed slope of the earthen structure, and then replacing the outer shell. Approximately 350,000 cubic yards of processed material would be acquired from a local (Sacramento area) commercial source and delivered to site. The processed material is expected to be delivered to the site throughout the excavation and foundation replacement work and would be stockpiled until needed for the overlay phase. Placement of the outer shell of the overlay would re-use 225,000 cubic yards of material from the MIAD shell that was originally excavated. An additional 775,000 cubic yards of material would be obtained from existing stockpiles that were deposited during excavation of the JFP Auxiliary Spillway. The material would be compacted as it is placed and would extend the length of the downstream slope of MIAD to near Green Valley Road. The purpose of the MIAD overlay would be strictly for seismic and static concerns, and would not provide additional hydrologic control. Figure 2-5 shows the construction of the overlay.

Equipment necessary to complete the overlay work would include dozers, scrapers, excavators or loaders, and dump trucks.

2.4.5 Staging, Stockpiling, and Off-Site Materials Delivery

Staging of equipment and vehicles would occur at the contractor use area in the northeastern portion of the project area and the southwestern stockpile area already in use for Phase II of the JFP (See Figure 2-2). Any necessary stockpiling would occur at existing stockpiles near the southwestern end of MIAD. Soil material for the excavation backfill and the overlay would be obtained from these staging areas. It is anticipated that off-site materials, including processed material and concrete for the foundation treatment work, would be delivered to the northern contractor use area, off of Green Valley Road.

2.4.6 Construction Sequencing

Alternative 1 is expected to require approximately 31 months for the foundation replacement and 24 months for the overlay. Because the overlay could overlap with the foundation treatment work, the total amount of construction would be about 38 months. Work would begin with two months of site preparation and clearing, with nine months for well installation and the construction of detention ponds for the dewatering system. Excavation activities would be carried out in approximately ten months and then the foundation would be replaced and the trench would be backfilled, requiring 14 months. The overlay process would commence approximately five months after the start of the foundation replacement work, and would be carried out concurrently with the backfilling of the trench. The overlay process is would be completed in about 24 months. Figure 2-5 shows the construction schedule for all four action alternatives, including Alternative 1.

2.5 Alternative 2 – Single Wall Excavate and Replace and Overlay

Alternative 2 – Single Wall Excavate and Replace and Overlay involves a variation on the open excavation being considered under Alternative 1; construction of a structural wall on the Green Valley Road side of the open excavation. The wall would prevent relocation of Green Valley Road and would decrease the size of the excavation. The wall would also help to reduce the quantity of groundwater that would need to be removed to keep the excavation dry.

2.5.1 Site Preparation, Well Installation, and Dewatering System Operation

The first two months of construction would involve clearing of vegetation and general site preparation, followed by installation of a dewatering system. The dewatering system for Alternative 2 would the same as that described above for Alternative 1. It would be designed to handle a peak flow of 3,000 gpm and a sustained flow of 500 gpm. An additional 800 gpm of capacity would be needed for the waste process water outflow from excavation activities. A series of wells would be installed in the excavation area. Up to 84 50-150 gpm electric pump wells and three large 1,000 gpm diesel powered pumps would be required. Approximately 13 acres of detention ponds would be created at the stockpiling areas or south of Green Valley Road. Approximately 20,000 cubic yards of material would be excavated and would be placed around the edge of the ponds to create berms. Groundwater in the trench would be pumped from the wells into the detention ponds to allow settling. The water would be discharged to the Humbug Creek south of Green Valley Road, which drains to Willow Creek and the Lower American River. The dewatering system is expected to run continuously during the excavation. When the trench is

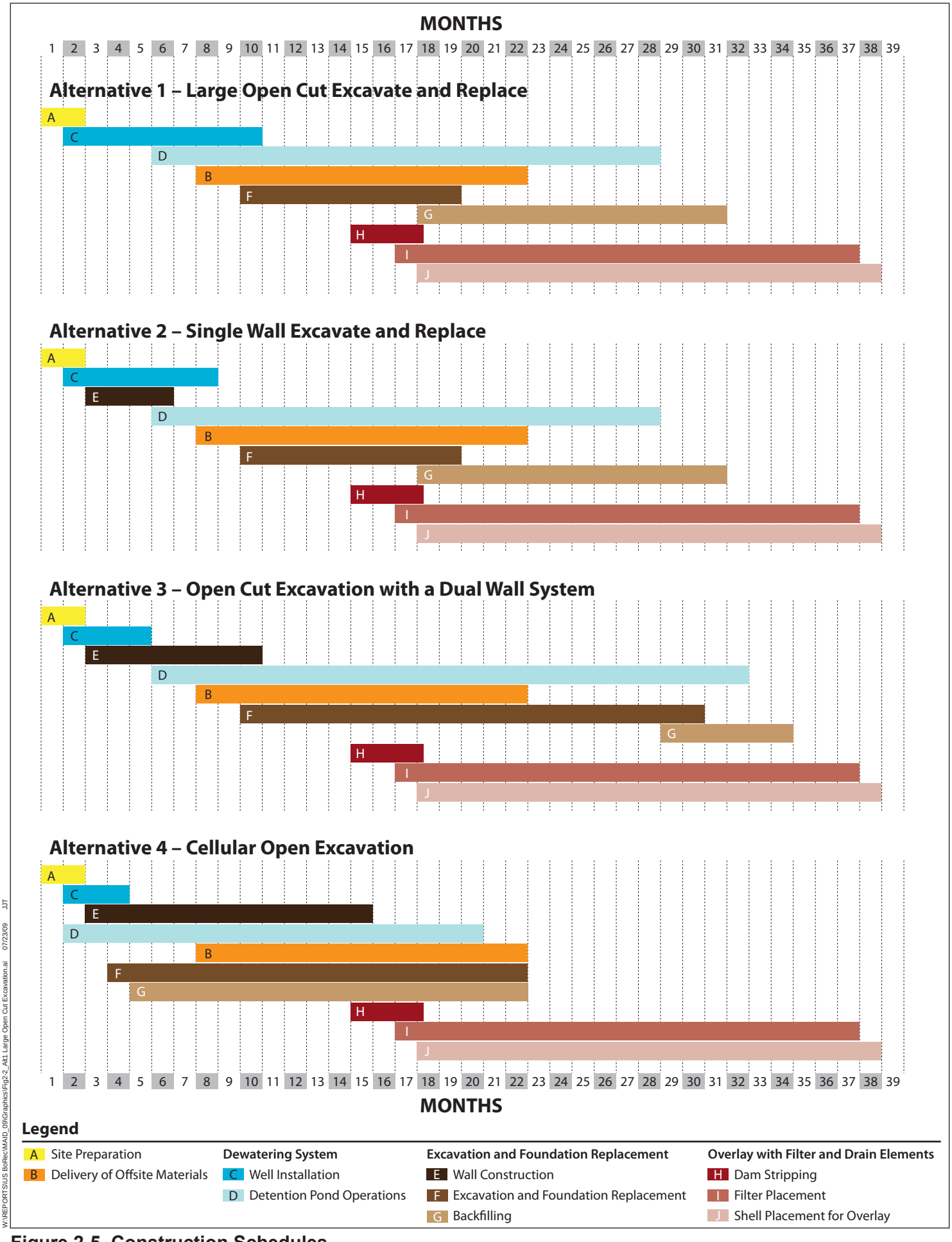

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Figure 2-5. Construction Schedules

backfilled with material, the dewatering system would be dismantled. The dewatering system and detention ponds would be in use for approximately 22 months. Reclamation is currently evaluating the possibility of modifying the dewatering ponds after the completion of modifications to MIAD, to provide long-term riparian and seasonal wetland habitat to satisfy MIAD or overall project mitigation requirements. Consultation from the appropriate regulatory agencies will be completed before the modifications occur.

2.5.2 Excavation, Foundation Replacement, and Backfilling

2.5.2.1 Construction Method

Excavation of the MIAD foundation under Alternative 2 would be similar to Alternative 1 with the exception of a wall that would be constructed on the Green Valley Road side of the trench (See Figure 2-6). Because of the structural support of the wall, the volume of material that would be excavated would be less than Alternative 1 (approximately 11 percent less).

A number of wall types could be used for this alternative; however it is assumed for analysis purposes that a secant pile wall would be the baseline method. Sheet piles may be used in the shallow sections (See Figure 2-7).

Secant walls are constructed by drilling a hole and backfilling with cementatious materials, repeating and interlocking one after another to create a continuous wall (See Figure 2-8). Internal structural steel could be installed if additional strength is needed.

Sheet pile walls are constructed by driving pre-fabricated sheet pile sections into the ground (See Figure 2-9). The wall is formed by connecting the joints of adjacent sheet piles in sequential installation.

The single wall would be constructed prior to excavation of the trench and would require approximately 7,000 cubic yards of cement. After the wall is in place, approximately 136,400 cubic yards of material would be removed from the lower half of the existing dam face, which would leave a steeper lower face of the dam for construction. Below this excavation a bench would be constructed for access around the deep excavation.

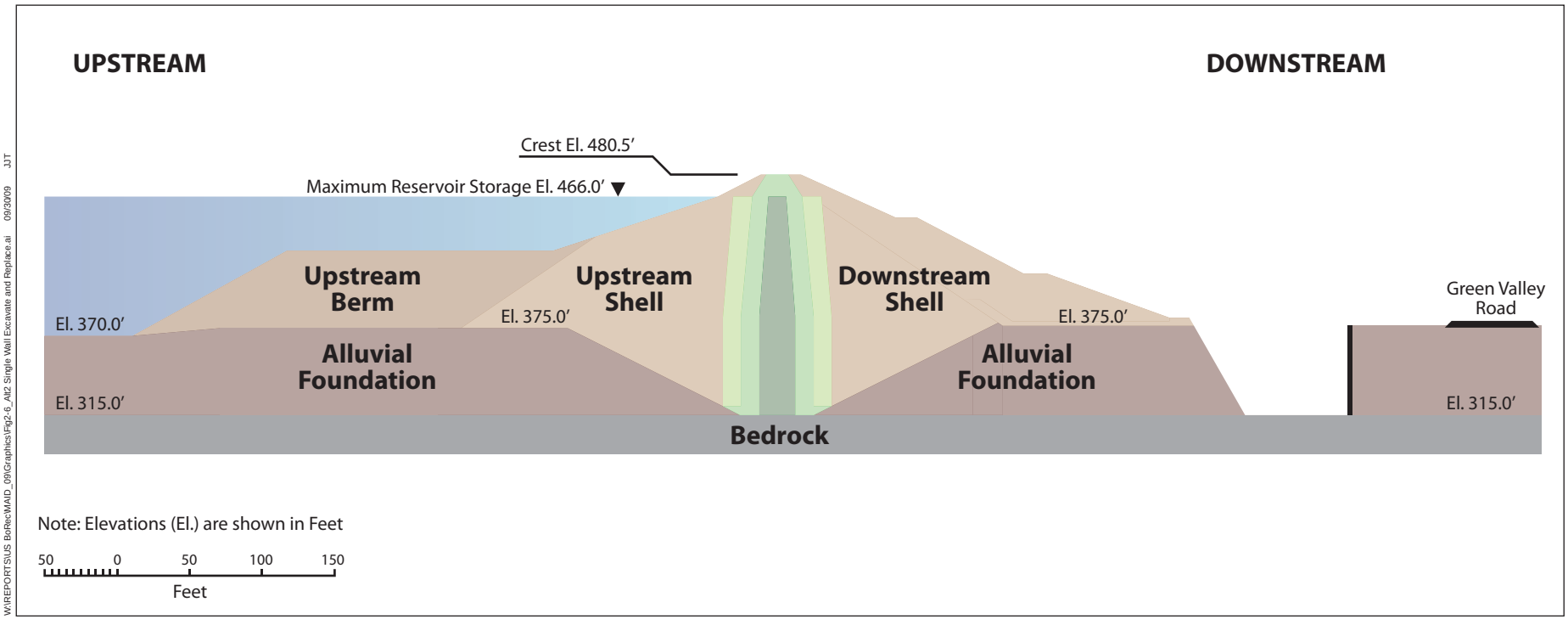

Figure 2-6. Alternative 2 – Single Wall Excavate and Replace

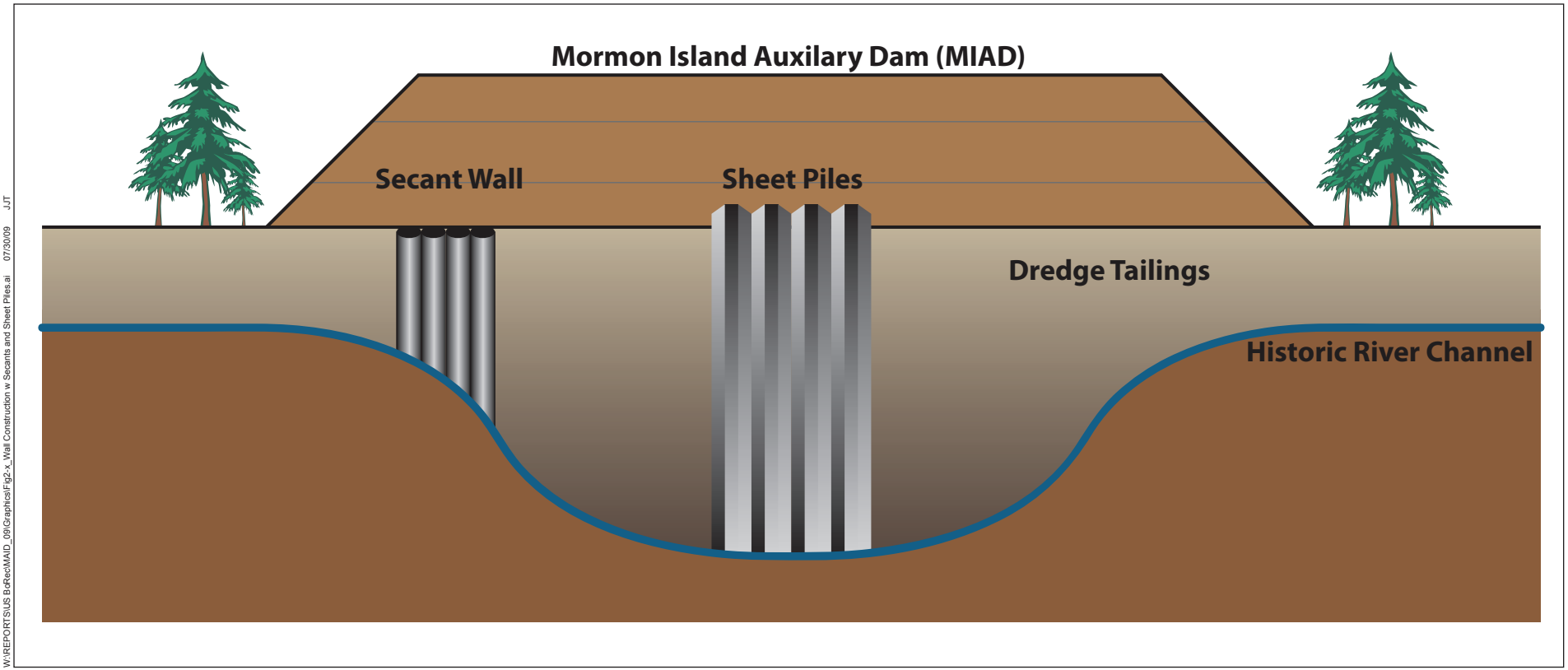

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Figure 2-7. Wall Construction with Secants and Sheet Piles

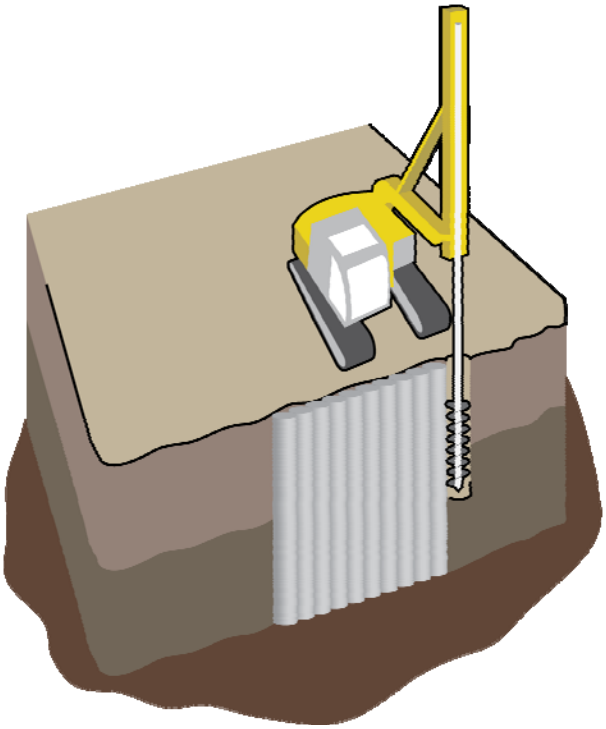


Figure 2-8. Secant Wall

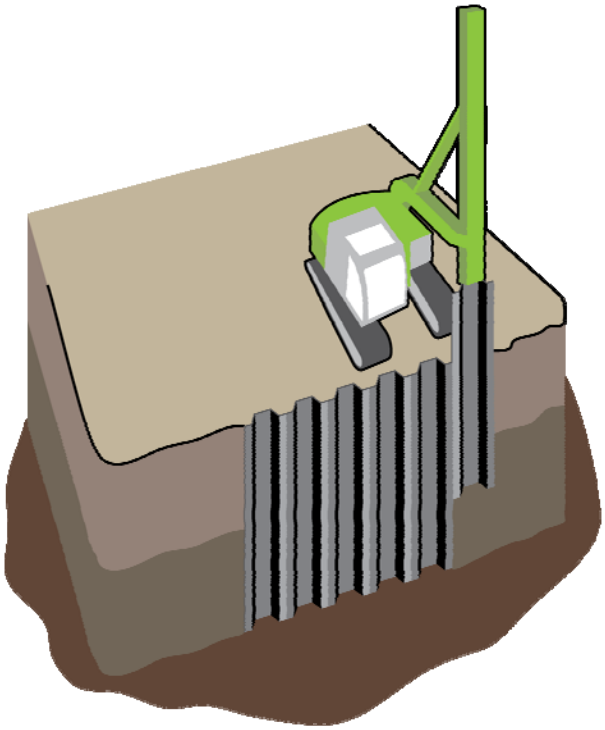


Figure 2-9. Sheet Pile Wall

The foundation would then be excavated down to bedrock, with a base width of the key trench on bedrock of about 70 feet. This deep excavation would remove approximately 425,000 cubic yards of additional material. The base of the key trench would be excavated into competent rock, inspected, and then backfilled. Backfilling of the block would require a CMS that would be placed and compacted in the lower portion of the excavation, about 30 feet thick, up to about elevation 340 feet. About 70,000 cubic yards of CMS would be mixed with soil and placed in the trench. The remaining portion of the open excavation (approximate elevation 340-370 feet or 30 feet thick) and dam face would be replaced with 491,400 cubic yards of granular soil material compacted in lifts up to the current ground surface. Material obtained from the initial excavation would be used to backfill the trench, with additional material obtained from the stockpile area that is already in use (excess material from Phase II of the JFP Spillway). Once the excavation was backfilled up to the current elevation of the dam toe, the dewatering system would no longer be required.

2.5.2.2 Equipment

Construction is expected to require a fleet of scrapers and dozers, along with support compaction equipment, a soil cement batch plant, water handling infrastructure, and compaction with vibratory rollers. It could also be carried out with a shovel/excavator/loader and truck operation. Wall installation is expected to occur by rotary drills.

2.5.2.3 Materials

Alternative 2 would have less material volume to excavate and replace than Alternative 1. The only offsite materials required for this alternative would be concrete for the foundation replacement and wall construction and filter materials. Table 2-3 presents the material quantities needed to implement Alternative 2.

2.5.2.4 Reservoir Elevation Constraints

While the downstream wall would provide some structural support to MIAD, the excavation under this alternative would still require a large open trench and would therefore present a risk of failure if reservoir levels suddenly rise. To reduce this risk, emphasis on construction activity to specific calendar year, weather, and reservoir conditions would be critically evaluated and would affect the duration of excavation. If reservoir levels are too high (March through June), up to a four month break may be required. In this case, the excavated area would be backfilled and the site would be closed until reservoir levels are low enough to continue, generally in July. If a seasonal break is required, the amount of materials handling would increase as the trench would have to be excavated after the reservoir levels have declined. The maximum construction length for this alternative, assuming two seasonal breaks are required, would be three seasons.

Table 2-3. Quantity of Materials Handled under Alternative 2

Material Type	Quantity (Cubic Yards)
Total Excavated Material	
Embankment material	136,400
Deep Excavation	425,000
Detention Pond Excavation	20,000
Trench Backfill Material	
Material from existing stockpiles (from Phase II Excavation of JFP Spillway)	81,141
Re-used excavated material	410,259
Other Materials	
Imported Sand	9,000
Cement (foundation replacement)	70,000
Cement (wall construction)	7,000
Temporary road construction materials (Green Valley Road)	0
Road Removal Materials (Green Valley Road)	0
Overlay	
Filter Material (imported)	350,000
Total Excavated Material	250,000
Overlay Placement: Existing stockpiles from Phase II Excavation of JFP Spillway	775,000
Overlay Placement Re-used excavated material	225,000
Total Materials Handled:	**2,533,800**

2.5.3 Overlay Placement with Filters and Drains

These would be the same as described for Alternative 1.

2.5.4 Materials, Staging, and Site Development

Stockpiling, borrow areas, haul roads, construction zones, equipment and vehicle staging, off-site materials needed, etc.

2.5.5 Construction Sequencing

Alternative 2 is expected to require approximately 30 months for the foundation treatment (from clearing of construction site and installation of well system through backfilling the trench) and 24 months for the overlay (from dam stripping to shell placement). Because the overlay placement would overlap with the foundation treatment work, the total amount of construction would be about 38 months. Work would begin with two months of site preparation and clearing, and up to seven months for well installation and the construction of detention ponds for the dewatering system. Excavation activities would be carried out in approximately 11 months, followed by backfilling of the trench in about14 months. The overlay process would commence approximately five months after the start of the foundation treatment work, and would likely be completed concurrent with excavation and backfilling of the trench for the foundation replacement. The overlay process is expected to take approximately 24 months. Figure 2-6 shows the draft construction schedule for Alternative 2.

2.6 Alternative 3 – Open Cut Excavation with a Dual Wall System and Overlay

Alternative 3 - Open Cut Excavation with Dual Wall System and Overlay includes the construction of two walls (one near Green Valley Road, and one closer to MIAD) in an effort to substantially minimize dewatering and the amount of materials required to be removed. The MIAD wall would contribute to supporting MIAD, and may eliminate the need to strip off a portion of the downstream dam toe, if the block can be shifted south. The Green Valley Road wall would eliminate the need to relocated Green Valley Road. The wall system would require modification of the means and methods of excavation. This would increase the total excavation time (21 months) compared to Alternatives 1 and 2 (10 months), but it could be completed year round regardless of reservoir elevations.

2.6.1 Site Preparation, Well Installation, and Dewatering System Operation

The first two months of construction would involve clearing of vegetation and general site preparation, followed by installation of a dewatering system. The dewatering system for Alternative 3 would be substantially smaller than Alternatives 1 and 2. It would be designed to handle a peak flow of 1,000 gpm, and a sustained flow of 200 gpm. An additional 250 gpm of capacity would be needed for the waste process water outflow from excavation activities. A series of wells would be installed in the excavation area. Up to 20 50-150 gpm electric pump wells and three large 1,000 gpm diesel powered pumps would be required. Approximately 13 acres of detention ponds would be created at the stockpiling areas or south of Green Valley Road. Approximately 10,000 cubic

yards of material would be excavated and would be placed around the edge of the ponds to create berms. Groundwater in the trench would be pumped from the wells into the detention ponds to allow settling. The water would be discharged to the Humbug Creek south of Green Valley Road, which drains to Willow Creek and the Lower American River. The dewatering system is expected to run continuously during the excavation of the foundation. When the trench is backfilled with material, the dewatering system would be dismantled. The dewatering system and detention ponds would be in use for approximately 26 months. Reclamation is currently evaluating the possibility of modifying the dewatering ponds after the completion of modifications to MIAD, to provide long-term riparian and seasonal wetland habitat to satisfy MIAD or overall project mitigation requirements. Consultation from the appropriate regulatory agencies will be completed before the modifications occur.

2.6.2 Excavation, Foundation Replacement, and Backfilling

2.6.2.1 Construction Methods

Under Alternative 3, a dual wall system would line the trench (See Figure 2-10). Multiple wall construction methods for such a wall system could be employed, but it is assumed for analysis purposes that secant and sheet piles would be used. The addition of the dual walls would increase the total duration of construction at the site, due to the installation of the secant pile and sheet pile walls, but the open cut duration would be less.

The excavation for Alternative 2 would likely be performed in one long trench with cross bracing, but could be also completed in smaller segments without "end" closure walls, which are considered under the "cellular" concept. The amount of material excavated would be substantially reduced compared to Alternatives 1 and 2, with only 5,000 cubic yards of material excavated from the dam face, and 130,000 cubic yards of material removed during deep excavation of the foundation. Approximately 16,000 cubic yards of cement would be required to construct the walls.

After the foundation has been excavated, backfilling of the key block would commence. This would require a CMS that would be placed and compacted in the lower portion of the excavation, about 30 feet thick, up to about elevation 340 feet. About 50,000 cubic yards of CMS would be mixed with soil and placed in the trench. The remaining portion of the open excavation (approximate elevation 340-370 feet or 30 feet thick) and dam face would be replaced with 85,000 cubic yards of granular soil material compacted in lifts up to the current ground surface. Material obtained from the initial excavation would be used to backfill the trench, with additional material obtained from existing stockpiles. Once the excavation was backfilled up to the current elevation of the dam toe, the dewatering system would no longer be required.

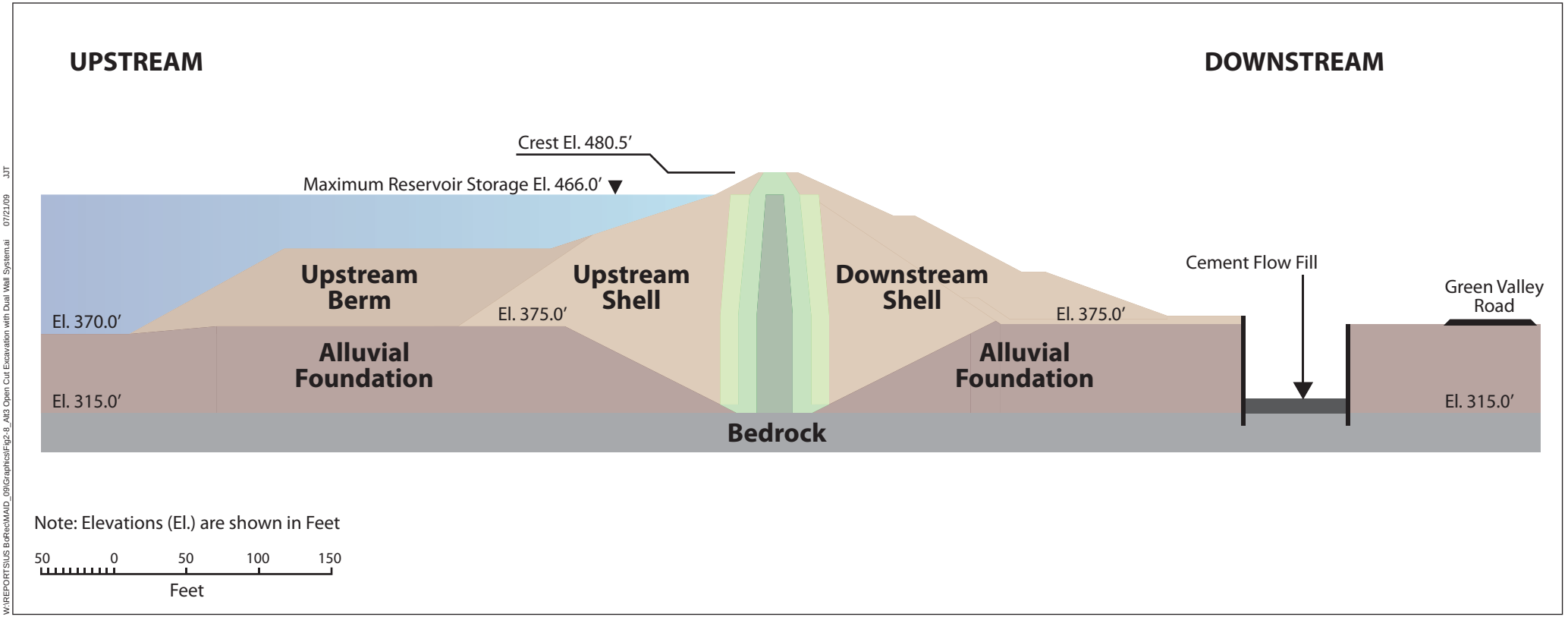


Figure 2-10. Alternative 3 – Open Cut Excavation with a Dual Wall System

2.6.2.2 Equipment

Construction would likely require a shovel/excavator/loader and truck type operation. It could also be carried out with a fleet of scrapers and dozers if pre-stripping was accomplished. Support compaction equipment, a soil cement batch plant, a dewatering system, and compaction with vibratory rollers would also be required. Wall installation is expected to occur by rotary drills.

2.6.2.3 Materials

Alternative 3 would have fewer materials to excavate and replace than Alternatives 1 and 2. The offsite materials required for this alternative would be concrete for the foundation replacement and wall construction and sand for the filters. Table 2-4 presents the material quantities needed to implement Alternative 3.

Table 2-4. Quantity of Materials Handled under Alternative 3

Material Type	Quantity (Cubic Yards)
Total Excavated Material	
Embankment material	5,000
Deep Excavation	130,000
Detention Pond Excavation	10,000
Trench Backfill Material	
Material from existing stockpiles (from Phase II Excavation of JFP Spillway)	27,000
Re-used excavated material	58,000
Other Materials	
Imported Sand	9,000
Cement (foundation replacement)	50,000
Cement (wall construction)	16,000
Temporary road construction materials (Green Valley Road)	0
Road Removal Materials (Green Valley Road)	0
Overlay	
Sand for filters (imported)	350,000
Total Excavated Material	250,000
Overlay Placement: Existing stockpiles from Phase II Excavation of JFP Spillway	775,000
Overlay Placement Re-used excavated material	225,000
Total Materials Handled:	**1,905,000**

2.6.2.4 Reservoir Elevation Constraints

While the dual wall system would provide some structural support to MIAD, the excavation under this alternative would still require a large open trench and would therefore present a risk of failure if reservoir levels suddenly rise. To reduce this risk, emphasis on construction activity to specific calendar year, weather, and reservoir conditions would be critically evaluated and would affect the duration of excavation. If reservoir levels are too high (March through June), up to a four month break may be required. In this case, the excavated area would be backfilled and the site would be closed until reservoir levels are low enough to continue, generally by July. If a seasonal break is required, the amount of materials handling would increase as the trench would have to be excavated after the reservoir levels have declined. The maximum construction length for this alternative would be two seasons.

2.6.3 Overlay Placement with Filters and Drains

This would be the same as described for Alternative 1.

2.6.4 Materials, Staging, and Site Development

This would be the same as described for Alternative 1.

2.6.5 Construction Sequencing

Alternative 3 is expected to require approximately 31 months for the foundation treatment (from clearing of construction site and installation of well system through backfilling the trench) and 24 months for the overlay (from dam stripping to shell placement). Because the overlay placement would overlap with the foundation treatment work, the total amount of construction would be about 38 months. Work would begin with two months of site preparation and clearing, and 4 months for well installation and the construction of detention ponds for the dewatering system. Excavation activities would be carried out in approximately 20 months. Backfilling of the trench would require about six months. The overlay process would commence approximately 6 months after the start of the foundation treatment work, and would be completed concurrent with excavation and backfilling of the trench. The overlay process is expected to take approximately 24 months. Figure 2-6 shows the draft construction schedule for Alternative 3.

2.7 Alternative 4 – Cellular Open Excavation and Overlay

Alternative 4 – Cellular Open Excavation and Overlay would involve the creation of "cells" to close off an area that could be excavated independently of other cells. It is expected that a maximum of five cells would be open at any given time. The cells would allow excavation of one small area of the foundation at a time, rather than the larger open cut excavation described under Alternative 1. This alternative would greatly reduce the construction risk as it would limit the size of the open cut excavation; however, it would increase the duration of the excavation compared to Alternatives 1 and 2.

2.7.1 Site Preparation, Well Installation, and Dewatering System Operation

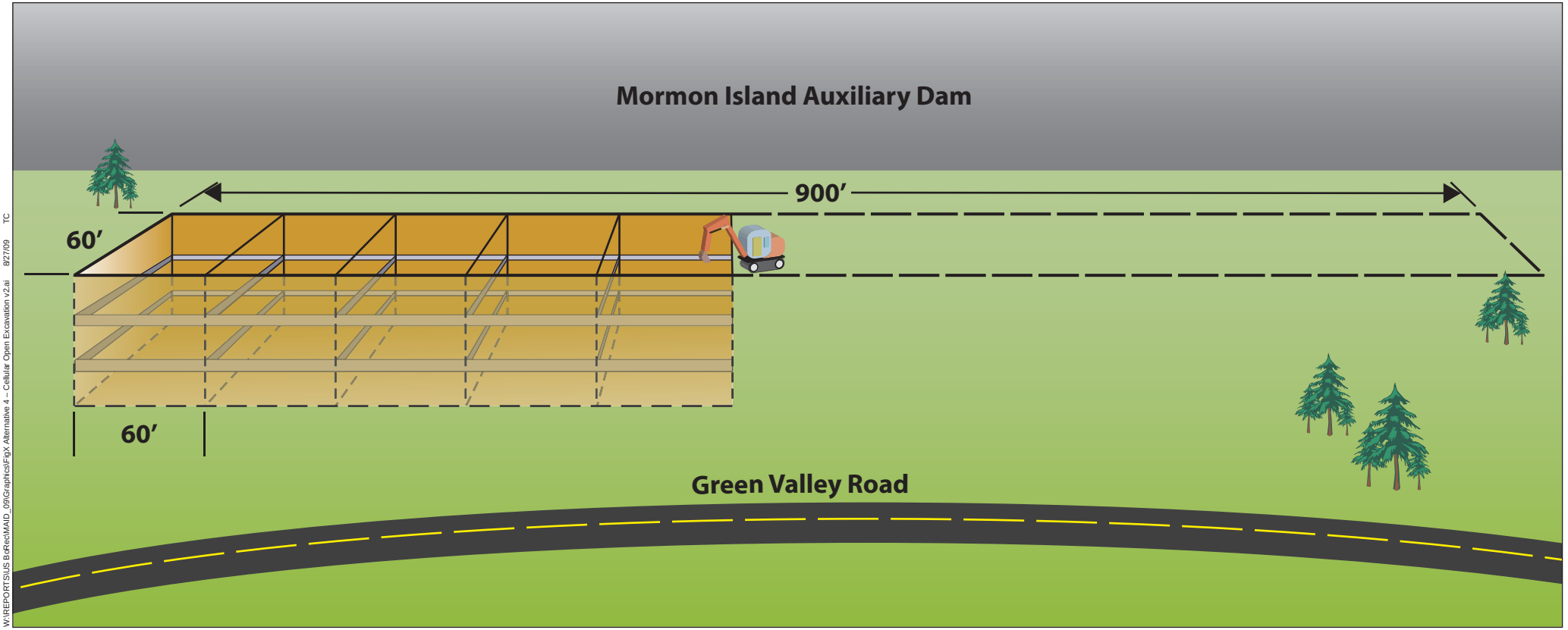
The site dewatering system for Alternative 4 would be similar to Alternative 3. It would be designed to handle a peak flow of 1,000 gpm, and a sustained flow of 200 gpm. An additional 250 gpm of capacity would be needed for the waste process water outflow from excavation activities. A series of wells would be installed in the excavation area. Up to 20 50-150 gpm electric pump wells and three large 1,000 gpm diesel powered pumps would be required. Approximately 13 acres of detention ponds would be created at the stockpiling areas or south of Green Valley Road. Approximately 10,000 cubic yards of material would be excavated and would be placed around the edge of the ponds to create berms. Groundwater in the trench would be pumped from the wells into the detention ponds to allow settling. The water would be discharged to the Humbug Creek south of Green Valley Road, which drains to Willow Creek and the Lower American River. The dewatering system is expected to run continuously during the excavation of the foundation. When the trench is backfilled with material, the dewatering system would be dismantled. The dewatering system and detention ponds would be in use for approximately 18 months. Reclamation is currently evaluating the possibility of modifying the dewatering ponds after the completion of modifications to MIAD, to provide long-term riparian and seasonal wetland habitat to satisfy MIAD or overall project mitigation requirements. Consultation from the appropriate regulatory agencies will be completed before the modifications occur.

2.7.2 Excavation, Foundation Replacement, and Backfilling

2.7.2.1 Construction Method

This variation of the walled excavation includes either constructing the dual wall system and excavating from the surface in cellular segments with excavators using alternating cells as insitu ground support, or cellular cross-lot bracing construction of a closed wall (sheet pile or soldier pile) type system (See Figures 2-11, 2-12 and 2-13). Cells could be square, rectangular,

hexagonal or circular. It is assumed that approximately 18,000 square feet will be the maximum continuous limit of excavation exposure.



W:\REPORTS\US BoRec\MAID_09\Graphics\FigX Alternative 4 – Cellular Open Excavation v2.ai 8/27/09 TC

Figure 2-11. Alternative 4 – Cellular Open Excavation

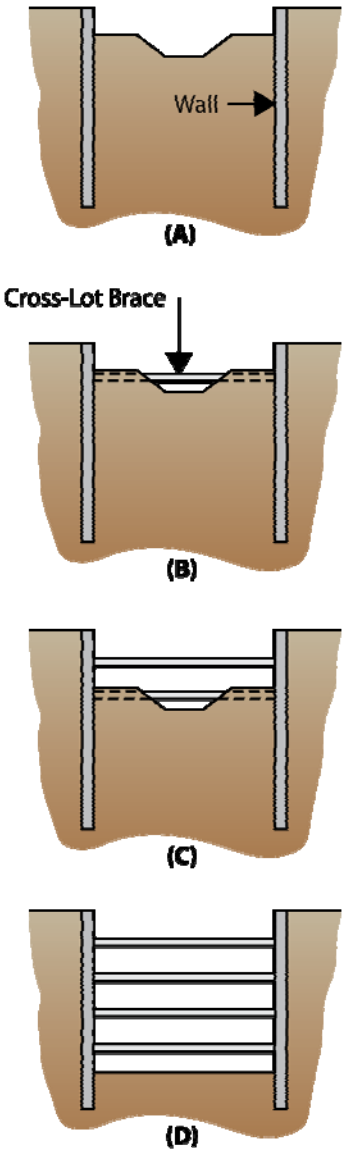


Figure 2-12. Cellular Open Construction with Cross Lot Bracing

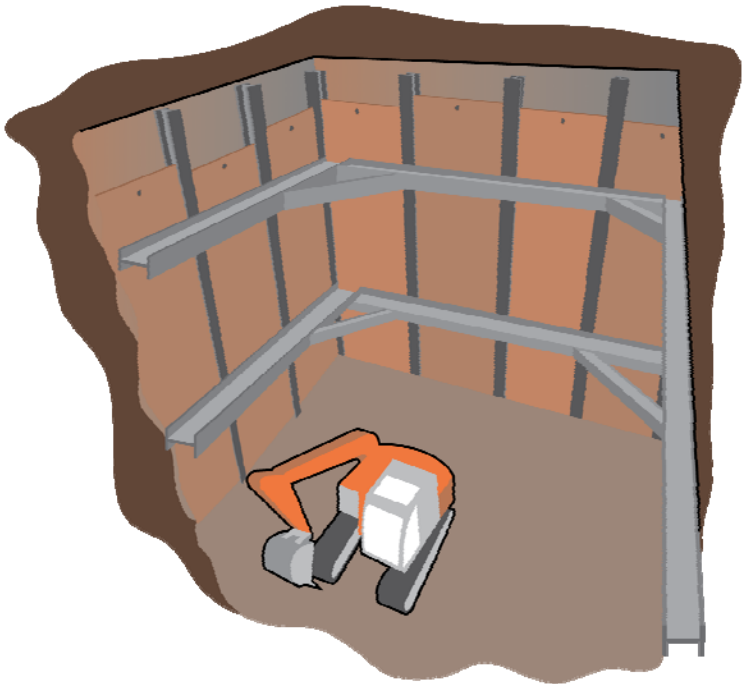


Figure 2-13. Cellular Open Construction

The benefit of this system is that it would minimize the amount of materials required to be removed at a given time, and would reduce the dependency of the excavation on the dewatering system. It would also eliminate construction risk to the dam. The key block could also be shifted just downstream of the existing toe, eliminating the need for excavation of the face of the existing dam.

The baseline construction method assumed for analysis would be secant walls, although other wall options may be selected. Construction would commence with two or three drills constructing the secant walls. For conceptual purposes,

two long, continuous, walls parallel to the dam would be constructed spaced 60 feet with cross walls every 60 feet forming a total of 15, 60 by 60 foot cells.

Once the cement has reached it design strength excavation would follow. Excavation could commence with long reach excavator, large diameter drill augers or clamshell type shovels. The total amount of cement needed to construct the cells would be approximately 21,000 cubic yards.

Once the foundation is cleaned and inspected, backfilling would commence. A flowable concrete could be used as opposed drier materials in the other three alternatives. This would require approximately 45,000 cubic yards of flowable concrete. The cell would then be back filled about 30 feet thick, completing the block within a cell. Once flowable fill has set up (approximately 2- 5 days), the remainder of cell would be back filled with stockpiled material and compacted in lifts until complete. Assuming staged progressive development, up to 5 non-contiguous cells could be in progress at a time.

2.7.2.2 Equipment

The method for construction if secants are used would most likely require two or three drills. Excavation would require long reach excavator, large diameter drill augers, or clamshell type shovels. Support compaction equipment, a cement batch plant, water handling infrastructure, and compaction with vibratory rollers would also be required.

2.7.2.3 Materials

Of the four action alternatives, Alternative 4 would have the smallest quantity of materials to excavate and replace. The offsite materials required for this alternative would be concrete for the foundation replacement and wall construction and sand for the filters. Table 2-5 presents the material quantities needed to implement Alternative 4.

2.7.2.4 Reservoir Elevation Constraints

The construction risk under this alternative is greatly reduced as a much smaller continuous open excavation footprint would be required at any given time. No seasonal breaks would be needed; construction could occur year-round.

Table 2-5. Quantity of Materials Handled under Alternative 4

Material Type	Quantity (Cubic Yards)
Total Excavated Material	
Embankment material	5,000
Deep Excavation	110,500
Detention Pond Excavation	10,000
Trench Backfill Material	
Material from existing stockpiles (from Phase II Excavation of JFP Spillway)	22,950
Re-used excavated material	47,550
Other Materials	
Imported Sand	9,000
Cement (foundation replacement)	45,000
Cement (wall construction)	21,000
Temporary road construction materials (Green Valley Road)	0
Road Removal Materials (Green Valley Road)	0
Overlay	
Sand for filters (imported)	350,000
Total Excavated Material	250,000
Overlay Placement: Existing stockpiles from Phase II Excavation of JFP Spillway	775,000
Overlay Placement Re-used excavated material	225,000
Total Materials Handled:	**1,871,100**

2.7.3 Overlay Placement with Filters

This would be the same as described for Alternative 1.

2.7.4 Materials, Staging, and Site Development

This would be the same as described for Alternative 1.

2.7.5 Construction Sequencing

Alternative 4 is expected to require approximately 22 months for the foundation treatment (from clearing of construction site and installation of well system through backfilling the trench) and 24 months for the overlay (from dam stripping to shell placement). Because the overlay placement would overlap with the foundation treatment work, the total amount of construction would be

about 38 months. Work would begin with two months of site preparation and clearing, and three months for well installation and the construction of detention ponds for the dewatering system. The cellular construction would allow excavation and backfilling of the cells to occur quickly, with a total construction time of approximately 20 months. The overlay process would commence approximately 12 months after the start of the foundation treatment work, and would likely be completed concurrent with excavation and backfilling work. The overlay process is expected to take approximately 24 months. Figure 2-6 shows the draft construction schedule for Alternative 2.

2.8 Mississippi Bar Mitigation Overview

As the NEPA lead agency for the Folsom DS/FDR Project, Reclamation is responsible for completing mitigation for impacts to habitat and wetlands that occurred during project implementation. Impacts to habitat were described in the Coordination Act Report (CAR) for the Folsom DS/FDR Project and mitigation for this habitat was recommended by the USFWS and adopted in the 2007 RODs. The Clean Water Act Section 404 Permit for the Folsom DS/FDR Project outlined impacts to wetlands and other waters of the United States and required additional mitigation. Reclamation proposes to fulfill a portion of the USFWS CAR recommendations and Corps 404 mitigation requirements at Mississippi Bar. The site at Mississippi Bar would be used to complete mitigation for impacts associated with the JFP and could also be used to address mitigation that may be required for the MIAD modifications proposed in this Supplement. Each of the four action alternatives would include the same Mississippi Bar component.

2.8.1 Habitat Site Selection

Reclamation has considered a variety of potential mitigation sites to fulfill their mitigation requirements from the Folsom DS/FDR Project. This section describes the sites considered, those that are will no longer be pursued by Reclamation, and those that Reclamation is still considering to meet the mitigation requirements of the Folsom DS/FDR, including one mitigation site, Mississippi Bar, proposed for immediate implementation.

2.8.1.1 Potential Mitigation Sites Considered

Reclamation considered 14 potential sites for Folsom DS/FDR habitat mitigation:

- Kanaka Valley
- Stathos Parcels
- Mississippi Bar
- Sacramento River Ranch Mitigation Bank

- Woodlake
- Auburn Project Lands in Cool, California
- Minner-Schulz Property
- American River Restoration Site
- Carriage Hill
- Weiner Property
- Knickerbocker Flats
- Cosumnes River
- Sutter Basin Conservation Bank
- Old Auburn Dam Staging Area

Each of these sites was initially screened based on its location relative to the affected site (Folsom Reservoir), the size of the site, the potential for targeted habitat creation or preservation, economic feasibility, technical feasibility, environmental effects, potential to be protected in perpetuity, and USFWS and Corps approval. The USFWS gives fewer mitigation credits for sites that already contain good habitat value because any planned mitigation efforts will not substantially improve these areas above baseline conditions to compensate for habitat losses from the project. Reclamation would prefer to find a site with poorer quality habitat as it would allow them to obtain more mitigation credits to complete their mitigation in a shorter timeframe and would have the potential to substantially improve vegetation and habitat for wildlife in the area.

2.8.1.2 Sites Eliminated from Further Consideration

Reclamation eliminated several potential mitigation sites for various reasons. The sections below note the properties eliminated from further consideration and the reasons for their elimination.

Minner-Schulz Property This property was initially considered for preservation of 22 acres of oak woodland; however, it was not approved by the USFWS because a threat of imminent development could not be demonstrated.

American River Restoration Site This site was initially considered for riparian habitat conservation with Sacramento County as the implementing agency; however, this site has existing habitat value and is existing mitigation for another project.

Carriage Hill This 20 acre site was initially considered for chaparral preservation. The Bureau of Land Management (BLM) and the American River Conservancy would be the implementing agencies. Because only a small amount of chaparral habitat is required (0.55 acres), and because this site would offer no other habitat types, this would not be a cost efficient mitigation site.

Weiner Property This 167 acre site was initially considered for oak woodland and riparian preservation. BLM and the American River Conservancy would be the implementing agencies. This site was eliminated from further consideration because of the high cost associated with it.

Knickerbocker Flats This site is owned by Reclamation and was initially considered for seasonal wetland mitigation. This site was eliminated from further study because the existing habitat value was high and would result in fewer mitigation credits.

Cosumnes River This site is owned by BLM. This site was eliminated from further study because it is located too far from the project's area of effect.

Sutter Basin Conservation Bank This bank was considered for seasonal wetland mitigation; however, it is not currently approved by the Corps for sale of wetland credits, and therefore was eliminated from further consideration.

Old Auburn Dam Staging Area This property is owned by Reclamation and was previously used as a staging area in the preliminary stages of construction for Auburn Dam. The site is three to five acres of primarily disturbed habitat, including a new parking lot for recreational river access, a large gravel stockpile and three concrete lined settling ponds that hold water and have established riparian vegetation. Reclamation staff visited the site with staff from the USFWS on June 27, 2008. This site would not be approved by the USFWS because it is part of the construction area of Auburn Dam, which remains an authorized project. Therefore, this site could not be protected in perpetuity under current authorizations. This site was eliminated from further consideration.

2.8.1.3 Sites Retained for Further Consideration

Reclamation will retain six sites for further consideration to assess their suitability for meeting the mitigation requirements of the Folsom DS/FDR Project. The six sites retained for consideration are described in Table 2-6 below.

Table 2-6. Habitat Mitigation Sites Retained for Further Consideration

Mitigation Site Name	Implementing Agency	Habitat Type	Benefits	Constraints
Kanaka Valley	BLM and American River Conservancy	Oak Woodland, Chaparral, Riparian Woodland	• Proximity of site to project area of effect • Threat of development	• Site may be too large for mitigation needs • May be too costly due to size (need to confirm that Reclamation's mitigation could go forward there independent of other partners' involvement to acquire the whole site
Stathos Parcels (two parcels, same owner)	Sacramento Valley Conservancy	Oak Woodland, Chaparral, Riparian Woodland, Seasonal Wetland	• Potential cost sharing • Connectivity to Deer Creek Hills Oak Woodland Preserve and Working Ranch	• Potential competition over mitigation sites • Soil quality is currently unknown. • Cultural resource surveys have not been done • Need to research potential flood control impacts/benefits of seasonal wetland and riparian habitat restoration • Water availability for oak woodland restoration unknown
Mississippi Bar	DPR and Reclamation	Riparian Woodland	• Land owned by DPR • Use consistent with current designation in draft management plan • Proximity of site to project area of effect • Groundwater close to surface • Land owned by DPR and Reclamation	• Topsoil needed • Cultural Resource analysis and SHPO Consultation needed • Compaction, possible gravel removal
Sacramento River Ranch Mitigation Bank	Wildlands, Inc.	Seasonal Wetland, Riparian Woodland	• Low risk • Long term maintenance requirement would be the responsibility of Wildlands, Inc.	• Approval still pending • Not all habitat types • May not be cost effective
Woodlake	Corps	Riparian Woodland, Seasonal Wetland, Oak Woodland, Chaparral	• Almost all mitigation requirements could be fulfilled at this site • Connectivity to other restoration • Project design partially completed • Located in the American River Parkway	• No mitigation space currently available as it is in use by Sacramento County and the Corps • Significant excavation may be required to accomplish riparian restoration • Existing utility easements • Known and potential cultural resources
Auburn Project Lands in Cool, California	Reclamation	Oak Woodland or Chaparral	• Owned by Reclamation • Could fulfill limited oak woodland mitigation	• Water availability unknown • Already contains quality upland habitat • Remote site expensive to construct, operate, maintain, and monitor • Currently part of the Auburn Dam Project footprint

The Mississippi Bar site has been selected for immediate implementation as a mitigation site because it is considered to have the least amount of constraints and could be completed in a reasonable timeframe.

2.9 Mississippi Bar Habitat Mitigation Characteristics

Reclamation is proposing to increase the acreage of wetland and riparian vegetation in three phases on approximately 80 acres at Mississippi Bar. Mississippi Bar is located on the west shore of Lake Natoma in Sacramento County (See Figure 2-14). The land at Mississippi Bar is owned by both Reclamation and DPR. Reclamation has entered into discussions with DPR for the use of State lands at Mississippi Bar for mitigation purposes, but at this time no formal agreement has been completed. Reclamation and DPR will need to reach a formal agreement on the terms and conditions for the use of State lands, which may or may not include some or all of the proposed actions at Mississippi Bar in this document. If an agreement is not reached, Reclamation will begin to explore alternative mitigation options.

Additionally, SAFCA is proposing to enter into an agreement with Reclamation to take over long-term O&M of the Mississippi Bar mitigation site; however no agreement is currently in place. If SAFCA does not take over long-term O&M, Reclamation would ultimately be responsible for the site, but would likely enter into an agreement with another willing entity.

The Mississippi Bar habitat mitigation would be the same under each of the four action alternatives for the MIAD Modification Project. Under the No Action/No Project Alternative, it is assumed that no mitigation activities would occur at Mississippi Bar as part of the MIAD Modification Project. However, Reclamation would still be obligated to fulfill their mitigation requirements for the Folsom DS/FDR Project and such mitigation would occur independently of the MIAD Modification Project.

All four action alternatives proposed in this Supplemental EIS/EIR would include the same Mississippi Bar elements; creation/restoration of riparian woodland on approximately 80 acres, replacement of a culvert, and creation of seasonal wetland. Because this site is part of the Folsom Lake State Recreation Area (FLSRA), Reclamation has been actively coordinating with DPR to ensure the mitigation is consistent with DPR's future recreation plans for the site.

The Corps will be providing final habitat mitigation design plans for the Mississippi Bar Mitigation Site (riparian woodland, seasonal wetland) in Spring 2010, which will be reviewed by USFWS and the Corps' Regulatory Division. Once the final habitat mitigation design plans are complete, DPR will meet with USFWS and Corps to provide assurances that recreation will be consistent with mitigation requirements to maintain the Mississippi Bar mitigation site (riparian woodland and seasonal wetland habitats) in perpetuity.

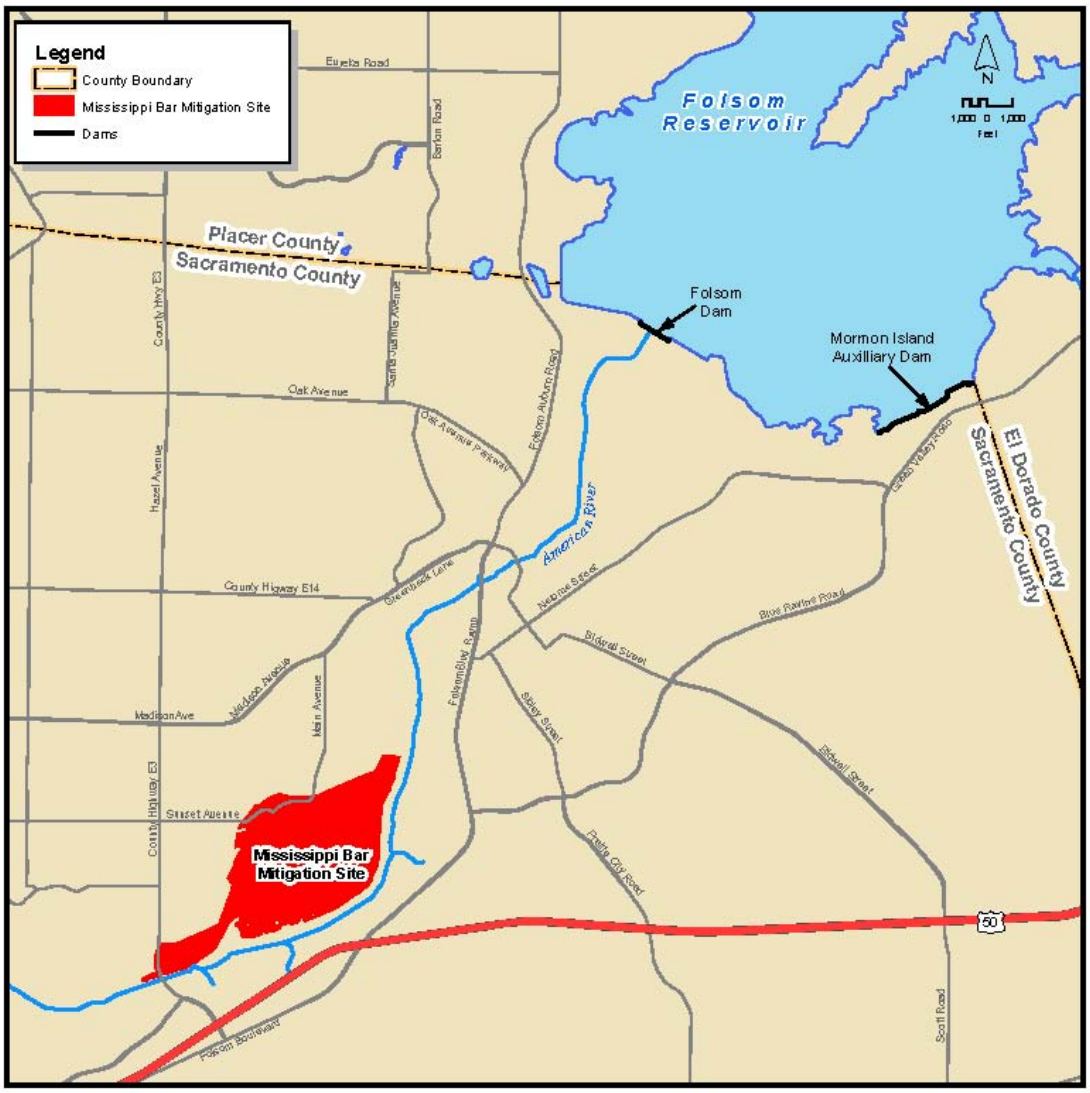


Figure 2-14. Mississippi Bar Mitigation Site

2.9.1 Phase 1 Riparian Woodland Mitigation

Riparian woodland habitat creation efforts would concentrate on those areas that have not recovered from past mining activities. Reclamation would re-contour the land to establish more natural drainage patterns and would restore native riparian vegetation. Mitigation activities would avoid all identified mine tailings, wetlands, and elderberry shrubs. All areas would be planted with native vegetation similar to that found along Lake Natoma and the Lower American River.

Site Preparation
Avoidance Measures All biologically sensitive areas would be avoided during mitigation activities. Consistent with the avoidance and minimization measures in the biological opinion for the Folsom DS/FDR project, a 100 foot buffer would be established around all existing elderberry shrubs. Coordination with the USFWS would occur for any work within the 100 foot buffer zones. All existing wetlands and other sensitive habitats would be fenced or flagged to ensure avoidance. Existing trees would be removed.

Grading and Re-Contouring Excavation and grading would be necessary in areas to create the depressions and to encourage sediment accumulation often associated with riparian vegetation. Deep ripping would occur where acceptable soil is encountered within 3 feet of the ground surface. Excavated material would be re-used as part of the re-contouring, if possible. Re-contouring would include removing soil where unacceptable cobble/aggregate depths are encountered and bringing in acceptable soil. Soils for re-contouring would be hauled by truck from a local source, and may include excess soil material excavated from MIAD. If any MIAD material is to be used at Mississippi Bar, it will be the first 1-2 inches of topsoil from the MIAD shell. If there is not enough soil on MIAD to warrant transporting it to Mississippi Bar, soil will come from an off-site source. Materials brought to the site would use existing surface streets. Once at the site, trucks would use existing roads and paths to avoid impacts to vegetation and wildlife. Staging for equipment, vehicles, and materials would occur in disturbed areas without vegetation. The area would then be seeded with native grasses listed in Table 2-7.

Soil Treatment Soil treatment may include incorporating sandy loam soil into the existing soil and would consist of applying a mulch and tackifier over seeded areas to help vegetation establish. Additional best management practices may be implemented as approved by USFWS and the Corps' Regulatory Division.

Vegetation and Planting Plan In the fall, native seedlings such as those listed in Table 2-7, would be planted at a density of approximately 290 plants per acre on up to 80 acres around the Mississippi Bar area. A water basin would be formed around each plant to help preserve moisture and a geotextile fabric would be stapled over each water basin to moderate soil temperature and suppress weed growth. A browse guard would be placed around each seedling to protect from herbivores. The browse guard would be removed when the seedling becomes too large for the guard. Poultry-wire baskets would be formed and placed in the planting pit around the seedling rootball to protect the plant from gophers. These gopher baskets would degrade over time. An 8 foot high deer fence would be constructed around the new planting sites. The fences would be designed and placed to maintain recreation access and would eventually be removed when the plants are well established. With DPR's approval, Reclamation would likely remove some user-made trails in the Mississippi Bar area.

Table 2-7. Plant Species Proposed for Mitigation Site

Botanical Name	Common Name
Acer negundo subsp. californicum	Box Elder
Fraxinus latifolia	Oregon Ash
Populus fremontii	Freemont Cottonwood
Platanus racemosa	Western Sycamore
Quercus wislizenii	Interior Live Oak
Salix gooddingii	Black willow
Salix laevigata	Red willow
Rubus ursinus	California blackberry
Symphoricarpos albus	Snowberry
Elymus glaucus	Blue wildrye
Leymus triticoides	Creeping wildrye
Nassella pulchra	Purple needlegrass
Nassella cernua	Nodding needlegrass
Hordeum californicam	California barley
Baccharis pilularis subsp. cosanuinea	Coyote Brush
Rhamnus crocea subsp ilicifolia	Hollyleaf Redberry
Rosa californica	California wild rose

Additional species that could be planted in the area that may be conducive to riparian habitat include *Fraxinus latifolia* (Oregon Ash), *Acer negundo subsp californicum* (Box elder), and *Quercus lobata* (Valley oak).

Nature and Source of Propagules Container stock plants would likely be 4 inch x 14 inch "Treepot4" or 2-1/2 inch x 10 inch "Deepot 40" for tree and shrub species and 2-1/4 inch x 5 inch "Tree Bands" for herbaceous species. All container plant material would be delivered to the project site in a covered vehicle. All additional plant material required due to vandalism or loss during delivery would be the responsibility of Reclamation. The container stock seed would be collected from within the vicinity of the site and propagated in a local native plant nursery. Pole cuttings for species would be collected within 2 miles of the Project area. Cuttings would be harvested in the vicinity of the Mississippi Bar site or in the watershed of American River at the same elevation. If required, a plant collection permit would be the responsibility of the installation contractor. Cuttings would occur from healthy material, roughly 6 feet in length, approximately ½-2 inches in diameter, and true to specified species. All cuttings would be protected and kept moist at all times before planting, including during transport and storage. Cuttings would be stored in a cool/dark location, soaking in water. Cuttings would be planted within 24 hours of harvesting. Some seeding would be anticipated. The exact seed mix, rate, and methodology would be determined based on site conditions. Plants would be planted deep enough to be in contact with sandy loam soil.

Irrigation An existing well on DPR property may be used for irrigation. In the event that the existing well cannot be used, a new well would be installed.

Irrigation of plantings would occur the first three to five years from April 1 through October 31 to facilitate plant and root establishment and connection with underlying water sources.

Survival Rate The plantings would need to be self-sustaining with an 80 percent survival rate for at least three years, with a maximum maintenance period of five years. This includes the woody species only.

Maintenance Weeding, mowing, and herbicide applications are expected to occur periodically, although this would not occur near existing elderberry shrubs or other sensitive habitats unless otherwise permitted by the USFWS. Removal of pests and/or invasive plants would occur as needed if their presence is determined to have a negative effect on the success of the plantings, including but not limited to disease, leaf damage, defoliation, herbivory, or outcompeting the plantings. The maintenance period would be up to five years.

Monitoring A qualified job inspector/construction monitor would be onsite during plantings. The monitor would have in-depth knowledge of the excavation and planting contract specifications, would have the authority to direct equipment operators, and would document any problems that arose. After the initial plantings the site would be irrigated and monitored for up to five years or until it reaches the survival rates noted above. After the site has been established it could be turned over for long-term O&M to SAFCA or another willing entity.

Reporting An annual report documenting the results of an annual plant survey would be submitted to USFWS and the Corps' Regulatory Division each year of the five year establishment period.

2.9.2 Phase 2 Culvert Replacement, Channel Widening, Mid-Channel Dredging

In 2003, DPR proposed adding a second access point from Lake Natoma to the existing Mississippi Bar lagoons to provide a loop "water trail" for canoes, kayaks, and other small paddle boats. DPR prepared and approved a "Notice of Exemption" under the California Environmental Quality Act for this project (State Clearinghouse # 2003118411). The project was stalled due to contract bids that were in excess of funding. Reclamation proposes to complete the proposed DPR project as part of mitigation for the Folsom DS/DFR Project and, in turn, assist DPR with their program goals. As noted in Section 2.9 above, this phase of the mitigation work would not be implemented until a formal agreement is in place with DPR.

Consistent with creating a functional seasonal wetland (See Phase 3 in Section 3.9.3 below), Reclamation proposes to develop approximately 5 acres of seasonal wetlands by replacing an existing 48 inch diameter culvert, widening

the channel, dredging mid-channel and breaching an area under an existing road.

An existing 48 inch diameter culvert under the paved American River Bike Trail would be replaced with a new arch culvert, thus improving the exchange of water between Lake Natoma and the lagoons, and creating a second entrance into the lagoons from lake. The location for the proposed large arch culvert is approximately 100 yards east of an existing arch culvert. In addition to installing the new oversized culvert, some dredging and excavation would be required in the channel that leads from the lake to the second oversized culvert location. Each aspect of the work is described in detail below.

Area 1 - Oversized Culvert The proposed new culvert would be 23 feet wide, 14 feet high, and 50 feet long. Installing the culvert would require excavating approximately 1,500 cubic yards of material (see Figure 2-15). Of this, 1,200 cubic yards of material would be excavated on dry ground and 300 cubic yards of material would be excavated in the channel between the lagoons and the lake. This work would involve temporarily closing the American River Bike Trail, then removing a section of the bike trail and the existing culvert (see Figure 2-16).

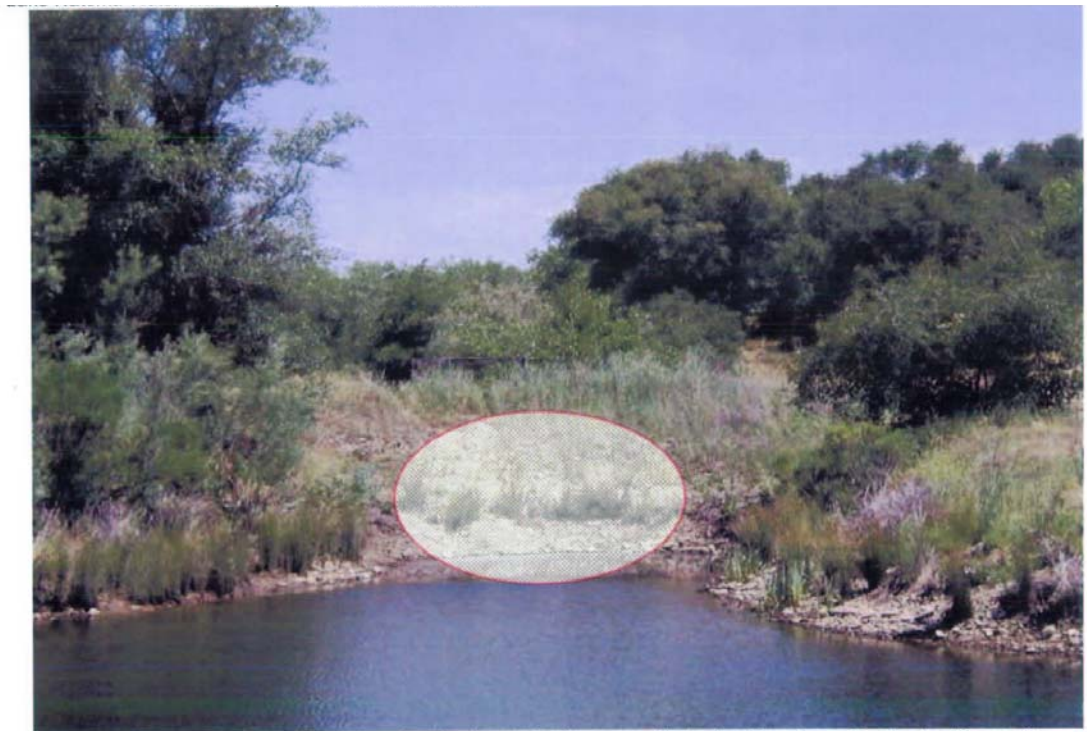


Figure 2-15. Oversized Culvert Location

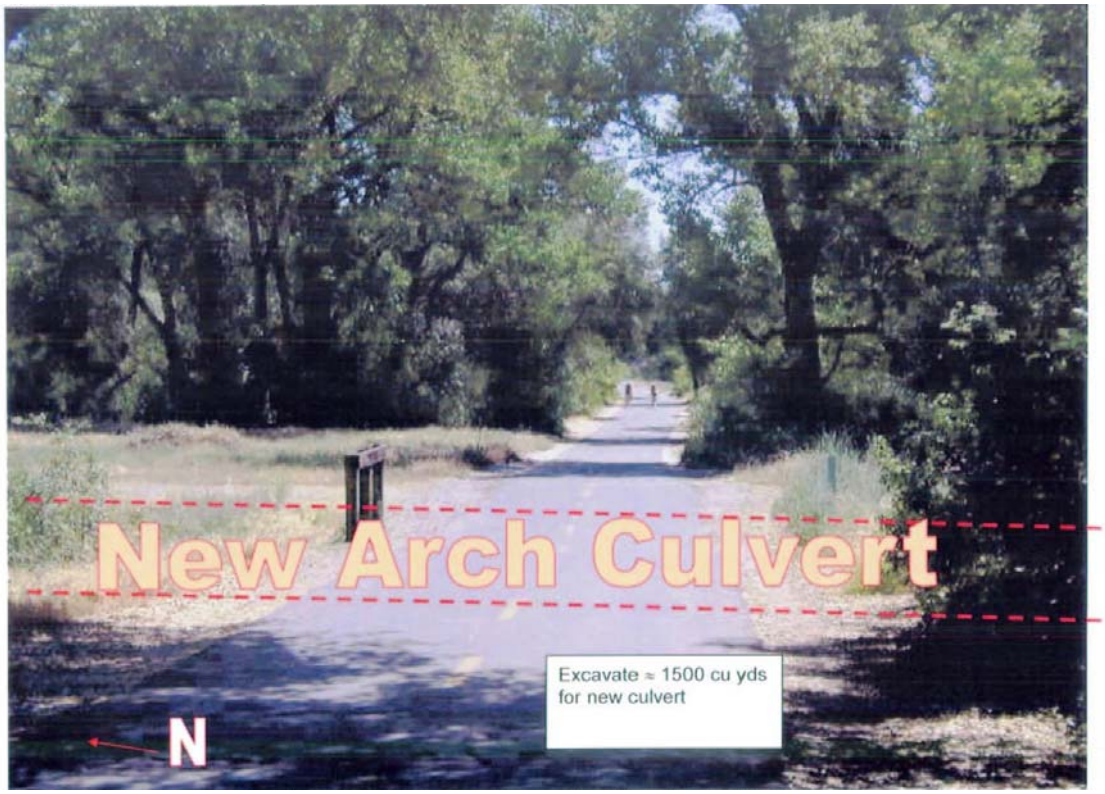


Figure 2-16. Culvert Alignment under Bike Trail

A temporary trail detour would be established prior to closure of the trail and construction activities. Signs would be posted to inform the public of the trail detour and construction schedule. The trail detour would be coordinated with DPR. The bike trail would be replaced across the top of the new culvert and railings would be installed on either side of the bike trail where it would cross the new culvert.

Area 2 - Western Area Power Authority (WAPA) Service Road Channel Widening Currently, a service road used by WAPA to access their power lines crosses the channel between Lake Natoma and the location of the proposed new culvert. A culvert allows water to pass under the road where it crosses this channel. In order to improve water flow and create access for paddlers, a channel would need to be cut through this service road, the culvert would be removed, and this portion of the road abandoned (see Figure 2-17). WAPA has access to all of their towers and lines without this portion of the service road. In DPR's initial discussions with WAPA, they have indicated that the break in the service road would not impede their operations. Confirmation from WAPA will

be obtained to ensure they no longer require use of this road. The new channel would be approximately 20 feet wide, two to three feet deep (from normal high water) and 45 feet long. Cutting the channel across this dirt service road would require excavating approximately 150 cubic yards of material. Of this, 90 cubic yards would be excavated from dry ground and 60 cubic yards would involve excavation in the water. Disposal of excavated materials would occur on areas without vegetation.

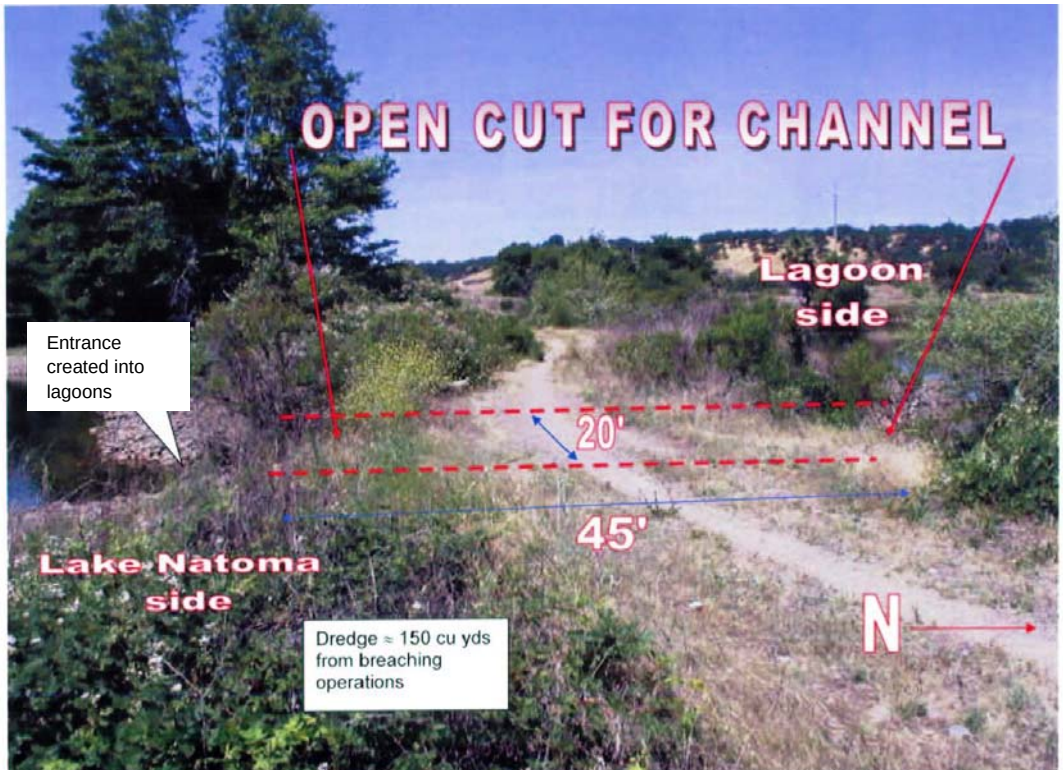


Figure 2-17. WAPA Service Road Crossing

Area 3 - Mid-Channel Dredging Some dredging would be required in the channel to be cut across the service road and in the location of the new oversize culvert where the existing channel becomes narrow and shallow. This work would involve excavating approximately 10 cubic yards of material in the water (see Figure 2-18). Dredged materials would be stockpiled in areas where no vegetation currently exists or incorporated into soil material and used for the riparian woodland mitigation. Dredging and culvert installation would be limited to periods of low stream flow and dry weather (May to October).

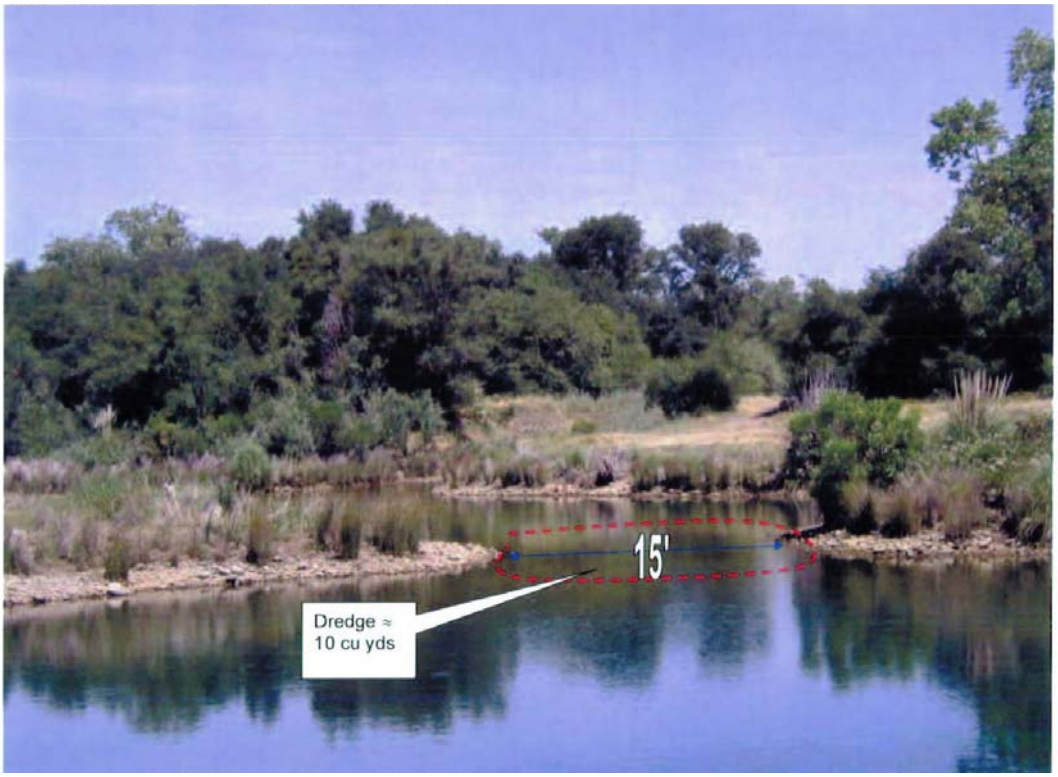


Figure 2-18. Mid-Channel Dredging

2.9.3 Phase 3 Seasonal Wetland Mitigation

For the proposed seasonal wetland mitigation, seasonal wetland vegetation would be enhanced along the margins of the proposed channel widening. All areas would be planted with plant communities similar to existing native vegetation found throughout the Lake Natoma shoreline and lagoons.

Mitigation activities would avoid elderberry bushes and established trees. The lagoon would not be cleared of downed logs used by turtles for sunning unless it totally blocks a channel or creates a hazard to people or boats. Special status species and habitat would be avoided.

As noted above, dredging and culvert installation would be limited to periods of low stream flow and dry weather (May to October). Wetland planting would not be confined to this time period. 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. Best management practices would be implemented to control sedimentation and erosion.

Planting/Re-seeding A qualified job inspector/construction monitor would be onsite during plantings. The monitor would have in-depth knowledge of the excavation and planting contract specifications, would have the authority to direct equipment operators, and would document any problems that arose.

Nature and Source of Propagules Container stock plants would likely be 4 inch x 14 inch "Treepot4" or 2-1/2 inch x 10 inch "Deepot 40" for tree and shrub species and 2-1/4 inch x 5 inch "Tree Bands" for herbaceous species. Plants would be planted deep enough to be in contact with sandy loam soil. Plants would be randomly placed within the site. The container stock seed would be collected from within the vicinity of the site and propagated in a local native plant nursery.

Pole cuttings for species would be collected within two miles of the site. Cuttings would be harvested in the vicinity of the site or in the watershed of American River at the same elevation as the site. If required, a plant collection permit would be the responsibility of the installation contractor. Cuttings would be from healthy material, roughly six feet in length, approximately ½-2 inches in diameter, and true to specified species. All cuttings would be protected and kept moist at all times before planting, including during transport and storage. Cuttings would be stored in a cool/dark location, soaking in water. Cuttings would be planted within 24 hours of harvesting.

Some seeding would be anticipated. The exact seed mix, rate, and methodology would be determined based on site conditions and in consultation with USFWS and the Corps.

Delivery of Propagules All container plant material would be delivered to the project site in a covered vehicle. All additional plant material required due to vandalism or loss during delivery would be the responsibility of Reclamation.

Irrigation Given the operations of the reservoir, which result in annual inundation and drying of the shoreline, irrigation of plantings would occur the first three to five years to facilitate plant and root establishment and connection with underlying water sources. The design and type of irrigation would be similar to that described above for the riparian woodland mitigation.

2.9.4 Construction Equipment and Staging

The habitat mitigation at Mississippi Bar would require the use of the heavy duty loaders, dump trucks, a D-8 Caterpillar, and a road grader. All staging of equipment and vehicles would occur on previously disturbed areas that do not have any vegetation or mine tailings. The area would then be seeded with native grasses listed in Table 2-7.

2.9.5 Habitat Mitigation Schedule

Table 2-8 shows the proposed schedule for the Mississippi Bar habitat mitigation. Phase 1 of the riparian woodland mitigation would occur in two parts. The first part would involve planting 10 acres of riparian woodland in Spring/Summer of 2010. The 10 acres of riparian woodland mitigation must be completed by January 31, 2011 to meet the CWA 404 permit conditions. The remaining riparian woodland acres would be planted by summer 2011 (up to 70 additional acres). Phase 2 with culvert replacement, channel widening, and mid-channel dredging would occur in the late summer and early fall of 2011. Phase 3 includes the seasonal wetland mitigation planting and would occur in the fall of 2011.

Table 2-8. Habitat Mitigation Schedule

Date	Phase	Description
Spring 2010	Environmental Permits	Obtain required permits including the CWA 404 permit, and CWA 401 Certification
Spring/Summer 2010	Phase 1 Riparian Woodland (10 acres)	Award of Contract for first 10 acres of riparian woodland
Summer/Fall 2010		Mobilization and start of construction for first 10 acres of riparian woodland
Winter/Spring 2011	Phase 1 Riparian Woodland (70 acres)	Award of Contract for remaining acres of riparian woodland
Summer 2011		Mobilization and start of construction remaining acres of riparian woodland
Summer/Fall 2011	Phase 1 Culvert Replacement, Channel Widening, Mid-Channel Dredging	The culvert would be replaced, channel widening would occur, and mid-channel dredging would be completed.
Fall 2011	Phase 3 Seasonal Wetland Mitigation	Seasonal wetland planting would occur.

2.10 Environmentally Preferred Alternative

The NEPA lead agency must identify the environmentally preferable alternative of an EIS in the Record of Decision, according to Section 1505.2(b) of the CEQ Guidelines. The environmentally preferable alternative is considered the alternative that will "promote the national environmental policy as expressed in NEPA's Section 101" (46 FR 18026). This generally refers to the alternative that would result in the least adverse effects to the biological and physical environment. It is also the alternative that would best protect, preserve, and enhance historic, cultural, and natural resources. Although this alternative must be identified in the ROD, it need not be selected for implementation. Sections 15126(a) and 15126.6(e)(2) of the CEQA Guidelines require identification of an environmentally superior alternative. If the No Project Alternative is the environmental superior alternative, an additional environmentally superior alternative must be identified among the other alternatives. This section presents

the environmentally preferred alternative in order to meet NEPA and CEQA requirements.

Table 2-9 provides a relative comparison of impacts among the four MIAD Modification Project action alternatives. Aggregated in this table are the resource impacts evaluated in Chapters 4 through 22, which provide the basis of comparison among the alternatives. The four major categories used to assess relative impacts include the degree the alternative meets the Purpose and Need, and effects to physical resources, natural resources, and sociological resources. The major factor related to the Purpose and Need is dam safety. The physical resources category incorporates the air quality, noise, water quality/supply, and geology/soils effects resulting from each alternative. In natural resources, the effects on aquatic, vegetation, and wildlife resources are evaluated for each alternative. Sociological resources were characterized based on the impacts of each alternative on cultural resources, land use, recreation, transportation, public health and safety, and public services and utilities.

Table 2-9. Environmentally Preferred Alternative

Evaluation	No Action/No Project Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Purpose and Need	5	1	1	1	1
Physical Resources	1	5	4	4	4
Natural Resources	1	5	4	4	4
Sociological Resources	1	5	4	3	1
Total	**8**	**16**	**13**	**12**	**10**

Rankings within each resource category are based on a relative scale of one through five. A score of one indicates the alternative that best meets the Purpose and Need of the five action alternatives and/or the alternative with the least impact(s) for that resource category. A score of five represents the alternative that least meets the Purpose and Need and/or represents the largest or most severe adverse impact(s) to resources. The total score for each alternative represents the sum of the resource category rankings for the alternative, with the lowest scores indicating the environmentally preferred alternative.

The No Action/No Project Alternative is the least environmentally damaging of all the alternatives, but the No Action/No Project Alternative does not meet any of the requirements in the Purpose and Need for the MIAD Modification actions. Based on the comparative analysis, Alternative 4 scored the lowest, meaning it is considered the Environmentally Preferred Alternative.

2.11 References

Case Foundation Company. 2007. Secant Pile Walls. Accessed on: 07 07 2009. Available at: http://www.casefoundation.com/services/secantpilewalls.aspx

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Chapter 3
Impact Analysis Overview

This chapter presents an overview of the impacts analysis for the MIAD Modification Project, including the organization of the impact analysis for the environmental resources affected by the project and the resources not analyzed in this Supplemental EIS/EIR as they would not be affected by the project.

3.1 Impacts Analysis by Environmental Resource

Chapters 4 through 22 present an assessment of the environmental impacts associated with each of the five alternatives currently being considered for the MIAD Modification Project, specifically the No Action/No Project Alternative and the four action alternatives, as described in Chapter 2. The chapters describe the existing physical environment at and around the MIAD and Mississippi Bar sites and delineate the potential impacts that may result from construction of the various improvements proposed under each alternative. Also included is a discussion of mitigation measures, as well as a description of potential cumulative effects associated with implementation of the MIAD Modification Project and other projects nearby.

Each of the environmental resources addressed in the following chapters are discussed using a common organization, as follows:

- **Affected Environment/Environmental Setting** – subsection discusses the affected environment within a defined geographic area (i.e., Area of Analysis) relative to the MIAD Modification Project, and includes an overview of pertinent environmental regulations (i.e., Regulatory Setting) and a description of the existing conditions (i.e., Environmental Setting).

- **Environmental Consequences/Environmental Impacts** – subsection presents the analysis of impacts associated with implementation of each alternative. The subsection begins with an explanation of the assessment method(s) used to identify and address potential impacts and then presents the basis and criteria for determining whether the potential impacts are significant. The need for determining whether or not a potential impact is significant is particular to the requirements of CEQA, and provides the basis for subsequently determining, under CEQA, whether mitigation of that impact is warranted (i.e., under CEQA, impacts determined to be less than significant do not require mitigation). Under NEPA, there is not the same emphasis to determine

whether the impact is significant or not, but rather the focus is on disclosing the overall nature and magnitude of environmental impacts associated with each of the alternatives considered, which, when compared amongst and between the individual alternatives, will assist decision-makers in choosing a course of action. The impacts analysis presented in this Supplemental EIS/EIR serves to meet the requirements of both NEPA and CEQA. The analysis presented herein discloses and compares the environmental impacts associated with each of the alternatives, identifies those impacts that are considered significant under the CEQA analysis, and provides recommended mitigation measures where appropriate. The analysis presented in this chapter also meets the requirements of both NEPA and CEQA relative to the baseline from which impacts are measured. Under NEPA, the environmental impacts of each action alternative are measured against the environmental conditions that would otherwise occur if no action was taken (i.e., the impacts of each action alternative are measured from the conditions anticipated for the No Action Alternative). Under CEQA, the impacts of a proposed project are measured against the environmental conditions that currently exist. In the case of the MIAD Modification Project, no notable changes in existing environmental conditions are anticipated to occur under the No Action Alternative because no substantial improvements to MIAD are expected to occur under that scenario (see Chapter 2). As such, the impacts associated with each action alternative as measured from the No Action Alternative would be the same as measured from existing conditions.

- **Comparative Analysis of Alternatives** – subsection is based on the conclusions of the analysis described above and focuses on how certain impacts associated with the subject environmental topic are greater, less, or the same between the individual alternatives.

- **Environmental Commitments/Mitigation Measures** – subsection provides recommended mitigation measures based on the results and conclusions of the impacts analysis.

- **Cumulative Effects** – subsection addresses the impacts of the project in conjunction with past, present, and probable future projects (under CEQA), or reasonably foreseeable future projects (under NEPA), in or near the area. In general, the environmental impacts of the project may be individually minor, but collectively significant when considered in conjunction with other projects or other environmental effects of the project. Of particular note relative to CEQA is whether the project's contribution to such impacts is cumulatively considerable. Chapter 23 provides the more detailed explanation of how cumulative effects are addressed in this Supplemental EIS/EIR, and describes the other projects, which in conjunction with the proposed MIAD Modification Project, form the basis of the cumulative projects.

Because this document addresses both NEPA and CEQA, the terms used in this document reflect both NEPA and CEQA. Table 3-1 presents a list of NEPA terms that are synonymous with CEQA terms and are used throughout this document.

Table 3-1. NEPA and CEQA Terms

NEPA	CEQA
Proposed Action	Proposed Project
No-Action Alternative	No-Project Alternative
Environmentally Preferred Alternative	Environmentally Superior Alternative
Purpose and Need	Project Objectives
Affected Environment	Environmental Setting
Environmental Consequences	Environmental Impacts
Environmental Commitments	Mitigation Measures
Environmental Impact Statement (EIS)	Environmental Impact Report (EIR)

3.2 Resources Not Affected by the Project

Several environmental resources would not change as a result of implementation of the MIAD Modification Project and are therefore not discussed further in this document. They include:

- **Hydropower** – the MIAD Modification Project would not change Folsom Reservoir operations or reservoir levels; therefore it would not affect hydropower production.

- **Agricultural Resources** – no agricultural lands exist in the study area and no agricultural lands would be affected by the MIAD Modification Project.

- **Population and Housing** – no housing would be needed for workers; it is assumed that workers would come from the existing local workforce. No housing would be removed as part of the MIAD Modification Project and no people would be displaced.

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