FOLSOM DAM MODIFICATION PROJECT APPROACH CHANNEL

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT/ ENVIRONMENTAL IMPACT REPORT

DECEMBER 2012

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US Army Corps of Engineers

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

SAFCA
Sacramento Area Flood Control Agency

CENTRAL VALLEY FLOOD PROTECTION BOARD
PUBLIC SAFETY
AND FLOOD MANAGEMENT
STATE OF CALIFORNIA

FOLSOM DAM SAFETY AND FLOOD DAMAGE REDUCTION FOLSOM DAM JOINT FEDERAL PROJECT

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Type of Statement: **Final** Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR)

Lead Federal Agency: U.S. Army Corps of Engineers, Sacramento District

Lead State Agency: State of California Central Valley Flood Protection Board (CVFPB)

Abstract: This Final SEIS/EIR has been prepared by the U.S. Army Corps of Engineers (Corps) and the Central Valley Flood Protection Board, the non-Federal sponsor, for the proposed construction of the approach channel of the Folsom Dam auxiliary spillway. The document supplements the Final EIS/EIR and Record of Decision completed in 2007 for the Folsom Dam Safety and Flood Damage Reduction Project by providing new and additional information on the design and means to construct the auxiliary spillway approach channel which was not completely defined at the time of publication. The 2007 EIS/EIR stated that the design of the approach channel would be determined in the Corps' pre-construction, engineering, and design phase and, as needed, supplemental NEPA/CEQA documentation would be prepared. The Final SEIS/EIR evaluates the direct, indirect, and cumulative environmental effects of alternative plans for the approach channel. Mitigation measures are identified to avoid, minimize, and compensate for resource impacts. Most potential adverse effects would be either short term, or would be avoided or reduced using best management practices. Public and agency comments that were received during the DSEIS/EIR comment period are addressed in this FSEIS/EIR.

Public Review and Comment: The final public review period is scheduled for December 28, 2012, and the official closing date for receipt of comments on the final SEIS/EIR will be January 28, 2012. Comments received will be considered in the Record of Decision (ROD). For further information, please contact the U.S. Army Corps of Engineers at the following address: U.S. Army Corps of Engineers, Sacramento District; Attn: Mr. Todd Plain, Public Affairs Office; 1325 J Street; Sacramento, California 95814-2922, or by e-mail: spk-pao@usace.army.mil.

EXECUTIVE SUMMARY

ES.1 PURPOSE OF THE SEIS/EIR

This Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR) has been prepared for the Folsom Dam Modification Project, Approach Channel. The SEIS/EIR is a supplement to the 2007 Final EIS/EIR for the Folsom Dam Safety and Flood Damage Reduction Project (FEIS/EIR), prepared by the U.S. Bureau of Reclamation. This project is also known as the Folsom Joint Federal Project (Folsom JFP). The Folsom JFP is a cooperative effort between the U.S. Army Corps of Engineers (Corps), the U.S. Bureau of Reclamation (USBR), the State of California Central Valley Flood Protection Board (CVFPB), and the Sacramento Area Flood Control Agency (SAFCA).

This SEIS/EIR examines the impacts of proposed construction of the approach channel of the “Gated Auxiliary Spillway Alternative” identified as the preferred alternative in the March 2007 FEIS/EIR; and as the Selected Alternative in the Record of Decision (ROD) approved on May 3, 2007. The FEIS/EIR stated that the design of the spillway approach channel would be determined in the Corps’ pre-construction, engineering, and design phase and if needed, supplemental National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) documentation would be prepared. The implementing regulations of the NEPA at 40 CFR 1502.9(c) provide that a lead Federal agency must prepare a supplemental EIS if (1) the agency makes substantial changes in the proposed action that are relevant to the environmental concerns, or (2) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. The SEIS/EIR for the approach channel complies with this implementing regulation of NEPA. A draft SEIS/EIR was prepared for public review during the period of July 25 through September 10, 2012. The comments resulting from this review have been addressed within the document.

The SEIS/EIR describes changes to the project and/or conditions in the project area that have occurred since the 2007 FEIS/EIR. While it builds upon and incorporates work already completed as part of the project development process, it does not reproduce in full the prior 2007 FEIS/EIR and ROD documentation. Instead, it incorporates information from those documents by reference, where applicable. The 2007 FEIS/EIR and ROD can be reviewed at:
http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=1808

ES.2 PROJECT AREA

The project area is located in the city of Folsom at Folsom Dam, approximately 20 miles northeast of Sacramento (Figure ES-1) in Sacramento County. The new auxiliary spillway is located on the left abutment of the main dam, immediately downstream of the left wing dam. Current access to the site is via Folsom Lake Crossing to an overlook site at approximately 480 feet in elevation. The approach channel for the auxiliary spillway is expected to extend approximately 1,100 feet upstream of the concrete control structure. Currently, this area consists of a natural rock plug, which is currently acting as a natural dam between the reservoir and the excavation areas for the gated control Structure and spillway chute.

In this document, the project area consists of the ongoing auxiliary spillway construction area; the footprint of the approach channel; a spur dike and transload facility; the existing project haul routes; the existing disposal areas at the Mormon Island Auxiliary Dam (MIAD) and Dike 7; the proposed disposal areas at Dike 8 and in-reservoir, and the existing staging areas at the Folsom Overlook and Folsom Prison sites. The project area is shown on the map in Figure ES-2.

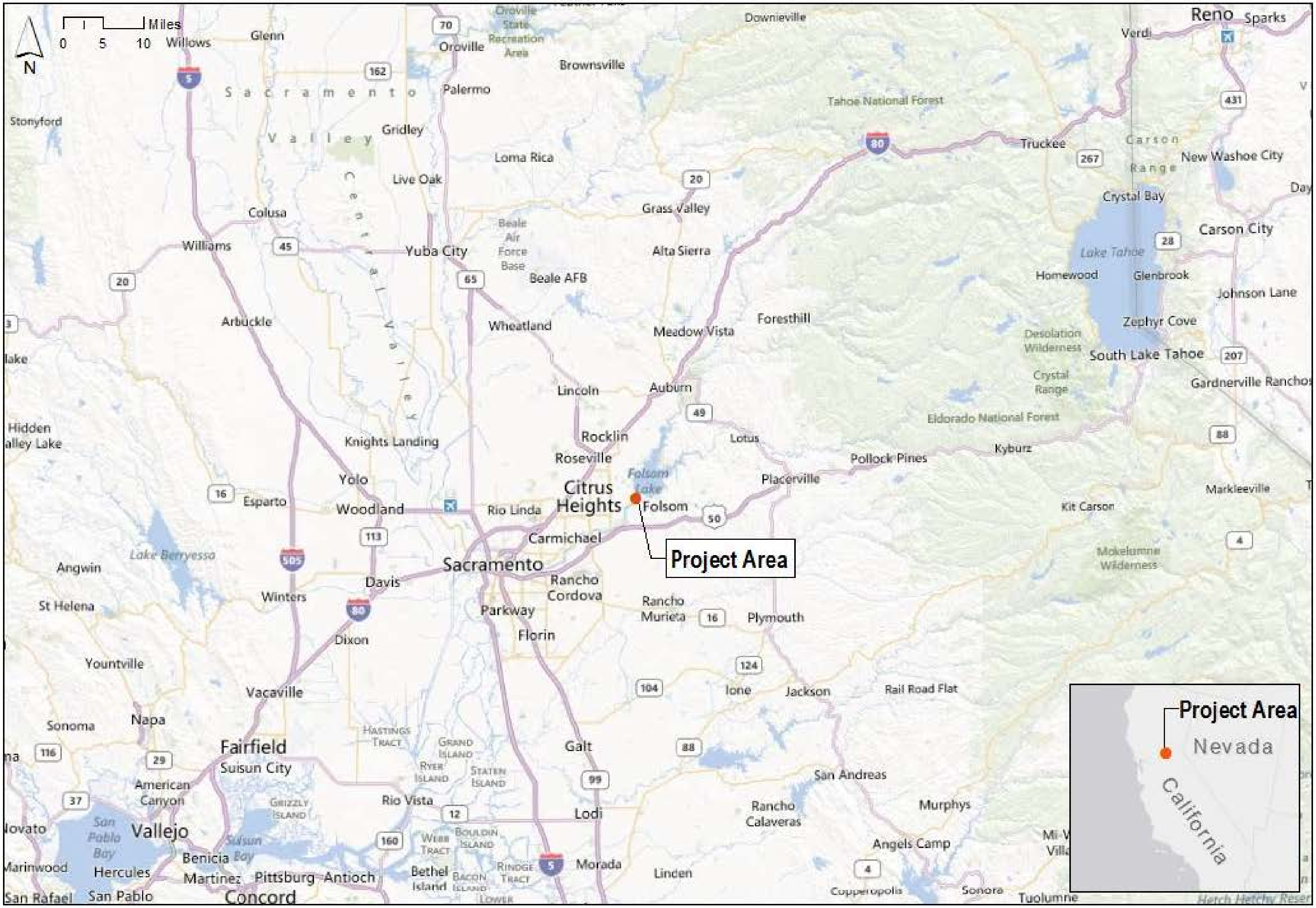
ES.3 BACKGROUND AND NEED FOR ACTION

The current spillway and outlets at the Folsom facility do not have sufficient discharge capacity for managing the predicted probable maximum flood (PMF) and lesser flood event inflows above a 100-year event (an event that has a 1% chance of occurring in any given year). Structural modifications associated with the Folsom JFP are proposed to address increasing discharge capability and/or increasing storage during extreme flood events above the 200-year event level. The new auxiliary spillway is a major feature that will address the need to safely pass part or the entire PMF event. A hydraulic analysis was completed for the new auxiliary spillway and is included in the PACR (Corps 2007).

In 2007, the Corps completed the Post Authorization Change Report (PACR) for the Folsom Modifications and Folsom Dam Raise Projects. This report recommended authorization of two refined projects: (1) the Folsom JFP and (2) the Folsom Dam Raise. In 2007, the U.S. Bureau of Reclamation (USBR) also completed the FEIS/EIR for the Folsom JFP. This FEIS/EIR addressed alternative measures for implementing both USBR’s dam safety and security obligations, as well as the Corps’ flood damage reduction structural modifications at the Folsom facility. The Corps was a cooperating Federal agency in the preparation of this FEIS/EIR.

The refined Folsom JFP, as described in the Corps’ PACR and USBR’s FEIS/EIR was later authorized under the Water Resources Development Act of 2007. Construction of the Folsom JFP was initiated by USBR in the fall of 2007, with USBR acting as the lead agency for the first two phases of construction. The new auxiliary spillway will address the need to safely pass part of or the entire PMF event. Increasing the discharge capability and increasing storage will potentially achieve the goal of a greater than 200-year flood protection objective (USBR 2006).

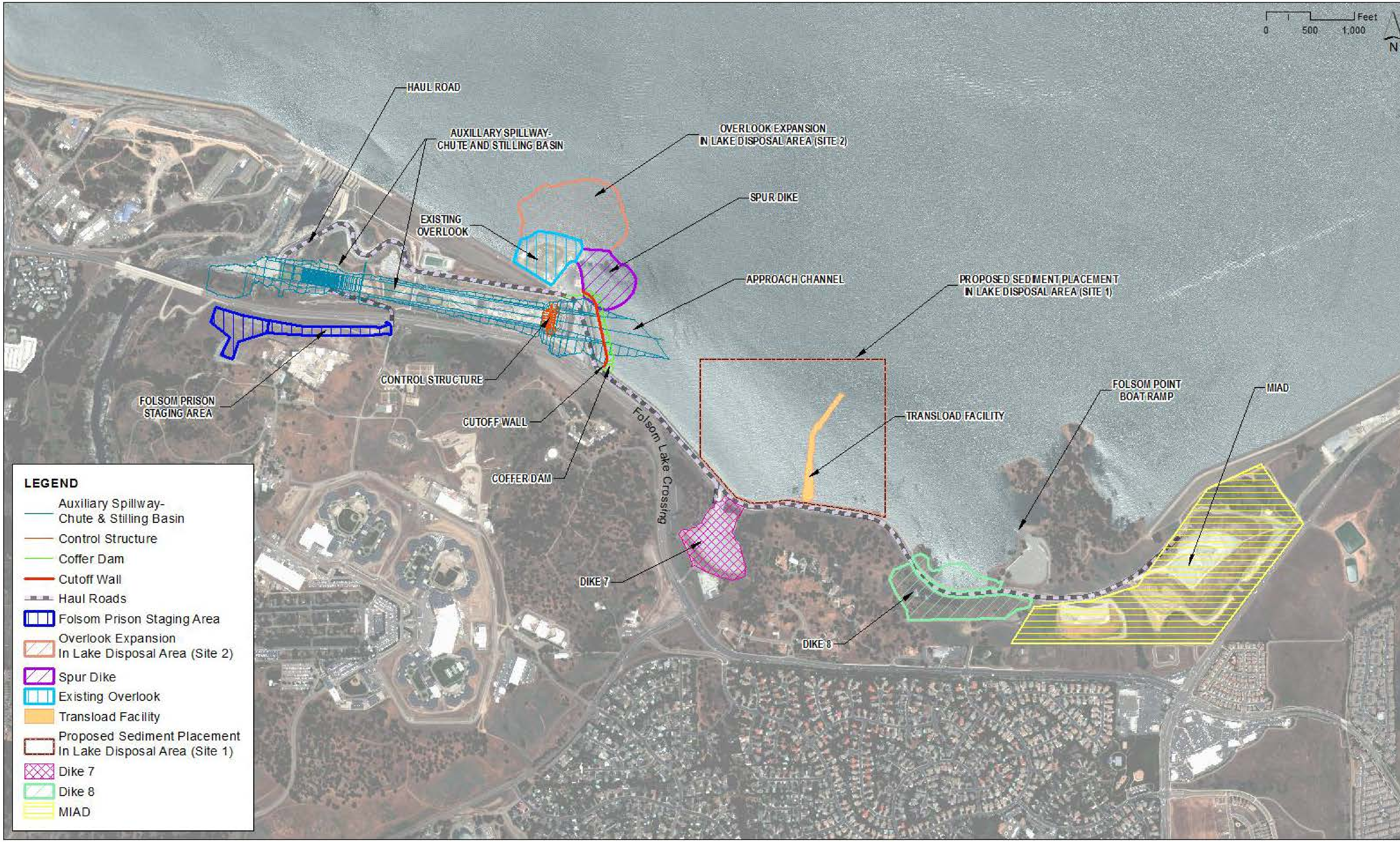
The Folsom JFP auxiliary spillway is being constructed by both USBR and the Corps in five phases, plus a commissioning and transfer phase. The five phases are (1) initial spillway excavation, (2) spillway excavation, (3) gated control structure, (4) lower spillway, stilling basin, and excavation and lining of the upstream approach to control structure, (5) site restoration. Phases 1 and 2 were completed in 2011. Phase 3 is currently under construction by the Corps. Phases 4 and 5 are currently under design. The expected completion of the project is October 2017. Figure ES-4 shows an aerial photograph of the project area.



US Army Corps of Engineers
Sacramento District

ES 1 - Project Vicinity Map

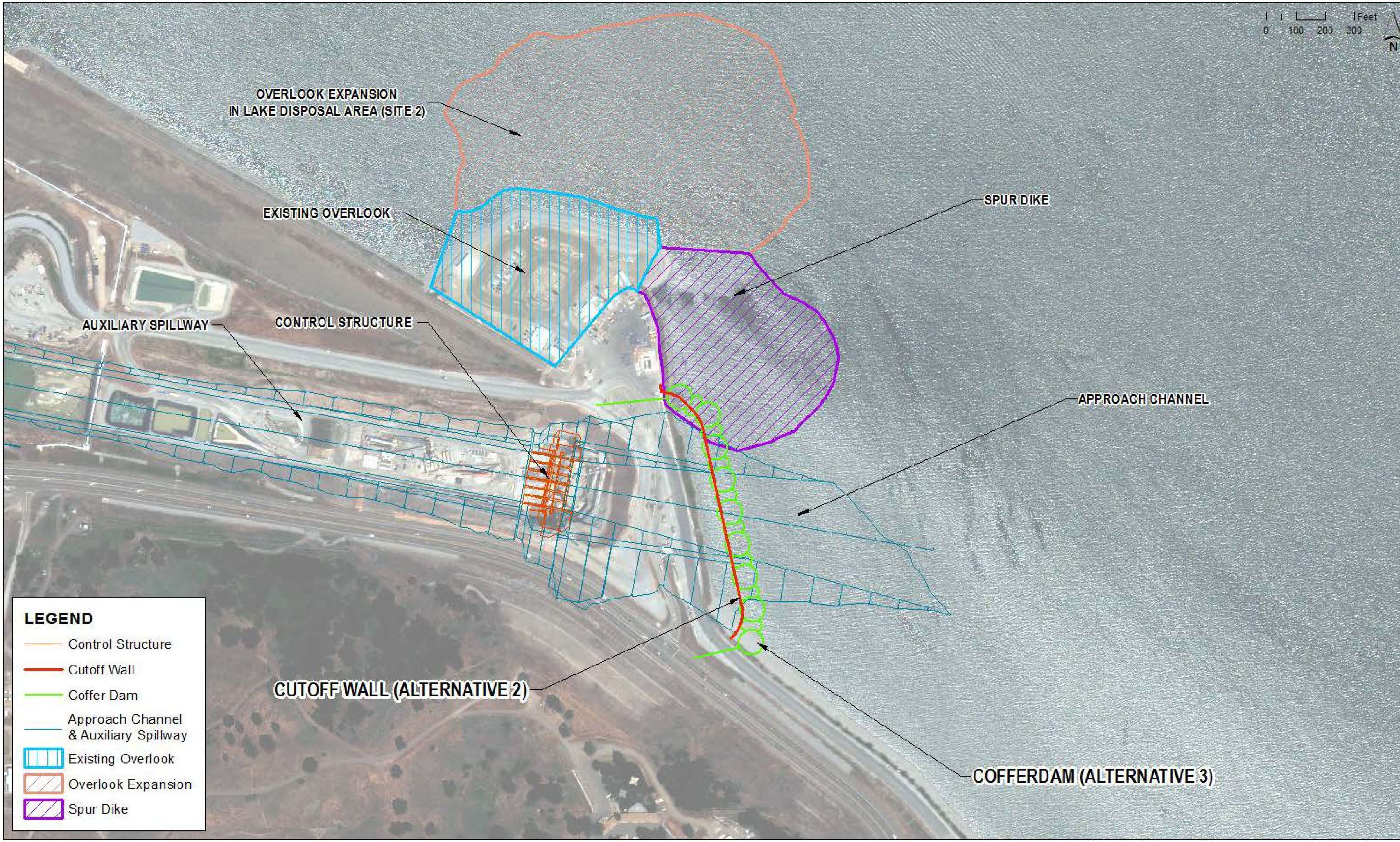
Folsom Dam Modification Project, Approach Channel SEIS/EIR
December 2012



US Army Corps of Engineers
Sacramento District

ES - 2 Project Area Map

Folsom Dam Modification Project, Approach Channel SEIS/ EIR December 2012



US Army Corps of Engineers Sacramento District

ES 3 - Construction Footprints of Alternatives 2 and 3

Folsom Dam Modification Project, Approach Channel SEIS/ EIR December 2012

Figure ES-4. Aerial View of Project Area and Folsom Dam.

The 2007 FEIS/EIR stated that the design of the approach channel would be determined in the Corps' pre-construction, engineering, and design phase and, if needed, supplemental NEPA/CEQA documentation would be prepared. This final SEIS/EIR provides this supplemental documentation and evaluates the direct, indirect, and cumulative environmental effects of alternative plans for the approach channel and identifies mitigation measures to avoid, minimize, and compensate for impacts.

ES.4 ALTERNATIVES

Documentation of the plan formulation process associated with the overall Folsom Dam Modification Project can be found in the Corps' 2007 Post Authorization Change Report for the American River Watershed Project, Folsom Dam Modifications and Folsom Dam Raise. Concurrently, USBR prepared the 2007 EIS/EIR, a programmatic document to which this supplemental EIS/EIR is tiered (USBR 2007a). The 2007 EIS/EIR contains the overarching analysis of this multi-phased project, followed by supplemental NEPA documents focusing on the design refinements of each project phase. Specific approach channel design assessment was intended for later NEPA and CEQA analyses that are conducted within this EIS/EIR.

Potential design alternatives were identified for assessment of engineering, environmental, and cost considerations. The two alternatives chosen included a small cofferdam and a cutoff wall. These structures could accommodate approach channel construction in partially dry conditions, and stabilize the shoreline in compliance with dam safety standards throughout excavation of the existing shoreline. Assessment of construction safety and scheduling to optimize total construction time was a primary factor in the evaluation of alternatives. The cutoff wall or cofferdam would serve as a dam to restrain reservoir water from the construction area until the control structure is functional and the approach channel can be flooded.

ES.4.1 Alternative 1 – No Action

Under Alternative 1, the Corps would not participate in the construction of the approach channel to the auxiliary spillway. Since the approach channel is an essential feature to the overall function of the spillway, dam safety and flood damage reduction improvements to the Sacramento area would not be implemented, and enhanced public safety would not be realized as detailed in the 2007 FEIS/EIR (USBR 2007a).

ES.4.2 Alternative 2 – Cutoff Wall

Alternative 2 consists of excavation of the approach channel using a cutoff wall to serve as a temporary dam during excavation The proposed action would also construct an adjacent spur dike, which would channel flood flows to the auxiliary spillway. This alternative would include:

- Installation of a 1,000-foot-long concrete secant pile cutoff wall between the rock plug and the control structure.
- Placement of fill material along the east side of the rock plug to maintain the 80-foot-wide haul road connection to the spillway.
- Excavation of an approximate 1,100-foot-long approach channel at the upstream side of the auxiliary spillway and control structure.
- Installation of the approach channel concrete slab and walls.
- Construction of a spur dike in the reservoir adjacent to the approach channel.
- Stockpiling and disposal of excavated material at one of five proposed potential disposal sites (MIAD, Dike 7, Dike 8, spur dike, and in-reservoir).
- Construction of a transload facility consisting of up to a 2,000-foot-long rock ramp into the reservoir near Dike 7 for barge unloading of dredge material.
- Staging of contractor materials and equipment at the spillway excavation site, Folsom Overlook, Dike 7, Folsom Prison, and MIAD locations (Figure ES-2).
- Temporary installation of a concrete-producing batch plant and/or rock crusher at the spillway excavation site, Folsom Overlook, Folsom Prison, or MIAD locations.

ES.4.3 Alternative 3 – Cofferdam

Alternative 3 consists of construction of the approach channel using a cofferdam to serve as a temporary dam during excavation. The proposed action also includes the construction of an adjacent spur dike, which would channel flood flows to the auxiliary spillway. This alternative would include:

- Installation of a cofferdam in the reservoir upstream of the rock plug.
- Excavation of an approximate 1,100-foot-long approach channel at the upstream side of the auxiliary spillway and control structure.
- Installation of the approach channel concrete slab and walls.
- Construction of a spur dike in the reservoir adjacent to the approach channel.
- Stockpiling and disposal of excavated material at one of five proposed potential disposal sites (MIAD, Dike 7, Dike 8, spur dike, and in-reservoir).
- Construction of a transload facility consisting of up to a 2,000-foot-long rock ramp into the reservoir near Dike 7 for barge unloading of dredge material.
- Staging of contractor materials and equipment at the spillway excavation site, Folsom Overlook, Dike 7, Folsom Prison, and MIAD locations (Figure ES-2).
- Temporary installation of a concrete-producing batch plant and/or rock crusher at the spillway excavation site, Folsom Overlook, Dike 7, Folsom Prison, or MIAD locations.

ES.6 ENVIRONMENTAL EFFECTS AND MITIGATION

Significant resources that may be affected by the alternatives include air quality, climate change, water quality, fisheries, aesthetics and visual resources, recreation, traffic and circulation, noise, and cultural resources. Table ES-1 summarizes the potential effects of the alternatives, the significance of those effects, and any potential mitigation measures that would be implemented to reduce any effects to less than significance, if possible. The majority of the resource areas have a similar range of effects with the implementation of Alternatives 2 or 3. The major difference in effects between the alternatives includes: (1) Alternative 3 would have less effects to water and air quality than Alternative 2; (2) Alternative 3 would have less effects to fisheries than Alternative 2; and (3) Alternative 3 would have an additional temporary visual effect during construction due to the presence of the cofferdam in the reservoir, while the cutoff wall under Alternative 2 would not be visible to receptors.

Since the publication of the DEIS/EIR, changes have been made to the boundaries for proposed material disposal at Dike 8. The southern section of Dike 8, totaling 3 acres, was withdrawn from potential use by the U.S. Bureau of Reclamation. As a substitute for this acreage, three acres within the lake high watermark was added to the north side of Dike 8 as a proposed in-water and/or terrestrial disposal site. Affects associated with this change have been assessed within this SEIS/EIR and are not considered to be substantial or significant effects to resources. The addition of three acres within the lake proper would not change disposal material quantity, or affect cultural, threatened and endangered species or social resources. Water quality could be affected in the immediate area if material placement is conducted in-the-wet, but effects would be less-than-significant with a silt curtain, mitigations and compliance with state water quality mandated conditions. Additional noise assessment has been conducted for Dike 8 within the final document. The range of noise effects would increase with the use of Dike 8 as a disposal area, but noise effects to residential areas would be reduced with the removal of the southern three acres of Dike 8 from the project.

Additional change since the publication of the DEIS/EIR includes the classification of some mitigation measures from required to an optional choice for the selected contractor. This change was made to provide contractor flexibility in contract compliance. Silt curtains were removed as a required method for achieving State water quality Section 401 compliance. Blasting mitigations for protection of fish were changed from required to optional. Adaptive management for production blasting for fish protection is no longer required. These mitigation measures are relevant to impacts, but will likely not be required by the Corps. However, the selected contractor will be encouraged to implement these measures where practicable.

Temporary adverse effects that cannot be avoided even when mitigation measures are implemented will affect air quality, water quality, fisheries, and noise, but these adverse effects are expected to be less-than-significant with mitigation. Initial air quality emission estimates showed that the project would exceed the Federal Clean Air Act General Conformity Ruling *de minimis* thresholds established for the non-attainment area at the project site for up to five years. The U.S. Environmental Protection Agency and the Sacramento Air Quality Management District (SMAQMD) recommended that the Supplemental EIS and Record of Decision (ROD) include a clear commitment to project refinements and include a list of control measures with emission reduction data demonstrating compliance with conformity ruling thresholds. To comply with the conformity ruling, unprecedented actions and mitigations were utilized for the project, which reduced NO_x emissions substantially. The use of electrical equipment and higher tiered construction vehicles and marine vessels were included as project requirements. Additional mitigation measures and mitigation fee payments were incorporated to reduce effects of a temporary emissions increase to a less-than-significant level. These actions are supported under Executive Order 13514 Federal Leadership in Environmental, Energy, and Economic Performance, October 5, 2009. As a result, estimated mitigated cumulative emissions met conformity thresholds for most project years in both construction alternatives. NO_x emissions that could not be reduced to conformity threshold were incorporated into the State Implementation Plan.

Construction activities are likely to cause temporary adverse water quality effects in the immediate project area due to the increase in turbidity, but compliance with Federal and State water quality thresholds is expected to retain effects at a less-than-significant level. A potential permanent net loss of up to 9 acres of open water habitat could result from the project. Mitigation for loss of open water habitat would be achieved by assisting the Bureau of Reclamation in creation of 10 acres of riparian wetland at Mississippi Bar. In addition, the Corps would assist the Reclamation in creation of an additional 2 to 5 acres of riparian wetlands at Mississippi Bar to compensate for temporary losses of approximately 85 acres of waters of the

U.S. If Dike 8 is utilized as a disposal area, the Corps would purchase 2.5 acres of seasonal wetlands at an approved mitigation bank to compensate for the loss of fish habitat function. Fish within the immediate project area could incur sublethal or lethal effects due to turbidity, in-water blasting and excavation activities, but Federal and State listed species are absent from the vicinity and will not be affected. Mitigation will include blasting precautions, compliance with turbidity thresholds and the restocking of Folsom Reservoir with rainbow trout as requested by the California Department of Fish and Game. As a result of these measures, significant effects are not expected for fish habitat or recreational fishing.

Noise will increase while project construction occurs. Noise during non-exempt hours will require coordination and permitting from the City of Folsom and affected counties. Mitigation actions including acoustic shielding, coordination of activities and equipment placement, and a noise monitoring plan are expected to reduce noise effects to a less than significant level.

The CEQA environmentally superior alternative and the NEPA environmentally preferred alternative are Alternative 3 due to a lesser amount of in-water excavation, dredging and blasting effects and corresponding reduced risk and effects to water quality and fisheries. Alternative 2 was also estimated to produce a lower NO_x emissions quantity than Alternative 3 by five tons over the five year span of the project. Due to considerable variability in estimates versus actual production of $NO_{x,}$ this relatively small difference could also be reduced to less NOx emissions than Alternative 3.

ES.7 COMPLIANCE WITH APPLICABLE LAWS, POLICIES, AND PLANS

This document will be adopted as a joint SEIS/EIR and will fully comply with National Environmental Policy Act and California Environmental Quality Act requirements. The project will comply with all Federal laws, regulations, and Executive Orders. In addition, the non-Federal sponsor will comply with all State and local laws and permit requirements.

ES.8 PUBLIC INVOLVEMENT

Public involvement activities associated with the approach channel excavation include public meetings, Native Tribe and agency meetings, and distribution of the draft SEIS/EIR for public review and comment.

On October 20, 2011, the Corps and Central Valley Flood Protection Board (CVFPB) staff held a public meeting to present the status of the project and obtain public input. The meeting was publicized in a Notice of Intent/Notice of Preparation (NOI/NOP), in the *Sacramento Bee*, and on the CVFPB's website. The NOI was published in the Federal Register on September 1, 2011. The NOP was filed with the State Clearinghouse on October 3, 2011 and mailed to interested parties and residents in proximity to the project area. The purpose of the meeting was to continue the flow of information on the Folsom Dam Modification Project, Approach Channel, while gathering additional information and community comments from citizens who live, work, and commute near the project area. The public was encouraged to submit written comments. No comments were received during the meeting.

A list of potentially interested Native Americans was obtained from the California Native American Heritage Commission in October 2011. Those individuals were contacted on multiple occasions regarding the public scoping meeting for the project and the overall proposed project. The Corps met with the United Auburn Indian Community of the Auburn Rancheria (UAIC) in December 2011 to discuss the project and the Tribe's interests and concerns. In a letter dated January 12, 2012, the UAIC concluded they did not have any archaeological concerns for the project beyond recommendations for the use of native plants and resources in potential mitigation banking activities. The Shingle Springs Band of Miwok Indians (SSB) requested information on the project and to meet with the Corps regarding the project. The Corps provided project information and background, as requested, and met with representatives of the SSB on March 16, 2012. The SSB indicated they are interested in activities occurring within the project area and they requested a site visit. A site visit with SSB was conducted on July 19 2012. Follow up phone calls and emails to the SSB did not indicate that the SSB had any further questions or concerns about the project. No other responses from potentially interested Native Americans have been received. Correspondence related to Section 106 consultation is included in Appendix J.

Letters in response to the NOP were received from the California Department of Parks and Recreation (State Parks), Sacramento Regional County Sanitation District (SRCSD), U.S. Coast Guard, Federal Emergency Management Agency, National Marine Fisheries Service, and Sacramento Metropolitan Air Quality Management District (SMAQMD). No comments were received from the NOI. The comments are summarized in Section 7.3 and are attached to the document in Appendix K in the main SEIS/EIR.

The draft SEIS/EIR was circulated for a 45-day review to Federal, State, and local agencies; organizations; and individuals who have an interest in the project. Public workshops were held on August 23, 2012 during the review period to provide additional opportunities for comments on the draft SEIS/EIR. All comments received during the public review period have been considered and incorporated into the final SEIS/EIR, as appropriate. Public comments and responses appendix to the draft EIS are included under Section 7.4.

ES.9 AREAS OF CONTROVERSY

Significant issues identified as areas of controversy by agencies and the public related to construction of the approach channel and related features are summarized below. These issues were based on preliminary studies and comments from formal and informal agency meetings, workshops, public meetings, telephone discourse, letters, and emails.

- Preliminary air quality emission calculations indicated that all active construction alternatives of the approach channel project would result in air emissions that could lead to violations of applicable State ambient air quality standards and would not comply with the Federal Clean Air Act (CAA). Concurrent downstream construction activity would contribute additional emissions that would cumulatively fail to meet the general conformity rule of the CAA. The Corps would not adopt an option to lengthen approach channel construction schedules to lower annual emissions to meet the CAA due to an expedited schedule for purposes of public safety.

- Preliminary studies identified potential issues with temporary turbidity, mobilization and reintroduction of existing sediment contaminants into the water column, and contaminants from blasting or constructions materials.
- In 2007, U.S. Fish and Wildlife Service (USFWS) expressed concern regarding the potential for mercury methylation following sediment-disturbing activities and bioaccumulation in the food chain. USFWS specified the use of specific references to be used in assessment of freshwater sediment.
- Construction is expected to increase noise levels, affecting local recreationists and adjacent residents, even under circumstances of compliance with the City of Folsom noise ordinances.
- Underwater blasting would result in some fish kill despite use of BMPs, and methods to attenuate pressure waves. Public comments to the 2007 EIS/EIR identified concerns over temporary curtailment of recreational activities in the project area. However, Folsom Point and the Folsom Point launch area will remain open to recreationists.
- Recreational experience may be degraded in and adjacent to the project area. Noise, visual esthetics, and access will be compromised during construction during years 2013 to 2017.

ES.10 PREFERRED PLAN

Based on the results of the technical, economic, and environmental analyses; coordination with the non-Federal sponsor; and public input, Alternative 2 has been identified as the preferred plan. Alternative 1 was not selected as the best interest of public safety as it did not provide for increased flood releases and failed to protect Folsom Dam. Alternative 2 provided an optimized and reduced schedule risk for project completion compared to Alternative 3, and as such, provided the highest public safety option. Due to schedule advantages conferred with a reduced risk construction approach, it was determined that the public interest and safety was best served by expediently constructing an operable approach channel prior to a high flood event. Alternative 2 is expected to provide continuous dam safety and public protection while realizing total project objectives at an earlier date.

Table ES-1. Comparative Summary of Environmental Effects, Mitigation, and Levels of Significance.

	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 - Cofferdam
Geology and Minerals			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	Not applicable.	Not applicable.
Hydrology and Hydraulics			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	Not applicable.	Not applicable.
Public Utilities and Services			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	Not applicable.	Not applicable.
Land Use and Socioeconomics			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	Not applicable.	Not applicable.
Public Health and Safety			
Effect	No effect.	Public safety risk associated with construction site access and the operation of heavy construction equipment. Public safety risk associated with blasting.	Public safety risk associated with construction site access and the operation of heavy construction equipment. Public safety risk associated with blasting.
Significance	Not applicable.	Less-than-significant with mitigation.	Less-than-significant with mitigation.
Mitigation	Not applicable.	A prepared Public Safety Management Plan and Blasting Plan will include notifications to the public, safety measures and BMPs. The public will be excluded from construction and blasting affected zones.	A prepared Public Safety Management Plan and Blasting Plan will include notifications to the public, safety measures and BMPs. The public will be excluded from construction and blasting affected zones.
Hazardous, Toxic, and Radiological Wastes			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.

	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 - Cofferdam
Mitigation	Not applicable.	Not applicable.	Not applicable.
Air Quality			
Effect	No effect.	NO_x will exceed Federal Clean Air Act, GCR *de minimis* threshold. Project exceeds SMAQMD air quality basin thresholds. Higher emissions of 3 NO_x tons per year produced than in Alt. 3.	NO_x will exceed Federal Clean Air Act, GCR *de minimis* threshold. Project exceeds SMAQMD air quality basin thresholds. Lower emissions of 3 NO_x tons per year produced than in Alt. 2.
Significance	Not applicable.	Less-than-significant with mitigation and inclusion into State Implementation Plan.	Less-than-significant with mitigation and inclusion into State Implementation Plan.
Mitigation	Not applicable.	Compliance with SMAQMD mitigation. To meet CAA, project will be included in SIP. Higher tiered and electrical equipment will be used to lower emissions. State mitigation fee payments for excess NOx emissions.	Compliance with SMAQMD mitigation. To meet CAA, project will be included in SIP. Higher tiered and electrical equipment will be used to lower emissions. State mitigation fee payments for excess NOx emissions.
Climate Change			
Effect	No effect.	CO_2e emissions would occur during project construction.	CO_2e emissions would occur during project construction.
Significance	Not applicable.	Less-than-significant with mitigation.	Less-than-significant with mitigation.
Mitigation	Not applicable.	Compliance with SMAQMD mitigations and use of higher tiered and electrical equipment.	Compliance with SMAQMD mitigation and use of higher tiered and electrical equipment.
Water Quality and Jurisdictional Waters			
Effect	No effect.	Higher risk of turbidity exceeding CVRWQCB thresholds than in Alternative 3. Higher risk of mercury bioaccumulation potential, and chemical, gas and oil introduction into reservoir during excavation and blasting than Alt. 3. Permanent effects to 11.5 acres of waters of the United States, temporary effects to 88.5 acres of open water, and creation of 2.5 acres of new open water habitat through approach channel excavation.	Lower risk of turbidity exceeding CVRWQCB thresholds than in Alternative 2. Risk of mercury bioaccumulation potential, and chemical, gas and oil introduction into reservoir. Permanent effects to 11.5 acres of waters of the United States, temporary effects to 89.5 acres of open water, and creation of 2.5 acres of new open water habitat through approach channel excavation.
Significance	Not applicable.	Less-than-significant with mitigation	Less-than-significant with mitigation.
Mitigation	Not applicable.	Mitigations, BMPs, monitoring, and compliance with CVRWQCB thresholds specified in the Section 401 certification. To address loss of open	Mitigations, BMPs, monitoring, and compliance with CVRWQCB thresholds specified in 401 certification, To address loss of open water, 10

	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 - Cofferdam
		water, 10 acres of riparian wetlands at Mississippi Bar would be created. Credits would be purchased at a Corps mitigation bank if 2.5 acres of seasonal wetland is utilized for disposal at Dike 8.	acres of riparian wetlands at Mississippi Bar would be created. Credits would be purchased at a Corps mitigation bank if 2.5 acres of seasonal wetland is utilized for disposal at Dike 8.
Fisheries			
Effect	No effect.	Higher risk of sublethal and lethal effects on individual fish from turbidity and blasting than in Alternative 3. Risk for effects from chemical, oil and gas habitat contamination. Potential of physical crushing.	Lower risk of sublethal and lethal effects on individual fish from turbidity and blasting than Alternative 2. Risk for effects from chemical, oil and gas habitat contamination. Potential of physical crushing.
Significance	Not applicable.	Less-than-significant with mitigation	Less-than-significant with mitigation
Mitigation	Not applicable.	Mitigations, monitoring, BMPs, compliance with state water quality certification. Fish would be restocked in Folsom Reservoir for recreational fishing.	Mitigations, monitoring, BMPs, compliance with state water certification. Rainbow trout would be restocked in Folsom Reservoir for recreational fishing.
Aesthetics and Visual Resources			
Effect	No effect.	Permanent modification of shoreline from approach channel and spur dike. Permanent change in landscape at proposed disposal areas.	Permanent modification of shoreline from approach channel and spur dike. Permanent change in landscape at proposed disposal areas. Temporary visual effect of cofferdam surrounding the approach channel area within Folsom Lake.
Significance	Not applicable.	Less-than-significant.	Less-than-significant.
Mitigation	Not applicable.	Disposal areas would be recontoured to maintain visual consistency and revegetated with native grasses.	Disposal areas would be recontoured to maintain visual consistency and revegetated with native grasses.
Recreation			
Effect	No effect.	Temporary closure of the lake from Dike 7 or 8 to Folsom Overlook. Temporary closure of the Folsom Lake Crossing bike trail during scheduled blasts.	Temporary closure of the lake from Dike 7 or 8 to Folsom Overlook. Temporary closure of the Folsom Lake Crossing bike trail during scheduled blasts.
Significance	Not applicable.	Less-than-significant.	Less-than-significant.

	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 - Cofferdam
Mitigation	Not applicable.	Public outreach would ensure awareness of all closures. The majority of the FLSRA would remain unaffected.	Public outreach would ensure awareness of all closures. The majority of the FLSRA would remain unaffected.
Traffic and Circulation			
Effect	No effect.	Increased traffic on public road ways. Temporary closure of Folsom Lake Crossing during blasting.	Increased traffic on public road ways. Temporary closure of Folsom Lake Crossing during blasting.
Significance	Not applicable.	Less-than-significant.	Less-than-significant.
Mitigation	Not applicable.	Public outreach would ensure awareness of road closures. Schedule blasting activities during off-peak traffic hours.	Public outreach would ensure awareness of road closures. Schedule blasting activities during off-peak traffic hours.
Noise			
Effect	No effect.	Construction activities during non-exempt (night) hours could violate the local noise ordinance, if construction equipment (batch plant, rock crushers) are operated simultaneously at impactful areas (Dike 7).	Construction activities during non-exempt (night) hours could violate the local noise ordinance, if semi-permanent construction equipment (batch plant, rock crushers) are operated simultaneously at impactful areas (Dike 7).
Significance	Not applicable.	Less-than-significant with mitigation.	Less-than-significant with mitigation.
Mitigation	Not applicable.	Avoid overlap of construction activities during non-exempt time periods. Compliance with City of Folsom permits. Maintain equipment in best working condition. Use acoustic shielding. Monitor noise during non-exempt periods and reduce as noise as needed.	Avoid overlap of construction activities during non-exempt time periods. Compliance with City of Folsom permits. Maintain equipment in best working condition. Use acoustic shielding. Monitor noise during non-exempt periods and reduce noise as needed.
Cultural Resources			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	If archeological deposits are found during construction, work would be discontinued pursuant to 36 CFR 800.13(b), Discoveries without Prior	If archeological deposits are found during construction, work would be discontinued pursuant to 36 CFR 800.13(b), Discoveries

	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 - Cofferdam
		Planning, to determine the significance and, if necessary, complete appropriate discovery procedures.	without Prior Planning, to determine the significance and, if necessary, complete appropriate discovery procedures.
Topography and Soils			
Effect	No effect.	Permanent change in the shoreline topography. Temporary disturbance to soils during construction.	Permanent change in the shoreline topography. Temporary change in topography due to the cofferdam. Temporary disturbance to soils during construction.
Significance	Not applicable.	Less-than-significant.	Less-than-significant.
Mitigation	Not applicable.	Not applicable.	Not applicable.
Vegetation and Wildlife			
Effect	No effect.	Potential permanent loss of 15.8 acres of habitat and up to 30 trees with use of Dike 8 disposal site.	Potential permanent loss of 15.8 acres of habitat and up to 30 trees with use of Dike 8 disposal site.
Significance	Not applicable.	Less-than-significant with mitigation	Less-than-significant with mitigation
Mitigation	Not applicable.	Recommendations proposed by USFWS. Site restoration, planting of trees, and mitigation bank credits.	Recommendations proposed by USFWS. Site restoration, planting of trees, and mitigation bank credits.
Special Status Species			
Effect	No effect.	Potential permanent loss of up to 4 elderberry shrubs at Dike 8; if present, disturbance to white-tailed kites.	Potential permanent loss of up to 4 elderberry shrubs at Dike 8; if present, disturbance to white-tailed kites.
Significance	Not applicable.	Less-than-significant with mitigation	Less-than-significant with mitigation
Mitigation	Not applicable.	Planting elderberry shrubs at an existing Corps mitigation site in the American River Parkway. Conduct surveys for kites and if necessary implement CDFG recommendations.	Planting elderberry shrubs at an existing Corps mitigation site in the American River Parkway. Conduct surveys for kites and if necessary implement CDFG recommendations.

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FIGURES

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TABLES

APPENDICES

ACRONYMS & ABBREVIATIONS

1990	1990 Clean Air Act Amendments
AB	assembly bill
ADA	Americans with Disabilities Act
ANFO	ammonium nitrate fuel oil
AQMD	air quality management district
APCD	air pollution control district
APE	area of potential effects
ATCM	airborne toxic control measure
Basin Plan	CVRWQCB Water Quality Control Plan for the Sacramento River and San Joaquin River Basins
BMPs	best management practices
Bio-x	biological measurement site x (x = site number)
BNoise2	Blast Noise model
CadnaA	Computer-Aided Noise Abatement model
°C	degrees Celsius
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CASQ	California Stormwater Quality Association
CCAA	California Clean Air Act
CCAO	Central California Area Office
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQ	White House Council on Environmental Quality
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CFR	Code of Federal Regulations
CFS	cubic feet per second
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
CNEL	Community Noise Equivalent Level
Corps	U.S. Army Corps of Engineers
CSUS	California State University Sacramento
CTR	California Toxics Rule
CVP	Central Valley Project
CVFPB	Central Valley Flood Protection Board
CVRWQCB	Central Valley Regional Water Quality Control Board
Construction	State General Permit for Storm Water
CWA	Federal Clean Water Act
cy	cubic yards
dB	decibels

dBA	A-weighted decibels
DO	dissolved oxygen
DPM	diesel particulate matter
EA/EIR	Environmental Assessment/Environmental Impact Report
EA/IS	Environmental Assessment/Initial Study
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EO	executive order
ERL	effect range-low
ERM	effect range-medium
ESA	Environmental Site Assessment
FEIS/EIR	Final Environmental Impact Statement/Environmental Impact Report
FLSRA	Folsom Lake State Recreation Area
Folsom Facility	Folsom Dam and its associated facilities
FWCA	Fish and Wildlife Coordination Act
GHG	greenhouse gas
JFP	Joint Federal Project
HAP	hazardous air pollutant
HFC	hydrofluorocarbon
HFE	hydrofluorinated ether
hp	horsepower
HTRW	hazardous, toxic, and radiological waste
kV	kilovolt
kPa	One thousand Pascals (newtons per square meter)
L_{10}	10 percent sound levels (short-term events)
L_{50}	50 percent sound levels (median levels)
L_{90}	90 percent sound levels (background noise)
LACMTA	Los Angeles County Metropolitan Transportation Authority
lbs/day	pounds per day
lbs/hr	pounds per hour
µg/m3	micrograms per cubic meter
L_{eq}	equivalent sound level
LT-x	long term measurement site x (x = site number)
M	magnitude
mg/kg	milligram per kilogram
ml/l	milliliters per liter
MCL	maximum containment level
MIAD	Mormon Island Auxiliary Dam
MMRP	mitigation, monitoring, and reporting plan
MR-x	modeled receptor x (x = site number)
msl	mean sea level
MY	model year
ng/kg	nanogram per kilogram
N/A	not applicable
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act

NF_3	nitrogen trifluride
NMFS	National Marine Fisheries Service
NOA	naturally-occurring asbestos
NOI	notice of intent
NO_2	nitrous oxides
NO_x	nitrogen oxides
NRC	National Response Center
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
O_3	ozone
OAL	Office of Administrative Law
Pa	Pascal (newton per square meter)
Pb	lead
PEC	probable effect concentration
PFC	perfluorocarbon
PG&E	Pacific Gas and Electric Company
PM	particulate matter
PM10	particulate matter smaller than or equal to 10 microns in diameter
PM2.5	particulate matter smaller than or equal to 2.5 microns in diameter
PMF	probable maximum flood
psi	pounds per square inch
RMP	FLSRA General Plan and Resource Management Plan
RWQCB	Regional Water Quality Control Board
ROD	Record of Decision
ROG	reactive organic gases
SAFCA	Sacramento Area Flood Control Agency
SCS	sustainable communities' strategies
SDWA	Safe Water Drinking Act
SEL	sound exposure level
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SIR	Supplemental Information Report
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMUD	Sacramento Metropolitan Utility District
SO_2	sulfur dioxide
SPCC	spill prevention, control, and countermeasure
SQG	Sediment Quality Guideline
SSB	Shingle Springs Band of Miwok Indians
State Parks	California Department of Parks and Recreation
ST-x	short term measurement site x (x = site number)
SVAB	Sacramento Valley Air Basin
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board

SWTR	Surface water treatment rule
TAC	toxic air contaminants
TEC	threshold effect concentration
TDS	total dissolved solids
TOC	total organic carbon
TSS	total suspended solids
Tons/yr	tons per year
UAIC	United Auburn Indian Community of the Auburn Rancheria
ULSD	ultra-low sulfur diesel
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VELB	valley elderberry longhorn beetle
WAPA	Western Area Power Administration
WRDA	Water Resources Development Act

1.0 INTRODUCTION

1.1 BACKGROUND

The Folsom Dam Modification Project, also referred to as the Folsom Dam Safety/Flood Damage Reduction Project or the Folsom Joint Federal Project (Folsom JFP), is a cooperative effort between the U.S. Department of Interior, Bureau of Reclamation (USBR), the U.S. Army Corps of Engineers (Corps), the State of California Central Valley Flood Protection Board (CVFPB), and the Sacramento Area Flood Control Agency (SAFCA). The purpose of the Folsom JFP is to implement dam safety and security features along with flood damage reduction features at Folsom Dam and its associated facilities. An auxiliary spillway adjacent to Folsom Dam was selected as the plan to meet USBR's dam safety risk reduction objective and the Corps' flood damage reduction objective as part of the objectives of the Folsom JFP. The proposed alternatives, potential environmental effects, and proposed mitigation associated with the Folsom Modification Project was assessed in the Folsom Dam Safety and Flood Damage Reduction Final Environmental Impact Statement/Environmental Impact Report (FEIS/EIR), issued in March 2007 (USBR 2007a). The Corps was a cooperating agency for the preparation of the 2007 FEIS/EIR and adopted the finding of the 2007 FEIS/EIR in a joint record of decision (ROD) that was issued in May 2007.

This EIS/EIR has been prepared as a supplement to the 2007 FEIS/EIR and is thus referred to as a supplemental EIS (SEIS/EIR). The Corps and the CVFPB are the lead agencies in preparing this SEIS/EIR for the purposes of compliance with NEPA and CEQA, respectively. This document analyzes alternatives for excavation alternatives for the approach channel and other auxiliary spillway features upstream of the gated control structure. The 2007 FEIS/EIR conducted a programmatic or general analysis of proposed design features available at that time. However, new designs and refinements went beyond the scope of the 2007 FEIS/EIR analysis, necessitating additional analysis and documentation. The 2007 Final EIS/EIR stated that the design of the spillway approach channel would be determined in the Corps' pre-construction, engineering, and design phase and if needed, supplemental NEPA/CEQA documentation would be prepared.

The implementing regulations of the NEPA at 40 CFR 1502.9(c) provide that a lead Federal agency must prepare a supplemental draft EIS if: (i) the agency makes substantial changes in the proposed action that are relevant to the environmental concerns, or (ii) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Thus, to incorporate new information and consider alternatives for construction of the approach channel, the Corps determined that a supplemental EIS was required.

Section 15163 of the CEQA Guidelines identifies when a lead agency should prepare a supplement to an EIR. The Lead or Responsible Agency may choose to prepare a supplement to an EIR rather than a subsequent EIR if:

- Any of the conditions described in Section 15162 would require the preparation of a subsequent EIR; and
- Only minor additions or changes would be necessary to make the previous EIR adequately apply to the project in the changed situation.

Thus, to incorporate new information and consider alternatives for construction of the approach channel, the CVFPB determined that a supplemental EIR was required.

In 2007, the Corps completed the Post Authorization Change Report (PACR) for the Folsom Modifications and Folsom Dam Raise Projects. The PACR summarizes the history of flood management studies and actions in the American River basin (Corps 2007). The refined Folsom JFP, as described in the PACR and USBR's FEIS/EIR was later authorized under the Water Resources Development Act (WRDA) of 2007. Construction of the Folsom JFP was initiated by USBR in fall 2007, with USBR acting as the lead agency during construction for the first two phases of construction. USBR completed excavation of the spilling basin and spillway in 2011. The Folsom JFP auxiliary spillway is being constructed by both the Corps and USBR in five construction phases plus a commissioning and transfer phase. The expected completion of the project is October 2017. A timeline of the five phases of the Folsom JFP are shown on Figure 1 below. An aerial photo of the project area is shown as Figure 9 in Section 3.6.2, Aesthetics and Visual Resources.

The Corps conducted preliminary analysis of the approach channel excavation in 2009. This analysis considered alternatives to conduct excavation in the dry, for seasons in which Folsom Reservoir had low water levels. The environmental effects of these alternatives were evaluated in the August 2009 Folsom Dam Safety and Flood Damage Reduction Environmental Assessment/Initial Study (EA/IS), Early Approach Channel Excavation. While this analysis was completed, no early excavation work has been completed to date due to high reservoir levels.

As construction of the Folsom JFP progresses, the Corps is now analyzing alternative plans for the excavation of the approach channel during fluctuating lake levels. A detailed project description describing these alternatives is included in Chapter 2 of this document. The project area, including all proposed features of the alternatives, is shown on Plate 1. A rendering of the future project as proposed is shown on Plate 2.

1.2 AUTHORIZATION

The Folsom Dam Modifications Project was authorized by Section 101(a)(6) of the WRDA 1999 (1111 Stat. 274). Further authorization and guidance for the collaboration between the Corps and the USBR under the Folsom JFP was provided by the Energy and Water Development and Appropriations Act of 2006 (119 Stat. 2259), as follows:

> *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.

Formal authorization for the Folsom JFP was included in Section 3029(b) of WRDA 2007, as follows:

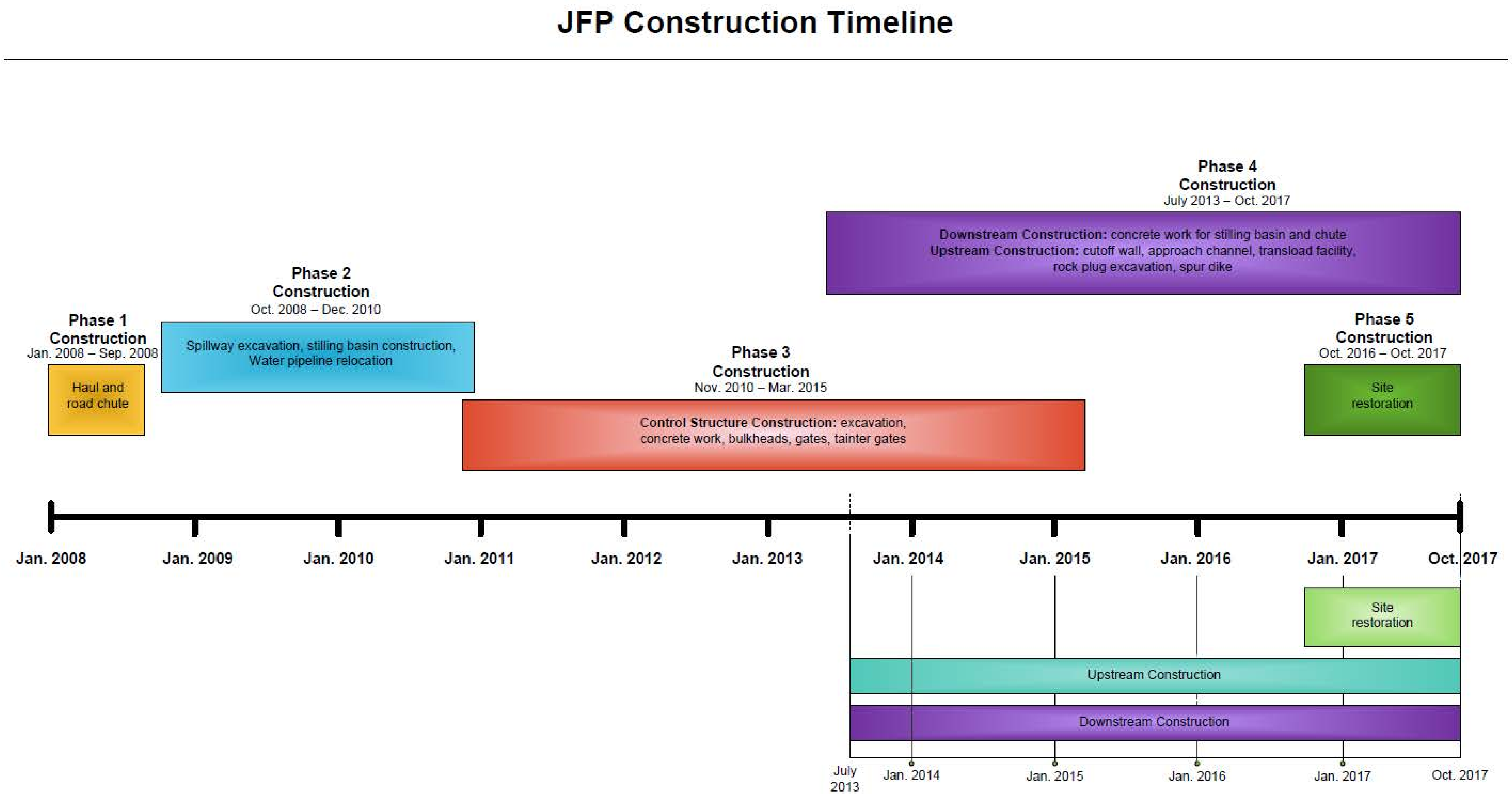
(b) JOINT FEDERAL PROJECT AT FOLSOM DAM.—
(1) IN GENERAL.—The project for flood control, American and Sacramento Rivers, California, authorized by section 101(a)(6)(A) of the Water Resources Development Act of 1999 (113 Stat. 274) and modified by section 128 of the Energy and Water Development Appropriations Act, 2006 (119 Stat. 2259), is modified to authorize the Secretary to construct the auxiliary spillway generally in accordance with the Post Authorization Change Report, American River Watershed Project (Folsom Dam Modification and Folsom Dam Raise Projects)…

1.3 PROJECT AREA

The project area is located in the city of Folsom at Folsom Dam, approximately 20 miles northeast of Sacramento. Folsom Dam and Reservoir are located downstream from the confluence of the north and south forks of the American River, and extend into Sacramento, Placer and El Dorado counties. Plate 3 illustrates the project area within the Sacramento River Watershed, and Figure 2 shows the Folsom Dam and Reservoir area.

The new auxiliary spillway is located on the left abutment of the main dam, immediately downstream of the left wing dam. Current access to the site is via Folsom Lake Crossing to an overlook site at approximately 480 feet in elevation. The approach channel for the auxiliary spillway is expected to extend approximately 1,100 feet upstream of the concrete control structure. The invert of the approach channel will be at elevation 362.34 feet (NAVD 88 datum).

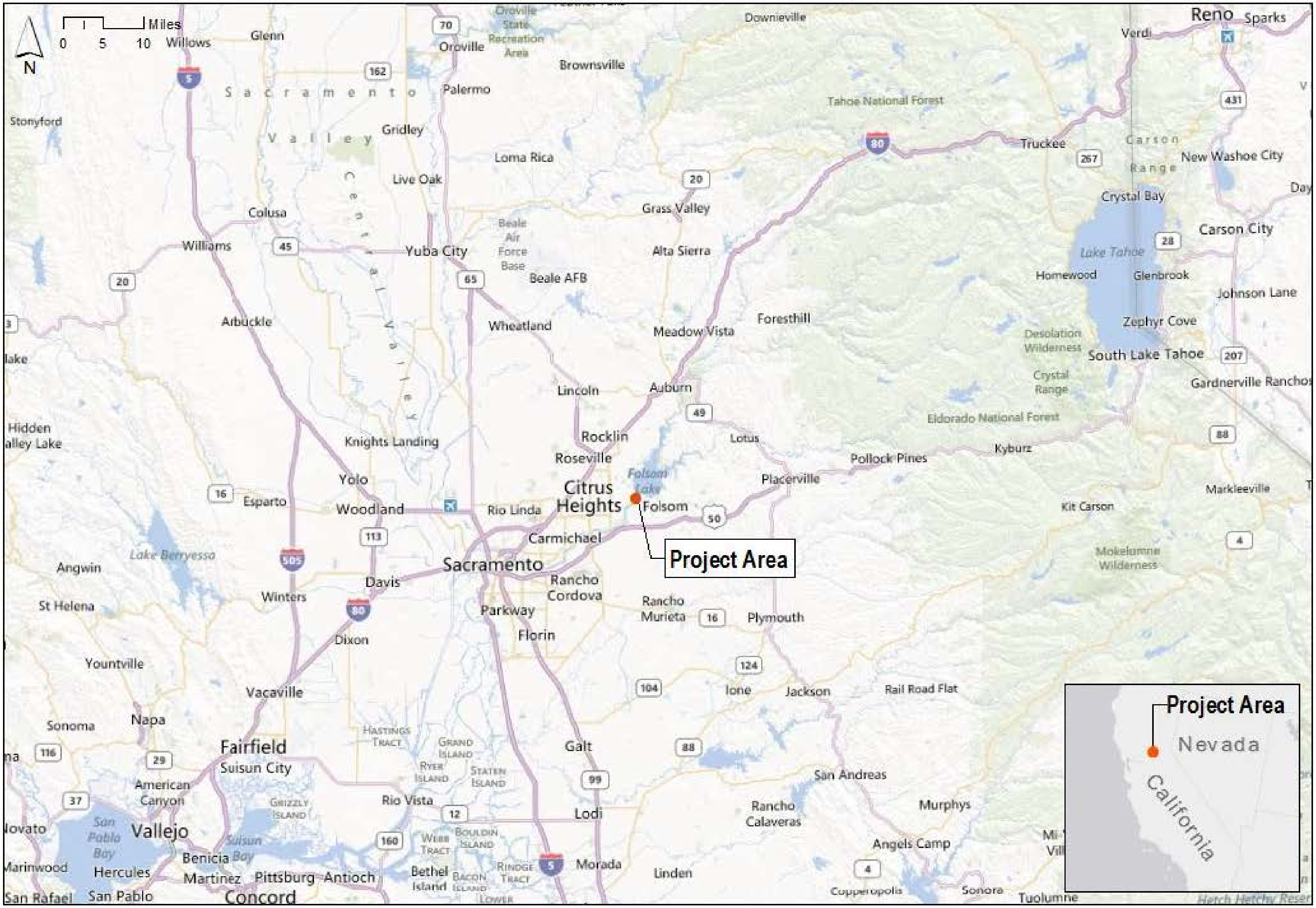
For the purposes of this document, the "project area" consists of the ongoing auxiliary spillway construction area; the footprint of the approach channel, as described above; the existing project haul routes; the existing project staging areas at the Folsom Overlook and Folsom Prison sites; proposed new disposal sites at Dike 8 and in-reservoir; and the existing project disposal areas at MIAD and Dike 7. The project area can be seen on the map in Plate 1.



US Army Corps of Engineers Sacramento District

Figure 1 - JFP Construction Timeline

Folsom Dam Modification Project, Approach Channel SEIS/ EIR December 2012



US Army Corps of Engineers
Sacramento District

Figure 2 - Project Vicinity Map

Folsom Dam Modification Project, Approach Channel SEIS/ EIR
Decmeber 2012

1.4 PROJECT PURPOSE AND NEED

The current spillway and outlets at the Folsom facility do not have sufficient discharge capacity for managing the predicted probable maximum flood (PMF) and lesser flood event inflows above a 100-year event (an event that has a 1% chance of occurring in any given year). Structural modifications associated with the Folsom JFP are proposed to address increasing discharge capability and/or increasing storage during extreme flood events above the 200-year event level. The new auxiliary spillway is a major feature that will address the need to safely pass part or the entire PMF event. A hydraulic analysis was completed for the new auxiliary spillway and is included in the PACR (Corps 2007).

The approach channel and its related features, as evaluated in this SEIS/EIR, are necessary functional features of the auxiliary spillway. Without the completion of these features, the auxiliary spillway would not be completed and the Folsom facility would remain unable to pass the PMF and provide a higher level of flood damage reduction. As a result, the 200-year level of protection would not be accomplished, and the Sacramento area would remain at risk for a more frequently occurring potential flood event.

1.5 SIGNIFICANT ISSUES

Significant issues identified by agencies and the public related to construction of the approach channel and related features are summarized below. These issues are based upon preliminary studies and comments from formal and informal agency meetings, workshops, public meetings, telephone discourse, letters, and emails.

- Preliminary air quality emissions calculations indicated that approach channel construction would result in air emissions that could lead to violations of applicable state ambient air quality standards and not comply with the Federal Clean Air Act.
- Preliminary studies identified potential issues with temporary turbidity, mobilization of existing sediment contaminants and reintroduction into the water column, and contaminants from blasting or constructions materials.
- U.S. Fish and Wildlife Service (USFWS) in 2007 expressed concern regarding potential for mercury methylation following sediment disturbing activities and bioaccumulation in the food chain. USFWS requested the use of specific references to provide appropriate assessment guidelines for freshwater sediment.
- Construction is expected to increase noise levels, affecting local recreationists and adjacent residents, even under circumstances of compliance with the City of Folsom noise ordinances.
- Underwater blasting would result in some fish mortality despite use of best management practices (BMPs), and methods to attenuate pressure waves.

- Public comments to the 2007 EIS/EIR identified concerns over temporary curtailment of recreational activities in the project area; Folsom Point and the Folsom Point launch area, however, will remain open to recreationists.
- Degradation of recreational experience in and adjacent to the project area. Noise, visual esthetics, and access will be compromised during construction during years 2013 to 2017.

1.6 PREVIOUS ENVIRONMENTAL DOCUMENTS

There have been numerous planning and environmental documents completed related to flood management studies and actions in the American River Basin. The documents most pertinent to the approach channel study are listed below and are available upon request from the Corps.

2007 Post Authorization Change Report, American River Watershed Project

The purpose of the 2007 PACR was to document and recommend changes to two authorized projects: the Folsom Dam Modification Project and the Folsom Dam Raise Project. The PACR resulted in new authorization in WRDA 2007 for the refined Folsom JFP, as described in this report. The PACR is pertinent to this SEIS/EIR because it is the planning study associated with this document, and contains the primary alternatives analysis for the overall JFP. This SEIS/EIR analyzes design refinements associated with those original alternatives for the auxiliary spillway.

2007 Folsom Dam Safety and Flood Damage Reduction FEIS/EIR

The 2007 FEIS/EIR was prepared by USBR and contains the initial analysis of environmental effects and potential mitigation associated with the overall Folsom JFP. This SEIS/EIR is supplemental to the 2007 FEIS/EIR and addresses design refinements associated with the alternatives originally analyzed in the 2007 FEIS/EIR.

2009 Folsom Dam Safety and Flood Damage Reduction EA/IS, Early Approach Channel Excavation

The 2009 EA/IS was supplemental to the 2007 FEIS/EIR and analyzed preliminary alternatives for possible early excavation of the approach channel in dry winter seasons when the reservoir levels remain low. The environmental effects analyzed in this document assumed all excavation would occur in the dry. Additionally, this EA/IS addressed construction of the spur dike in the dry.

2010 Folsom Dam Safety and Flood Damage Reduction EA/EIR, Control Structure, Chute, and Stilling Basin

The 2010 EA/EIR was supplemental to the 2007 FEIS/EIR and analyzed design refinements for the auxiliary spillway's chute, stilling basin, and construction of the control structure. In addition, exploratory borings for the cofferdam were analyzed under this EA/EIR. The construction associated with this study is ongoing in the project area, and implementation of this project is considered part of the existing condition for the approach channel analysis in this SEIS/EIR.

2012 Folsom Dam Safety and Flood Damage Reduction Project EA/EIR, Prison Staging Area and Stilling Basin Drain

The 2012 EA/EIR was supplemental to the 2007 FEIS/EIR and analyzed design refinements to use Folsom State Prison land as a staging area and to construct a drain at the stilling basin. The actions proposed to implement these design refinements include: (1) preparing the Folsom State Prison land for staging and operation of a concrete batch plant by relocating the prison fence, grading the land, and widening the site's driveway access; (2) installing a temporary traffic signal on Folsom Lake Crossing Road; (3) widening an existing dirt access road; and (4) constructing a drain at the stilling basin.

1.7 REPORT PURPOSE AND ORGANIZATION

This SEIS/EIR has been organized to present information regarding alternative plans and potential effects. It is intended to meet National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) requirements for evaluating and disclosing potential effects on the environment and recommended mitigation measures related to the proposed action, and alternatives, prior to making a decision on proceeding with construction. Specifically this document evaluates alternatives for proposed construction of the approach channel to the auxiliary spillway to support a NEPA Record of Decision (ROD) and CEQA Notice of Determination (NOD).

Although NEPA and CEQA generally have similar requirements, there are some differences in regards to terminology, procedures, environmental document content, and substantive mandates to protect the environment. In instances where NEPA and CEQA differ, the more rigorous of the two laws was applied. In instances where CEQA has additional requirements not specifically included in NEPA, the CEQA requirements have been added; for example, growth inducing impacts.

The SEIS/EIR is organized into eight sections. Section 1 introduces the project, and Section 2 describes the project alternatives. Sections 3 and 4 present the existing and future environmental resources and conditions in the project area, and evaluate the potential effects of the alternative plans on those resources. Section 5 describes the cumulative effects of the project combined with other past, present, and reasonably foreseeable future projects in the area. Chapter 6 provides a summary of activities being conducted to comply with Federal and State laws, regulations, and policies. Chapter 7 describes public involvement activities, while Chapters 8 through 10 identify the preparers, references, and index, respectively.

The report also includes tables, figures, plates, and appendices. The figures are included within the text while plates are located after the main report. The tables provide specific information and summarize main points in the text. The plates show current conditions, and provide a visual layout of the plans. The appendices provide detailed analyses, correspondence, and other information used to evaluate and compare the alternative plans.

2.0 ALTERNATIVES

This section addresses alternative formulation, alternatives that were not considered, and the three final alternatives selected for assessment, including the preferred alternative. The three alternatives assessed for the approach channel project include Alternative 1, which addresses a no action alternative; Alternative 2 that includes the use of a cutoff wall during excavation, and Alternative 3, which includes the use of a cofferdam during excavation.

The approach channel project is the final construction activity of Phase 4 of the Folsom Dam Modification Project. The primary and permanent structures proposed in both Alternative 2 and 3, consist of the 1,100 foot long excavated approach channel and a spur dike (Plate 2). A transload facility and concrete batch plant would be constructed as temporary structures to facilitate the construction. Additional existing sites and facilities that would be utilized for the length of the project include the Folsom Prison staging area, the existing Folsom Overlook, the MIAD area, Dike 7, and Dike 8. These sites and facilities are connected by an internal project haul road.

The two construction alternatives would engage similar designs and processes, but as mentioned, the primary feature that differentiates Alternative 2 from Alternative 3 is the construction of a concrete secant pile cutoff wall to provide seepage control during approach channel excavation in Alternative 2. Alternative 3 would utilize a cofferdam to provide dry conditions for approach channel excavation. The juxtaposition of the two alternative structures is found in Figure 4.

2.1 ALTERNATIVE FORMULATION AND SCREENING

Documentation of the plan formulation process associated with the overall Folsom Dam Modification Project can be found in the Corps' 2007 Post Authorization Change Report for the American River Watershed Project, Folsom Dam Modifications and Folsom Dam Raise. Concurrent with the Post Authorization document, USBR prepared the 2007 EIS/EIR, a programmatic document to which this supplemental EIS/EIR is tiered (USBR 2007a). The 2007 FEIS/EIR contains the overarching assessment of this multi-phased project, with each supplemental NEPA/CEQA document focusing on the design refinements of project elements. For this reason, alternatives to the entirety of the Folsom JFP are not considered in this supplemental NEPA/CEQA document. Alternatives for the auxiliary spillway components, the control structure, chute, and stilling basin are also not considered in the approach channel assessment phase as they have been addressed in the 2010 EA/EIR (Corps 2010). The approach channel project was identified under the 2007 FEIS/EIR (USBR 2007a), which acted as a programmatic assessment for the JFP project. Specific approach channel design assessment was intended for later NEPA and CEQA analyses that are conducted within this SEIS/EIR.

Objectives and constraints for the approach channel project were previously identified under several comprehensive engineering, cost, and environmental analyses including preliminary alternative feasibility studies (URS 2008a; URS 2008b; URS 2009; URS 2010). These studies evaluated in detail the project design limitations, safety and risk considerations, and optimized construction paths and schedules for the approach channel and related structures, including a spur dike and transload facility. Manipulation of water levels in order to conduct construction in the dry has been considered, but currently is not considered a viable option due to prescribed water uses, pre-determined releases, and existing water rights.

Three potential design alternatives were delineated from the feasibility studies for additional assessment due to engineering, environmental and cost considerations. The three design alternatives included the optimal assessments of a small cofferdam, large cofferdam, and wet construction design without a cofferdam. Assessment of construction safety, and scheduling to optimize total construction time were deciding factors during additional evaluation of alternatives. Opportunity for construction of a cutoff wall was further assessed for engineering feasibility and time savings (URS 2011), and this structure was incorporated into Alternative 2.

Finally, a preferred alternative, Alternative 2, was identified based upon criteria including engineering and economic feasibility, environmental effects and safety risk. Criteria that were used to evaluate measures and alternatives are described in detail in Corps contracted engineering feasibility studies for the Folsom Dam JFP (URS 2008; URS 2009; URS 2010; URS 2011). Completion of the approach channel project in the shortest time frame was considered a priority due to the inability of the current Folsom Dam spillway to accommodate potential high flood flows. Compliance with this overriding safety issue was achieved by selection of Alternative 2 as the preferred alternative that provided the greatest design efficiency and lower risk for construction delay.

2.2 ALTERNATIVES NOT CONSIDERED IN DETAIL

The following alternatives were considered but not carried forward based on failure to meet engineering infeasibility and safety risk criteria discussed above. These alternatives include a large cofferdam alternative and a combined cofferdam and cutoff wall alternative, which are discussed below.

2.2.1 Approach Channel Excavation – Dry Excavation with Large Cofferdam

The large cofferdam proposal consisted of the construction of a large cofferdam at the upstream end of the approach channel to allow the approach channel to be excavated in-the-dry conditions. The location of the cofferdam would have extended further into the lake than the small cofferdam, thereby providing a larger construction area to excavate in-the-dry. Construction of a larger structure would have involved greater quantities of construction materials and time resulting in more costly expenditures. To construct this larger cofferdam, a series of flat circular sheet pile cells with a 90-foot diameter and a maximum height of 80 feet would be placed upon the top of a rubble mound. The round sheet formed cells would have been filled with gravel. To provide sufficient bearing against downstream sheet pile, additional stability measures were proposed to provide support.

The large cofferdam alternative was removed from further consideration for two primary reasons: insurmountable engineering issues, and safety risks to construction workers. The results of geotechnical exploration indicated that the strength of the underlying foundation materials of decomposed granite and sediment was insufficient to support the load, or weight, of the larger cofferdam. Engineering remedies could not compensate for the load of these structures resulting in a stability issue and a structure that may be prone to failure. As a result, this alternative posed a safety issue for construction workers situated between the bulkhead gates and the cofferdam. Cofferdam failure would constitute a risk to human life.

2.2.2 Approach Channel Excavation – Wet and Dry Excavation with Cutoff Wall and Small Cofferdam

This excavation concept consisted of both the installation of a cofferdam and a cutoff wall. Addition of a cutoff wall to a cofferdam was evaluated as a method of reducing the construction schedule by providing for earlier construction of the sidewalls. Channel excavation in dry conditions would also have benefitted from this alternative.

Upon additional assessment, the combined cutoff wall and small cofferdam alternative was removed from further consideration because the combination of these two structures was infeasible in terms of physical juxtaposition. Sufficient space was not available to contain the two structures as they physically overlapped. In addition to the physical incongruity, construction space would have been insufficient to build the structures, comprising an insurmountable engineering issue. Instead, Alternatives 2 and 3 were formulated to address separately the construction of a smaller cofferdam, or the construction of a cutoff wall as both alternatives provided a feasible and safe design for construction.

2.3 ALTERNATIVE 1 - NO ACTION

A no action alternative is required pursuant to NEPA, and a no project alternative is required for CEQA (for consistency, in this SEIS/EIR it is referred to as the No Action Alternative). The No Action Alternative constitutes the future without-project conditions that would reasonably be expected in the absence of the proposed action and serves as the environmental baseline per NEPA against which the effects and benefits of the action alternatives are evaluated. The environmental baseline for CEQA is assumed to be the existing conditions.

Under Alternative 1, the approach channel structure, designed to connect the auxiliary spillway to the lake, would not be constructed. Since the approach channel is an essential feature to the overall function of the auxiliary spillway, the Corps would not participate in the completion of the overall Folsom JFP. A substantial amount of construction by USBR has already occurred and would be of no value if no further action was taken to complete the spillway. Consequently, dam safety and flood damage reduction improvements to the Sacramento area would not be implemented and enhanced public safety would not be realized as detailed in the 2007 FEIS/EIR (USBR 2007a).

2.4 ALTERNATIVE 2 - APPROACH CHANNEL CONSTRUCTION WITH CUTOFF WALL

Proposed construction elements for Alternative 2 are discussed below in detail, beginning with construction of the cutoff wall (Figure 3). A schedule of the proposed construction activities is also provided in Table 3.

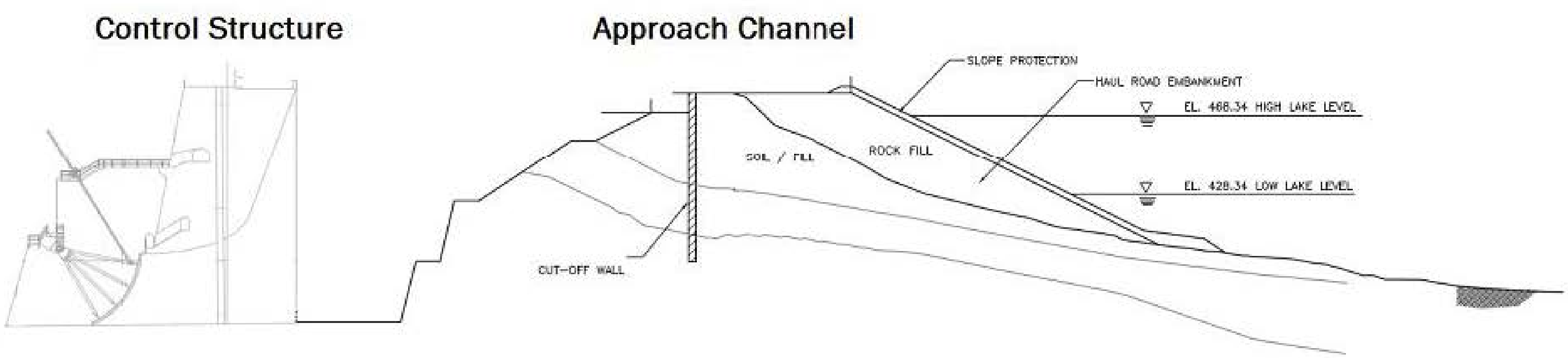
2.4.1 Cutoff Wall Construction

Installation of the cutoff wall across the 1,200 foot width of the future approach channel would occur as early as possible to maximize excavation activity in dry terrestrial conditions (in-the-dry). The cutoff wall would be formed by a reinforced concrete secant pile wall socketed into the underlying highly weathered granitic in situ rock (Figure 3). The secant pile wall is a wall constructed in a straight line which intersects supporting vertical columns or piles. Initially, 3-foot diameter holes for the primary piles on 4-foot centers would be drilled. The average pile length is estimated to be 85 feet. After drilling is completed, the holes would be filled with concrete and a reinforcing cage. The top section of the piles would be drilled with a steel casting used to support the layers of cobbles and boulders. The bottom section of the pile that penetrates the decomposed and highly weathered granite would not require casing. Casing would be removed as concrete is placed in the hole.

Three-foot diameter holes for the secondary piles would then be drilled on 4-foot centers between the primary piles. The secondary piles would be reinforced and constructed with concrete and a reinforcing cage. The fill material includes very strong, unweathered quartz boulders measuring up to 8 feet in size. The boulders would be enveloped in a matrix of loose silty and rounded gravel cobbles.

2.4.2 Approach Channel Excavation

The approach channel for the auxiliary spillway is expected to extend approximately 1,100 feet upstream of the concrete control structure (Plate 1). The first step in the dry excavation effort for the approach channel would consist of removal of rock plug material between the constructed control structure and the cutoff wall. A combination of ripping and blasting would be required to facilitate rock excavation. As sufficient material is removed, the approach channel slab and concrete walls would be installed over an eighteen month period. During this timeframe the control structure's bulkhead gates would be completed and operational. Excavation of the rock plug would continue in-the-dry until the approach channel is ready for flooding or the lake level overtops the rock plug. The remaining rock plug excavation would be timed to follow the dropping lake level as possible; top-down excavation of the rock plug would be performed following the lake level down to elevation 425.34 feet or less. As lake levels rise, excavation of the rock plug would be performed in-the-wet. An estimated total of 400,000 cy is expected to be excavated in-the-wet under Alternative 2 (Table 1).



Cross Section of Cutoff Wall

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Figure 3 - Cutoff Wall

Folsom Dam Modification Project, Approach Channel SEIS/ EIR December 2012

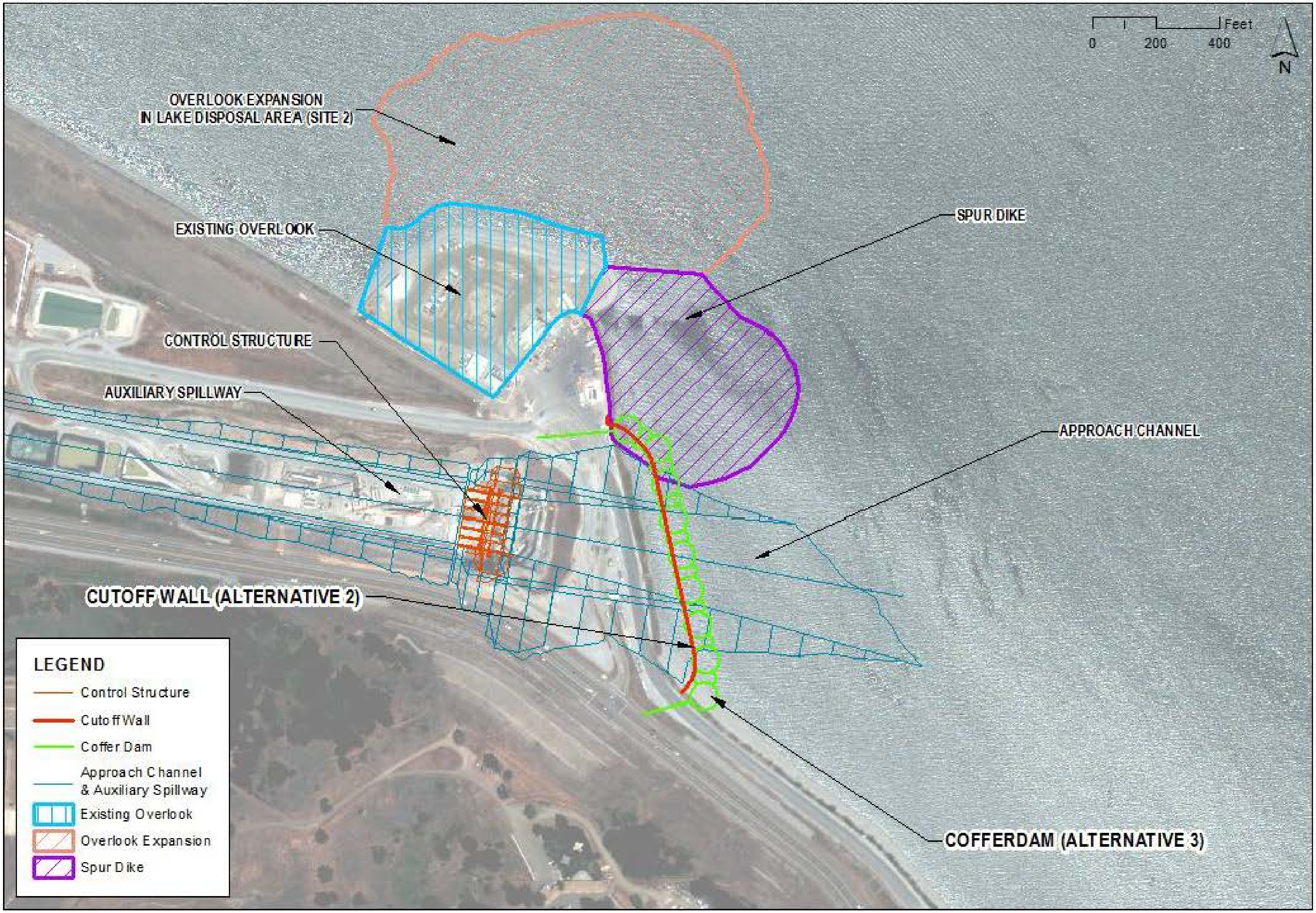

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Figure 4 - Construction Footprints of Alternatives 2 and 3

Folsom Dam Modification Project, Approach Channel SEIS/ EIR
Decmber 2012

Blasting and dredging would be required for rock plug excavation. Dredging of approximately 122,000 cy of soft material and silts on the lake bottom would be conducted first to reduce turbidity during the blasting phase. Low lake levels would be utilized where possible to maximize activity in lower lake levels or dry conditions. After fine materials are removed, the underlying rock would be blasted. Blasted material would be dredged using a barge-mounted clam shell or hydraulic excavator dredge, down to an elevation of 350 feet. The dredging would be performed from barges and would require marine equipment to be mobilized and the transload facility to be operational. The removal of remaining rock fragments from the dredging operations would be conducted using airlift systems. An airlift system is utilized to vacuum rock fragments from the lakebed up through a riser to bring fragments to the surface for discharge into a barge.

Table 1. Approach Channel Excavation Estimates Alternative Comparison.

Activity	Alternative 2	Alternative 3
Quantities of excavated material in-the-dry (cubic yards)	600,000	800,000
Quantities of excavated and dredge material in-the-wet (cubic yards)	400,000*	200,000**
Number of days of construction in-the-dry	465	390
Number of days of construction in-the-wet	456	290***

*An additional 400,000 cy of temporary fill material associated with the haul route embankment would be removed under Alternative 2.
**An additional 150,000 cy of cofferdam fill material would be removed under Alternative 3.
***An additional 100 days of in-the-wet deconstruction work may be required for the cofferdam removal.

In-the-wet excavation would continue to widen the channel in phases, until a width that would pass the PMF is reached. To achieve flood risk reduction benefits of the auxiliary spillway earlier in the project life, a notch may be cut through the reduced rock plug to pass a 200-year flood event as necessary up to a depth of elevation 350 feet. If conditions are not appropriate to install a notch in the reduced rock plug, the remaining excavation would continue top-down to elevation 350. Once the lake level has risen sufficiently to inundate the approach channel between the reduced rock plug and the control structure, the area would be flooded in a controlled fashion to prevent damage to the approach slab and wall and to avoid uncontrollable erosion of the remaining rock plug. The remaining rock plug would be excavated in-the-wet, using underwater blasting and dredging techniques. Seepage and water overflow will be treated and/or discharged back into the lake under appropriate permits.

Excavation of the approach channel upstream of the rock plug includes removal of rock material within the envelope of the approach channel with shaping and scaling of the channel surfaces; excavation of any rock trap recesses in the floor of the channel; placement of the approach slab, and armoring of any side slopes susceptible to erosion. Excavation would occur both in-the-dry and in-the-wet, but dry excavation would be executed whenever possible in conjunction with the seasonal low water pool. The remainder of the approach channel excavation under a flooded status would be conducted from barge mounted equipment and remaining rock fragments would be removed from the channel with airlift systems. Wet dredged material would be placed in lake or drained at site behind silt curtains to remove water content before transport to terrestrial disposal sites.

Approach Channel Concrete Lining

The approach channel concrete slab and walls would stretch for approximately 100 feet upstream of the control structure. The concrete slab would be approximately 5 feet thick, and both the right and left sides would flare out five degrees to increase the width of the slab upstream. A 30-foot wide by 10-foot deep rock trap would be located immediately upstream of the approach slab so that rocks on the approach channel invert block debris from entering the auxiliary spillway. Approach channel walls would be concreted from the control structure extending approximately 100 feet upstream. All concrete work and placement in the approach channel would be conducted in-the-dry conditions; no concrete work would be conducted in-the-wet. A rendering of the completed project is shown on Plate 2.

Haul Road Embankment

The existing haul road, located on top of the rock plug, provides truck traffic access to the disposal areas from the auxiliary spillway. Because excavation of the rock plug would cause loss of the current haul route, approximately 165,000 cubic yards (cy) of fill material would be placed east of the rock plug to create an embankment in order to maintain the haul road connection to the auxiliary spillway. Approximately 40,000 cy of lakebed soft material would be dredged preceding placement of fill material. The fill would consist of 6 inch minus crushed rock (approximately 145,000 cy) with slope protection consisting of two layers of 1/4 ton rock (approximately 20,000 cy). Processed fill rock with less than 5% fines would be hauled from Dike 7. The haul road would extend to 80 feet wide in order to accommodate two-way truck traffic. Once the cutoff wall and haul road are complete, in-the-dry excavation would begin.

Hydraulic Dredging

Hydraulic cutterhead dredging is proposed for dredge material that does not require blasting prior to excavation or dredging. Hydraulic cutterhead dredging is necessary for site preparation of the transload facility, spur dike, approach channel, and the haul road embankment. A hydraulic dredge floats on the water and excavates and pumps the material through a temporary pipeline to another location. The dredge acts like a floating vacuum cleaner that can remove sediment very precisely.

A 24-inch or smaller pipeline cutterhead dredge is anticipated to be used to dredge sandy or soft material. A 24-inch pipeline would have an estimated volumetric flow rate, or pumping capacity, of 2,700 to 7,200 cy of dredged sediment slurry per hour, depending on the constraints of the placement site being used (including distance) and the type of sediment being dredged. Approximately every 500 feet, the 24-inch flexible pipeline sections would be anchored in the bottom of Folsom Lake to secure it. Pipeline sections and anchors not in use would either be secured on a floating barge, capped and lashed together to float in the project area, or would be stored at the designated staging areas.

Approximately 20,000 cy of soft material from the transload facility footprint, approximately 122,000 from the approach channel, approximately 40,000 cy of material from the haul road embankment, and up to 80,000 cy of the spur dike/expanded overlook footprint could be placed in the proposed dredging deposition site shown in Plate 1. Material deposited in the proposed Folsom Lake site below Dike 7 would be spread out to produce a level plane in the depressed lake elevations. Hydraulic dredging would occur between 2013 and 2017.

In-the-Dry (Land-Based) Excavation and Blasting

Land-based rock excavation would consist of conventional drilling and blasting methods. Drilling would be performed in lifts and patterns to facilitate thorough pulverization of the granite material. In dry holes, ammonium nitrate-fuel oil (ANFO) would be used and primed with cast boosters. Water-resistant emulsified slurry would be required since water intrusion is anticipated. Explosives would be stored off-site, and would be trucked to the site on a daily basis. The explosives storage facility would be located in Jamestown, California, approximately 80 miles from the site or Suisun City, California approximately 70 miles from the site.

Blasting would typically consist of approximately 15,000 cubic yards rock shots. Blasted rock would be excavated with shovels or loaders, placed in haul trucks, and hauled to one of the on-site disposal areas, located no more than 1.5 to 2 miles from the excavation area. The proposed disposal areas are discussed in Section 2.4.6.

The land-based blasting would be conducted up to one blast per day between 1:30 p.m. and 2:30 PM., over 48 months (estimated February 2014 to October 2017) for up to six days per week. Up to 200 land-based blasts are expected in Alternative 2. There would be additional provisions for a potential second blast in the morning between 10:00 a.m. and 11:00 a.m. A safety fly rock zone of 2500 feet would be maintained for human safety. Blasting would require an encroachment permit from the City of Folsom, and the contractor would coordinate with the City of Folsom and provide adequate notification to the public, include signage, prior to blasting. The contractor's blasting plan would be approved by the Corps prior to blasting commencement.

In-the-Wet (Underwater) Blasting and Excavation

Underwater rock excavation would be accomplished by drill and blast methods (URS 2009). Barge platforms would be transported and assembled on-site to accommodate drilling and excavation equipment. Down-the-hole hammer drills would bore 5-inch holes and the holes would be charged with emulsified slurry explosives. Blasting techniques including decking, delayed charges and stemming would be conducted to reduce underwater blast pressures. All charges at least 20-charge diameters would be confined by rock burden and crushed stone stemming to limit the blast over-pressures. Up to ten test blasts with reduced charges would be conducted over a week period prior to production blasting. Underwater blast pressures would be limited to 5.8 pounds per square inch at a distance of 2,500 feet from the blast point for human safety and 19 psi for at the control structure to protect structural integrity. A physical floating exclusion boundary would be maintained at 3,000 feet from the blast point for safety of recreational swimmers and boaters. Prior to detonations, the drill and fleeting barge would move

300 to 500 feet from the blast area. Each blast would produce approximately 2,000 cy of rock. The removal of material would be completed in two blasted consecutive layers, or lifts, when the rock depth exceeds 30 to 40 feet. Approximately 400 blasts would be conducted underwater over a projected period extending from 2015 to 2017. The contractor's blasting plan would be approved by the Corps, and public notices and meetings would be conducted by the contractor prior to commencement of blasting.

Explosives would be stored off-site. The explosives storage facility would be located at Jamestown, California, approximately 80 miles from the site or Suisun City, California approximately 70 miles from the site. Explosives would be trucked to the site on a daily basis. After verification all charges have been detonated, a long stick excavator or crane supported clam shell would dredge the shot rock into material barges for tow to the temporary transload facility.

The dredging equipment that could be utilized for this project includes barges, excavators, and airlifts:

- A barge-mounted large long reach excavator, with an effective excavating depth of 90 to 95 feet, would be used. Different size buckets can be changed out for the various soil and rock materials to be encountered during construction. The excavator method is limited by its effective digging depth. Accordingly, a 3½ month (mid-November to end of February) low lake level window would be required to effectively dredge to the final grades.
- A 225-ton class barge-mounted crawler crane clam shell unit would supplement the hydraulic excavator to dredge shot rock and common material to grade in periods where the lake level is too high for the hydraulic excavator to dredge to final grade.
- An airlift or sweep would be set up on the drill barge to perform foundation clean up for approximately 90 days in Alternative 2.

The long reach excavator, conventional clam shell, and other overwater equipment would be mounted on portable *"Flexifloat"* units, sized and assembled to maintain stability and manage the excavation sets. The size of the *"Flexifloat"* barges would be approximately 180 to 200 feet by 40 to 50 feet by 7 feet deep. The barges would be held in position by large winch controlled spuds, or in water over 50 feet deep, by a four-point mooring system using bottom founded anchors.

The cleanup of rock fragments would be removed from the channel by airlift systems. Following the use of airlifts, in-the-wet inspection of the lakebed would take place to identify areas where rock fragments remain and designate areas that have been cleared. The airlift and inspection divers would work iteratively until all grid areas have been verified to be free of rock fragments. Dredged material would be drained at site behind silt curtains, and would not be transported with high water content to disposal sites.

2.4.3 Spur Dike (Overlook Extension) Construction

A spur dike is an embankment designed to induce a free, even flow of water into an opening; in this case the opening would be the approach channel (Figure 3). In 2007, USBR was permitted to place approximately 600,000 cy of material into three acres of waters of the U.S., to expand the Observation Point Overlook and develop a staging area for the auxiliary spillway. An extension of the overlook would be constructed by the placement of up to 1,400,000 cy of material to perform a spur dike function; this structure is referred to in the document as either the “spur dike” or “overlook extension”.

The proposed elliptical-shaped spur dike, or overlook extension, would be located directly to the northwest of the approach channel (Figure 5). The spur dike would have one vertical (V) by 2 horizontal (H) slopes. The surface area of the top of the spur dike would be up to approximately 9 acres; the overall foot print of the spur dike on the lake bottom would be up to approximately 22 acres. The crown elevation would be approximately elevation 483.34 feet (NAVD88 vertical datum).

Lakebed fines would be dredged from under the footprint of the spur dike (approximately 40,000 cy to 80,000cy), and this material would be placed into another in-water section of the lake or drained behind the silt curtains (also referred to as turbidity curtains), and removed to a terrestrial disposal site. The amount of excavated disposal material to be placed into the combined spur dike and overlook extension would determine the footprint size of the spur dike. The core of the spur dike would be constructed of a decomposed quartz diorite core, commonly known as decomposed granite. This would be followed by a compacted random rock fill followed by a stone riprap cap. A silt curtain would be used around the construction area as needed to contain turbidity.

Material for the spur dike construction may originate from the excavation of the approach channel excavation, or be transported from processed rock stockpiled at one of the proposed disposal sites, or it may be exported from off-site. The construction equipment needed for dry construction of the spur dike consists of normal scrapers, bulldozers, compactors, off-highway trucks, 10 cy agitator trucks, and sheep-foot rollers for the body of the spur dike, and backhoes, bulldozers, and smooth rollers for the bedding, riprap, and surfacing materials. Equipment needed for wet construction includes barges, traditional or clamshell excavator, and hydraulic suction dredging equipment. The work zone would be protected within a series of contractor-designed turbidity curtains. The construction would take place over 24 months from 2015 to 2017.

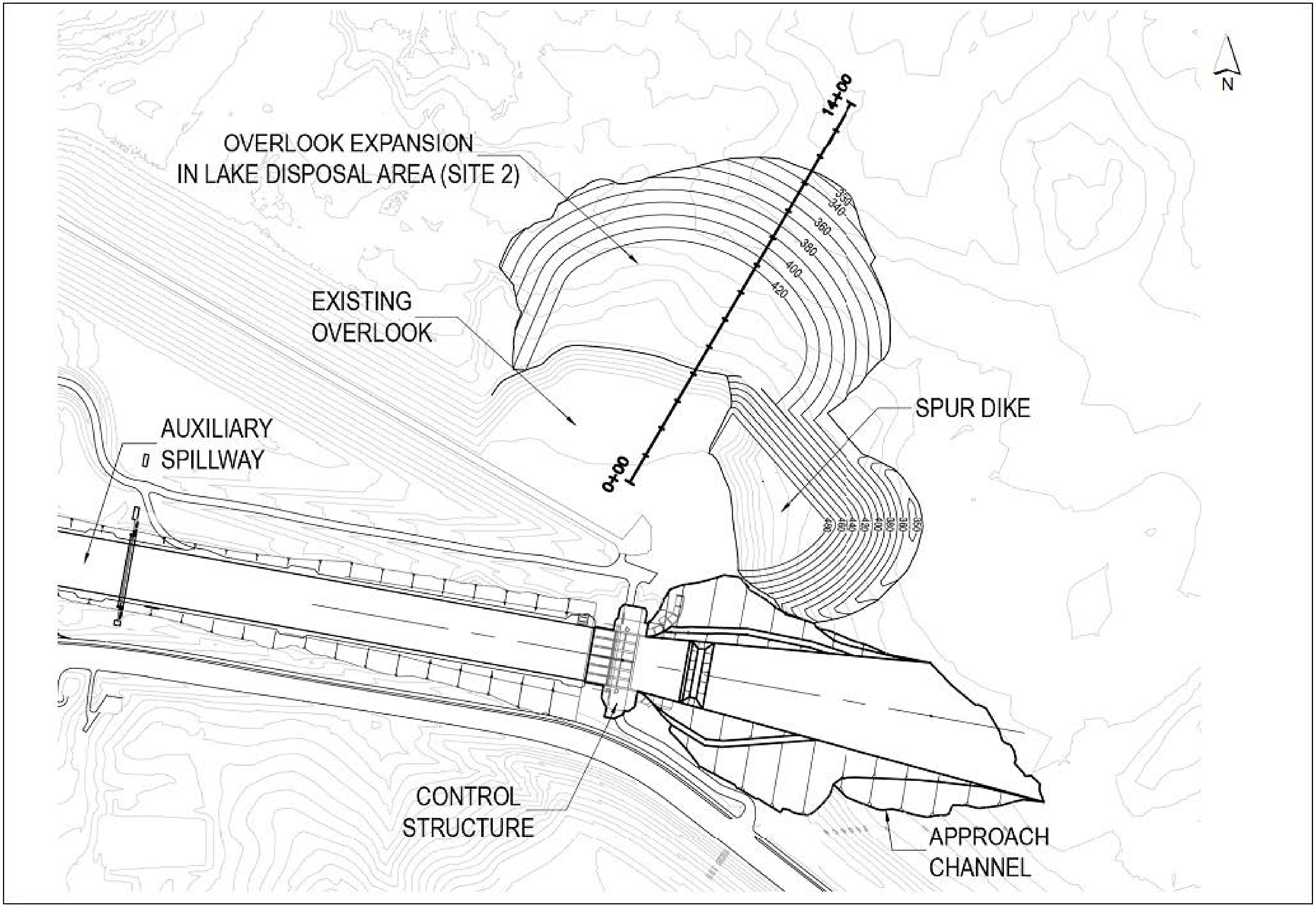

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Figure 5 - Spur Dike

Folsom Dam Modification Project, Approach Channel SEIS/ EIR December 2012

2.4.4 Transload Facility Construction

A transload facility would be needed for mobilization and demobilization of marine equipment (e.g., sectional barges and heavy cranes), dredge spoil off-loading from barges to trucks, marine equipment fuel and explosives transfer to support barges, equipment maintenance, and marine crew deployment. The proposed transload facility would be comprised of a ramp, crane and crane pad, and a fuel transfer station. The transload facility would be located adjacent to Dike 7 as shown on Plate 1. The ramp structure would require progressive construction to accommodate seasonal and variable lake levels between the elevations of 355 to 475 feet (NAVD 88).

The ramp dimensions are approximately 50 feet wide and 1,500 feet long, with a maximum slope of 10 percent. The width allows large haul trucks the ability to turnaround and two-way passage along the ramp. At approximately 1,000 feet from the haul road the ramp would intersect the existing lake bottom. From 1,000 feet to 1,500 feet, steel planks would lie on the existing bottom to control mud and minimize siltation and turbidity within the lake.

The ramp would be constructed from approximately 30,000 to 230,000 cy of compacted 3 inch maximum graded fill with less than five percent fines obtained on-site or transported from off-site. Approximately 20,000 cy of ¼ ton riprap would be placed on top of the main fill for protection from wave action. Material used in the transload construction may be transported from off-site or on-site material may be utilized. Dredging out an average of three feet of material under the footprint of the ramp, up to 20,000 cy may be required depending on the soils at the lake bottom. A silt curtain would be used during construction and removal of the transload facility to contain turbidity.

Depending on lake levels, ramp material would be placed directly into the water. The fines content of the ramp material would be reduced as much as possible to limit water turbidity during placement of material

The ramp would incur progressive construction, with each stage of horizontal extension depending upon the existing lake level, and depth needed to accommodate the reach to barges. Construction would begin at the shoreline junction with the haul road with extension constructed into the reservoir as needed in response to fluctuating lake levels. Completion of the ramp construction is expected to require four months. To offload the dredge spoils from barges, a crane would be at the furthermost extension of the ramp just above lake level. Timber mats would form a work platform for the crane on top of a level crushed rock pad that would be relocated to accommodate fluctuating lake levels.

A fuel transfer station would be located on the ramp to refuel marine vessels. The transfer station would include a flexible hose from the ramp that would be supported intermittently by a small float anchored offshore. The float would be used to service a utility barge with a storage tank, and then recalled to the ramp to prevent severage by boat traffic. The tank would hold one day's supply of fuel for the floating equipment at the project site. Fuel would be delivered by trucks and pumped from the trucks through the fuel transfer facility to the tank on the utility barge. Protections, BMPs and spill plans would be instituted specifically for fuel actions to maintain water quality.

At this time, the transload facility is intended as a temporary structure that will be removed after the completion of the approach channel project in 2017; USBR has currently not expressed interest in adopting a temporary structure. Ramp material would be removed with excavators and hauled for disposal. Preferably the ramp material will be removed during low lake levels. USBR has not expressed interest in maintaining the ramp after the completion of the project, which is not currently included within this project scope.

2.4.5 Batch Plant Operations

The construction of the cutoff wall and lining of the approach channel would require large quantities of temperature controlled concrete. This concrete will be exported from off –site or would necessitate the use of a contractor-provided, on-site concrete batch plant with deliveries and stocking of concrete aggregate, concrete sand, and cement. The batch plant would be powered by electricity from overhead Sacramento Municipal Utility District (SMUD) lines. The batch plant would be located either at MIAD, Folsom Overlook, downstream chute, or the Folsom Prison site.

Approximately 13,000 cy of concrete would be needed for the approach channel and approximately 11,200 cy of concrete would be needed for the cutoff wall. The batch plant would produce concrete for the approach channel's 18 month construction period. A plant capacity between 100 to 150 yards per hour would be appropriate for these placement sizes.

The concrete batch plant area would consist of the aggregate storage system, aggregate rescreen system (if needed), rewashing facility (if needed), the batching system, cement storage, ice manufacturing, and the concrete mixing and loading system. The aggregate storage system is designed to have sufficient storage on-hand of input materials to produce about 3,000 cy of concrete per day. All aggregate used within batch plant operations will be obtained from existing local commercial off-site sources and delivered to the site.

The aggregate storage system consists of three course aggregate piles and a fine blended sand pile. The aggregate would be transported to the project in belly type trucks. The trucks would dump the aggregate into a truck unloading hopper, after which it would be conveyed up to an overhead shuttle conveyer, and dropped into respective storage piles. To accommodate the requirement of 3,000 cy per day of batching capacity, the storage area will need to accommodate the materials listed in Table 2 below.

Table 2. Batch Plant Stockpile Requirements.

Aggregate Source	Stockpile Requirements
Sand	350 Tons
¾" Coarse Rock	300 Tons
1 ½" Coarse Rock	250 Tons
3" Coarse Rock	150 Tons
Cement	175 Tons
Fly Ash	75 Tons

The sand and the aggregate would be loaded out of the storage piles with a front end loader, placed into bin hoppers, and conveyed to the batching day hoppers. The aggregates would then be mixed and transported into transit agitator trucks or mixer trucks. Once ready for placement, the concrete would be transported by truck or conveyer from the batch plant site across the auxiliary spillway access road to the concrete conveyor or truck unloading hopper. Two or three 10 cy agitator trucks would be needed depending on contractor production rates. After delivery of the mix to the unloading hopper, the concrete would be conveyed by a crane for targeted placement.

Generally, work associated with the batch plant operations would occur during the hours of 7:00 a.m. to 7:00 p.m., however, it is likely that some batching and placements would have to occur in the very early morning or night-time hours. This is especially true for large volume placements and placements that occur in the hot summer season. Early morning or night-time placements would be subject to traffic and noise limitations of the City of Folsom’s ordinances and would have to be coordinated with the City by the contractor. If the batch plant is situated at the Prison Staging area site, night batch plant operation would be coordinated with and approved by Folsom Prison and the City of Folsom

Due to the large amounts of rock material being excavated, disposed, and processed as concrete for the project, an on-site rock crushing facility would be necessary. A rock crusher is a machine used to reduce stone to particle sizes that are convenient for their intended uses. Reduction in material size is generally accomplished in several stages and for this project may be used to produce three to six inch rock and smaller aggregate. The rock crusher would be electrically powered and located at either the Folsom Overlook staging area or the MIAD staging and disposal area. The rock crusher would be operated only during noise exempt hours or as permitted by the City of Folsom.

2.4.6 Construction Details

Access and Staging

General construction access to the site would come from the southeast by way of Folsom Lake Crossing Road. A turnoff at the south end of the Overlook area would allow connection to the main haul road and other construction access roads (Plate 5). The contractor will also have the option to construct and use a second site access off Green Valley Road. The area required for access from Green Valley Road to the project site was included as part of the project in the FEIS/EIR. Any required improvements associated with this access would be coordinated by the contractor with USBR and the City of Folsom. Any necessary permits associated with this access would also be secured by the contractor. Access roads to the site, as well as on site haul roads, would be used to transport materials, supplies, equipment, and personnel for the approach channel construction.

The contractor would require staging areas for the following main items and activities: assembly of barges and other marine equipment; stockpiling of materials; contractor's lay-down area; transload facility; concrete batch plant, rock crushing plant; fuel storage; and marine construction and excavation equipment. Staging and stock pile areas would be located at Dike 7, MIAD, Folsom Overlook, and Folsom Prison property (Plate 1). Some staging activities would also occur in the auxiliary spillway chute. The staging area at Dike 7 covers approximately 9 acres and is currently in use to stock pile crushed rock for construction of the control structure. The MIAD staging area is also currently in use for rock crushing and for stockpiling of materials for control structure construction. The Folsom Overlook is approximately 5 acres in size, and is currently in use for equipment staging and stockpiling for the control structure construction.

The proposed Folsom Prison staging area consists of a previously disturbed area of approximately 10 acres that lies between the existing prison facilities and Folsom Lake Crossing. The majority of the substrate on these acres was deposited as fill from the Folsom Bridge project. The Folsom Prison property is expected to be developed as a staging area prior to the approach channel project for continued work on downstream features below the approach channel project. The existing prison site access road will serve as the primary point of access to the staging area.

The haul road between the construction site and the MIAD disposal area is an existing feature and is currently in use for control structure construction activities. Another existing haul road extends from the Folsom Overlook to the chute construction site and down the length of the auxiliary spillway to the stilling basin. This haul road is currently being used for the control structure construction work.

Site Preparation

Prior to construction, the project's office facilities and a parking area would be set up at Dike 7 staging area, the Folsom Overlook point, or the Folsom Prison property. Additional haul road improvements by the rock plug may be implemented. Before construction begins, a safety buffer will be installed in the lake at a distance of 3,000 feet from the blast point. Public access will be restricted along the entire boundary to provide safety protection for the public and the project. Lake bed dredging under the footprint of the transload facility may be conducted in initial site preparation depending upon the existing lake level.

Prior to initiation of construction, the contractor would prepare a traffic management plan with measures to minimize traffic congestion, delays, and ensure public safety. These measures would include scheduling construction activities to avoid commute hours, posting warning signs and speed limits, and using flaggers.

Construction Workers and Schedule

The number of private construction employees present on-site each day would vary with scheduled construction activities; a maximum of 40 workers could be expected onsite any one day for the approach channel project. Parking for the employee's vehicles would occur in the staging area at Dike 7, Folsom Prison site, the Overlook, and/or MIAD. The construction work schedule would normally consist of 10 hour days over 6 days per week, with the exception of dredging and underwater drilling, for which double shifts could occur. The 6 days per week could be extended to 7 days per week with necessary permits obtained from the City of Folsom. Twenty-four hour shift schedules may be requested under special circumstances; the double shift schedule would be temporary and short-term.

Alternative 2 would have an expected project length from beginning through completion of approximately 33 months. This includes pre-work planning, site preparations, and a five month gap to accommodate construction of the approach channel slab and walls, drilling and blasting operations, excavation of common and blasted rock, spur dike and transload facility construction and bottom cleaning operations. Preparatory work would include an estimated 140 days for setting up office facilities, haul route improvements, and the construction of the transload facility. Construction of the cutoff wall would require approximately 293 days. In-the-dry excavation of the approach channel and casting of the concrete approach channel slab and walls would be conducted over approximately 1,029 days. In-the wet-excavation of the approach channel including clean up and inspection would extend over approximately 484 days. Demobilization and site restoration would require approximately 16 days.

Table 3. Alternative 2 Proposed Construction Activities by Year

Construction Activity	2013	2014	2015	2016	2017
Site Prep / Haul Road Prep	X				
Construct Transload Facility*	X				
Haul Road Embankment*	X	X			
Cutoff Wall Concrete Placement*	X	X			
Common Excavation to Disposal*	X	X	X	X	X
Rock Crusher at MIAD or Overlook Staging Areas	X	X	X	X	X
Batch Plant at MIAD, Prison, or Overlook Staging Areas*	X	X	X	X	X
Import Material from Quarry	X	X	X	X	X
Dike 7 Staging Area*	X	X	X	X	X
Prison Staging Area*	X	X	X	X	X
On-Site Haul Road Usage to and From Excavation Site and MIAD*	X	X	X	X	X
On-Site Haul Road Usage for Construction of Transload Facility*	X				
Rock Excavation In-the-Dry*	X	X	X	X	X
Mobilization for Approach Walls*		X	X		
Intake Approach Walls and Slab Construction*		X	X	X	
Set up and Operate Silt Curtain**	X	X	X	X	X
Dredge Common Material to Rock*	X	X	X	X	
Drill and Blast / Dredge Rock In-the-Wet***			X	X	X
Spur Dike Riprap***			X	X	X
Transfer Excavated Material to Disposal Site***	X	X	X	X	X
Teardown, Clean Up, and Site Restoration***				X	X
Remove Transload Facility***					X

*potential nighttime construction activity
**potential nighttime construction activity (four 1500 CFM compressors only), if needed;
***nighttime activity with exception of blasting

<u>Borrow and Disposal Sites</u>

Imported rock material may be used for construction of the temporary transload facility, spur dike and concrete production. Emissions associated with importation of construction material not originally calculated within equipment emissions totals would require recalculation by the contractor to assure that they comply with approved emission totals.

Material for the remainder of construction activities would originate from on-site sources, such as the spillway and approach channel excavation. Material to construct the spur dike core would likely be short-hauled directly from the approach channel excavation. The riprap and bedding for the spur dike would need to be processed to provide the required gradations for structure stability. Processing this material would also ensure that it contains less than 5 % fines in order to reduce introduction of silt into the reservoir.

There is approximately 1.4 million cy of disposal material associated with construction of the approach channel project. Five potential on-site disposal sites proposed for use as a part of the proposed project. Disposal sites being considered for excavated materials include: 1) the spur dike; 2) an in-reservoir site around the transload facility; 3) the MIAD disposal site; 4) Dike 7; and Dike 8 (land based and in-reservoir). The spur dike in-reservoir, and Dike 8 would serve as permanent disposal for excavated material. MIAD and Dike 7 would serve as temporary disposal sites, where excavation material would be eventually removed and used for other purposes. The proposed disposal sites are listed in Table 4 below, along with the maximum disposal capacity feasible at each site. The proposed disposal site boundaries are displayed on Plate 1.

Table 4. Proposed Disposal Sites and Capacity.

Proposed Disposal Site	Estimated Capacity (cy)	Acres
Spur Dike	up to 1.4 million cy	22
In-reservoir	up to 220,000 cy	85
MIAD disposal area	up to 1 million cy	93
Dike 7	up to 160,000 cy	9
Dike 8 (land-based and in-reservoir)	up to 730,000 cy	16

Site use feasibility is under assessment at this time for all proposed disposal sites; therefore, all proposed disposal sites are to be addressed as options in this SEIS/EIR. Environmental effects associated with the use of these sites differ, and the effects of project construction would depend on sites and site combinations selected by the contractor for disposal. Therefore, the effects analyzed in this document accommodate worst-case scenarios to cover all disposal options. It is unlikely that all disposal sites assessed would be used, but it is probable that multiple sites would be selected for use in partial capacity. Currently, all disposal sites are situated on land under the jurisdiction of the USBR.

The MIAD temporary disposal area is the environmentally preferred disposal site, as it is a previously-disturbed, terrestrial site with minimal overall impacts, and material disposed here would be removed for future projects. However, the use of the MIAD disposal site requires coordination with the scheduling of the USBR Mormon Island Auxiliary Dam Modification Project. Due to potential conflicts in site use, it is possible that this site would not be available during multiple years of construction. Unavailability of MIAD for disposal would require increased use of in-water or Dike 8 disposal sites.

There is potential for additional disposal sites to be proposed after the release of the SEIS/EIR for the approach channel construction. Proposed disposal sites must be within a 1.5 to 2 mile radius of the approach channel construction area to remain in compliance with the air quality assessment. If any proposed disposal site would have effects beyond the scope of those analyzed in this SEIS/EIR, additional NEPA/CEQA analysis would be required and supplemental NEPA/CEQA documents may be necessary. Written concurrence is required from the Corps and USBR before any disposal site can be used.

Dredged and excavated material that is not used for spur dike construction would be stockpiled at one of the proposed disposal sites. Excavated material not suitable for fill, such as vegetation, debris, and old fill, would be disposed of at a local landfill. Asphalt, concrete, and other material would be removed or recycled in an appropriate manner.

Restoration and Cleanup

Once construction of the approach channel is complete, all equipment and excess materials would be transported offsite via the haul routes discussed above. The access roads and staging areas not used as permanent features of the project would also be restored to pre-project conditions. The work sites and staging areas would be cleaned of all rubbish, and all parts of the work area would be left in a safe and neat condition suitable to the setting of the area. Any un-vegetated areas disturbed during construction would be hydro-seeded with native grass species. The USBR would conduct additional native vegetative plantings after project completion outside the scope of the Corps project work. Construction debris would be hauled to an appropriate facility. Equipment and materials would be removed from the site, and staging areas and any temporary access roads would be restored to pre-project conditions. Demobilization would occur in various locations as construction proceeds along various elements.

Operation and Maintenance

Long term operations of the approach channel would be performed by USBR under a Flood Management Operations Study that is currently in production, and outside the scope of this assessment. The Flood Management Operations Study for Folsom Dam will develop, evaluate, and recommend changes to the flood control operations at Folsom Dam that will further reduce flood risks to the Sacramento area. Operational changes may be necessary to fully realize the flood risk reduction benefits of the following:

- The additional operational capabilities created by the auxiliary spillway;
- The increased downstream conveyance capabilities anticipated to be provided by the American River Common Features Project (Common Features);
- The increased flood storage capacity anticipated to be provided by completion of the Folsom Dam Raise Project (Dam Raise); and
- The use of improved forecasts from the National Weather Service.

Further, the Flood Management Operations Study will evaluate options for the inclusion of creditable flood control transfer space in Folsom Reservoir in conjunction with Union Valley, Hell Hole, and French Meadows Reservoirs (also referred to as Variable Space Storage). The study will result in a Corps decision document and will be followed by a water control manual implementing the recommendations of the Study. It should be recognized that the initial water control manual will implement the recommendations of the study, but will not include the capabilities to be provided by the Dam Raise and additional Common Features project improvements until such time as these projects have been completed.

2.5 ALTERNATIVE 3 - APPROACH CHANNEL CONSTRUCTION WITH COFFERDAM

Under Alternative 3, a cofferdam would be utilized to maximize construction activities in-the-dry. The primary difference between the two construction alternatives, Alternative 2 and Alternative 3, is that Alternative 3 would not include a cutoff wall, but instead, construction of a temporary cofferdam would afford excavation in the dry for a longer period of time (Table 1). A cofferdam is a temporary dam formed by steel circular structures lined in a slight arc across the width of the approach channel (Figure 4). The steel circular structures, or cells, filled with rock, provide greater integral strength and load to hold back the force of upstream water.

Detailed construction activities are discussed below when they differ from Alternative 2; otherwise, Alternative 2 is listed for detailed project description. The proposed construction activities associated with Alternative 3 are shown as scheduled by year in Table 5.

2.5.1 Cofferdam

The location of the cofferdam upstream of the control structure and the rock plug, is based on a trade-off between feasible cofferdam size and the amount of in-the-wet excavation. Prior to cofferdam construction, lake sediments and other soils would be dredged to expose decomposed granite. A silt curtain placed around the perimeter of the excavation and during cofferdam installation would be required to control turbidity in the lake.

The cofferdam consists of a series of 84-foot diameter circular sheet pile cells constructed using 85-foot-long flat sheet piles. Sheet piles for construction of the cofferdam would be driven by a vibratory hammer. Vibratory hammers use oscillatory hammers that vibrate the pile, causing sediment to liquefy allowing pile penetration. Pre-drilling for sheet piles may e necessary dependent upon foundation conditions and hammer refusal. The total estimated volume of cofferdam fill materials would be 149,600 cy, almost all of which is cell fill. The construction of the cells requires sheet piles to be installed using a template of two to three horizontally mounted ring wales to provide support for the vertical flat sheets. The sheet piles are installed using a vibratory hammer, working progressively around the ring. Once erected, the cells would be filled with well-graded clean crushed rock. The same plan dimension is maintained throughout the cofferdam, allowing for one sheet pile installation template to be utilized for construction of all of the circular cells. A layer of riprap would be placed along the upstream toe of the cells for scour protection. The cells are founded directly on the decomposed granite. A temporary haul road would be created on top of the cofferdam with the placement of approximately one foot of crushed rock in order to provide continuing access to the overlook. The cofferdam accommodates a high design lake level of elevation 468.34 feet.

After the cofferdam is installed the downstream area would be dewatered. Timing would be coordinated with the completion of the control structure. After excavation of the approach channel is completed, the cofferdam would have a provision for controlled but rapid flooding of the approach channel area to allow for quick equalization of hydraulic loads on both sides of the cofferdam. Rapid flooding of the approach channel excavation would be achieved by two or more flood gates installed in the connector cells. Each gate would consist of an approximately 100-foot long, 4-foot diameter pipe mounted with a slide gate on the upstream side of the cofferdam. Infilling of the approach channel excavation area up to the high lake level at elevation 468.34 feet would be expected to occur within about 6 hours. After approach channel flooding is completed, the cofferdam would be removed. Any remaining materials would be dredged using a barge-mounted clam shell or hydraulic excavator dredge until elevation 350 is reached.

2.5.2 Approach Channel Excavation

As described in Alternative 2 (Section 2.4.4), the approach channel would extend approximately 1,100 feet upstream of the concrete control structure (Plate 1). The primary difference within Alternative 3 is that a reduced amount of excavation would occur within in-the-wet conditions. Approximately 200,000 cy would be excavated in-the-wet under Alternative 3, (Table 2). After construction of the cofferdam, the downstream area would be dewatered prior to the in-the-dry excavation for the approach channel slab, walls, and rock trap.

As described in Alternative 2, ripping and blasting would be required to facilitate rock excavation. The approach channel slab and concrete walls would be installed once sufficient excavation material is removed. The approach channel excavation and blasting could continue during construction of the approach channel slab and walls provided they do not damage or interfere with the construction of the slab and walls or damage the cofferdam. During this timeframe the control structure's bulkhead gates would be constructed. Once the control structure's bulkhead gates are installed and the approach channel is completed, the area downstream of the cofferdam would be flooded in a controlled fashion to equalize the water with lake levels. In-the-wet excavation begins with the removal of the cofferdam.

The remaining common material would be excavated in-the-wet, using underwater blasting and dredging techniques as described in Alternative 2. The remainder of the approach channel excavation under a flooded status would be conducted from barge mounted equipment. Residual rock fragments would be removed from the channel with airlift systems.

Approach Channel Concrete Lining

The approach channel concrete lining, in-the-wet and in-the-dry excavation and blasting methods for Alternative 3 would be the same as described under Alternative 2 with the exception of the material amounts excavated under wet conditions versus dry conditions (Table 2).

Haul Road

The haul road embankment specified under Alternative 2 (Haul Road, Section 2.4.2) will not be built adjacent to the rock plug under Alternative 3 (Figure 4). Because construction of the cofferdam affords a longer term access to the overlook area, the current haul road accessing the overlook area would be shifted to the top of the cofferdam. The cofferdam affords sufficient level area to support a haul road that would be incorporated into the cofferdam construction by placement of approximately one foot of crushed rock on top of the cofferdam.

<u>In-the Dry (Land-Based) Excavation and Blasting</u>

Land-based excavation methods would be similar to those described under Alternative 2. An increased amount of land based blasting would occur under Alternative 3 (Table 2) since a decreased amount of blasting and excavation would occur under in-the-wet conditions. Land-based blasting would be expected for up to 200 days. Removing more material in-the-dry, would reduce the total amount of blasting needed for the project due to the higher material density that can be removed in the dry than in the wet.

<u>In-the-Wet (Underwater) Excavation and Blasting</u>

Underwater drill and blast methods are the same as discussed under Alternative 2, and material removal by dredge equipment and barge is expected to follow a similar prescription. The primary difference within Alternative 3 is the reduced amount of blasting and excavation activity in the wet (Table 2) corresponding to installation of a cofferdam. Under Alternative 3, approximately 200 underwater blasts could be expected from 2015 to 2017.

2.5.3 Spur Dike (Overlook Extension) Construction

Under Alternative 3, a spur dike would be constructed as described in Alternative 2 (Section 2.4.3). See Figure 5 for an aerial perspective of the proposed spur dike.

2.5.4 Transload Facility Construction

Under Alternative 3, a transload facility would be constructed as described in Alternative 2 (Section 2.5.4). Under Alternative 3, the transload facility would likely be constructed within an earlier time frame of the construction schedule to provide facilities for construction of the cofferdam.

2.5.5 Batch Plant Operations

Under Alternative 3, a batch plant would be constructed and operated as described in Alternative 2 with the exception that a reduced amount of concrete would be produced for Alternative 3. Concrete produced by the batch plant would be used only for the construction of the approach channel slab and walls. Approximately 13,000 cy of concrete would be produced under Alternative 3.

2.5.6 Construction Details

Access and Staging

Access and staging areas under Alternative 3 would be the same as described in Alternative 2.

Site Preparation

Site preparation of the project area under Alternative 3 would be the same as described in Alternative 2.

Borrow and Disposal Site

Material for the cofferdam would be reused from onsite excavation of the approach channel. Materials for the transload facility, spur dike and approach channel under Alternative 3 would be the same as described in Alternative 2. The disposal of materials would also be the same as described in Alternative 2.

Construction Workers and Schedule

Under Alternative 3, the estimated number of workers, work hours, and work shifts would be as described in Alternative 2. The construction durations and schedule is described below.

Alternative 3 requires combined in-the-dry and in-the-wet excavation of the approach channel with a cofferdam. The construction schedule of Alternative 3 would run approximately 37 months through completion. Work would include pre-work planning, cofferdam construction and demolition, a 5-month gap to accommodate construction of the approach channel slab and side walls, in-the-dry and in-the-wet drilling and blasting operations, in-the-dry and in-the-wet excavation of blasted rock, spur dike construction, and bottom cleaning operations. Preparatory work includes 140 days for setting up office facilities, haul route improvements/construction and the construction of the transload facility. Construction of the cofferdam is expected to require approximately 240 days, which includes in-the-dry excavation allowing for soft lake sediments removal below cofferdam along existing shoreline, dredging of soft lake sediments below cofferdam foot print, and the installation of the cofferdam. Dewatering of the approach channel excavation would take place upon installation of all pumps, monitoring and instrumentation equipment.. In-the-dry excavation and blasting of the approach channel and casting of the concrete approach channel slab and walls would require approximately 600 days. The removal of the cofferdam would engage approximately 115 days. In-the wet-excavation of the approach channel including clean up and inspection would extend over approximately 290 days. Demobilization and site restoration would be expected to take approximately 16 days.

Table 5. Alternative 3 Proposed Construction Activities by Year.

Construction Activity	2013	2014	2015	2016	2017
Mobilization for Cofferdam	X	X			
Construct Transload Facility*	X				
Common Excavation Below Cofferdam*	X				
Common Dredge Below Cofferdam*	X				
Construction of Sheet Pile Cells*	X	X			
Fill Cells*	X	X			
Set up and Operate Silt Curtain**	X	X	X	X	X
Rock Crusher at MIAD or Overlook Staging Areas	X	X	X	X	X
Batch Plant at MIAD, Prison, or Overlook Staging Areas*	X	X	X	X	X
Import Material from Quarry	X	X	X	X	X
Dike 7 Staging Area*	X	X	X	X	X
Prison Staging Area*	X	X	X	X	X
On-Site Haul Road Usage to and From Excavation Site and MIAD*	X	X	X	X	X
On-Site Haul Road Usage for Construction of Transload Facility*	X				
Dewater Behind Cofferdam*		X			
Mobilization for Approach Walls*			X		
Intake Approach Walls and Slab*			X	X	X
Import of Construction Material*	X	X	X		
Rock Excavation In-the-Dry*	X	X	X	X	X
Spur Dike Riprap*				X	
Transfer Excavation Material to Disposal Site*	X	X	X	X	X
Remove Cell Rubble Fill*					X
Remove Sheets*					X
Dredge Common Material to Rock*	X	X	X	X	X
Drill and Blast / Dredge Rock In-the-Wet*			X	X	X
Teardown, Clean Up, and Site Restoration*				X	X
Remove Transload Facility*					X

*potential nighttime construction activity
**potential nighttime construction activity (four 1500 CFM compressors only), if needed

<u>Restoration and Cleanup</u>

Removal of the cofferdam would begin during low lake levels and the aggregate would be disposed at one of the proposed disposal area or at a landfill. The remainder of the restoration and cleanup of the project area under Alternative 3 would be similar to that described in Alternative 2. An exception would include the amount of an estimated 60 days, rather than 90 days, for foundation clean up by an airlift or sweep.

Operation and Maintenance

Under Alternative 3, long term operations would follow the description provided in Alternative 2.

3.0 AFFECTED ENVIRONMENT

The information provided in this chapter supplements the documentation of the affected environment contained in chapter 3.0 of the 2007 FEIS/EIR. It describes the existing conditions of the environmental resources in the project area for which new information or analysis is relevant to the proposed action being considered. In Chapter 4.0, these existing conditions are compared to the three alternatives described in Chapter 2 in order to determine the effects of the proposed project. Resources not evaluated in detail are described first, followed by the resources that may be significantly affected by the alternatives.

3.1 RESOURCES NOT EVALUATED IN DETAIL

Initial evaluation of the effects of the project indicated that there would likely be little to no effect on several resources. Additionally, certain resources were fully addressed in the 2007 FEIS/EIR and the current project alternatives would not result in a change to the previous analysis. These resources are discussed in Sections 3.1.1 through 3.1.8 to add to the overall understanding of the area. Sections 3.2 through 3.10 describe the existing conditions for the resources that may be significantly affected by implementation of the proposed alternatives.

3.1.1 Geology and Seismicity

<u>Geology</u>

Folsom Reservoir is situated within the westernmost extent of the Sierra Nevada Foothills, between the Central Sierra Nevada and the Central Valley geomorphic provinces. The Sierra Nevada geomorphic region is characterized by a north-northwest trending mountain belt with extensive foothills on the western slope (Harden 1997). Geological mapping by Wagner, Jennings, Bedrossian, and Bortugno (1981) indentifies two major rock divisions within the project area: granodiorite intrusive rocks, and metamorphic rocks. A geological map of the general project area is shown on Figure 6.

Granodiorite intrusive rocks are similar to granite. Folsom Dam and the western side of Folsom Reservoir mainly consist of Mesozoic dioritic rocks. They are composed of a coarse grained crystalline matrix with slightly more iron and magnesium-bearing minerals and less quartz than granite.

Metamorphic rock units are part of the Jurassic-Age Amador Group, referred to as the Copper Hills volcanic. Copper Hill volcanic (Jch) rocks occur in the project area near Folsom Point and at MIAD disposal area. These rocks are described as metamorphosed basaltic breccia and ash (mafic pyroclastic) rocks, pillow lava, and minor bodies of granitic composition (felsic porphyrite). The origin of most of these rocks is at or near an oceanic island volcanic arc that was later added (accreted) to the continent and deformed. These rocks are generally resistant to erosion and form thin, clayey soil. Naturally occurring asbestos may be found in this formation. The existing geology of the area would not affect the proposed project.

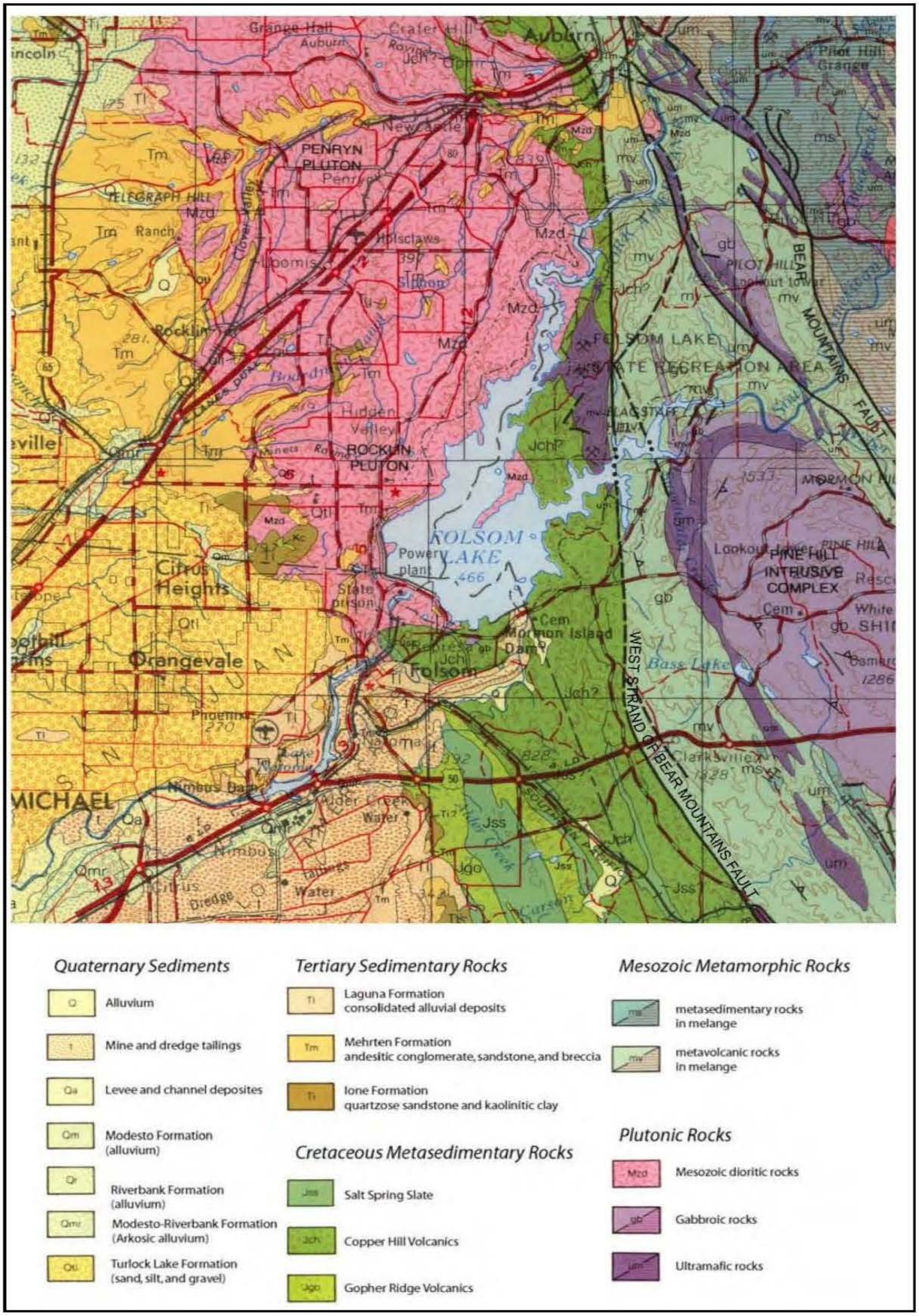

Figure 6. Geologic Setting.

Seismicity and Fault Zones

The project area is within the Foothills Fault system, which is located in the metamorphic belt. This system consists of northwest trending vertical faults and is divided into two zones, the western Melones Fault zone and the western Bear Mountains Fault zone. The west trace of the Bear Mountains Fault zone transects the upper reaches of the North Fork arm near Manhattan Bar Road, and crosses the South Fork arm in the region of New York Creek.

The largest historic earthquake in the Sierra Nevada foothills was the 1975 Oroville event of magnitude (M) 5.7, located approximately 60 miles to the north. However, distant faults capable of major earthquakes (M>7) include the faults of the San Andreas system approximately 60 miles or more to the west and faults of the Sierra Nevada frontal fault system 40 miles to the east of Folsom.

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is fault ground rupture, also called surface faulting. No active faults have been mapped within the project area by the California Geological Survey or U.S. Geological Survey (Jennings, 1994). The project area is not located within the one of the Alquist-Priolo Earthquake Fault Zones, and therefore the Alquist-Priolo Earthquake Fault Zoning Act does not apply to this project (California Geological Survey, 2007). The risk of fault ground rupture is negligible in the project area.

Common secondary seismic hazards include ground, shaking, liquefaction, subsidence and seiches. Design, construction, and maintenance must comply with the regulatory standards of the Corps and USBR seismic dam safety regulations. The design and construction of the approach channel, spur dike, and cofferdam would meet or exceed applicable design standards for static and dynamic stability, seismic ground shaking, liquefaction, subsidence, and seepage (URS, 2011). Therefore, the seismicity of the area would not affect the proposed project.

3.1.2 Mineral Resources

In compliance with the California Surface Mining and Reclamation Act, the California Geological Survey has established the classification system to denote both the location and significance of key extractive resources. A variety of mineral resources are present within the general area. Resources such as chromite, minor nickel, talc, and asbestos are associated with the ultramafic rocks and past mining has occurred within the region. Decomposed granite may also be considered a resource within the area. The project area is already developed by Folsom Dam and is not accessible for mineral extraction. Construction of project alternatives thus would not reduce or eliminate availability of mineral resources. Therefore; there would not be a potential loss of locally or regionally significant mineral resources

Naturally-occurring asbestos (NOA) is the term applied to the natural geologic occurrence of any type of asbestos. NOA is commonly associates with ultramafic rocks and along faults. NOA was found in the Copper Hills Volcanic unit, a geologic unit mapped in the Geologic Map of the Sacramento Quadrangle. The SMAQMD has designated the area at Copper

Hills Volcanic unit as "moderately likely to contain NOA" (California Geological Survey 2006). SMAQMD recommends that all earth-moving activities in areas located in the Copper Hills Volcanic unit implement the requirements of Section 93105 of the California Code of Regulations, Asbestos Airborne Toxic Control Measure (ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations (SMAQMD 2006).

The MIAD disposal area and Dike 8 is located in the Copper Hills Volcanic unit (Figure 6). While disposal of material would occur at MIAD and Dike 8, there are no earth moving activities in the natural soil at MIAD as a part of this project. Haul trucks would deliver excavated material from the approach channel to MIAD and Dike 8 for disposal, therefore, there is the potential for NOA to occur throughout the construction area due to soil and dust migration associated with vehicle traffic. A tire washing station has been installed at the exits to remove dirt and mud from tires to reduce track out of dirt to public roads. The tire washing station would remain in place during the Phase 4 construction. Implementation of this measure would ensure that NOA does not migrate beyond the reaches of the project area, and thus, there would be no effects associated with NOA.

After construction is complete vegetative cover would be established at MIAD. Project-related analysis along the approach channel and the cofferdam alignment concluded that no asbestos-containing soils are present in the excavation area (Corps 2009; URS 2011).

3.1.3 Hydrology and Hydraulics

Surface Water Hydrology

The American River Basin covers an area of approximately 2,100 square miles, and has an average annual unregulated runoff of 2.7 million acre-feet; however, annual runoff has varied in the past from 900,000 acre-feet to 5,000,000 acre-feet. The major tributaries in the American River system include the North Fork American River, Middle Fork American River, and South Fork American River. These tributaries drain the upper watershed carrying runoff from precipitation and snowmelt into Folsom Reservoir. Plate 3 shows the hydrology of Folsom Reservoir including tributaries and streams.

Folsom Dam and Reservoir is a multipurpose water project constructed by the Corps and operated by USBR as part of the Central Valley Project (CVP). At an elevation of 466 feet above mean sea level (msl), Folsom Reservoir is the principal reservoir on the American River impounding runoff from a drainage area of approximately 1,875 square miles. Folsom Reservoir has a normal full-pool storage capacity of approximately 975,000 acre-feet, with a seasonally designated flood management storage space of 400,000 acre-feet. An interim agreement between the SAFCA and USBR provides variable flood storage ranging from 400,000 to 670,000 acre-feet (Corps 2008).

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

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

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

Implementation of the project would not change surface water hydrology. Water would continue to flow through the Basin in the same manner. Although the auxiliary spillway adds an additional outlet from the Reservoir, the rates of change in outflow would not exceed the historical maximum rates of increase, which are, as per Corps guidance, the rates that would have occurred naturally without the dam.

Groundwater Hydrology

California's Basin Plans establish standards for groundwater in addition to surface water. The Basin Plans include provisions to prevent degradation and require clean up of groundwater quality problems. These provisions address local problems such as underground storage tanks and associated issues. Basin Plans also address groundwater degradation due to elevated nitrate and salt concentrations caused by leaching from nearby urban developments, agricultural fields, confined animal feeding operations, and municipal sources.

Folsom Reservoir is located at the eastern edge of the Sacramento Valley Groundwater Basin, in the North American and South American sub-basins. The area surrounding Folsom Reservoir primarily consists of bedrock formations of the Sierra Nevada foothill complex. Ground water is found primarily in fractured geologic formations, and water could be present within the fractured formations. Although groundwater is not a major resource in the vicinity of the Folsom JFP site, small amounts of groundwater are typically found in granitic fissures and cracks. Bedrock is close to, or in some areas, at the surface; therefore, high water tables exist in a few locations. Due to the presence of the impermeable material near the surface, natural drainage cannot regularly occur, thus low areas frequently become water-logged.

Fractured aquifer systems are typically low yielding; therefore, surface water sources are primarily used for drinking water or irrigation water sources rather than wells. The 2007 EIS/EIR analyzed project impacts to groundwater and determined that no effects to groundwater resources would result from the project.

The construction of the project would not restrict movement of groundwater or change near-surface groundwater levels adjacent to the approach channel. In addition, the project would not directly change land use such that the rate of groundwater recharge would decrease. Therefore, there would be no effects to groundwater hydrology with implementation of the project. Effects associated with water quality are further discussed in Section 4.4.

Hydraulics

Currently, the Folsom Facility can safely release flood flows between 115,000 cubic feet per second (cfs) and 160,000 cfs for a duration which provides a level of protection associated with a 100 year event from the downstream levees. Structural modifications associated with the Folsom JFP are proposed to address increasing discharge capability and/or increasing storage during extreme flood events above the 200-year event (an event that has a 0.5 percent chance of occurring in any given year) up to the PMF. Combined, the modifications would be able to safely release flood flows between 115,000 cfs and 160,000 cfs for a longer duration, achieving the goal of providing up to 200-year flood protection. The new auxiliary spillway would address the need to safely pass part or the entire PMF event.

As an integral part of the auxiliary spillway, the approach channel would provide an outlet for water from the reservoir to flow into the auxiliary spillway chute and step section. Upon completion of this last design component, the goal to increase the flood management capabilities of Folsom Dam and reduce the operational uncertainty and overall risk associated with the PMF would be met.

The effects on hydraulics associated with construction of the approach channel would remain consistent with the analysis included in the 2007 FEIS/EIR. Effects associated with the operation of the auxiliary spillway will be addressed in the Folsom Dam Flood Management Operations Study and its associated environmental analysis.

3.1.4 Public Utilities and Services

This section discusses existing utilities and public services including water and wastewater, solid waste, electrical and natural gas, telephone and cable lines, and fire and police protection within the project area and surrounding areas.

Public Utilities

Electric utilities near the project area include Sacramento Metropolitan Utility District (SMUD), Pacific Gas and Electric (PG&E), and Western Area Power Administration (WAPA) lines and facilities. SMUD owns and operates the Folsom-Elverta 230-kilovolt (kV) transmission line that runs along the northern boundary of Folsom Prison and carries electricity from the Upper American River Project facilities to the Lake to Folsom Transmission Line and to the Lake to Orangeville Transmission Line. The Folsom-Elverta transmission line also connects the SMUD grid, a component of the Sacramento County electrical system. The utility corridor north of the prison is considered a building-restricted area and does not permit certain uses incompatible with the safety, operation, maintenance, and construction of the transmission line facility. PG&E's only transmission line within the project area is the Halsey Junction-Newark 115 kV line. Additionally, WAPA has a 15-kilovolt Folsom-Nimbus transmission line and associated fiber optic link within the project area.

The concrete batch plant would be powered by electricity from overhead SMUD lines, and this usage would be coordinated with SMUD prior to construction. No natural gas infrastructure or facilities exist within the project area. No public utilities would be interrupted during construction of the approach channel, spur dike, cutoff wall or cofferdam, and transload facility.

Hydropower

The CVP hydropower system consists of eight power plants and two pumping-generating plants. This system is fully integrated into the Northern California Power System and provides a significant portion of the hydropower available for use in northern and central California. The installed power capacity of the system is 2,044,350 kilowatts (kW). By comparison, the combined capacity of the 368 operational hydropower plants in California is 12,866,000 kW. Pacific Gas and Electric Company (PG&E) is the area's major power supplier, with a generating capacity from all sources of over 20 million kW.

The Folsom power plant has three generating units, with a total generating capacity of 196.72 megawatts (MW) and a release capacity of approximately 8,600 cubic feet per second (cfs). By design, the facility is operated as a peaking facility. Peaking plants schedule the daily water release volume during the peak electrical demand hours to maximize generation at the time of greatest need. At other hours during the day, there may be no release (and no power generation) from the plant.

The construction of the approach channel would have no effect on the ability of Folsom Dam generate hydropower. The project would not change any water diversions that could affect power generation.

Public Services

Construction activities would generate various types of waste materials such as litter, and various types of construction waste including but not limited to concrete, and steel that would require disposal in an approved landfill. Construction would not access or realign the existing potable water supply, sanitary sewerage, or storm sewer systems. The existing haul route would be used by construction vehicles to avoid overloading public roadways and causing delays to public services. There would be no effects to public services as a result of project construction.

Water Supply

Folsom Reservoir is operated as part of the Central Valley Project for flood control, irrigation water supply, municipal and industrial water supply, hydropower generation, fish and wildlife, navigation and water quality purposes. The dams and dikes impound approximately 977,000 acre-feet; the average monthly storage ranges from 838,100 acre-feet in June to 472,900 acre-feet in November (USBR 2005). The reservoir meets the majority of water demands for the city of Roseville, the city of Folsom, the San Juan Water District, and Folsom Prison. The San Juan Water District provides water to the city of Folsom, Orangevale Water Company, Fair Oaks Water District, and Citrus Heights Water District. Placer County Water Agency and El Dorado Irrigation District also receive water from Folsom Reservoir (USBR 2005).

Folsom Reservoir provides water through a diversion at Folsom Dam to the cities of Folsom and Roseville, the San Juan Water District, and Folsom State Prison. An 84-inch pipeline, which is part of the North Fork distribution system, passes through the right abutment of the dam, providing water to the City of Roseville and San Juan Water District. A second 42-inch pipeline, which is part of the Natoma distribution system or Natoma Pipeline, passes through the left abutment. Water is conveyed from the Natoma Pipeline to the City of Folsom and California Department of Corrections water treatment plants, and the Corps' Resident Office fire protection system.

Project impacts influencing water supply were evaluated in the 2007 FEIS/EIR. The area of analysis of the document included Folsom Reservoir and surrounding counties: El Dorado, Sacramento, and Placer. The water supply portion of Folsom Reservoir for both Central Valley Project contractors and local water purveyors was also included in the area of analysis. The 2007 FEIS/EIR determined the placement of fill material in the reservoir would not significantly reduce storage at Folsom Reservoir. Water allocations and the timing of deliveries would not be impacted by the excavation of the approach channel or construction of the cofferdam, spur dike, or transload facility.

3.1.5 Land Use and Socioeconomics

Land Use

The land surrounding Folsom Dam and Reservoir is primarily Federally-owned and designated for recreation and flood control use. The major land use in the project area is USBR's Central California Area Office and the Folsom Dam industrial complex, along with a utility corridor. Additionally, there are residential areas near East Natoma Street.

State Parks, under an agreement with USBR, manages Folsom Lake, Lake Natoma, and adjacent lands designated as the Folsom Lake State Recreation Area (FLSRA). Most of the project area is designated as part of the FLSRA, however, the lands directly surrounding the project area are closed to the public. As part of the FLSRA, a portion of the American River bicycle, pedestrian, and equestrian trail is located adjacent to the project area.

Adjacent to the project area is a portion of the California State Prison, Sacramento. This multi-mission institution consists of about 1,200 acres located on Prison Road. California's second oldest prison, Folsom State Prison, is located at 300 Prison Road on a 40-acre parcel adjacent to and south of Folsom Dam. Both prisons collectively house nearly 8,000 inmates, the Regional Corporation yard for Inmate Day Labor, and the main headquarters for the Prison Industry Authority. The prison property includes access to the Sacramento-Folsom firing range, office and storage facilities, and the Green Valley Conservation Camp.

The project area is within Sacramento County; however, it falls entirely within the city of Folsom. Therefore, Sacramento County planning agencies do not have jurisdiction. The land located west of the project area is within the city of Folsom and is zoned as an Open Space Conservation District. This zoning district was established to maintain these properties as open or undeveloped, or developed as permanent open uses such as parks or greenbelts. This zoning district also includes Folsom State Prison. East of the prison, the land is zoned as an Agricultural Reserve District. This area provides a buffer between Folsom Lake and developed areas to the south. This zoning district is intended to provide for interim agricultural and livestock grazing uses until community services are available for urban development (Reclamation 2006). The designated land zones within and adjacent to project area would remain unchanged after implementation of the proposed action.

No construction activities would require access to or construction within any of the nearby residential areas. There is no farmland within the project area, therefore there would no adverse effects on agricultural resources. The land use in and around the project area, including the recreation and prison lands, would not change as a result of construction of the approach channel project. Therefore, there would be no effect to land use as a result of the project.

Socioeconomics

The city of Folsom is within Sacramento County, approximately 25 miles east of downtown Sacramento on Highway 50. The U.S. Census Bureau reports that the population of Folsom was 72,203 in 2010, which was a population growth of approximately 39% since the 2000 Census. The population of Folsom is approximately 74% white, 12% Asian, 6% African American, 0.5% Native American, and 0.2% Pacific Islander, with the remaining percentages classified as other or more than one race (Census 2010). People of Hispanic origin make up approximately 11% of the city's population.

The labor force in the city of Folsom was 26,400 people in September 2011, with 25,000 employed people and 1,400 unemployed, and an unemployment rate of 5.4%. The city's unemployment rate is well below the unemployment rate for Sacramento County of 11.9% during the same time period (EDD 2011). The median family income in the city of Folsom from the years 2005 through 2009 was $93,620, and the per capita income is $34,320 (Census 2010). Employment opportunities near the project area include technology, food manufacturers, retail, health care, and education (City of Folsom 2011).

No actions associated with the Folsom JFP, including the approach channel, would limit either current or future opportunities for agriculture, business, employment, or housing. While there are residents located adjacent to the project area, these populations do not comprise any low income or minority peoples. No populations would be displaced as a result of project construction, and no local industry would be disrupted by project activities. There would be no disproportionately adverse effects to minorities or low-income populations. Therefore, socioeconomics are not evaluated further in this EIS/EIR.

3.1.6 Public Health and Safety

Project impacts influencing potential public health and safety concerns were evaluated in the 2007 FEIS/EIR. The area of analysis included the Folsom Reservoir, as well as, areas identified as construction areas, staging areas, and borrows areas for the alternatives evaluated in the 2007 FEIS/EIR. All construction areas would be fenced off to prevent access by the public. The contractor would prepare and implement a Public Safety Management Plan to notify the public of the location and duration of construction activities.

The area surrounding the Folsom Facility is operated as a State Recreation Area used by visitors for hiking, biking, running, camping, picnicking, horseback riding, water-skiing, swimming, and boating. As such, threats to public safety exist from construction hazards with in construction, staging, and disposal areas and on roadways near recreational areas. Potential effects include injury or death from contact with heavy machinery and construction vehicles and falling and/or entrapment in excavation areas. Effects associated with recreationists in and around the project area are analyzed in Section 4.7.

There would also be the potential for effects to the safety of construction workers themselves. The contractor would also prepare and implement a Worker Health and Safety Plan prior to the start of construction. The plan would identify all contaminates that could be encountered during excavation activities; all appropriate worker, public health, and environmental protections equipment and procedures; emergency response plan; most direct route to a hospital; and the Site Safety Officer. The plan would require documentation that all workers have reviewed and signed the plan.

Blasting activities would be conducted to break rock substrate in excavation of the approach channel. Without proper controls, blasting could constitute a public safety risk. However, the contractor would be required to prepare a blasting plan, to include BMPs and safety measures to be implemented during all blasting activities. The contractor would be limited to underwater blast pressures at 5.8 pounds per square inch at a distance of 2,500 feet from the blast point for human safety (Appendix E), A floating exclusion boundary would be established at 3,000 feet from the blast point for safety of recreational swimmers and boaters. Boat patrols will also occur prior to and during blasting activity along the safety perimeter. In addition, a 2,500 foot safety boundary is enforced due to the possibility of overhead fly rock during terrestrial based blasting. It is also expected that during blasts, Folsom Lake Crossing may be closed to the public, to reduce the possibility of public safety risks. Blasting plans from the contractor would be approved by the Corps and the contractor would be required to conduct public notice prior to blasting.

Sacramento County is less vulnerable to wildfires than surrounding counties with sparse and/or hillside development. Fire hazard severity zones are measured qualitatively based on vegetation, topography, weather, potential for crown fire (i.e., a fire's tendency to burn upward into trees and tall brush), and ember production and movement within the area of question. The project area is not located within a state or local responsibility area rated as high or very high fire hazard (Cal Fire 2008). Construction activities for the proposed project would include the use of mechanized construction equipment and vehicles that contain flammable fuels. During construction, equipment and vehicles may come in contact with vegetated areas and could accidently spark and ignite vegetation. To minimize the potential for wildfires, staging areas, haul roads, and other construction areas would be cleared of vegetation. In addition, the contractor would be required to prepare a Fire Management Plan to outline the measures to be taken to reduce the risk of wildfires caused by construction activities.

Potential hazards associated with seismology and earthquakes are evaluated in Section 3.1.1. Potential effects associated with the presence of NOA are discussed in Section 3.1.2, Mineral Resources. Public services and utilities, including emergency services, are evaluated in Section 3.1.3. Air quality, including the potential of emission-related health impacts, is analyzed in Section 3.2. Potential effects associated with hazardous, toxic, and radiological waste is analyzed in Section 3.1.9.

Construction activities would not occur outside the areas identified in the 2007 FEIS/EIR; therefore, no effect to public safety in other areas is expected. The 2007 FEIS/EIR determined that with selected mitigation measures, impacts associated with various aspects of the overall Folsom JFP would be less-than-significant. Construction of the approach channel, spur dike, transload facility, and cofferdam would not increase risk to public safety or change the previous analysis.

3.1.7 Hazardous, Toxic, and Radiological Wastes

Hazardous, toxic, and radiological wastes (HTRW) in and around the project area were evaluated in the 2007 FEIS/EIR. The 2007 FEIS/EIR determined that with selected mitigation measures, impacts associated with various aspects of the overall Folsom JFP would be less-than-significant. No impacts were identified associated with the approach channel excavation, spur dike, cofferdam, or transload facility.

In January 2012, the Corps prepared an updated Phase I Environmental Site Assessment (ESA) to identify and evaluate potential hazardous and toxic waste issues in and near the project area. The purpose of the ESA was to review available documentation regarding past and current land use activities to assess the possible presence of hazardous substances and waste. The ESA consisted of a records investigation and site reconnaissance, encompassing both the project area and the surrounding area. The study area of analysis included the proposed project area, plus a 50 foot construction zone, and the area within a 1/4-mile radius from the project site.

The Corps contracted with Environmental Data Resources, Inc. to perform comprehensive database searches of the study area. The records investigation identified 78 HTRW sites in the study area, many of which were duplicated in multiple databases. The actual physical sites consisted of 16 aboveground storage tanks, underground storage tanks, treatment, generator, storage, or disposal facilities, as well as 23 mitigating sites or sites that had reported spills in the past.

On January 31, 2012, the Corps conducted a site reconnaissance of the project area. During the reconnaissance, the Corps looked for any evidence of environmental concerns in connection with the property, such as spills, stressed vegetation, discolored soils, pipes or drains, fuel tanks or barrels, and waste stockpiles. No hazardous materials, storage containers, aboveground storage tanks, or underground storage tanks were encountered during the site visit.

Sites that were reported by Environmental Data Resources, Inc. would not affect the proposed construction because they are under control, exhibit no signs of continuing release and are generally more than ¼ mile away from the construction area. Based on the ESA and field reconnaissance, there are no additional HTRW sites in the study area, and there is no apparent HTRW contamination that would interfere with construction of the project. As a result, the effects associated with HTRW sites remain consistent with the analysis conducted for the 2007 FEIS/EIR. The minimization measures discussed below would continue to be implemented as a part of project construction

During construction there is a potential for a hazardous materials such as fuels, oils, or paints to be accidentally spilled or released into the environment. Prior to construction, a hazardous materials management plan would be prepared and implemented. The plan would include measures to reduce the potential for spills of toxic chemicals and other hazardous materials during construction. The plan would also describe a specific protocol for the proper handling and disposal of these hazardous materials, as well as contingency procedures to follow in the event of an accidental spill. As a result, construction of the project is not expected result in any adverse effects due to HTRW.

3.2 AIR QUALITY

This chapter provides regulatory and environmental setting sections for air pollutants. Air quality pollutants analyzed in this chapter include criteria pollutants, which are pollutants that have established national standards, and toxic air contaminants (TACs) which do not have established standards.

Two separate areas of analysis are discussed in this document and defined in section 3.2.2 Environmental Setting. The first is for criteria air pollutants and the second is for TACs. They are defined separately because the Federal and local regulatory agencies have different significance criteria for each area of analysis.

The areas of analysis for criteria pollutant and TACs are based on the jurisdiction of the local air quality management districts (AQMDs) or air pollution control districts (APCDs), which are responsible for granting permits for construction and operation of new sources of air pollution and establishing rules and regulations for limiting pollution emissions. The project is located within the Sacramento Metropolitan Air Quality Management District's (SMAQMD's) jurisdiction, which manages air quality in Sacramento County. The area of analysis for criteria pollutants and TACs is the SMAQMD's jurisdictional area.

3.2.1 Regulatory Setting

Air quality management and protection are regulated by federal, state, and local levels of government. The primary statutes that establish ambient air quality standards and establish regulatory authorities to enforce regulatory attainment are the Federal Clean Air Act (CAA) and California Clean Air Act (CCAA). Applicable air quality regulations and responsible agencies are described below.

Federal Clean Air Act

The Federal 1970 CAA authorized the establishment of national health-based air quality standards, and also set deadlines for their attainment. The Federal Clean Air Act Amendments of 1990 (1990 CAAA) made major changes in deadlines for attaining National Ambient Air Quality Standards (NAAQS) and in the actions required of areas of the nation that exceeded these standards. Under the CAA, state and local agencies in areas that exceed the NAAQS are required to develop state implementation plans (SIP) to show how they will achieve the NAAQS for nonattainment criteria pollutants by specific dates. SIPs are not single documents; rather, they are a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations and federal controls. The United States Environmental Protection Agency (USEPA) is responsible for enforcing the NAAQS primarily through reviewing SIPs that are prepared by each state.

As required by the Federal CAA, the USEPA has established and continues to update the NAAQS for specific criteria air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), inhalable particulate matter (PM10), fine particulate matter (PM2.5), and lead (Pb). The NAAQS for these pollutants are listed under "Federal Standards" in Table 6 and represent the upper-bound levels of pollutant concentrations deemed necessary by the USEPA to protect the public health and welfare with an adequate margin of safety.

General Conformity Rule and de minimis Levels

Pursuant to CAA Section 176(c) requirements, USEPA promulgated the General Conformity Rule, which applies to most federal actions, including the Folsom JFP project. The General Conformity Rule is used to determine if federal actions meet the requirements of the CAA and the applicable SIP by ensuring that pollutant emissions related to the action do not:

- Cause or contribute to new violations of a NAAQS.
- Increase the frequency or severity of any existing violation of a NAAQS.
- Delay timely attainment of a NAAQS or interim emission reduction.

A conformity determination under the General Conformity Rule is required if the federal agency determines: the action will occur in a nonattainment or maintenance area; that one or more specific exemptions do not apply to the action; the action is not included in the federal agency's "presumed to conform" list; the emissions from the proposed action are not within the approved emissions budget for an applicable facility; and the total direct and indirect emissions of a pollutant (or its precursors), are at or above the *de minimis* levels established in the General Conformity regulations.

An action will be determined to conform to the applicable SIP if the action meets the requirements of 40 CFR 93.158(c). In addition, federal activities may not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions toward attainment.

State

The CARB is responsible for the development, implementation, and enforcement of California's motor vehicle pollution control program, administration of the state's air pollution research program, adoption and updating, as necessary, of California Ambient Air Quality Standards (CAAQS), review of local APCD activities, and coordination of the development of the SIP for achievement of the NAAQS.

California Clean Air Act

The CCAA establishes an air quality management process that generally parallels the Federal process. The CCAA, however, focuses on attainment of the CAAQS that, for certain pollutants and averaging periods, are more stringent than the comparable NAAQS. The CAAQS are included in Table 6 alongside the NAAQS.

The CCAA requires that AQMDs and APCDs prepare a clean air plan, or air quality attainment plan if the district violates CAAQS for CO, SO_2, NO_2, or O_3, showing strategies for and progress toward attaining the CAAQS for which it is in non-attainment. These plans are required to be updated triennially. The region's SIPs are addressed in the Existing Conditions section below.

Table 6. State and Federal Ambient Air Quality Standards.

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 $\mu g/m^3$)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 $\mu g/m^3$)		0.075 ppm (147 $\mu g/m^3$)		
Respirable Particulate Matter (PM10)	24 Hour	50 $\mu g/m^3$	Gravimetric or Beta Attenuation	150 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 $\mu g/m^3$		—		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 $\mu g/m^3$	Gravimetric or Beta Attenuation	15.0 $\mu g/m^3$		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m³)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—	—	—
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 µg/m3)	Gas Phase Chemiluminescence	53 ppb (100 $\mu g/m^3$) (see footnote 8)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (339 $\mu g/m^3$)		100 ppb (188 $\mu g/m^3$) (see footnote 8)	None	
Sulfur Dioxide (SO_2)	24 Hour	0.04 ppm (105 $\mu g/m^3$)	Ultraviolet Fluorescence	—	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)[9]
	3 Hour	—		—	0.5 ppm (1300 $\mu g/m^3$) (see footnote 9)	
	1 Hour	0.25 ppm (655 $\mu g/m^3$)		75 ppb (196 $\mu g/m^3$) (see footnote 9)	—	
Lead[10]	30 Day Average	1.5 $\mu g/m^3$	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 $\mu g/m^3$	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Rolling 3-Month Average[11]	—		0.15 $\mu g/m^3$		
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 $\mu g/m^3$	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 $\mu g/m^3$)	Ultraviolet Fluorescence			
Vinyl Chloride[10]	24 Hour	0.01 ppm (26 $\mu g/m^3$)	Gas Chromatography			

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990 California Air Resources Board (09/08/10)

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

8. To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010). Note that the EPA standards are in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national standards to the California standards the units can be converted from ppb to ppm. In this case, the national standards of 53 ppb and 100 ppb are identical to 0.053 ppm and 0.100 ppm, respectively.

9. On June 2, 2010, the U.S. EPA established a new 1-hour SO_2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. EPA also proposed a new automated Federal Reference Method (FRM) using ultraviolet technology, but will retain the older pararosaniline methods until the new FRM have adequately permeated State monitoring networks. The EPA also revoked both the existing 24-hour SO_2 standard of 0.14 ppm and the annual primary SO_2 standard of 0.030 ppm, effective August 23, 2010. The secondary SO_2 standard was not revised at that time; however, the secondary standard is undergoing a separate review by EPA. Note that the new standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the new primary national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

10. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

11. National lead standard, rolling 3-month average: final rule signed October 15, 2008.

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Source: California Air Resources Board (CARB) 2010

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 APCDs are required to establish and implement emission control programs commensurate with the extent of pollutant transport to downwind districts.

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

Asbestos Control Measures

CARB has adopted two airborne toxic control measures for controlling naturally occurring asbestos (NOA): the Asbestos Airborne Toxic Control Measure (ATCM) for Surfacing Applications and the Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations. CARB and local air districts have been delegated authority by the USEPA to enforce the Federal National Emission Standards for Hazardous Air Pollutants regulations for asbestos.

Local

SMAQMD is responsible for implementing federal and state regulations at the local level, permitting stationary sources of air pollution, and developing the local elements of the SIP. Emissions from indirect sources, such as automobile traffic associated with development projects, are addressed through the APCD's air quality plans, which are each air quality district's contribution to the SIP.

In addition to permitting and rule compliance, air quality management at the local level is also accomplished through AQMD/APCD imposition of mitigation measures on project environmental impact reports and mitigated negative declarations developed by project proponents under CEQA. Specific to project construction emissions, CEQA requires mitigation of air quality impacts that exceed certain significance thresholds set by the local AQMD/APCD. The SMAQMD's CEQA significance thresholds, which would be applicable to the project, are described below.

3.2.2 Environmental Setting

The study area for the project is the SVAB, which includes Sacramento County, where the project site is located. Criteria air pollutants relevant to the project were determined based on the existing pollutant conditions in the SVAB. TACs relevant to the project were determined based on SMAQMD guidance and the project site conditions.

Air Pollutants

Air pollutants relevant to the project and their health effects are discussed below and summarized in Table 7. In addition, sensitive receptors are defined and receptors near the project are identified.

Table 7. Summary of Air Pollutants of Concern for the Project.

Pollutant Class	Pollutant	Existing Condition
Criteria Pollutants	CO, NO_2, O_3 (precursors: NO_x, ROG), PM10, PM2.5, and SO_2	The SVAB has NAAQS and/or CAAQS non-attainment designations for PM10, PM2.5, and O3. The SVAB is also a maintenance area (formerly non-attainment) for CO. Consequently, PM10, PM2.5, CO, and ozone precursor (ROG and NOx) emissions are the primary criteria pollutants of concern associated with the project.
TACs	DPM and NOA	Local geology supports the formation of NOA, although no NOA has been located within the project site. The primary DPM sources associated with the project are diesel-powered on-road haul trucks and off-road construction equipment.

Criteria Pollutants

For criteria pollutants, NAAQS and CAAQS have been established to protect public health and welfare. Criteria pollutants include CO, NO_2, O_3, PM10, PM2.5, and SO_2. Ozone is a secondary pollutant that is not emitted directly to the atmosphere. Instead, it forms by the reaction of two ozone precursors – reactive organic gases (ROGs) and nitrogen oxides (NO_x) – in the presence of sunlight and high temperatures. The sources of these pollutants, their effects on human health and the nation's welfare, and their annual emission to the atmosphere vary considerably and are detailed in Appendix A.

Toxic Air Contaminants

A TAC is defined by California law as an air pollutant that “may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health.” The USEPA uses the term hazardous air pollutant (HAPs) in a similar sense. Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments, whereby Congress mandated that the USEPA regulate 188 air toxics. TACs can be emitted from stationary and mobile sources.

Ten TACs have been identified through ambient air quality data as posing the greatest health risk in California. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to brain and nervous system and respiratory disorders. TACs do not have ambient air quality standards because often no safe levels of TACs have been determined. Instead, TAC impacts are evaluated by calculating the health risks associated with a given exposure.

The TACs of interest to this project are diesel particulate matter (DPM) and NOA. The Folsom Dam area has been identified as within an area where the local geology supports the formation of NOA, although no NOA has been located within the project site. Sources and health effects of DPM and NOA are detailed in Appendix A.

Meteorology and Climate

The project is located at the southern end of the Sacramento Valley, which has a Mediterranean climate, characterized by hot dry summers and mild rainy winters. The mountains surrounding the Sacramento Valley create a barrier to airflow, which can trap air pollutants in the valley when meteorological conditions are right and a temperature inversion exists. The climate and air patterns of the Sacramento Valley, which would be applicable to the project site, are further detailed in Appendix A.

Air Quality

Within Sacramento County, on-road motor vehicles are the major source of ROG, CO, and NO_x emissions. Other equipment and off-road vehicles contribute substantially to ROG, CO, and NO_x emissions. Fugitive dust, generated from construction, roadways, and farming operations, is the major source of PM10 and, to a lesser degree, PM2.5. Residential fuel combustion also substantially contributes to PM2.5 emissions. Estimates of existing criteria air pollutants in Sacramento County are presented in Appendix A.

Based on 2008-2010 monitoring data of CO, O_3, NO_2, SO_2, PM10, and PM2.5 collected at a monitoring station located approximately 11 miles from the project site, CO, NO_2 and SO_2 in Sacramento County did not exceed the applicable CAAQS and NAAQS while O_3, PM10 and PM2.5 did exceed the CAAQS and/or NAAQS (Appendix A).

Sensitive Receptors

Some locations are considered more sensitive to adverse effects from air pollution than others. These locations are termed sensitive receptors. A sensitive receptor is generally defined as a location where human populations, especially children, seniors, and sick persons are found, and where there is a reasonable expectation of continuous human exposure according to appropriate standards (e.g., 24 hour, 8-hour, and 1-hour). Sensitive land uses and sensitive receptors generally include residents, hospital staff and patients, and school teachers and parents.

The closest sensitive receptors to the spillway construction area are the prison population and employees located at Folsom State Prison. The closest residences at Folsom Prison are slightly more than 1,000 feet from the prison staging area. Also, several residences are located within 1,000 feet of the Dike 7 staging area, the MIAD disposal area, and the haul road that connects these areas to the spillway construction area. These primarily include the residences located north of East Natoma Street between Folsom Lake Crossing and Green Valley Road.

Attainment Status

The General Conformity *de minimis* levels are based on the non-attainment and maintenance classification of the air basin. General conformity thresholds are for ozone precursors. The request for reclassification of the 8-hour ozone nonattainment area from "serious" to "severe" was granted by the USEPA on June 1, 2010, and as a result, the GRC de minimis thresholds for ozone, VOC, and NO_X were reduced from 50 tons per year to 25 tons per year.

The Lower SVAB is designated as a "severe" non-attainment for the O_3 NAAQS (for the 2008 8-hour O_3 standard) and as nonattainment for PM2.5 NAAQS. In 2008, the 1-hour O_3 NAAQS (established in 1997) was revoked and is no longer applicable. However, the USEPA is in the process of reviewing the CARB's request, on behalf of SMAQMD, to formally designate the area as in PM10 attainment. The county is a designated maintenance area for the CO NAAQS. Sacramento County is in non-attainment for the O_3, PM2.5, and PM10 CAAQSs, and in attainment for all other criteria pollutants. (CARB 2012; USEPA 2012a; USEPA 2012b).

State Implementation Plans

Due to the nonattainment or maintenance area designations for the SVAB discussed above, the SMAQMD is required to prepare SIPs for O_3, PM10 and PM2.5 and a maintenance plan for CO. The status of these SIPs for the SVAB is summarized below and detailed in Appendix A.

- O_3: A final attainment designation for the 2008 O_3 NAAQS of 0.075 ppm has not been provided by the USEPA and an attainment plan has not been prepared.
- PM10: The USEPA is in the process of reviewing a maintenance plan and evaluating a CARB request to change the designation to attainment.
- PM2.5: SMAQMD is preparing a PM2.5 attainment plan for submission in 2012.
- CO: A maintenance plan was approved by the USEPA in 2005 and is still applicable.

3.3 CLIMATE CHANGE

This chapter provides regulatory and environmental setting sections for greenhouse gases (GHGs).

3.3.1 Regulatory Setting

Federal

The USEPA is responsible for GHG regulation at the Federal level. Key Federal GHG guidance and regulations relevant to the project are summarized below.

In *Massachusetts v. U.S. Environmental Protection Agency*, et al., 127 S.Ct. 1438 (2007), the United States Supreme Court ruled that GHGs fits within the CAA's definition of a pollutant, and that the USEPA has the authority to regulate GHGs.

On October 5, 2009, President Obama signed Executive Order (E.O.) 13514; *Federal Leadership in Environmental, Energy, and Economic Performance*, E.O. 13514 requires Federal agencies to set a 2020 GHG emissions reduction target within 90 days; increase energy efficiency; reduce fleet petroleum consumption; conserve water; reduce waste; support sustainable communities; and leverage Federal purchasing power to promote environmentally-responsible products and technologies.

On December 7, 2009, the Final Endangerment and Cause or Contribute Findings for Greenhouse Gases (endangerment finding), under Section 202(a) of the CAA went into effect. The endangerment finding states that current and projected concentrations of the six key well-mixed GHGs in the atmosphere [carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and other fluorinated gases including nitrogen trifluoride (NF_3) and hydrofluorinated ethers (HFEs)]) threaten the public health and welfare of current and future generations. Furthermore, it states that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution which threatens public health and welfare (USEPA 2012a).

Under the endangerment finding, the USEPA is developing vehicle emission standards under the CAA. The USEPA and the Department of Transportation's National Highway Traffic Safety Administration have issued a joint proposal to establish a national program that includes standards that will reduce GHG emissions and improve fuel economy for light-duty vehicles in model years (MYs) 2012 through 2016. This proposal marks the first GHG standards proposed by the USEPA under the CAA as a result of the endangerment and cause or contribute findings (USEPA 2012b). These emission reductions were incorporated into the project analysis.

On February 18, 2010, the White House Council on Environmental Quality (CEQ) released draft guidance regarding the consideration of GHGs in National Environmental Policy Act (NEPA) documents for Federal actions. The draft guidelines include a presumptive threshold of 25,000 metric tons of carbon dioxide equivalent (CO_{2e}) emissions from a proposed action to trigger a quantitative analysis. CEQ has not established when GHG emissions are "significant" for NEPA purposes; rather, it poses the question to the public (CEQ 2010).

State

The California Air Resources Board (CARB) is responsible for the development, implementation, and enforcement of California's motor vehicle pollution control program, GHG statewide emission estimates and goals, and development and enforcement of GHG emission reduction rules.

California is a substantial contributor of global GHGs as it is the second largest contributor in the U.S. and the sixteenth largest in the world (CEC 2006). During 1990 to 2003, California's gross state product grew 83 percent while GHG emissions grew 12 percent. While California has a high amount of GHG emissions, it has low emissions per capita. The major source of GHG in California is transportation, contributing 41 percent of the State's total GHG emissions (CEC 2006). Electricity generation is the second largest generator, contributing 22 percent of the State's GHG emissions. Emissions from fuel use in the commercial and residential sectors in California decreased 9.7 percent over the 1990 to 2004 period (CEC 2006).

California has taken proactive steps, briefly described in Table 8, to address the issues associated with GHG emissions and climate change. A summary of the major California GHG regulations that will affect the project's GHG emissions are presented below.

California Environmental Quality Act GHG Amendments

CEQA and the CEQA Guidelines require that State and local agencies identify the significant environmental impacts of their actions, including potential significant air quality and climate change impacts, and to avoid or mitigate those impacts, when feasible. The CEQA amendments of December 30, 2009, specifically require lead agencies to address GHG emissions in determining the significance of environmental effects caused by a project, and to consider feasible means to mitigate the significant effects of GHG emissions (California Natural Resources Agency 2012).

Table 8. Summary of Relevant California GHG Regulations.

Bill, Year	Description
Assembly Bill (AB) 4420, 1988	Directed California Energy Commission, in consultation with the CARB and other agencies, to "study and report…on how global warming trends may affect California's energy supply and demand, economy, environment, agriculture, and water supplies."
AB 1493, 2002	Requires CARB to develop and implement regulations to reduce automobile and light-truck GHG emissions. These stricter emissions standards apply to automobiles and light trucks beginning with the 2009 MY. Although litigation was filed challenging these regulations and EPA initially denied California's related request for a waiver, the waiver request has now been granted.
Executive Order (E.O.) S-3-05, 2005	The goal of E.O. S-3-05 is to reduce California's GHG emissions to: (1) year 2000 levels by 2010, (2) 1990 levels by 2020, and (3) 80% below the 1990 levels by 2050.
AB 32, California Global Warming Solutions Act of 2006	Sets overall GHG emissions reduction goals and mandates that CARB create a plan that includes market mechanisms and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Requires statewide GHG emissions be reduced to 1990 levels by 2020. (The 1990 CO2e level is 427 million metric tonnes of CO2e (CARB 2012a)). Directs CARB to develop and implement regulations to reduce statewide emissions from stationary sources. Specifies that regulations adopted in response to AB 1493 be used to address GHG emissions from vehicles. Requires CARB to adopt a quantified cap on GHG emissions representing 1990 emissions levels. Includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.
E.O. S-01-07, 2007	Requires the carbon intensity of California's transportation fuels to be reduced by at least 10% by 2020.
Senate Bill 97	This bill directed the Natural Resources Agency, in coordination with the Governor's Office of Planning Research, to address the issues through Amendments to the CEQA Guidelines. The revised Guidelines were adopted December 30, 2009 to provide direction to lead agencies about evaluating, quantifying, and mitigating a project's potential GHG emissions.

Source: CARB 2012a, CARB 2012b, CARB 2012c, Office of the Governor 2007

Relevant provisions of CEQA amendments include the following list (Office of Planning and Research 2009). A lead agency subject to CEQA may consider the following when assessing the significance of impacts from GHG emissions:

(1) The extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting;

(2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project;

(3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHGs.

When an agency makes a statement of overriding considerations, the agency may consider adverse environmental effects in the context of region wide or statewide environmental benefits. Lead agencies shall consider feasible means of mitigating GHGs that may include, but not be limited to:

(1) Measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision;

(2) Reductions in emissions resulting from a project through implementation of project features, project design, or other measures;

(3) Offsite measures, including offsets;

(4) Measures that sequester GHGs;

(5) In the case of the adoption of a plan, such as a general plan, long-range development plan, or GHG reduction plan, mitigation may include the identification of specific measures that may be implemented on a project-by-project basis. Mitigation may also include the incorporation of specific measures or policies found in an adopted ordinance or regulation that reduces the cumulative effect of emissions.

Local

SMAQMD is responsible for implementing federal and state regulations at the local level. SMAQMD has not developed screening levels for GHG emissions from projects in Sacramento County.

Though the context of GHGs is global, Assembly Bill (AB) 32 has defined the area of analysis for GHG emissions to be statewide. To meet the AB 32 reduction goals in the SVAB, SMAQMD has further narrowed the study area for GHGs to Sacramento County and recommended that thresholds of significance for GHG emissions should be related to statewide GHG reduction goals (SMAQMD 2011). To meet the AB 32 reduction goals in the SVAB, the SMAQMD has further narrowed the study area for GHGs to Sacramento County. GHGs relevant to the project were determined based on the project's potential to emit certain GHGs.

3.3.2 Environmental Setting

Warming of the climate system is now considered to be unequivocal (IPCC, 2007). Global average surface temperature has increased approximately 1.33 °F over the last one hundred years, with the most severe warming occurring in the most recent decades. In the twelve years between 1995 and 2006, eleven years ranked among the warmest years in the instrumental record of global average surface temperature (going back to 1850). Continued warming is projected to increase global average temperature between 2 and 11 °F over the next one hundred years (IPCC, 2007). The causes of this warming have been identified as both natural processes and as the result of human actions. Increases in GHG concentrations in the Earth's atmosphere are thought to be the main cause of human induced climate change.

Some GHGs, such as CO_2, occur naturally and are emitted to the atmosphere through both natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. Sources of GHGs and their effects on the Earth's climate are detailed in Appendix A. Each GHG traps a different amount of heat. In order to compare emissions of different GHGs, a weighting factor called a Global Warming Potential (GWP) is used, in which a single metric ton (1,000 kilograms) of CO_2 is taken as the standard. Emissions are expressed in terms of CO_2 equivalents (CO_2e). Therefore, the GWP of CO_2 is 1; the GWP of CH_4 is 21; and the GWP of N_2O is 310. These three GHGs would be applicable to the project and potentially emitted during project construction activities.

GHG emission sources in Sacramento County and California are detailed in Appendix A. The total 2005 Sacramento County GHG emissions were 13.9 million metric tonnes of CO_2e. Statewide GHG emissions in 2008 were approximately 477.74 million metric tonnes of CO_2e. Based on this estimate, statewide emissions would need to be reduced by approximately 50 million metric tonnes of CO_2e by 2020 to meet the AB 32 goal of achieving 1990 CO_2e levels (427 million metric tonnes of CO_2e) (CARB 2012a).

3.4 WATER QUALITY

Water quality analysis is divided into conventional pollutants and bioaccumulation potential. For this analysis, conventional pollutants analyzed are:

- pH;
- Turbidity;
- Total dissolved solids (TDS);
- Dissolved oxygen (DO);
- Nutrients, including total organic carbon (TOC), nitrogen, and phosphorus;
- Trace elements, including arsenic, cadmium, chromium, copper, lead, nickel, and zinc.

Mercury is the specific focus of bioaccumulation potential analysis because of the regionally common presence of mercury-contaminated sediments.

Groundwater quality is not analyzed in this report because of the lack of hydraulic connectivity between the groundwater in the vicinity of the Mormon Island Auxiliary Dam and Folsom Reservoir. The *Mormon Island Auxiliary Dam Field Exploration Report Containing Data through January 1, 2005 (FER)* (Sherer 2006) indicates that the data collected throughout the downstream foundation area indicated there is no connection between the reservoir and local groundwater levels.

The area of analysis for this section is the aquatic body of Folsom Lake, particularly the surface waters within the area of the lake along the proposed alignment of the approach channel and spur dike for the auxiliary spillway (Plate 1).

3.4.1 Regulatory Setting

Dredging projects subject to regulation from a government agency consist of the following four activities:

a. The physical removal of sediment material from the bottom of a water body;
b. The incidental discharge of sediment during the dredging, as a result of disturbing and physically moving the sediments;
c. The placement of the dredged sediments on land; and
d. The return of any water from the dredged sediments back to surface water either during removal or after placement.

<u>Federal Water Quality Regulations</u>

Clean Water Act

The Clean Water Act (CWA) is the primary federal law governing water pollution. It established the basic structure for regulating discharges of pollutants into the waters of the U.S. and gives the U.S. Environmental Protection Agency (USEPA) the authority to implement pollution control programs such as setting wastewater standards for industries (USEPA 2002). In certain states such as California, the USEPA has delegated authority for the CWA to state agencies.

The CWA requires that a permit be obtained from the USEPA and the Corps when discharge of dredged or fill material into wetlands and waters of the United States occurs. Under Section 404 of the CWA, the Corps regulates such discharges and issues individual and/or general permits for these activities. Before the Corps can issue a permit under CWA Section 404, it must determine that the project is in compliance with the CWA Section 404(b) (1) guidelines. The 404(b)(1) guidelines specifically require that “no discharge of dredged or fill material shall be permitted if there is a practical alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences" (40 CFR 230.10[a]). The USEPA, however, has "veto" authority over permits issued by the Corps. When performing its own civil works projects, the Corps does not issue itself these permits, rather, the Corps must determine that the project is incompliance with the CWA Section 404(b)(1) guidelines issued by the USEPA as stated in Corps regulations.

Section 401 of the CWA regulates the water quality for any activity which may result in any in-water work or discharge into navigable waters. These actions must not violate federal or state water quality standards. The Central Valley Regional Water Quality Control Board (CVRWQCB) administers Section 401 in the State of California, and either issues or denies water quality certifications depending upon whether the proposed discharge or fill material complies with applicable State and Federal laws. Water quality certifications for large or complex actions such as this Project typically include project-specific requirements established by the CVRWQCB to ensure attainment of water quality standards and compliance with applicable policies and regulations.

Section 303(d) of the CWA requires that States establish priority rankings for water on the lists and develop action plans, called Total Maximum Daily Loads (TMDLs), to improve water quality (USEPA 2002). A TMDL is a tool for implementing water quality standards and is based on the relationship between pollution sources and in-stream water quality conditions.

The Lower American River, downstream of the Project setting, has been placed on the State's list of impaired water bodies (the 303(d) list of the CWA) for mercury and polychlorinated biphenyls (PCBs) and unknown toxicity. The upper American River, including Lake Natoma downstream of the Project Setting, Folsom Lake within the project setting, and the North and South Forks of the American River, upstream of the Project setting, have been placed on the 303(d) list for mercury. Placement on the State's 303(d) list means that TMDLs will eventually be required for those pollutants in each affected water body. Mercury TMDLs for all those water bodies will be addressed though a Statewide mercury TMDL plan, which is anticipated to be completed in 2013.

Jurisdictional Waters of the United States

Regulated or jurisdictional waters include all wetlands adjacent to navigable waters in addition to navigable waters, interstate waters, and their tributaries. Therefore, any discharge of dredged or fill material into these jurisdictional waters would be subject to compliance with Section 404 and 401 of the CWA. Project construction related to impacts to jurisdictional wetlands would be subject to regulations stated within these permits. All waters of the United States are also considered waters of the State and are subject to regulation under the Porter-Cologne Water Quality Control Act.

Seasonal wetlands and freshwater marshes exist along the margins of the reservoir, typically within or adjacent to streams, swales, or other drainages. In addition, groundwater upwelling is creating a wetland near Dike 5 on the western side of the reservoir.

The Corps verified a wetland delineation submitted by USBR for the 2007 FEIS/EIR on December 11, 2007. Approximately 314.46 acres of waters of the United States, including Folsom Lake, the American River, and wetlands, were present within the survey area. The survey did not delineate any wetlands within the project area that comprises approximately 10 acres of Folsom Lake. Folsom Lake and all tributaries are regulated under Section 404 of the CWA, since they are tributaries to navigable waters of the United States.

The Mormon Island Wetlands Natural Preserve is located south of Green Valley Road between Natoma Street and Sophia Parkway. The 100-acre preserve is approximately 0.50 miles upstream from the project site. The excavation of the approach channel and disposal of materials at the MIAD disposal area would not impair wetland functions of the Mormon Island Wetlands Natural Preserve.

Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act of 1899 regulates alteration of (and prohibits unauthorized obstruction of) any navigable waters of the United States. Construction of any bridge, dam, dike or causeway over or in navigable waterways of the U.S. is prohibited without Congressional approval. Construction plans for a bridge or causeway must be submitted to and approved by the Secretary of Transportation, while construction plans for a dam or dike must be submitted to and approved by the Corps. Excavation or fill within navigable waters also requires the approval of the Corps.

National Pollutant Discharge Elimination System

All point sources that discharge into navigable waters of the United States must obtain a National Pollutant Discharge Elimination System (NPDES) permit under provisions of Section 402 of the CWA. In California, the State Water Resources Control Board (SWRCB) and CVRWQCBs are responsible for the implementation of the NPDES permitting process at the state and regional levels, respectively. Individual NPDES permits have previously been issued in California to dewatering operations having a long duration, but not for shorter duration dewatering activities such as the Folsom Dam JFP.

The NPDES permit process also provides a regulatory mechanism for the control of non-point source pollution created by runoff from construction and industrial activities, and general and urban land use, including runoff from streets. Projects involving construction activities (e.g., clearing, grading, or excavation) involving land disturbance greater than one acre must file a Notice of Intent (NOI) with the CVRWQCB to indicate their intent to comply with the State General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2010-0014-DWQ Construction General Permit. This Project would be required to file an NOI to and comply with the provisions of the CGP.

The Construction General Permit establishes conditions to minimize sediment and pollutant loadings and requires preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) prior to construction. The SWPPP is intended to help identify the sources of sediment and other pollutants, and to establish Best Management Practices (BMPs) for storm water and non-storm water source control and pollutant control. The Construction General Permit also has detailed requirements regulating the use of active treatment systems (ATS) used to control turbidity for construction and dewatering. ATS are used where traditional erosion and sediment controls are not sufficient to prevent water quality standards from being exceeded. If this Project were to implement ATS, an approved ATS would be required by the Construction General Permit.

State Water Quality Regulations

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1970 established the SWRCB and nine regional water quality control boards within the State of California. These groups are the primary state agencies responsible for protecting California water quality to meet present and future beneficial uses and regulating appropriative surface rights allocations. The preparation and adoption of water quality control plans, or Basin Plans, and statewide plans, is the responsibility of the SWRCB.

California Water Code

State law requires that Basin Plans conform to the policies set forth in the California Water Code beginning with Section 13000 and any State policy for water quality control. These plans are required by the California Water Code (Section 13240) and supported by the Federal CWA. Section 303 of the CWA requires states to adopt water quality standards which "consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses." According to Section 13050 of the California Water Code, Basin Plans consist of a designation or establishment for the waters within a specified area of beneficial uses to be protected and water quality objectives to protect those uses. Adherence to Basin Plan water quality objectives protects continued beneficial uses of water bodies.

The Project is located within the jurisdiction of the CVRWQCB, within the greater Sacramento Valley watershed. Beneficial uses and water quality objectives for Folsom Lake are established in the CVRWQCB's Water Quality Control Basin Plan for the Sacramento and San Joaquin River Basins. Basin Plans are adopted and amended by regional water boards under a structured process involving full public participation and State environmental review. Because of the long time frame for amending Basin Plans, amendments affecting the Project are not likely, except for the possibility that a Statewide Mercury TMDL may be established in 2013.

The Basin Plan includes numerical and narrative water quality objectives for physical and chemical water quality constituents. Numerical objectives are set for temperature, DO, turbidity, and pH; TDS, electrical conductivity, bacterial content and various specific ions; trace metals; and synthetic organic compounds. Narrative objectives are set for parameters such as suspended solids, biostimulatory substances (e.g. nitrogen and phosphorus), oil and grease, color, taste, odor, and aquatic toxicity Narrative objectives are often precursors to numeric objectives. The primary method used by the CVRWQCB to ensure conformance with the Basin Plan's water quality objectives and implementation policies and procedures is to issue Waste Discharge

Requirements (WDRs) for projects that may discharge wastes to land or water. WDRs specify term and conditions that must be followed during the implementation and operation of a project.

California Office of Environmental Health Hazard Assessment

The California Office of Environmental Health Hazard Assessment (OEHHA) is responsible for protecting and enhancing public health and the environment by scientific evaluation of risks posed by hazardous substances. In the Project setting, OEHHA's recent Public Health Goal (PHG) for hexavalent chromium in drinking water and risk assessment guidelines for mercury in fish are used to establish thresholds for effects. The California Department of Health (DPH) implements guidance established by OEHAA, the United States Environmental Protection Agency, and other sources by establishing maximum concentration limits (MCLs) for chemical constituents in drinking water. MCLs are enforceable as numeric water quality objectives in California. The PHG for hexavalent chromium established by OEHAA has not yet been adopted as an MCL by DPH. An MCL for hexavalent chromium may be adopted by DPH during the duration of the Project, but the final value is not certain and the implementation plan for that MCL has not been specified by DPH.

Local Water Quality Regulations

General Plans for El Dorado, Placer, and Sacramento Counties each have provisions aimed at protecting local water resources for future and current use. The El Dorado County General Plan establishes a county-wide water resources program to conserve, enhance, manage, and protect water resources and their quality from degradation. These objectives consist of the following: ensuring an adequate quantity and quality of water is available; protection of critical watersheds, riparian zones, and aquifers; improvement and subsequent maintenance of the quality of both surface water and groundwater; wetland area protection; utilization of natural drainage patterns; and encouraging water conservation practices including re-use programs for applicable areas such as agricultural fields (El Dorado County 2004).

The Placer County General Plan's main goal pertaining to local water resources states that the natural qualities of its streams, creeks and groundwater would be protected and enhanced. To accomplish this goal, the County has enacted policies such as requiring various setbacks and easements from sensitive habitat areas or creek corridors, requiring mitigation measures for developments encroaching water bodies, implementing BMPs to protect streams from runoff during construction activities or due to agricultural practices, and protecting groundwater resources from contamination (Placer County 1994).

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

In general, it is assumed that compliance with Federal and State water quality regulations will ensure compliance with local policies and regulations.

3.4.2 Environmental Setting

Project activities such as drilling, dredging, blasting and hauling may disturb or mobilize sediments, which has the potential to affect total suspended solids (TSS), pH, turbidity, and dissolved oxygen (DO). Re-suspension of sediments may also affect the concentrations of metals (arsenic, cadmium, chromium, copper, lead, nickel, and zinc) in the water column by releasing metals that are present in lake sediments from both natural and human sources. Metals, TSS, pH, turbidity, and DO are of concern because of the potential to cause acute (e.g., mortality) or chronic (e.g., impaired reproduction) effects on benthic and aquatic life within the lake.

Water Quality Conditions

Folsom Reservoir has numerous beneficial use designations as defined by the CVRWQCB. The beneficial uses include municipal, domestic, and industrial water supply; irrigation; power; water contact and non-contact recreation; and warm and cold freshwater habitat, warm freshwater spawning habitat; and wildlife habitat (SAFCA, 2003).

Water quality in Folsom Lake is generally acceptable for the beneficial uses currently defined for these water bodies. However, taste and odor problems have occurred in municipal water supplies diverted from the lake in the past. These problems were attributed to blue-green algal blooms that occasionally occur in the reservoir as a result of elevated water temperatures. The Folsom Reservoir is not listed on CVRWCB State List of Impaired Waters or listed as a federally designated and state-designated Wild and Scenic River.

Snowmelt and precipitation from the relatively undeveloped upper American River watershed leads to runoff. This runoff is generally of very high quality, rarely exceeding the State of California’s water quality objectives (Wallace, Roberts, and Todd et al., 2003). Although water quality within Folsom Lake is generally acceptable to meet the currently designated beneficial uses, occasional taste and odor problems have occurred in municipal water supplies diverted from Folsom Lake. Blue-green algal blooms that occasionally occur in the reservoir due to elevated water temperatures were identified as the cause of those taste and odor problems.

Water quality data compiled in Table 9 below help to characterize existing conditions in Folsom Lake. The pH, electrical conductivity, DO, and turbidity data were collected on June 28, 2005; a total of 47 samples were taken. The TOC data were collected on June 11, 2003; a total of 6 samples were taken. The nitrogen, phosphorus, and TDS data were collected over a 13-month period from February 2001 to February 2002; 5 samples were taken for each of these parameters. These data are considered representative of the general water quality conditions of Folsom Lake.

Table 9. Water Quality Parameters (2001-2005).

Parameter	Minimum	Maximum	Average	Water Quality Objective
pH	6.6	8.23	6.94	6.5 (min) - 8.5 (max)
Turbidity	1	126.9	8.4	10 NTU
DO	4.95	7.93	6.88	> 7 mg/L (*COLD*) >5 mg/L (*WARM*)
Nitrogen	<0.050	0.11	0.062	"no adverse effects"
Phosphorus	<0.010	<0.050	0.0212	
TDS	39	44	41.8	100 mg/L (*AGR*, *MUN*)

Sources: USBR (2005); Wallace, Roberts and Todd et al. (2003). Water quality objectives established by CVWQCB Basin Plan.

<u>Chromium</u>

The Pillikin Mine, an abandoned chromium mine, exists on the Peninsula just north of Flagstaff Hill. The Pillikin Mine contained the largest known chromite deposit in the Sierra Nevada. The mine began ore production during World War I and became inactive in April of 1955 (El Dorado County Public Library 2002). The mine is located above the elevation of the reservoir and would not cause new water quality effects as a result of the implementation of any of the Folsom JFP alternatives. According to USBR, there has been no detection of chromium in the water tested (Sherer 2006c).

<u>Mercury</u>

As noted above, Folsom Lake is on the State's list of impaired water bodies due to mercury concentrations in fish that exceed risk assessment levels. As noted in Appendix C, the concentrations of mercury in Folsom Lake fish are comparable to mercury concentrations in fish from throughout the State. Mercury concentrations in Folsom Lake largemouth bass are lower than other mining-impacted reservoirs, and within 1 standard deviation of all other reservoirs in the Central Valley.

The sediments in Folsom Lake may contain mercury from historic mining releases and from naturally occurring mercury within the watershed of the upper American River drainage. Mercury inputs from atmospheric deposition are also a common source to lakes and reservoirs, including Folsom Lake. Atmospheric deposition alone is sufficient to cause many lakes and reservoirs throughout the nation to have mercury concentrations in fish that exceed risk assessment thresholds for people and wildlife.

Mercury is a potent neurotoxin that occurs in several different chemical forms. The most common form is inorganic mercury (Hg^{2+}), which can form complexes in solution with anions such as chloride and sulfide. Mercury produced from mining is inorganic mercury present as mercury sulfide, the reddish ore also known as cinnabar. Cinnabar ore was crushed and roasted during mining operations to produce elemental mercury (Hg^0), the silvery liquid also known as quicksilver. In the California Coast ranges during the time period of 1840 to 1972, millions of pounds of cinnabar ore were mined to produce quicksilver. Much of that quicksilver produced in

California was transported to the Sierra Foothills, where it was used to extract of gold from placer deposits mobilized by hydraulic mining. As a result of the historic mining use, many lakes and streams in California have mercury contaminated sediments present.

Project activities may disturb, or mobilize, mercury and pollutants that may be present in the lake sediments. Mercury contamination in the American River watershed results from the historic use of mercury for gold mining. The first major gold deposits discovered in California were located in the upper watershed of the American River. Folsom Lake, like any other surface water is subject to atmospheric deposition of mercury due to its widespread distribution in the atmosphere from natural sources (volcanoes) and human activities (coal combustion). Mercury is of concern because of the unique biochemical transformations that affect mercury bioaccumulation.

The chemical form of greatest concern is known as methylmercury, which is inorganic mercury with a carbon attached by a covalent bond. Methylmercury has an extremely high affinity for sulfur atoms present in amino acids, and therefore binds to proteins. Small aquatic organisms (zooplankton and benthic invertebrates) that graze on algae that have assimilated methylmercury into protein will tend to retain the protein, and therefore accumulate mercury (bioaccumulation).

Bioaccumulation of mercury tends to increase at successively higher levels in the food web; this process is also referred to as biomagnification. Biomagnification of methylmercury is approximately 1 million fold from dissolved methylmercury in water to the flesh of a top level aquatic predator; in other words, an average concentration of 1 mg/L of methylmercury in water can lead to an average concentration of 1 mg/kg in the flesh of a large mouth bass.

Exposure to elemental mercury through inhalation is more of an industrial/occupational concern, and not relevant to the project setting. Exposure to mercury through drinking water is also not relevant to this environmental analysis. The very small difference between the CTR criterion for mercury in potable water (0.050 ng/L) and non-potable water (0.051 ng/L) reflects the relatively low risk of exposure to inorganic mercury through the drinking water pathway as compared to consumption of organisms; conventional drinking water treatment to remove sediment is also highly effective at removing inorganic mercury, because of its tendency to adhere to particles.

Mercury in Folsom Lake Sediments

The Corps and USBR conducted several sediment assessments in 2006, 2008, and 2011 within the project area. Eighteen samples collected in 2006 by USBR were taken from both terrestrial and aquatic sites in the vicinity of the spillway. All samples were collected using a gravity core, except for one site, where a Ponar grab was used. Samples for total metals were analyzed without any additional processing; samples for mercury analysis were sieved through a 63 micron mesh prior to analysis to remove coarse material.

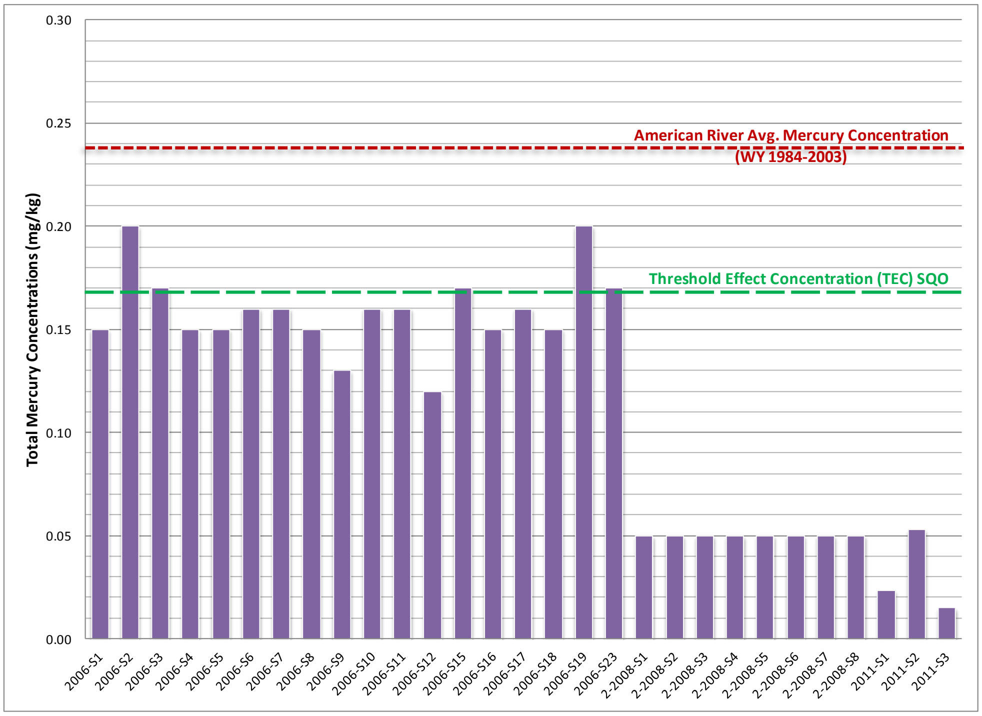
Sediment samples were collected by the Corps in 2008 at eight aquatic sites within the area of the Seismic Refraction Study boundary. Unusually low lake levels allowed sediment samples to be collected from areas that are typically submerged. Stainless steel scoops were used to collect the samples. According to the field sampling and analysis plan (FSAP) sediment samples were not sieved.

Pre-dredge sediment samples were collected by the Corps in 2011 at three locations within the dredging area. Two composite samples were collected from the proposed approach channel location and one was collected from the proposed transload facility. The field sampling FSAP indicates that sediment samples were not sieved. In addition to chemical characterization, modified elutriate tests (MET) were run to characterize the chemical constituents and toxicity of decant water returned to Folsom Lake after dredging and dewatering of sediments.

The 2006 to 2011 assessments show that mercury concentrations in sediments are well below the average concentration of mercury in American River watershed sediments (0.27 ppm), and most are below established thresholds based on State Sediment Quality Objective (SQO) guidance. The observation that eighteen samples collected by USBR in 2006 are consistently higher than those collected later by the Corps in 2008 and 2011 is probably due to the fact that the USBR samples were sieved to remove coarse material—mercury tends to be present at higher concentrations in fine sediments compared to coarse sediments.

The observation that Folsom Lake mercury concentrations in the project area are comparable to watershed background levels may be explained by the fact that the project area is located further from tributary inflow sites where sediments and mercury from the upper watershed would tend to deposit. The upper American River watershed had a relatively low level of mining activity compared to the Bear and Yuba River watersheds. Researchers have suggested that this difference in historic mining activity may account for some of the difference in mercury concentrations in organisms between these watersheds (Figure 8).

In addition to the aquatic sediment samples, soil samples were collected from the haul road to assess total mercury (USBR, 2008). Those samples were collected using a hand auger; they were homogenized using a 10-mesh sieve (~1600 micron size cutoff), which would not exclude coarse sediment. All twenty samples collected had total mercury concentrations below 0.08 mg/kg, which is below the 1.06 mg/kg threshold of significance for mercury.



Sources: USBR (2006); USACE (2008); USACE (2011)

Figure 7. Total Mercury in Project Area Sediment Samples (2006, 2008, and 2011).

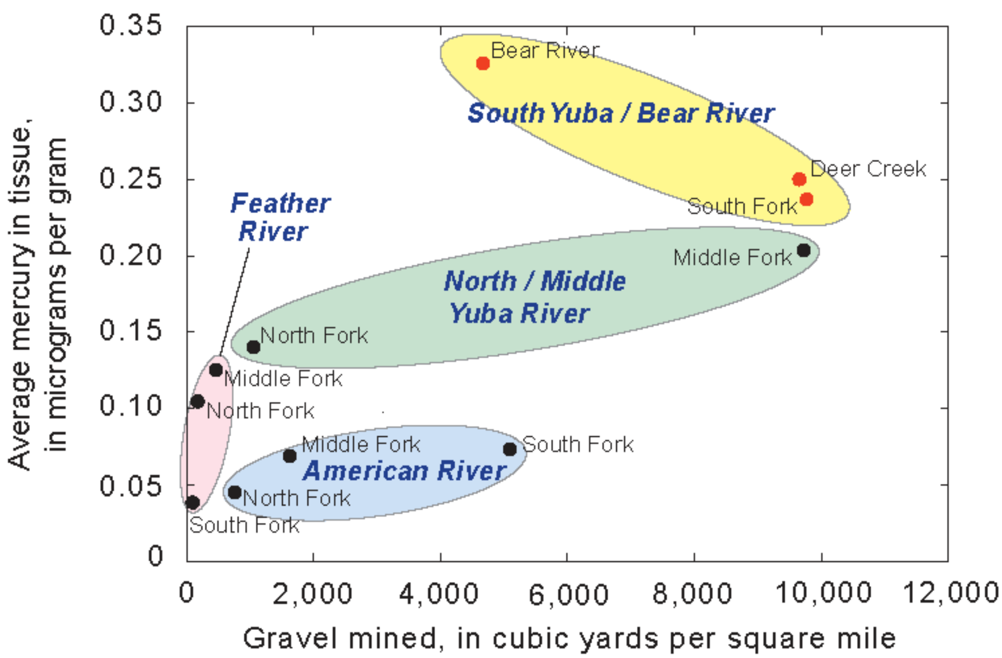


Figure 8. Relationship Between Hydraulic Mining in Sierra Nevada Watersheds and Mercury Concentration in Aquatic Organisms (Alpers et al., 2000).

Mercury Bioaccumulation

The primary concern with mercury contamination is the accumulation of methylmercury in organisms, particularly at the top of aquatic food webs. Mercury occurs in many forms, but methylmercury is the form which poses the highest bioaccumulation risk, because it binds to proteins. Elevated levels of methylmercury in the tissues of wildlife and humans can adversely affect health and fitness. Methylmercury is produced from inorganic mercury in aquatic ecosystems by naturally-occurring bacteria that thrive under low oxygen conditions. In particular, sulfate-reducing bacteria are known to be significant sources of methylmercury. Those bacteria must acquire inorganic mercury to methylate it, so the rate at which bacteria methylate mercury depends in part on how readily the mercury can be acquired, or how "bioavailable" the mercury source is.

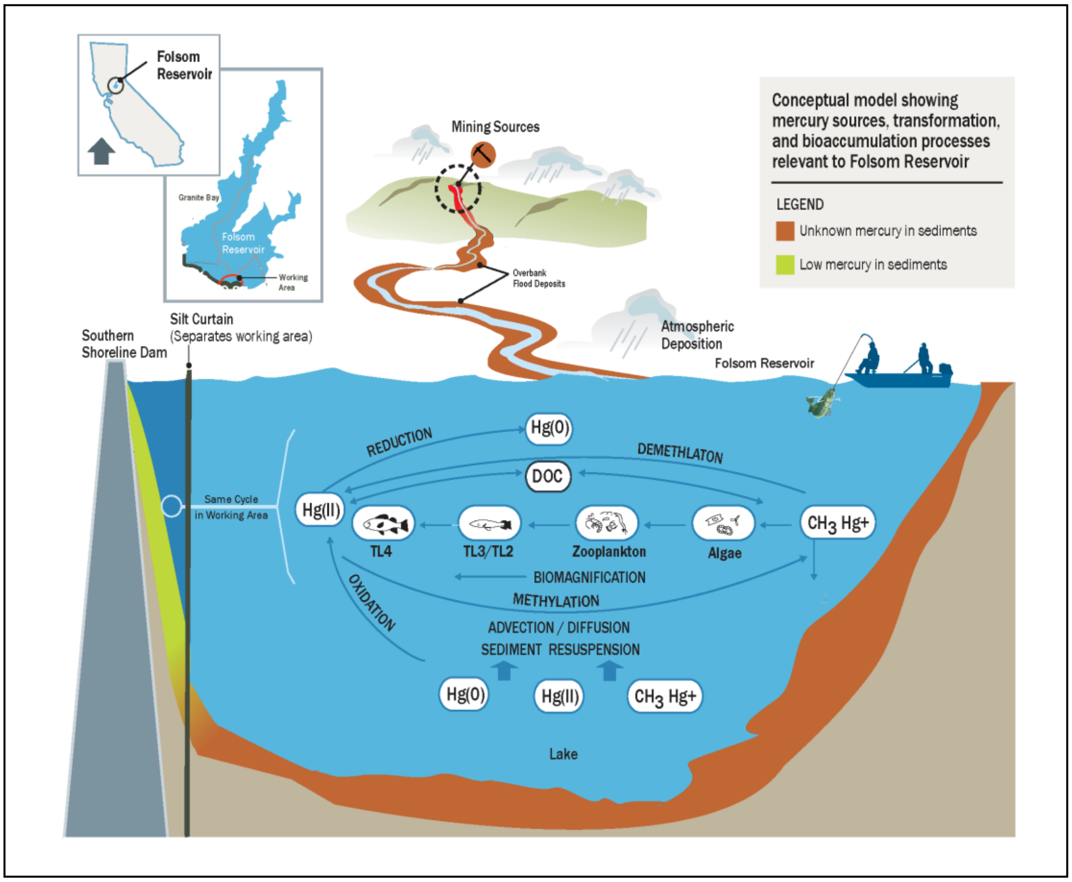
The bioavailability of mercury is highly dependent on site-specific factors that can change. For example, mercury from atmospheric deposition has relatively greater bioavailability that is diminished during watershed transport as the mercury interacts with soils and organic matter. An assessment question related to project activities is whether or not activities would increase the bioavailability of mercury present in reservoir sediments.

It is difficult to forecast exactly how project activities could affect mercury bioavailability, because mercury bioavailability is a relatively new area of research. Resuspension of sediments can potentially increase mercury bioavailability by moving the mercury from bedded sediments, where binding by sulfide and other complexes can reduce bioavailability, up into the water column. If so, any increased methylation effects would be confined to the area where increased amounts of bioavailable mercury are present as a result of project activities. In other words, physical containment of the working area would be an important mitigation measure, given the uncertainties.

The assessment of mercury bioaccumulation potential relies upon a qualitative analysis using a conceptual model for mercury methylation and bioaccumulation in Folsom Lake; the conceptual model is adapted from a generalized conceptual model developed by Alpers et al. (2000) for mercury bioaccumulation in Sierra foothills reservoirs (Figure 9).

As shown in the conceptual model, methylation of bioavailable mercury is one factor that affects the net accumulation of mercury in the food web. Other factors include the degree to which methylmercury is transported out of methylating areas and acquired by algae and their zooplankton grazers. To the extent that any increased methylation effects are contained to within the working area of the project by turbidity control measures, only zooplankton within the project area would be at risk of acquiring increased methylmercury concentrations.

Small fish and benthic invertebrates such as crayfish confined within the working area would also experience more localized effects from grazing on algae and zooplankton. Small fish and crayfish that persist in the working area after activities cease can transport accumulated mercury to predators that feed on them, including larger fish and birds. The significance of mercury accumulated in small fish and invertebrates from within the Project area on the mercury diet of larger fish and birds from the lake and surrounding watershed would be proportional to the fraction of the diet that larger predators obtain from the Project area. As shown by the inset in Figure 9, the affected project area is small, under 70 acres, which represents approximately 0.6 percent of the entire lake surface.



Note: Site conceptual model based on general conceptual model as presented in Alpers et al. (2000)

Figure 9. Conceptual Model for Mercury Bioaccumulation in Project Area.

In addition to the risk factors and spatial scales identified above, the qualitative assessment also considers time scales. Top level predators such as salmon and largemouth bass live for years, whereas the construction windows of in-the-wet operations will last months.

Risk factors that lead to increased methylmercury production include:

- Creation of low oxygen conditions that could increase mercury methylation rates by naturally occurring bacteria;
- Conversion of existing mercury in the lake sediments to forms that are more readily methylated (i.e., reactive mercury, or bioavailable mercury).
- Mobilization of mercury contaminated sediments into existing or created areas of low oxygen and/or high microbial activity.

As noted above, mercury concentrations in project area sediments do not appear to be particularly contaminated in comparison to watershed background levels. Therefore, the assessment for potential mercury bioaccumulation effects from this Project focuses on two risk factors: the creation of low dissolved oxygen and the conversion of existing mercury in lake sediments to forms that are more readily methylated.

Metals

The sediments in Folsom Reservoir contain naturally occurring trace metals, including arsenic, cadmium, chromium, copper, lead, nickel, and zinc. Concentrations of some trace metals may also be increased above natural concentrations by human activities, such as copper released from automobile brake pads, lead released from automobile wheel weights, and zinc released from galvanized steel. Metals in sediments can potentially be mobilized by disturbances, affecting metal concentrations in the overlying water column. Water Quality Objectives for metals are established in the California Toxics Rule (CTR) promulgated by USEPA, which is incorporated by reference in the Basin Plan.

Sediment quality analysis indicates that trace element concentrations are comparable to background concentrations, based on average crustal abundances. Sediment concentrations in Table 10 are used to evaluate the potential for sediment resuspension related to Project activities to cause dissolved metals concentrations that exceed numeric thresholds.

Table 10. Approach Channel Sediment Quality Samples.

Element (Natural Background)*	Units	August 2006 (USBR 2006)		March 2008 (Corps 2008)		October 2011 (Corps 2011)	
		Range	Mean	Range	Mean	Range	Mean
Arsenic (4.8 ± 0.5)	mg/kg	4.1-12	7.44	1.67-5.74	2.84	0.711-2.13	1.43
Cadmium (.09 ± .01)	mg/kg	<0.4-<0.61	<0.50	<1.00-<1.00	<1.00	<0.400-<0.400	<0.400
Chromium (92 ± 17)	mg/kg	44-87	65.06	13.2-36.39	18.52	20.1-35	26.80
Copper (28 ± 4)	mg/kg	41-72	56.34	4.98-8.29	6.88	10.7-26.5	16.90
Lead (17 ±0.5)	mg/kg	12-26	19.65	3.43-8.3	5.02	2.63-6.97	4.47
Mercury (0.05 + 0.04)	mg/kg	0.12-0.2	0.16	<0.100-<0.100	<0.100	0.015-0.0528	0.03
Nickel (47 ± 11)	mg/kg	50-100	76.28	10.4-17	13.49	16.1-33.9	22.30
Zinc (67 ± 6)	mg/kg	60-99	80.06	15.3-30.3	23.20	21.7-45.4	30.83
Total Samples		18		8		3	

*Note: Natural background concentrations based on average ± 1 standard deviation of upper continental crustal abundance, as reported by Rudnick (2003).

Recreational Uses

Recreational uses of the reservoir can affect background water quality by creating litter and bacteria sources, releasing hydrocarbons, oil and grease from boating and motor vehicles, and increasing sediment transport due to erosion. Water quality effects from these activities are managed by enforcement of ordinances and regulations that prohibit dumping, litter, biking and hiking outside authorized areas, and adherence to marina and boat launch regulations.

3.5 FISHERIES

This section discusses fishery resources in the vicinity of the project area. Information regarding regulated fish species can be found in Section 3.1.6, Special Status Species.

3.5.1 Regulatory Setting

Federal

Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)

The Magnuson-Stevens Act establishes a management system for national marine and estuarine fishery resources. This legislation requires that all Federal agencies consult with the National Marine Fisheries Service (NMFS) regarding all actions or proposed action permitted, funded, or undertaken that my adversely affect “essential fish habitat”. Essential fish habitat is defined as “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The legislation states that migratory routes to and from anadromous fish spawning grounds are considered essential fish habitat. The phrase “adversely affect” refers to the creation of any impact that reduces the quality or quality of essential fish habitat.

Fish and Wildlife Coordination Act (FWCA)

The FWCA (16 USC 661 et seq.) provides that fish and wildlife resources shall receive equal consideration with other features throughout the planning process of water resources development projects. The FWCA requires Federal agencies to consult with Federal and 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 Federal and State fish and wildlife resource agencies in project reports and to include measures to reduce impacts on fish and wildlife in project plans.

State

Folsom Lake State Recreation Area General Plan and Resource Management Plan

The California Department of Parks and Recreation (State Parks), in partnership with USBR, completed the integrated FLSRA General Plan and Resource Management Plan (RMP) and DEIR/DEIS (2007), which is the first comprehensive update to the FLSRA RMP since 1979. The plan is the primary management document for the park unit, providing a defined purpose, vision, long term-goals, and management guidelines guides the protection of natural and cultural resources, provides for and manages recreational opportunities, and outlines the future development of public facilities at FLSRA. The major overall goal for fisheries, as outlined in the RMP, is to support the protection and restoration of native anadromous fisheries below Nimbus Dam, including special status species such as Central Valley steelhead and Chinook salmon. Additionally, the RMP outlines guidelines for supporting recreational fishing opportunities in Folsom Lake, including CDFG's recreational fishery programs (State Parks and USBR 2007a).

3.5.2 Environmental Setting

The construction of Folsom Reservoir, completed in 1955, inundated portions of both the North and South Forks of the American River, creating a lake with approximately 85 miles of shoreline and approximately 12,000 surface acres (State Parks 1979). The structure of Folsom Dam, and also of the downstream Nimbus Dam, effectively discontinued the migratory access for anadromous fisheries, and obstructed passage of other fish species. The deepest point of the reservoir lies directly behind Folsom Dam at 266 feet, though the remainder of the reservoir is relatively shallow with a mean depth that averages 66 feet. In general, lake levels are the least variable during the spring and most variable during summer. Fluctuations of the reservoir level due to seasonal flows and anthropogenic draw downs accounted for differences in lake elevations of almost 120 feet between 1985 and 2008 (URS 2009). Reductions in water levels elevations that begin in late spring can affect reproduction of a number of the reservoir's warm water species such as bass, catfish, and sunfish. Shallow water spring and summer nests can be exposed or desiccate as water levels recede affecting annual recruitment into reservoir populations.

Folsom Reservoir is managed for native and introduced cold and warm water fish that utilize the stratified temperature layers of the lake according to thermal habitat needs. Thermal stratification begins in April and usually holds through November when winter rains and high inflows mix the waters. Thermal stratification during summer results in an upper layer of warm water, a transitional zone called a thermocline, and a lower layer of cold water (Wallace, Roberts, and Todd et al. 2003). The deepest section of the reservoir, directly in front of Folsom Dam, is used by salmon and trout during warm summer and early fall months (Thomas pers. comm.) to take advantage of less oxygenated, but colder temperatures in the hypolimnion (deepest) layer. Native cold water fish, rainbow trout and Chinook salmon populations, are maintained through a stocking program operated out of the Nimbus Fish Hatchery by CDFG.

Other cold water and warm water species found within the reservoir maintain populations independent of hatchery support.

Anadromous fish, including Chinook salmon and steelhead that travel up the Sacramento and American Rivers, cannot pass over Nimbus Dam. The Nimbus Hatchery was constructed as a mitigation action for the construction of Folsom Dam. Nimbus Hatchery, located approximately one quarter mile downstream of Nimbus Dam and six and a quarter miles downstream of Folsom Dam, produces the majority of hatchery fish stocked in Folsom Reservoir. CDFG releases several sizes of rainbow trout in Folsom Lake including fingerlings, catchable size, and trophy fish with a stocking quota of approximately 14,000 catchable fish per year (J. Rowan pers. comm. 2012). A management stocking goal for 100,000 fingerling Chinook salmon has not been realized since 2006, but the Inland Chinook Salmon Program managed by CDFG has shown substantial recruitment in Folsom Reservoir from salmon spawning in the upstream forks of the American River since 2009 (J. Rowan pers. comm. 2012).

The Lower American River below Nimbus Dam Hatchery is designated as Essential Fish Habitat for Chinook salmon by the Pacific Fishery Management Council within the Pacific Coast Salmon Plan (USACE 2001b). Government agency working groups set the goals for preferred flow and temperature conditions in the Lower American River to create favorable conditions for downstream populations of salmon and steelhead. The management of the cold water pool in Folsom Lake is critical to the population of fall-run Chinook salmon and steelhead in the Lower American River below Nimbus Dam. Seasonally high water temperatures limit the reproduction, growth, and survival of anadromous salmonids in the Lower American River. Summer releases of cold water from Folsom Lake occur to maintain juvenile steelhead rearing habitat in the lower American River, and fall releases of cold water are made for adult Chinook salmon immigration, spawning, and egg incubation. Salmonids within the reservoir do not qualify as federal listed anadromous salmon and steelhead due to the inability to pass upstream past Nimbus Dam. As a result, no effects to anadromous salmonid species or essential fish habitat would occur within the project area.

With the exception of the hardhead minnow, there are 30 known species that occur within Folsom Reservoir (J. Rowan pers. comm. 2012). Both native and nonnative introduced species form an active recreational fishery, and of these species, bass, trout and salmon are considered the most popular game fish species. Electrofishing surveys conducted in Folsom Reservoir by CDFG in 2003, 2004 and 2009 indicated that spotted bass are present in higher numbers compared to other bass or sunfish species and this is reflected within creel counts (K. Thomas pers. comm. 2011). Wakasagi smelt are also known to occur in high numbers within the reservoir. Dewatering operations were conducted in October 2004 associated with the Folsom Dam Modifications project. A total of 1,250 fish were removed from the basin and included a variety of species and sizes. Wakasagi smelt represent 95 percent of the fish accumulation that also included rainbow trout, spotted bass, largemouth bass, smallmouth bass, riffle sculpin and unidentified bass and sculpin. Bass species represented 4 percent of the total and the remaining three species constituted 1 percent. Dewatering operations conducted in 2000 within the stilling basin recounted similar results.

Listed below are the current fish species known to occur in Folsom Reservoir. Relative ratings of abundance (common, uncommon, rare) were provided by Kevin Thomas, and Jay Rowan, CDFG fisheries biologists. General California species data is attributed to Moyle (2002).

Cold Water Game Fish

Chinook Salmon (*Onchroynchus tshawytcha*)

Folsom Reservoir is stocked for recreational fishing with fingerling and yearling Chinook salmon. In the absence of dams, native Chinook salmon would migrate to upstream rivers and tributaries to spawn and juveniles would return downstream to the ocean. Chinook salmon have been documented traveling upstream from Folsom Reservoir to spawn in the upper American River and tributaries. The amount of natural reproduction from upstream spawning was considered low in 2003 (Wallace, Roberts, and Todd et al. 2003), but has since increased sufficiently to maintain the reservoir population in lieu of regular stocking. Juvenile salmon feed primarily on zooplankton in the reservoir, and are considered catchable when they reach 12 to 14 inches in size. Temperature preferences for juveniles range between 5 and 19 degrees Celsius (°C), while temperatures greater than 24 °C can cause mortality.

Rainbow trout (*Onchorhynchus mykiss*)

The Nimbus Fish Hatchery stocks both juvenile and adult rainbow trout in Folsom Reservoir, creating the bulk of the reservoir's recreational rainbow trout population. Natural reproduction also occurs in tributaries upstream of Folsom Reservoir where trout spawn in gravel with fast flowing water and migrate into other stream pools or the lake to rear. Rainbow trout in lakes feed on zooplankton, benthic invertebrates, or small fish. Temperatures less than 20 °C are preferable for optimum growth and mortality can occur at temperatures greater than 27 °C (Wallace, Roberts, and Todd et al. 2003).

Brown trout (*Salmo Trutta*)

Brown trout are a common nonnative species introduced to Folsom Reservoir. These trout are not currently stocked and maintain a self supporting population by accessing tributaries for spawning. Considered a cold water species, brown trout prefer water temperatures in the range from 12 to 20 °C. Brown trout habitat preferences are similar to rainbow trout, but their diet is more piscivorous; a larger proportion of small fish is consumed as they increase in size. Adults also consume crayfish, and dragon and damsel fly larvae. As fry or juveniles, brown trout feed on zooplankton and macroinvertebrates.

Steelhead (*Oncorhynchus mykiss*)

Though uncommon**,** landlocked steelhead may still be present in Folsom Reservoir as identified by steelhead-like morphological characteristics (J. 2012 pers. comm.). Steelhead are produced in the Nimbus Hatchery, and it is probable that some of these hatchery fish have been introduced into Folsom Reservoir with upstream fish genetically related to the original Central Valley stock.

Kokanne salmon (*Oncorhynchus nerkus*)

Kokanne salmon, the land locked version of the Pacific Ocean sockeye salmon, are not a native species to Folsom Reservoir but have been introduced intermittently since 1964. Prior to 1971, over 5 million fingerlings were introduced. During the years from 1972 to 1982, lower numbers of fingerlings were intermittently stocked in Folsom Reservoir. CDFG resumed plants with 100,000 fish in 1994 and 158,856 in 1995. Fingerlings were again planted in 2006 and 2007, and intermittent stocking continued through 2011. Though intensive stocking has occurred they are still considered an uncommon fish, and stocking was recently discontinued due to sustained absence from creel counts. There is concern from CDFG that competition for plankton from Wakasagi smelt accounts for low survival of these salmon (J. 2012 pers. com).

<u>Warm Water Game Fish Species</u>

Largemouth Bass (*Micropterus salmoides*); Spotted Bass (*M. punctatus*); Smallmouth Bass (*M. Dolomieui*)

Largemouth bass are an introduced species that is considered common in Folsom Reservoir. Largemouth bass are a popular game fish, but they are not stocked in Folsom Reservoir, because they reproduce sufficiently to provide for a recreational fishery. Largemouth bass normally prefer shallow water, less than 20 feet deep, with submerged aquatic vegetation. Young bass feed primarily on plankton, aquatic invertebrates, and fish fry, while adults feed on fish, amphibians, and crayfish, as available. Optimal temperatures for growth are from 25 to 30 °C; water temperatures at 15 °C provides for spring spawning. Substantial reductions of reservoir water levels that begin in late spring affect bass reproduction. Egg and juvenile survival are affected negatively by water level fluctuations that occur during nesting season and can leave nests stranded. Additionally, the lack of aquatic vegetation is not conducive to largemouth bass breeding.

Spotted bass are commonly found in Folsom Lake and of the three bass species present, are the species most often caught according to creel census (J. Rowan pers. comm. 2012). The breeding success of this species in reservoirs is attributed to its ability to spawn in deeper water and more open habitat than the largemouth bass. Smallmouth bass are adapted to cool water streams, but are commonly found in Folsom Reservoir where it attempts to avoid largemouth bass. Adult smallmouth bass are less piscivorous than largemouth bass and their diets consist of more invertebrates.

Bluegill (*Leopomis macrochirus*)

Bluegill are an introduced nonnative species common to Folsom Reservoir. Bluegill are considered a warm water fish and water from 27 to 32 °C is considered optimum for their growth. Spawning occurs in the spring and summer when water temperatures reach 18 to 21 °C.

They are usually found in shallow water among aquatic vegetation and feed on aquatic invertebrates and small fish.

Redear Sunfish (*Lepomis microlophus*)

Redear sunfish are an introduced species from the southeastern United States that prefer deep, still warm water at 24 to 32 °C. They are considered common in Folsom Reservoir, and prefer aquatic vegetation that provides a diet of benthic invertebrates, including snails. Similar to bluegill, spawning occurs in summer over nests in shallow water.

Green Sunfish (*Lepomis cyanellus*)

A nonnative species introduced to Folsom Reservoir, green sunfish are considered a common species that can exist in a wide range of temperatures, but prefer water from 26 to 30 °C. Optimal habitat for green sunfish is shallow lake water with aquatic vegetation. Green sunfish adults consume invertebrates and small fish. Spawning occurs in spring or summer over fine gravel.

White Catfish (*Ictalurus catus*); Channel Catfish (*Ictalurus punctatus*)

White catfish are an east coast species introduced to Folsom Reservoir and are considered an uncommon resident. Channel catfish are introduced from the Mississippi-Missouri River system and are considered common in Folsom Reservoir. While white catfish live in slow moving warm water where temperatures exceed 20 °C during the summer, channel catfish prefer the bottom of swiftly moving rivers. Spawning occurs in June and July over nests when water temperatures reach 21 to 29 °C. A variety of fish and invertebrates compose their diet.

White Crappie (*Promoxis annularis*); Black Crappie (*Promoxis nigromaculatus*)

White and black crappie are introduced nonnative fishes and are considered to be uncommon in Folsom Reservoir. These fish prefer slow moving, warmer water in a temperature range of 27 to 29 °C. Spawning occurs in shallow water nests from March through July.

Brown bullhead (*Ictalurus nebulosus*)

Brown bullheads are introduced to Folsom Reservoir from the eastern United States and Canada. This species tolerates a wide range of temperatures and is able to live in low dissolved oxygen conditions. As a result, in California, they are widely distributed and found in habitats from warm turbid sloughs to clear mountain lakes. Spawning occurs from May through July near aquatic vegetation or large woody debris. Adult brown bullhead are piscivorous and also feed upon insect larvae

<u>Native Non-Game Fishes</u>

Hardhead (*Mylopharodon conocephalus*)

These large native minnows, a California Species of Concern, are found in mid-elevation foothill streams of the Central Valley in preferred habitat of clear, deep pools and runs. When inhabiting reservoirs, hardhead minnows are found in shallower or surface water to utilize optimum water temperatures of 24 to 28 °C. Hardheads would be more likely to be found in preferred habitat of tributaries and streams above Folsom Reservoir, but they do not tolerate predation well by sunfish and bass, and are unlikely to inhabit the tributary arms and the main body of Folsom Reservoir due to the concentration of these predatory species. There is no record of hardhead minnow occurring within the boundaries of Folsom Lake, though they have been recorded much further upstream within the South Fork American River around the Coloma area (K. Thomas, pers.comm. 2011). Spawning occurs in April and May over stream gravel substrate. Juveniles rear along edge habitat in covered areas.

Sacramento Pikeminnow (*Ptychochelilus grandis*)

Sacramento pikeminnow grow up to a meter in length and occupy stream and river habitats with deep pools and cover. They are usually not found in reservoirs, with the exception of proximity to the entrance of large tributaries. Most likely occupied habitat in Folsom Reservoir would be found at the confluence of the north and south forks of the American River into the reservoir. Summer waters with temperatures of 18 to 28 °C are preferred. Spring and early summer spawning occurs over gravel substrate in shallow flowing streams.

Sacramento Sucker (*Catostomus occidentalis*)

The Sacramento sucker is a native species, widely distributed in central and northern California, found most abundantly in larger streams and rivers (Moyle 2002). Sacramento suckers spawn over gravel substrate in stream riffles or along shorelines in lakes. Preferred temperatures are 20 to 25 °C. Larval suckers concentrate in warm stream or lake margins over bottoms with detritus or vegetation. Juvenile suckers are also found in low velocity water in stream margins foraging on algae, diatoms, and some invertebrates.

California Roach (*Lavinia symmetricus*)

The California roach is a small native minnow found in the Central Valley and Sierra Foothills. California roach are considered relatively rare residents of Folsom Reservoir, and are more likely to be found in small tributary streams. Roaches prefer small, warm stream habitats and tolerate a greater temperature range than other native fishes. Spawning occurs in spring and early summer over gravel substrate.

Sacramento Perch (*Arcoplites interruptus*)

Once an abundant food source for native Americans in the Sacramento-San Joaquin River Basins, this native fish has been extirpated from much of its former habitat. This perch, however, is considered common in Folsom Reservoir, possibly due to its relatively wide feeding niche similar to adult largemouth bass and green sunfish. Fry feed primarily on lake bottom crustaceans, and progress to consumption of aquatic insect larvae as yearlings; adults are more piscivorous. Sacramento perch are also able to accommodate a wide range of salinities and alkalinities found in California pond habitats. Like bass, sunfish, and other species in the Centrarchid family, perch reproduce by spawning in relatively shallow water nests.

Prickly Sculpin (*Cottus asper*); Riffle Sculpin (*Cottus gulosus*)

Prickly and riffle sculpins are Sacramento River Basin natives commonly found in flowing streams with rock cover substrate; they are considered uncommon to Folsom Reservoir. Though riffle sculpins have been known to occur in the project area, both sculpins are more likely to be found in flowing reaches of the American River below the Dam, and the river and tributaries upstream of the Reservoir (Corps 2006b). Prickly and riffle sculpins feed on bottom dwelling invertebrates, salmonid eggs and particularly insect larvae. Riffle sculpins prefer fast moving streams and vegetative or rock cover. Water temperatures from 25 to 26 °C are preferred, and spawning occurs from February through April.

Threespine Stickleback (*Gasterosteus aculeatus*)

A native species to California streams and estuaries, the threespine stickleback has a wide osmotic tolerance and is considered an uncommon species in Folsom Reservoir. Within streams, threespine stickleback use shallow, slow water along bank edges that provide variable substrates and vegetative cover. Clear water is necessary for nest building and food foraging. Stickleback require cool water for long term survival in the range of 23 to 24°C. These fish usually form loose schools or shoals, and individuals as well as groups, engage in specific feeding habits. Freshwater populations feed mostly on organisms living on the bottom or amongst aquatic vegetation. Most sticklebacks complete their life cycle in one year, though it is possible for them to live 2 or 3 years. Breeding occurs in late spring to summer, where males sticklebacks construct nests in freshwater.

<u>Introduced Non-Game Fishes</u>

Threadfin Shad (*Dorosoma pretenense*)

Threadfin shad are nonnative fish introduced to California as a forage fish. They inhabit open areas of Folsom Reservoir and slow moving rivers. Warm temperatures of 22 to 24 °C are preferred in the summer. They forage on plant and animal plankton. Spawning occurs in from April through August over submerged material.

Wakasagi Smelt (*Hypomesus nipponensis*)

Native to Japan, Wakasagi smelt were introduced to Folsom Dam in 1989 as forage fish for trout, and have proliferated in large numbers to be a common species of the reservoir. wakasagi smelt were the most numerous fish found in the Folsom Dam stilling basin when it was drained in the year 2000 (Wallace, Roberts, and Todd et al. 2003). The smelt feed on plankton and school in open water. Spawning occurs in April and May with a life cycle of one year.

<u>Additional Introduced Fish</u>

Listed below are additional nonnative fish introduced into the Reservoir that are not considered to be important game or forage fish:

- Mosquito fish (*Gambusia afinis*) - common nonnative
- Carp (*Cyprinus carpio*) - common nonnative
- Goldfish (*Carassius auratus*) - common nonnative
- Golden shiner (*Notemigonus crysoleucas*) – uncommon nonnative
- Bigscale Logperch (*Percina macrolepida*) – uncommon nonative

3.6 AESTHETICS AND VISUAL RESOURCES

The scenic attractiveness and aesthetic value of a site is rated based on the unique combinations and contrasts of the vegetation, landforms, water features, and built environment. The aesthetic experience is highly subjective, and is affected by the viewer's proximity, the viewing duration, and the viewer's past experiences and expectations. There are three primary distance zones that are used as part of the assessment of visibility. These distance zones include:

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

This section describes the regulatory setting, existing views, viewing opportunities, and potentially sensitive resources in the project area, with respect to both natural and manmade features. The viewers (sensitive visual receptors) are identified under each feature of the approach channel project below. There are no scenic highways in the vicinity of the project area.

3.6.1 Regulatory Setting

There are no Federal laws or regulations associated with aesthetics and visual resources. The State of California regulatory guidance for visual resources in the project area is associated with the FLSRA General Plan and Resource Management Plan (RMP). The aesthetic goal of the RMP is the protection and enhancement of views and distinct landscape features that contribute to the FLSRA's setting, character, and visual experience (State Parks and USBR 2007a).

The RMP includes a wide range of guideline in a number of different categories that work towards preserving the visual quality of the FLSRA. The categories of guidelines include scenic quality, facility design, lighting, and general guidelines. The following guidelines are relevant to the overall Folsom JFP, including the approach channel:

- Work with local jurisdictions in the land use planning and development process to protect key views in the FLSRA from continued visual intrusion from surrounding development. This will include appropriate general plan land use designations, zoning to regulate such matters as building height and setbacks, ridgeline protection ordinances that help protect visual resources of the FLSRA, and rigorous development review and enforcement.
- Minimize existing elements that detract from the quality of views and scenic character of the FLSRA, including visual intrusion from adjacent development, as well as facilities within the FLSRA. Strategies could include planting to screen adjacent development, such as at Lake Overlook, Blue Ravine area of Lake Natoma, North Granite Bay, Brown's Ravine, and the Folsom Point.

Buildings, structures, and landscaping should be sited to be sensitive to scenic views from and into the park. Site facilities should minimize the impact on views from key viewpoints (e.g., Nimbus Flat, Lake Overlook, Negro Bar, Beal's Point, Granite Bay, Brown's Ravine, and Folsom Point). Landscape design and planting should be used to visually buffer developed areas, enhance visual quality, and integrate the surrounding native landscape (State Parks and USBR 2007a).

3.6.2 Environmental Setting

The project area is situated in the FLSRA along the southeastern edge of Folsom Lake. The FLSRA represents a significant visual and scenic resource within the region. Although the manmade reservoir was created for flood control, water supply, and power generation, the resulting lakefront offers visitors with dramatic panoramas of the lake and the surrounding natural landscape. The winding lake shoreline and hilly topography provide significant variety in both viewpoint orientation and available viewsheds, creating a wealth of aesthetic conditions and opportunities. There are few areas within the FLSRA that do not provide a positive viewing experience (State Parks and USBR 2007a).

However, while the overall FLSRA provides high quality aesthetic views, the project area itself has been highly disturbed since 2008, due to the ongoing construction of the JFP. The disposal areas at MIAD and Dike 7 have been in use for that function for approximately the same period of time. Therefore, there are two key aspects of the visual character of the project area: 1) the background, which consists of the dramatic, high quality views of Folsom Lake and the surrounding foothills, and 2) the active construction area, which is highly disturbed and of an extremely low visual quality.

There are no historic buildings or scenic highways in the area of analysis; however there are cultural resources. These are described in Section 3.11, Cultural Resources.

Approach Channel and Spur Dike

Views of the approach channel project area can be seen primarily from Folsom Lake Crossing and recreationists in the reservoir and at Folsom Point. The sensitive visual receptors associated with the view of the approach channel and spur dike include drivers, commuters, and bikers on Folsom Lake Crossing; recreationists viewing the project area from Folsom Point; and boaters and recreationists on Folsom Lake itself.

To the west of the Folsom Overlook, the main spillway of Folsom Dam rises out of the lake, flanked by earthen dams; a four story tower sits atop Folsom Dam in sharp relief against the sky. Figure 10 shows the large engineering features in the area. The aesthetic value of such built features is subject to different interpretations. The contrast of built features with their setting can cause determinations of aesthetic contributions to be subjective. Large engineering projects such as Folsom Dam can detract from the scenic character of the setting.

Figure 10. Aerial View of Project Area and Folsom Dam.

Figure 11 shows an aerial view of the approach channel area. The majority of the project area consists of exposed soil, concrete, and rock. From Folsom Lake Crossing, the view of the project area is primarily dominated by the existing spillway excavation and the staging of equipment on the Folsom Overlook. Additionally, one can see dramatic views of the lake in the middleground, surrounded by the oak-studded Sierra Foothills in the background.

For recreationists viewing the project area from the reservoir or Folsom Point, the immediate foreground consists of a bare, unvegetated shoreline, with some banks covered with riprap (Figure 12). Seasonal fluctuations in lake level lead to a "bathtub ring" effect at low elevations (Figure 13). Since the project area is currently active for construction of the spillway's control structure, the equipment staging should be visible for most recreationists on the lakebed or at Folsom Point. However, the rock plug shields the view of the ongoing construction in the spillway chute from the reservoir.

Figure 11. Aerial View of Shoreline at Approach Channel and Folsom Overlook.

Figure 12. View of Shoreline, Looking South from Proposed Approach Channel.

Figure 13. Bathtub Ring Effect, Looking South from Proposed Approach Channel.

Haul Road and Dike 7

Views of the JFP's haul road are primarily from recreationists on the lake or at Folsom Point, and by residences on the hills above Dike 7. The residents on the hills are also the primary sensitive receptors that could be affected by views of the Dike 7 disposal area. Both of these areas are highly disturbed and of a low visual quality.

The JFP's haul road is an existing feature in the project area that was analyzed in the 2007 FEIS/EIR, and was constructed by USBR in the first phase of the JFP. The haul road consists of a dirt road that hugs the shoreline and runs from the Folsom Overlook to the MIAD disposal area (Figure 14). The surrounding hills shield the haul route from the views of motorists on Folsom Lake Crossing and East Natoma Street. Approximately 40 to 50 trucks per day are currently traveling from the Overlook to the disposal areas on the haul road.

Dike 7 is tucked into the hillside approximately halfway between the Overlook and MIAD. It is an active disposal area that has been associated with JFP construction since the project's groundbreaking in 2008. Disposal activities at Dike 7 mostly consist of the disposal of excavated and processed granite rock. As a result, views of Dike 7 from the lake, or from the residents above, would dominated by a large pile of barren rock. However, the residents view of the lake and foothills in the middleground and background would remain intact.

Figure 14. View of Haul Road.

Dike 8

Dike 8 is tucked between two hillsides along the haul route just west of Folsom Point. The area has been previously undisturbed by the project and currently only consists of two features that contrast from the natural environment: 1) the dike itself, which is an earthen berm covered in annual grasses that runs between the two hillsides; and 2) the project haul route, which crosses the area between Dike 8 and the Folsom Reservoir shoreline. Dike 8 is visible from the Folsom Point Church on East Natoma Street, from the newly-constructed residences on Nature Way, and from the Folsom Point access road and gates. However, the view from East Natoma Street is limited by the presence of the church along the road.

MIAD Disposal Area

The primary sensitive receptors near the MIAD disposal area consist of residents in the neighborhoods off of Green Valley Road and East Natoma Street, and drivers on Green Valley Road and East Natoma Street. Views of the MIAD disposal site consist of the gently rolling hills of the Sierra Nevada foothills dotted with occasional trees and shrubs. Large volumes of mounded disturbed earth dominate the foreground at the disposal site, since it has been an active disposal site for the JFP since 2008.

Current disposal operations and excavation at MIAD by USBR has contributed to a disturbed character that is considered to be of lower aesthetic value (Figure 15). Views from the MIAD disposal site include Folsom Reservoir to the north and west, the auxiliary dam to the east, and Green Valley Road, East Natoma Street, and neighboring residential developments to the south and southeast (Figure 16).

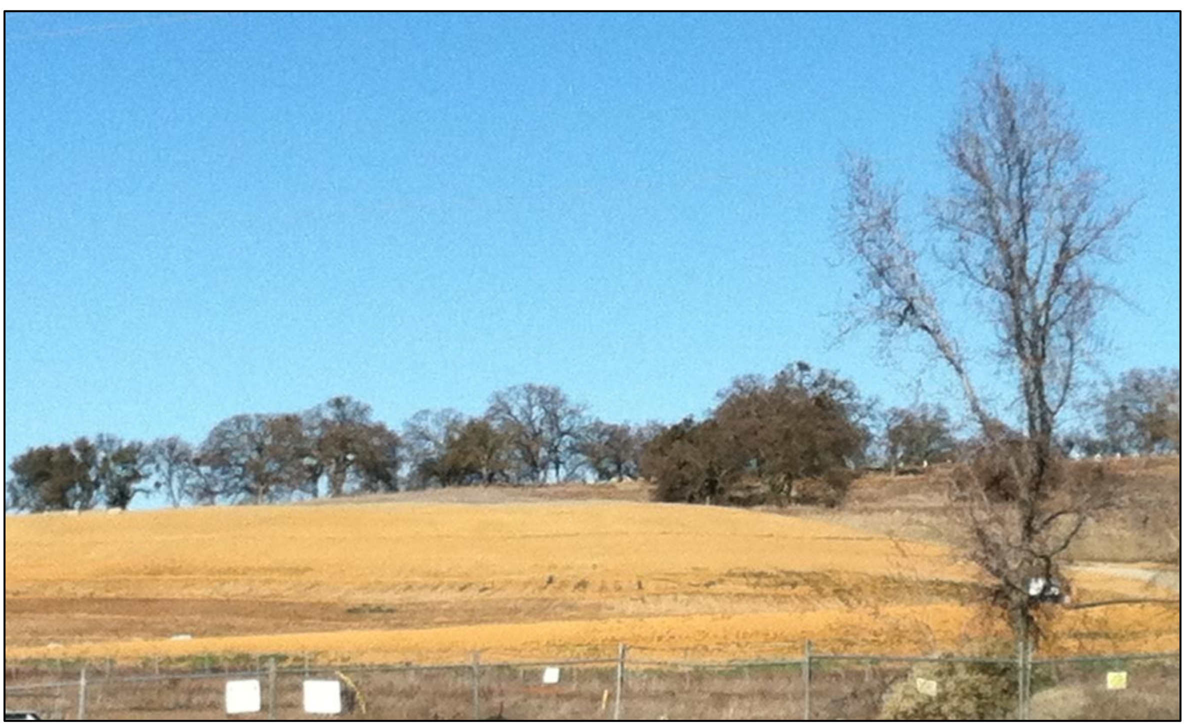


Figure 15. View of MIAD Disposal Area from East Natoma Street.

Figure 16. Southward View from MIAD of Green Valley Road and Residential Areas.

3.7 RECREATION

This section discusses the regulatory and environmental setting for development, management, and use of recreational facilities and resources at Folsom Lake and surrounding public lands. This discussion is focused on the existing conditions for three recreation use areas; Folsom Point, Beal's Point, and Granite Bay within the FLSRA. FLSRA is part of the California State Parks system. The majority of land within the FLSRA is owned by USBR and managed by State Parks. State Parks has acquired some property within the FLSRA. Primary sources of available recreational resource information was acquired from the 2007 FEIS/EIR and the Folsom Lake State Recreation Area General Plan and Resource Management (State Parks and Reclamation 2007a).

3.7.1 Regulatory Background

Federal

Auburn-Folsom South Unit, Central Valley Project of 1965, Public Law 89-161, 79 Stat. 615.

Section 3 of Public Law 89-161 authorizes the Secretary of the Interior to (1) construct, operate, and maintain or provide for public outdoor recreation and fish and wildlife enhancement facilities, (2) to acquire, or otherwise, to include within the unit area such adjacent lands or interests in land as are necessary for present or future public recreation or fish and wildlife use, (3) to allocate water and reservoir capacity to recreation or fish and wildlife enhancement and, (4) to provide for public use and enjoyment of unit lands, facilities, and water areas in a manner coordinated with other unit purposes.

Federal Water Project Recreation Act of 1965, Public Law 89-72, 79 as amended.

Public Law 89-72 allows qualified non-Federal government partners to manage recreation at its water projects through a management agreement and to cost share in planning, developing, operating, and maintaining the leased areas. Public Law 89-72 also allows USBR to transfer recreation and other land management responsibilities to another Federal agency if such lands are included or proposed for inclusion within a national recreation area, or are appropriate for administration by another Federal agency as part of the national forest system, as a part of the public lands classified for retention in Federal ownership, or in connection with an authorized Federal program for the conservation and development of fish and wildlife.

Water Resources Development Act of 1986, Public Law 99-662.

This Act defines the basis for sharing the financial responsibilities in joint Federal/non-Federal development, enhancement, and management of recreation and fish and wildlife resources at Federal water resource development projects.

State

Folsom Lake State Recreation Area General Plan and Resource Management Plan, 2007

State Parks, in partnership with USBR, completed the integrated RMP and DEIR/DEIS (2007), which is the first comprehensive update to the FLSRA RMP since 1979. The plan is the primary management document for the park unit, providing a defined purpose, vision, long term-goals, and management guidelines guides the protection of natural and cultural resources, provides for and manages recreational opportunities, and outlines the future development of public facilities at FLSRA.

California Code of Regulations, Title 14 Division 3

The California Code of Regulations (CCR) contains regulations formally adopted by state agencies. Title 14, Division 3 contains general policies applicable to the overall Department of Parks and Recreation, including all State Parks. These policies include regulations covering a wide range of operations, including concessions, camping, hunting, winter sports, aquatics and boating, architecture and engineering, historic resources, recreation trails, land and water conservation, and off-road vehicles.

3.7.2 Environmental Setting

The FLSRA is an important local, regional, and state recreation resource. With an average of 1.5 million visitors, the FLSRA is one of the most popular sites within California for recreation in the State Parks system (State Parks and USBR 2007a). The popularity of FLSRA is largely due to easy public access, being located next to a growing metropolitan area, and opportunities for year-round use. Recreational uses include both water-based activities and land-based activities. Water-based activities account for approximately 85 percent of all visits to the FLSRA State Parks and USBR 2007a). Activities included boating, personal water craft use, water skiing, wake boarding, sailing, windsurfing, swimming, and fishing. The remaining 15 percent of visitors participate in a variety of land-based activities, such as hiking, biking, picnicking, camping, and horseback riding. Approximately 75 percent of users visit the FSLRA during the warmer spring and summer months. State Parks obtains revenue from use fees paid by the public and rental fees associated with concession operations in the FLSRA. FLSRA spans across three counties (El Dorado, Placer, and Sacramento) as well as the city of Folsom.

Folsom Lake Reservoir

Folsom Reservoir was created in 1956 after the completion of Folsom Dam by the Corps. The reservoir includes 11,500 acres of water surface area to an elevation of 466 feet and over 75 miles of shoreline (USBR 2007). The reservoir's upper arms are designated slow zones for quiet cruising, fishing, and nature appreciation. The shoreline provides sandy swimming beaches, both formal (with lifeguard services) and informal. Summer water temperatures average 72º Fahrenheit, enhancing both water-oriented and shoreline activities. The reservoir serves flood control, water supply, and power generation purposes, and as a result reservoir levels typically fluctuate from a maximum of 466 feet in late winter or early spring to 405 feet during late fall (USBR 2007).

Historical Recreation Use

After the construction of Folsom Dam, State Parks entered into an agreement with USBR to build and manage recreation facilities. The area was designated as the FLSRA and the first facilities opened to the public in 1958. When the FLSRA first opened, the trails were used primarily by equestrians and hikers. The popularity of running in the 1970s and mountain biking in the 1980s greatly increased trail use. The first General Plan for the FLSRA was adopted in 1979.

Recreation activities in the FLSRA have changed significantly since it was open to the public. The popularity of personal watercraft, wake boarding, sailing, and bass fishing tournaments has transformed the boating environment on Folsom Reservoir. Land-based recreational activities have also changed over the years. With urban development surrounding the southern half of the FLSRA, paved trails now play an important part in the region's growing transportation network as more people commute via bicycle.

Current Recreation Use

Recreation facilities on the lake include a marina, boat launch areas, swimming beaches, campgrounds, landscape picnic areas, food and equipment concessions, interpretive facilities, scenic overlooks, restrooms, trail heads and equestrian staging areas. Popular aquatic activities in the FLSRA include boating, personal water craft use, water skiing, sailing, wind surfing, rowing, paddling, swimming, and fishing. Upland activities include hiking, biking, picnicking, camping, and horseback riding. Recreation uses tend to occur in discrete recreation centers with, in most cases, several miles of undeveloped shoreline separating each center.

Granite Bay and Beal's Point are the primary visitor areas on the western shoreline of Folsom Lake, with large day-use areas that include swim beaches, landscaped picnic area, boat launch facilities, restrooms, snack food and beach equipment concessions, trailheads, and associated parking. In addition, Granite Bay includes a modest multi-use activity center and Beal's Point includes a 69-site campground. The smaller and more remote Rattlesnake Bar visitor area provides boat launch facilities and informal access to the shoreline for fishing, swimming, and picnicking.

On the eastern shoreline, Brown's Ravine and Folsom Point are the primary visitor areas. Brown's Ravine is home to the Folsom Lake Marina which provides 675 wet slips, 175 dry storage spaces, boat launch facilities, marine provisions, a fueling station, a small picnic area, and restrooms. Folsom Point includes a picnic area, boat launch facilities, and restrooms. Secondary visitor areas on the eastern shore include Skunk Hollow/Salmon Falls whitewater rafting take-out areas, Old Salmon Falls/Monte Vista trailhead and equestrian staging area, and the Peninsula Campground with 104 campsites.

The FLSRA system of trails and access point links all of the visitor areas on Folsom Lake. Recreation support facilities and Folsom Lake include the Park Headquarters compound at Folsom-Auburn Road and Folsom Dam Road which includes the Gold Fields District Office and Folsom Sector office of State Parks, as well as the USBR Central California Area Office.

Day Use Facilities

Granite Bay, Beal's Point, and Brown's Ravine reach capacity by mid-day during the peak season. On weekdays, peak use periods generally occur during early morning and early evening hours with visitors running, cycling, walking dogs. The majority of the FLSRA visitors tend to be located within a short walk or drive. Since water-related activities account for most visits to FLSRA, the peak season begins as the weather warms. By Memorial Day weekend, recreationist use of FLSRA is high. This high level use continues through Fourth of July and gradually falls off until spiking during Labor Day weekend (State Parks and USBR 2007a). Falling water, Folsom Lake elevation levels, and extremely hot weather are key reasons the primary reasons for the drop in use.

Granite Bay

Granite Bay is the most popular day use facility within the FLSRA. Annual attendance in 2011 was 499,630 visitors. Facilities include picnic areas, a guarded swim beach for summer use, informal unguarded swim areas, equestrian staging area, hiking trails including an Americans with Disabilities Act (ADA)-only trail, parking, a reservable group picnic area, fishing, and boating. There are also a BBQ Pavilion, two baseball/soccer fields, restrooms, snack bar, bicycle/pedestrian trails and well-maintained playgrounds. The boat launch area capacity varies with water levels. Dependent upon water levels, a maximum of 14 boat launch ramps are available. Concessions in the area include a snack bar and beach equipment rentals.

The North Granite area is popular for fishing, horseback riding, and hiking. This area includes an informal beach area at Oak Point, an equestrian staging area, Doton’s Point, and Beek's Bight. An activity center just north of the Main Beach is available by reservation for group use and includes a small picnic area.

Trail facilities at Granite Bay include the equestrian and pedestrian Pioneer Express Trail running north to Auburn State Recreation Area, 8 miles of unpaved multi-use trails running through the area, and an unpaved pedestrian and ADA only trail in the Beek's Bight area.

As with Beal’s Point, capacity is a major concern at Granite Bay, particularly during peak season weekends when the day use parking area at Main Beach and the parking area and launch ramps at the launch area fill by midday. There is only one entrance to Granite Bay at Douglas Boulevard and significant backups occur along the roadway and onto Auburn-Folsom Road when the parking areas fill.

In addition, there is no external access to the sprawling and relatively remote North Granite area. Unrestricted vehicle access along the shoreline at low water is also a concern in the North Granite area. Unrestricted vehicle access causes erosion, potentially impacts water quality, damages vegetation, and threatens cultural resources below the high water line.

Maximum usable elevation of the boat launches areas range from about 400 to 470 feet. When the reservoir surface level is at 466 feet, only one 12-lane ramp and the two-lane boat launch ramp are usable. Elevations of the structures (other than the boat launch ramps), parking lot, and roads at Granite Bay range from approximately 465 to 475 feet.

Beal’s Point

Beal’s Point includes day use facilities and a campground. Annual attendance in 2011 was 244,148 visitors. Facilities include a guarded swim beach for summer use, parking for approximately 400 vehicles, one boat launch ramp, hiking trails, picnic areas, and campsites. Concessions include a snack bar and beach equipment rentals. A large grassy area along the reservoir includes picnic tables, barbeques, and restroom facilities.

The paved multi-use Jedediah Smith Memorial Trail begins at Beal's Point and connects to Lake Natoma and the American River Parkway. The unpaved multi-use Granite Bay Trail connects Beal's Point to other facilities along Folsom Reservoir.

The aquatic facilities at Beal's Point include an informal boat launch ramp, but the area does not have separate parking for vehicles and boat trailers. The informal boat launch ramp is an unpaved ramp that is available for use at specific reservoir elevations only. Ramp use is available for personal watercraft and other very light boats.

During peak season weekends, the parking area generally fills by midday, causing traffic to back up onto Auburn-Folsom Road and surrounding neighborhood streets. This also makes it difficult for campers with reservations to enter the FLSRA.

The structures, parking lot, and roads at Beal's Point range in elevation from 465 feet to 475 feet. When the reservoir surface level reaches 466 feet, water levels are just below the road, parking lot, restrooms/dressing room building, and concessions building. At 466 feet, the beach area would be inundated, although turf areas for picnicking, sunbathing, and other passive uses are still usable.

Folsom Point

Folsom Point, located off East Natoma Street is the most popular day use area on the Folsom Lake eastern shore. Attendance in 2011 from April through September was 85,917 visitors. Facilities include a picnic area with parking for 77 vehicles, and the largest formal boat launch area on the east side of the lake with parking for 129 vehicles. The maximum usable boat ramp elevation at Folsom Point is 468 feet. Aquatic and day use facilities quickly reach capacity during peak season weekends as it is a popular site for staging special aquatic events. During the summer, California State University Sacramento (CSUS) utilizes Folsom Point at Folsom Reservoir for their youth wake board and water ski camp.

Brown's Ravine

Annual attendance in 2011 was 255,170 visitors. The Folsom Lake Marina, located at Brown's Ravine, is the only marina facility in the FLSRA and is open year around. Waiting list for a slip is several years long due to the increased urbanization in El Dorado County. Concessions include a snack bar and beach equipment rentals.

Boat launch facilities accommodate various lake levels. The maximum usable elevation for boat ramp facilities at Brown's Ravine is 468 feet. The main ramp has four lanes and two courtesy docks to assist boaters in the launching and retrieval of their boats. The alternative boat ramp at Hobie Cove becomes operational in the fall when the lake elevation drops to elevation 435 feet. It also is a four lane paved ramp with two courtesy docks. Hobie Cove area is also popular for swimming and sun bathing. Picnic tables, BBQs and restroom facilities are located throughout the Brown's Ravine area.

The Brown's Ravine Trail is an unpaved multi-use trail extends four miles between Folsom Point and Brown's Ravine. The trail begins in the day use area at Folsom Point and ends at the Brown's Ravine/Old Salmon Falls trailhead at Brown's Ravine.

Camping

There are three campgrounds in the FLSRA, providing a total of 176 campsites that accommodate tent, trailer, RV, and group campers. Peninsula campground includes 104 family campsites. Negro Bar campground is compromised of three reservation-only group campsites, two of which are designed to accommodate 50 people, with the third site designed to accommodate 25 people. Beal's Point campground includes 49 family campsites and 20 RV sites with electrical hookups, sanitary dump station, two restrooms, and showers. The RV sites were constructed as mitigation for the loss of the family campsites at Negro Bar that were removed for the construction of the Lake Natoma crossing. Campers have easy access to all of the day use facilities provided at Beal's Point, including trails, the beach, boat launch, picnic area, and snack bar. Full capacity is often reached at all three campgrounds during the peak season.

Recreational Trails

There are 94 miles of existing trails within the FLSRA. Currently there area 46 miles of pedestrian/equestrian, 20 miles of multi-use trails, 16 miles of Class 1 paved trails, 9 miles of mountain bike/pedestrian trails, and 3 miles of pedestrian-only trails, of which 2 miles are ADA accessible. Trails connect Folsom Lake to Lake Natoma and the Auburn State Recreation Area. There is not a continuous trail connection around Folsom Lake.

Special Recreational Events

Throughout the year, permitted special events are held at various locations in the FLSRA. Events include bass fishing tournaments, yacht races, mountain bike races, triathlons, mountain bike triathlons, adventure races, running races, and summer camps. Past race events have included, but are not limited to: Future Pro Tour Amateur Bass Fishing Tournament at Granite Bay, Big Blue Adventure's Folsom Lake Sports Adventure Race at Granite Beach, Nissan Xterra USA Championship Real Mountain Bike Triathlon at Granite Bay and surrounding trails, Folsom Lake Yacht Club Series at Brown's Ravine, American Bass Tournament at Brown's Ravine. During the summer CSUS utilizes Folsom Point at Folsom Reservoir for their youth wake board and water ski camp.

3.8 TRAFFIC AND CIRCULATION

This section discusses the regulatory setting, and describes the local and direct access route to be used during construction, current capacities, traffic volumes, and levels of service for various roadway segments in and near the project area are identified.

3.8.1 Regulatory Setting

Federal

Title 23 of the U.S. Code (USC)

Federal statutes specify the procedures that the U.S. Department of Transportation must follow in setting policy regarding the placement of utility facilities within the rights-of-way of roadways that received Federal funding. These roadways include expressways, most State highways, and certain local roads. In addition, 23 USC 116 requires State highway agencies to ensure proper maintenance of highway facilities, which implies adequate control over non-highway facilities, such as utility facilities. Finally, 23 USC 123 specifies when Federal funds can be used to pay for the costs of relocating utility facilities in connection with highway construction projects.

Title 23 of the Code of Federal Regulations (CFR)

Federal Highway Administration (FHWA) regulations require that each state develop its own policy regarding the accommodation of utility facilities within the rights-of-way of such roads. After FHWA has approved a state's policy, the state can approve any proposed utility installation without referral to FHWA, unless utility installation does not conform to the policy.

Federal regulations do not dictate specific levels of operation or minimum delays, however, which are primarily established by local jurisdiction.

State

California Streets and Highways Code

The California Streets and Highways Code authorize the California Department of Transportation (Caltrans), to control encroachment within the State highway right-of-way. Encroachments allow temporary or permanent use of a highway right-of-way by a utility, a public entity, or a private party.

Caltrans's Right of Way and Asset Management Program is primarily responsible for acquisition and management of property required for State transportation purposes. Transportation purposes may include highways, mass transit guideways and related facilities, material sites, and any other purpose that may be necessary for Caltrans operations. The responsibilities of the Right of Way and Asset Management Program include managing Caltrans' real property for transportation purposes, reducing the costs of operations, disposing of property no longer needed, and monitoring right-of-way activities on Federally assisted local facilities.

3.8.2 Environmental Setting

This section describes the environmental setting as it pertains to traffic and circulation. The project area is located in the southwest region of Folsom Lake, off Folsom Lake Crossing Road and East Natoma Road within Sacramento County. Access to the proposed work sites is restricted to the southwest region of Folsom Reservoir. Direct access to the project area is limited to Folsom Lake Crossing. This section describes highways and local roads in the vicinity of the project area, roadway segments, and classification criteria. On-site haul routes are not discussed since they are not considered part of the public roadway system.

Functional Classification

Sacramento Country and Placer County uses a roadway classification system for long-range planning and programming. Roadways are classified based on the linkages they provide and their function, both of which reflect their importance to the land use pattern, traveler, and general welfare. The functional classification system recognizes differences in roadway function and standards between urban/suburban areas and rural areas. The following paragraphs define the linkage and functions provided by each class.

- **Freeways:** Operated and maintained by Caltrans, these facilities are designed as high-volume, high-speed facilities for intercity and regional traffic. Access to these facilities is limited, and in some cases on- and off ramps are metered during peak-hour periods to reduce congestion caused by merging cars and trucks.
- **Arterials:** Major Arterials (four to six lanes) and Minor Arterials (four lanes)—are the principal network for through-traffic within a community and often between communities.
- **Collectors:** These two-lane facilities function as the main interior streets within neighborhoods and business areas. Collectors serve to connect these areas with higher classification roads (i.e., arterials, expressways, and freeways).
- **Local Streets:** These facilities are two-lane streets that provide local access and service. They include residential, commercial, industrial, and rural roads.

Level of Service

To evaluate a roadway's operational characteristics, a simple grading system is used that compares the traffic volume carried by a road with that road's design capacity. Roadways adjacent to the project area fall with in Sacramento County, Placer Country, and the City of Folsom jurisdiction. Roadways under Caltrans' jurisdiction are also adjacent to the project area. Each of these jurisdictions has adopted standards regarding the desires performance level of traffic conditions on the circulation system within its jurisdiction. A measure called "Level of Service" (LOS) is used to characterize traffic conditions. LOS is a measure of quality of operational conditions within a traffic stream based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience. Six LOS from A (best) to F (worst), define each type of transportation facility. Each LOS represents a range of operating conditions and the driver's perception of those conditions. These LOS thresholds, reflect at the local jurisdiction level through the County and City General Plans, define the minimum levels of acceptable traffic conditions.

Most analysis, design or planning efforts typically use service flow rates at LOS C or D or higher to ensure acceptable operating service for facility users. LOS E generally is considered unacceptable for planning purposes unless there are extenuating circumstances or attaining a higher LOS is not feasible or extremely costly. For LOS F, it is difficult to predict flow due to stop-and-start conditions. Levels of service are typically described in terms of traffic operating conditions for intersections and would be similarly applicable to roadway conditions as shown Table 11.

Table 11. Regulatory Criteria for Roadways and Intersections.

Level of Service (LOS)	Description of traffic conditions
A	Conditions of free flow; speed is controlled by the driver's desires, speed limits, or roadway conditions.
B	Conditions of stable flow; operating speeds beginning to be restricted; little or no restrictions on maneuverability from other vehicles.
C	Conditions of stable flow; speeds and maneuverability more closely restricted; occasional backups behind left-turning vehicles at intersections.
D	Conditions approach unstable flow; tolerable speeds can be maintained but temporary restrictions may cause extensive delays; little freedom to maneuver; comfort and convenience low; at intersection, some motorists, especially those making left turns, may wait through more than one or more signal changes.
E	Conditions approach capacity; unstable flow with stoppages of momentary duration; maneuverability severely limited
F	Forced flow conditions; stoppages for long periods; low operating speeds.

Source: Transportation Research Board 2000

LOS thresholds are based on daily volumes, number of lanes, and facility type. These definitions and metrics are general transportation industry standards found in the Highway Capacity Manual (HCM), American Association of State Highway and Transportation Officials (AASHTO) and Institute of Transportation Engineers (ITE) guidelines and nomenclature. Table 12 shows the relationship of LOS threshold for various roadway functional classifications.

The City of Folsom General Plan (1995) establishes LOS C as the minimum acceptable threshold for City roadways. The Sacramento County General Plan (2011) establishes LOS D as the minimum acceptable threshold for rural roadways and LOS E for urban roadways. All of the Sacramento County roadways in the transportation study area are urban roadways. The Placer

County General Plan (1994) establishes LOS C as the minimum acceptable threshold for County roadways.

Table 12. Roadway Functional Classification Thresholds.

Functional Class	Code	LOS Capacity Threshold (Total vehicles per day in both directions)				
		A	B	C	D	E
2-Lane Collector	2C	-	-	5,700	9,000	9,800
Minor 2-Lane Highway	MI2	900	2,000	6,800	14,100	17,400
Major 2-Lane Highway	MA2	1,200	2,900	7,900	16,000	20,500
4-Lane, Multilane Highway	MH4	10,700	17,600	25,300	32,800	36,500
2-Lane Arterial	2A	-	-	9,700	17,600	18,700
4-Lane Arterial, Undivided	4AU	-	-	17,500	27,400	28,900
4-Lane Arterial, Divided	4AD	-	-	19,200	35,400	37,400
6-Lane Arterial, Divided	6AD	-	-	27,100	53,200	56,000
8-Lane Arterial, Divided	8AD	-	-	37,200	71,100	74,700
2-Lane Arterial, moderate access control[1]	2AMD	10,800	12,600	14,400	16,200	18,000
4-Lane Arterial, moderate access control[1]	4AMD	21,600	25,200	28,800	32,400	36,000
6-Lane Arterial, moderate access control[1]	6AMD	32,400	37,800	43,200	48,600	54,000
4-Lane Arterial, high access control[1]	4AHD	24,000	28,000	32,000	36,000	40,000
6-Lane Arterial, high access control[1]	6AHD	36,000	42,000	48,000	54,000	60,000
4-Lane Freeway[2]	4F	22,200	40,200	57,600	71,400	80,200
4-Lane Freeway with Auxiliary Lanes[2]	4FA	28,200	51,000	72,800	89,800	100,700
6-Lane Freeway[2]	6F	33,300	60,300	86,400	107,100	120,300
6-Lane Freeway with Auxiliary Lanes[2]	6FA	42,300	76,500	109,200	134,700	151,050

Source: Transportation Research Board 2000
Notes:
(1) Used to analyze roadways within County of Sacramento. LOS Capacity Thresholds from Traffic Impact Analysis Guidelines, County of Sacramento, July 2004
(2) Includes mixed flow lanes only. HOV lanes and volumes are excluded from the analysis because a review of existing HOV counts and forecasts showed the HOV lanes to be operating under capacity.

Freeways

There are two prominent freeways with the study area.

- **Interstate 80 (I-80):** I-80 is an east-west route but predominantly runs north-south within the study area. The study area for I-80 extends from Eureka Road to Sierra College Boulevard. I-80 consists of six lanes, divided by barriers, within the analysis area with acceleration/deceleration lanes at the interchanges.
- **U.S. Highway 50:** The study area for Highway 50 runs from Hazel Avenue to El Dorado Hills Boulevard in a predominantly east-west direction. Highway 50 consists of four lanes with two carpool lanes, divided by barriers, within the analysis area with acceleration/deceleration lanes at the interchanges.

Bridges

The following bridges play a prominent role and serve as key linkages to the community within the project study area.

- **Folsom Historic Truss Bridge:** After its reopening to the public in 2000, the historic truss bridge is currently used as a recreational pedestrian and bicycle bridge. Its colorful history reflect the City's long dependence and appreciation of the bridges that has provided service since the 1800's.
- **Rainbow Bridge (Greenback Lane):** Directly below and south of Historic Truss Bridge the Rainbow Bridge provides a more robust two-lane crossing that can handle cars and heavy vehicles. Although supplanted by wider bridges to the north and south, this attractive bridge with characteristic arches serve as key signature symbol for Folsom.
- **Lake Natoma Crossing Bridge:** Completed in 1999, the Lake Natoma Crossing connects Folsom-Auburn Road from the north to Folsom Boulevard to the south. This has brought enormous relief to the community having endured long delays and congestion of using Rainbow Bridge and the Folsom Dam Road when it was open to the public.
- **Folsom Lake Crossing Bridge:** Officially opened on March 29, 2009, the Folsom Lake Crossing Bridge is a modern concrete segmental bridge proving two travel lanes in each direction with Class 1 & 2 bicycle facilities. Situated below the Folsom Dam, this new bridge was constructed under the auspices of the Folsom Dam Raise Project, which is a component of the American River Watershed Long-Term Project.

The combined capacities of the aforementioned bridges has greatly enhanced and contributed to the reduction in crossing delay for both commuter/community and tourist traffic within the project study area.

Arterials, Collectors, and Local Roads by Jurisdiction

Table 13 shows the roadway segments analyzed in each county. Project area roadways range from two to six lanes and have speed limits from 35 to 55 miles per hour. The project area roads provide access to the industrial and residential uses in the vicinity of the project.

Table 13. Roadway Segments.

Sacramento County	Functional Class	Capacity (LOS C/D/E)	Year 2011 Traffic Volumes	
			Traffic Volumes	LOS
Folsom-Auburn Road – Folsom Lake Crossing to Greenback Lane	4AD	37,400	36,335	**E**
Folsom Boulevard – Greenback Lane to Iron Point Rd	4AD	37,400	42,131	**F**
Greenback Lane/Riley St – Natoma Street to Folsom Boulevard/Folsom Auburn Road	2A	18,700	52,281[2]	**F**
Greenback Lane - Hazel Ave to Madison Ave	4AMD	36,000	26,861	C
East Natoma Street – Cimmaron Cir to Folsom Lake Crossing	4AU	28,900	18,502	D
East Natoma Street – Folsom Lake Crossing to Green Valley Rd	4AU	28,900	30,205	**F**
Green Valley Road – East Natoma St to Sophia Pwy	4AU	28,900	35,667	**F**
Oak Avenue Parkway – Blue Ravine Rd to East Bidwell St	6AD	56,000	24,744	C
East Bidwell Street – Clarksville Rod to Iron Point Rd	6AD	56,000	43,803	D
Blue Ravine Road – Oak Avenue Pwy to Green Valley Rd	4AD	37,400	21,734	D
U.S. 50 – Hazel Ave to Folsom Blvd[1]	4FA	89,800	130,183	**F**
U.S. 50 - Folsom Blvd to East Bidwell St[1]	4F	71,400	110,344	**F**
U.S. 50 – East Bidwell St to County line[1]	4F	71,400	91,284	**F**
Folsom Lake Crossing Bridge	4AHD	40,000	29,425	C
I-80 – Douglas Blvd to Greenback Ln[1]	6F	107,100	182,580	**F**
I-80 – south of Greenback Ln[1]	6F	107,100	190,000	**F**
Placer County	**Functional Class**	**Capacity (LOS C/D/E)**	**Year 2011 Traffic Volumes**	**LOS**
Douglas Boulevard – Barton Rd to Folsom-Auburn Rd	4AD	35,400	44,806	**F**
Folsom-Auburn Road – Douglas Blvd to Lake Crossing	4AD	37,400	44,918	**F**
I-80 – north of Douglas Blvd[1]	6F	107,100	182,580	**F**

Source: Transportation Research Board 2000
Note: Year 2011 traffic volumes from the Folsom Control Study – calculated from 2010 ADT (Average Daily Traffic) with an annual 2% growth rate.
(1) Data obtained from Caltrans Traffic Data Branch – calculated from 2010 ATDs with an annual 2% growth rate.
(2) Data obtained from Folsom dam Raise Final Supplemental EIS/EIR – calculated from 2007 ADTs with an annual 2% growth rate.

3.9 NOISE

This section discusses the regulatory and environmental setting for noise conditions in and around the project area. In addition, this section describes the existing sensitive receptors and ambient noise conditions near the project area. The primary source of information for this noise analysis was acquired from the 2009 Noise Analysis for the Early Approach Channel Excavation EA/IS (URS and Ben C. Gerwick, Inc. 2009).

3.9.1 Regulatory Setting

Federal and state governments provide guidelines for construction noise in regards to worker protection and, for this project, traffic noise. The proposed project is located in the vicinity of four convergent jurisdictions: the City of Folsom, Sacramento County, Placer County, and El Dorado County. Construction noise from the project may impact noise sensitive receptors in each of these four jurisdictions. These noise sensitive receptors consist of both human receptors and wildlife receptors. There are no established criteria available for the wildlife species known to occur in the project area. Many regulatory agencies recommend using 60 dBA L_{eq} hourly levels as the threshold for determining significant impacts for sensitive bird species at the edge of suitable habitat.

The City of Folsom's noise standards will be applied to this project because it is the closest jurisdiction with the most restrictive noise ordinance. The local noise standards for Sacramento County, Placer County and El Dorado can be found in Appendix G. Compliance with the City of Folsom standards will assure compliance with all other local noise standards. The noise ordinance standards for the City of Folsom are listed in Table 15, and are based on the L_{50} metric as the baseline criterion level.

Table 14. City of Folsom Noise Ordinance.*

			Noise Levels Not To Be Exceeded In Residential Zone**	
Exterior Noise Standards	**Maximum Time of Exposure**	**Noise Metric**	**7 a.m. to 10 p.m. (daytime)**	**10 p.m. to 7 a.m. (nighttime)**
	30 Minutes/Hour	L_{50}	50 dBA	45 dBA
	15 Minutes/Hour	L_{25}	55 dBA	50 dBA
	5 Minutes/Hour	$L_{8.3}$	60 dBA	55 dBA
	1 Minute/Hour	$L_{1.7}$	65 dBA	60 dBA
	Any period of time	L_{max}	70 dBA	65 dBA
Interior Noise Standards				
	5 Minutes/Hour	$L_{8.3}$	45 dBA	35 dBA
	1 Minute/Hour	$L_{1.7}$	50 dBA	40 dBA
	Any period of time	L_{max}	55 dBA	45 dBA

*Construction Noise Exemption Times: 7:00 a.m. – 6:00 p.m. Weekdays, 8:00 a.m. – 5:00 p.m. Weekends
**5 dBA reduction for impact noise during non-exempt times SOURCE: City of Folsom, CA Municipal Code. Chapter 8.42

Construction noise is exempt from these standards during the periods of 7:00 a.m. to 6:00 p.m. on weekdays and 8:00 a.m. to 5:00 p.m. on weekends. If construction occurs outside of these periods, measures would be required to comply with exterior and interior noise limits at residential receptors. In the event that the measured ambient noise level exceeds the applicable noise level standard, the applicable standard would be adjusted so as to equal the ambient noise level. For impulse noise (such as impact pile driving or blasting), the limits are reduced by 5 dBA in the noise ordinance.

3.9.2 Environmental Setting

Sound Qualities and Standard Units

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity, and interferes with or disrupts normal activities. To provide a frame of reference, common sound levels are presented in Table 14. The standard unit of sound measurement is the decibel (dB). Because of the broad range of audible frequencies, methods have been developed to quantify these values into a single number. The most common method used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that is reflective of human hearing characteristics. Human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This process is termed "A-weighting", and the resulting level is termed the A-weighted decibel (dBA). A-weighting is widely used in local noise ordinances and state and Federal guidelines.

Most ambient environmental noise includes a mixture of noise from nearby and distant sources that creates an ebb and flow of sound, including some identifiable sources plus a relatively steady background noise in which no particular source is identifiable. A single descriptor called the "equivalent sound level" (L_{eq}) is used to describe sound that is constant or changing in level. L_{eq} is the energy-mean sound level during a measured time interval. It is the "equivalent" constant sound level that would have to be produced by a given constant source to equal the acoustic energy contained in the fluctuating sound level measured during the interval.

To describe the time-varying character of environmental noise, the statistical or percentile noise descriptors L_{10}, L_{50}, and L_{90} may be used. These are the noise levels exceeded during 10 percent, 50 percent, and 90 percent of the measured time interval, respectively. Sound levels associated with L_{10} typically describe transient or short-term events. L_{50} represents the median sound level during the measurement interval, while L_{90} levels are typically used to describe background noise conditions. The L_{50} metric is based on the concept that the 50^{th} percentile, or median level, of a noise measurement within a given timeframe, cannot be exceeded. This 50^{th} percentile means that half of the measured noise level values will fall below this number and half of the levels will be above this number. Some standards will use the L_{eq} metric with a duration of one hour. The L_{eq} value for a 1-hour measurement will be a higher level than the L_{50} value for the same measurement because the L_{eq} is driven by the top 50^{th} percentile noise levels while the L_{50} value is not.

Table 15. Sound Levels of Typical Noise Sources and Noise Environments (dBA).

Noise Source (at Given Distance)	Scale of A-Weighted Sound Level in Decibels	Noise Environment	Human Judgment of Noise Loudness (Relative to a Reference Loudness of 70 Decibels*)
Military Jet Take-off with After-burner (50 ft)	140	Carrier Flight Deck	–
Civil Defense Siren (100 ft)	130	–	–
Commercial Jet Take-off (200 ft)	120	–	**Threshold of Pain** *32 times as loud
Pile Driver (50 ft)	110	Rock Music Concert	*16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Power Lawn Mower (3 ft)	100		**Very Loud** *8 times as loud
Propeller Plane Flyover (1,000 ft) Diesel Truck, 40 mph (50 ft) Motorcycle (25 ft)	90	Boiler Room Printing Press Plant	*4 times as loud
Garbage Disposal (3 ft)	80	High Urban Ambient Sound	*2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (3 ft)	70	–	**Moderately Loud** *70 decibels (Reference Loudness)
Air Conditioning Unit (100 ft) Normal Conversation (5 ft)	60	Data Processing Center Department Store	*1/2 as loud
Light Traffic (100 ft)	50	Private Business Office	*1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban Ambient Sound	**Quiet** *1/8 as loud
Soft Whisper (5 ft)	30	Quiet Bedroom	Very Quiet
	20	Recording Studio	
	10	–	Extremely Quiet
	0	–	Threshold of Hearing

SOURCES: Harris, 1991; Louis Berger Group, Inc., 2004; Beranek, 1988.

Within the State of California, the Community Noise Equivalent Level (CNEL) is used to assess noise exposure. CNEL is the energy average, time-weighted noise level for a period of 24 hours. Noise levels during the evening period (7:00 p.m. to 10:00 p.m.) were weighted with a 5 dB penalty, while the noise occurring during the nighttime period (10:00 p.m. to 7:00 a.m.) is weighted with a 10 dB penalty. These weighting factors reflect a person's increased sensitivity to noise during these time periods. For a continuously operating noise source producing a constant noise level operating for periods of 24 hours or more, the CNEL value will be about 7 dB higher than the 24-hour L_{eq} value.

Outdoor sound levels decrease logarithmically as the distance from the source increases. This is due to wave divergence, atmospheric absorption, and ground attenuation. Sound radiating from a source in an undisturbed manner travels in spherical waves. As the sound waves travel away from the source, the sound energy is dispersed over a greater area decreasing the sound pressure of the wave. Spherical spreading of the sound wave from a point source reduces the noise level at a rate of 6 dB per doubling of the distance.

Atmospheric absorption also influences the sound levels received by an observer. The greater the distance traveled, the greater the influence of the atmosphere and the resultant fluctuations. Atmospheric absorption becomes important at distances greater than 1,000 feet. Over long distances, lower frequencies become dominant as the higher frequencies are more rapidly attenuated.

Sensitive Receptors and Ambient Noise

To characterize existing noise levels within the project limits, long- and short-term field noise measurements were conducted at sensitive land use areas that could be affected by project-related noise levels. Complete details of the noise monitoring and measurement program are included in the Folsom JFP Noise Technical Report (Appendix G) prepared for this project. Ambient noise level measurements were taken in Folsom, California from March 24, 2009 to March 26, 2009.

There are several areas within the project vicinity that are classified as noise-sensitive receptors. The noise sensitive receptors can be seen on Plate 6:

- Folsom State Prison, which is located approximately 2,700 feet south of proposed approach channel excavation activities and 2,300 feet west of Dike 7. Folsom State Prison is considered a residential area. Ambient noise level data at the Folsom State Prison were not collected due to security concerns. Access was not granted by the California Department of Corrections and Rehabilitation. As a result, modeling was conducted in order to analyze the levels of noise reaching the exterior of Folsom State Prison. This receptor is marked as MR-1a and MR-1b on Plate 6.
- A residential neighborhood, located approximately 5,700 feet west of the proposed approach channel excavation activities. This community is located west of the American River and east of where Folsom-Auburn Road and Pierpoint Circle meet. This receptor is marked as LT-6 on Plate 6.

- A large neighborhood that stretches from the western intersection of Briggs Ranch Drive and East Natoma Street to the intersection of Green Valley Road and East Natoma Street. Residences in this neighborhood are located approximately 3,700 feet south of the proposed approach channel excavation activities, 1,000 feet south of Dike 7, and approximately 600 feet south of the MIAD disposal area. The residence in the northwestern corner of this neighborhood at Tacana Drive and East Natoma Street is marked as LT-2 on Plate 6.
- Residences closest to the proposed approach channel excavation activities, located at the western end of Mountain View Drive and the western end of Lorena Lane. These residences are located approximately 3,300 feet southeast of proposed approach channel excavation activities. Ambient noise level data was not collected at Lorena Lane, therefore modeling was conducted in order to analyze the levels of noise at this location. These receptors are marked as MR-10 and LT-3 on Plate 6.
- Recreationists using Folsom Point, which is located approximately 4,800 feet southeast of proposed approach channel excavation activities, within 500 feet of Dike 7 and the MIAD disposal area, and approximately 200 feet from the proposed Dike 8 disposal area. Additionally, the haul road runs just south of Folsom Point. Folsom Point is a popular picnic area and boat launch facility. However, since it is a day use facility only, sensitive receptors would primarily be present during noise exempt hours. Only daytime and evening measurements could be completed at this site due to the park being closed at night. Folsom Point is marked as ST-8 on Plate 6.
- A residential community located approximately 8,000 feet southeast of proposed approach channel excavation activities and across the street from the MIAD disposal area. This community is located at the northeast corner of Green Valley Road and East Natoma Street. This community is marked as LT-4 on Plate 6.
- Two residences located directly southwest of the boundary of the proposed MIAD staging area. These homes are located at the northeast corner of Briggs Ranch Drive and East Natoma Street. The nearest residence is located approximately 300 feet southwest of the MIAD staging and disposal area, and approximately 300 feet from the proposed Dike 8 disposal area. Ambient noise level data was not collected at this location, therefore modeling was conducted in order to analyze the levels of noise. These residences are marked as MR-9 on Plate 6.
- The Folsom Point Church of Christ, which is located directly south of the boundary of the proposed Dike 8 disposal area. The church is located at the northwest corner of the intersection of East Natoma Street and Briggs Ranch Drive. Ambient noise level data was not collected at this location, therefore modeling was conducted in order to analyze the levels of noise. This church is marked MR-11 on Plate 6.
- The closest sensitive receptors that are within Placer County are located at the Beal’s Point Campground, which is marked as ST-7 on Plate 6. The campground is approximately 8,600 feet northwest of the proposed construction site. Only daytime measurements were completed here due to campground restrictions.

- The only sensitive receptors in El Dorado County that could be affected by construction noise are homes located along Agora Way, Shadowfax Lane, and Shadowfax Court. This community is approximately 2,500 feet east of the MIAD disposal area and more than 10,500 feet from proposed approach channel excavation activities. This community is marked as LT-5 on Plate 6.
- Potential noise-sensitive wildlife receptors were identified by project biologists within a five-mile radius of the project site. Eight potential sensitive sites were identified in this area and are marked as BIO-1 through BIO-8 on Plate 6. All eight wildlife receptors are located a mile or more away from the project area.

Five long-term measurements were conducted, at sites shown in Plate 6. Eight short-term measurements were conducted during the day, evening, and night for most of the corresponding long-term measurement sites. Each short-term measurement lasted a total of 10 minutes. Short-term day, evening, and night ambient noise level measurements were also completed at all eight noise-sensitive wildlife locations. The table for all short-term measurements can be found in Appendix G.

Table 16 shows existing (ambient) noise levels at human sensitive receptors and wildlife sensitive receptors within the project vicinity based on the results of the noise measurement survey. The reported noise levels are in terms of $L_{50.}$ These measured L_{50} noise levels represent the noise level exceeded more than 30 minutes per hour at these locations.

Table 16. Existing Noise Levels.

Site ID	Location	L_{50} (dBA)	Measurement Type
MR-1a	North Side of Folsom Prison	n/a	Modeled
MR-1b	East Side of Folsom Prison	n/a	Modeled
LT-2	Tacana Drive and E. Natoma St.	66	Long term
LT-3	Mountain View Dr.	46	Long term
LT-4	E. Natoma St. and Green Valley Rd.	73	Long term
LT-5	Shadowfax Court	45	Long term
LT-6	East of Folsom Auburn Rd. and Pierpoint Circle	47	Long term
ST-2	Tacana Dr. and E. Natoma St.	43	Short term
ST-3	Mountain View Dr.	40	Short term
ST-4	E. Natoma St. and Green Valley Rd.	42	Short term
ST-5	Shadowfax Ct.	49	Short term
ST-6	East of Folsom Auburn Rd. and Robin Ln.	42	Short term
ST-7	Beals Point (Campground)	51	Short term
ST-8	Folsom Point (Park)	49	Short term
MR-9	Northeastern-most Residence at Intersection of East Natoma Street and Briggs Ranch Drive	n/a	Modeled
MR-10	Western-most Residence on Lorena Lane	n/a	Modeled
MR-11	The Folsom Church of Christ	n/a	Modeled
BIO-1	Main St.	51	Short term

Site ID	Location	L_{50} (dBA)	Measurement Type
BIO-2	East of Folsom Auburn Rd. and Robin Ln.	41	Short term
BIO-3	Erwin Ave. and Snipes Blvd.	57	Short term
BIO-4	S. Lexington Dr. and Oak Avenue Parkway	N/A	Short term
BIO-5	Willow Bend Rd. and Grey Fox Ct.	66	Short term
BIO-6	Haddington Dr. and E. Natoma St.	46	Short term
BIO-7	Sturbridge Dr. and Stonemill Dr.	73	Short term
BIO-8	Wellington Way and Grizzly Way	45	Short term

3.10 CULTURAL RESOURCES

"Cultural resources" describe several different types of properties: prehistoric and historic archeological sites; architectural properties such as buildings, bridges, and infrastructure; and resources of importance to Native Americans (traditional cultural properties and sacred sites). "Artifacts" include any objects manufactured or altered by humans.

Prehistoric archeological sites date to the time before recorded history, and in this area of the U.S., sites are primarily associated with Native American use before the arrival of European explorers and settlers. Archeological sites dating to the time when these initial Native American-European contacts occurred are referred to as protohistoric. Historic archeological sites can be associated with Native Americans, Europeans, or any other ethnic group. In the project area and surrounding area, these sites include the remains of historic structures and buildings.

Structures and buildings are considered historic when they are more than 50 years old or when they are exceptionally significant. Exceptional significance can be attributed if the properties are integral parts of districts that meet the criteria for eligibility for listing in the National Register of Historic Places (NRHP) or if they meet special criteria considerations.

3.10.1 Regulatory Setting

<u>Federal</u>

Prior to implementation of an undertaking with the potential to cause effects to historic properties, the project must be in compliance with Section 106 of the National Historic Preservation Act of 1966 (36 CFR 800). Section 106 requires Federal agencies, or those they fund or permit, to consider the effects of their actions on the properties that may be eligible for listing or are listed in the NRHP. To determine whether an undertaking could affect NRHP-eligible or listed properties, cultural resources (including archeological, historical, and traditional cultural properties) must be inventoried and evaluated for listing in the NRHP. The term "historic property" specifically refers to a cultural resource that has been found eligible for listing in, or is listed in, the NRHP.

State

CEQA also requires that for public or private projects financed or approved by public agencies, the effects of the projects on historical resources and unique archeological resources must be assessed. Historical resources are defined as buildings, sites, structures, objects, or districts that have been determined to be eligible for listing in the California Register of Historical Resources. Properties listed in the NRHP are automatically eligible for listing in the California Register.

3.10.2 Environmental Setting

A discussion of cultural resources along the American River is included in the American River Watershed, California, Long-Term Study Final Supplemental Plan Formulation Report/Environmental Impact Statement/Environmental Impact Report, Volume II: Appendix A, Attachment 1, Appendix 1E (Corps 2002). A more recent and geographically specific discussion of cultural resources around Folsom Dam is included in the 2007 FEIS/EIR (USBR 2007a), as well as the "Cultural Resources Literature Search, Inventory, and National Register Evaluation for the Folsom Dam Safety and Flood Damage Reduction EIS/EIR" completed by Pacific Legacy, Inc. in 2007. The history of Folsom as a city connects back to several broader themes that have been prevalent in California history: mining, railroads, and early farming and agriculture. The following summary is specific to the historic presence of the Native Americans, the development of Folsom Dam, and the city of Folsom and helps to place it within the history of the region and the State.

Ethnography and Prehistory

The Nisenan were a southern linguistic group of the Maidu people, sometimes referred to as the "Southern Maidu." The name "Nisenan" was a self-designation by the native groups occupying the Yuba and American River drainages (Wilson and Towne 1978). Along with the Maidu and Kinkow, the Nisenan form a subgroup of the California Penutian linguistic family. The Nisenan's range covered a significant portion of the Central Valley and reached into the Sierra Nevada Mountains.

The climate of the area occupied by the Nisenan was of mild weather with wet winters and warm, dry summers. The Nisenan often inhabited areas near rivers, some major areas of significance included sites on the American, Sacramento, Bear, Feather, and Yuba Rivers (Moratto 1984). The basic political unit was a village community or tribelet with one primary village and a few satellite villages under one head authority. Villages within the valley were aware of one another and these varying groups of Nisenan had shared political and cultural connections. Generally, villages consisted of 15 to 20 people and as many as several hundred in one group. House structures were conical, dome shaped, and covered with earth, tule mats, grass thatch, and occasionally bark. These structures, along with the ceremonial lodges or chief's residences, which were large and circular or elliptical, would be situated on low knolls near streams and above marshy floodplains.

The Nisenan mostly settled in permanent or winter settlements and followed a yearly gathering cycle that led them away from the lowlands and into the hill country each summer. During the annual gathering cycle, the Nisenan harvested acorns, nutmeg, pine nuts, buckeyes, and sunflower seeds and often stored these for long periods. Other vegetation, such as greens, tule and cattail roots, brodiaea bulbs, manzanita berries, black berries, and California grapes, was harvested and eaten as it ripened. All valley groups, including the Nisenan, fished trout, perch, chub, sucker, hardhead, eels, Sturgeon, and Chinook salmon. Fishing methods included hook, net, harpoon, trap, weir, and poison (Moratto 1984). The Nisenan crafted tools from stone such as obsidian and basalt to make flaked stone knives and projectile points. They also made ground stone tools such as mortars, pestles, pipes, and charms from locally available rock. Using wood, bone, and plant material, the Nisenan also made weapons, bows, arrow shafts, paddles, canoes, rafts, fishing nets, and baskets (Wilson and Towne 1978).

Early contact occurred at the southern end of Nisenan territory as the Spanish, notably José Canizares in 1776, explored Miwok land. Although there is no record of the Nisenan removal to the Spanish missions, by the late 1820s, white settlement began to encroach on Nisenan land as American and Hudson's Bay Company trappers began to trap beaver in the Nisenan territory under peaceful occupation. In 1833, a disease, believed to be malaria, swept through the Sacramento Valley and decimated the valley Nisenan. An estimated 75 percent of the native population was killed; as a result, there were very few Nisenan left in the valley to face the settlers and gold miners who came soon after the epidemic (Hoover 1990).

History

By January 1850, the discovery of gold in Coloma in 1848 had encouraged development in the Sacramento area. Shortly after the initial discovery of gold, a group of Mormons previously employed by Sutter to work his mill were mining for riches near Folsom. At the juncture of the North and South Forks of the American River, the town of Mormon Island was established around 1848 by Samuel Brannan and a group of about 100 men. By 1855 a small town was flourishing, populated with 2,500 people and complete with two stage lines, a post office, a school, four hotels, seven saloons, and more than a dozen other businesses. The completion of the Sacramento Valley Railroad to Folsom in 1856 marked the firm establishment of Folsom as a destination and began the slow decline of Mormon Island. By 1880 the mining community had disappeared.

The early history of Folsom includes founders such as William Alexander Leidesdorff and Joseph Libby Folsom. Both individuals helped establish the city of Folsom, downstream of the current Folsom Dam. In 1856, Theodore Judah surveyed and laid out the city of Folsom where the 2,048 lots sold in the first day and the city began to flourish.

Mining continued to draw people to Folsom. By 1878, Folsom had a sizeable Chinese population, numbering more than 3,500. With the population continuing to rise, in 1870 Horatio Livermore devised and implemented a project to dam the American River and provide power to Folsom. Completed in 1893 with the use of convict labor from Folsom Prison, the original Folsom Dam provided local power as well as electricity to Sacramento, located 22 miles downstream. There are remnants the Old Folsom Dam just downstream of the current dam and Folsom Lake Crossing Bridge.

Mining activities took the form of dredging operations in 1900 and the population of Folsom slowly grew in the beginning decades of the new century. Eventually water resource needs for the region increased above what the Old Folsom Dam could provide. Although the town of Mormon Island disappeared decades earlier, there were a number of farmers occupying and utilizing the land at and near the juncture of the North and South Forks of the American River at the time of the construction of Folsom Dam (Folsom History Museum 2006).

Folsom Dam, reservoir, and the surrounding area have had an important role in the history of water and growth in California. During the 1920s, drought, water rights, and lack of sufficient storage facilities endangered the State's agricultural future. As a result, the CVP was designed and constructed. Before the construction of Folsom Dam, there was great concern in the Sacramento region about potential flooding if both the Sacramento and American Rivers should ever crest at the same time.

Construction began on Folsom Dam in 1948 under contracts supervised by the Corps. In 1956, the dam joined the overall CVP, and USBR took possession of the dam for operation and maintenance on May 15, 1956. The addition of the dam to the CVP operations added significant reservoir size to the dams on the Trinity, American, and Stanislaus Rivers. As a component of the CVP, Folsom Dam has been a significant contributor to the water and agricultural history of California. As an individual structure, Folsom Dam has had an important effect on flood control in the Sacramento region (Bailey 2005).

Records and Literature Search

The Corps conducted a records and literature search at the North Central Information Center at California State University, Sacramento in December 2011. A number of previous studies have investigated the area of potential effects (APE) for the project's preferred alternative. A survey of the area around MIAD was conducted by USBR in 1990, and Jones and Stokes, Inc. surveyed areas along the present day Folsom Lake Crossing in 1991 and 1993. Surveys conducted in 2004 by USBR and the Corps covered those areas previously surveyed and expanded to include additional areas of the APE. A nearly all inclusive survey of the APE was conducted by Pacific Legacy, Inc. in 2007 as part of the FEIS/EIR (USBR 2007a).

The records and literature search identified two historic properties and two cultural resources within the APE. CA-SAC-937H includes Folsom Dam, as well as its right and left wing dams and has been found individually eligible for listing in the NRHP due to its role in flood control, hydropower, and irrigation in the Sacramento region and it is eligible as a contributing element to the larger CVP. CA-SAC-1103H includes Dikes 7 and 8 and was found eligible for listing in the NRHP as integrated components of Folsom Dam and as important structural elements in the formation of Folsom Lake. CA-SAC-943H is a prospecting pit with associated spoils and drainage. Because no additional features or artifacts were found in association with the site a construction date for CA-SAC-943H could not be determined and a determination of eligibility to the NRHP has not been made. Previous construction for USBR's

Dam Safety, the Corps' Flood Damage Reduction and the combined USBR and Corps Joint Federal Project efforts near CA-SAC-943H have avoided the site. CA-SAC-943H will be avoided for this project effort as well. CA-SAC-358H was recorded within Folsom Lake Reservoir in 1977 and was described at a cement structure likely associated with two holding pads. In the 1977 recordation for the site it was described as 95% destroyed due to erosion by Folsom Lake and bulldozer disturbance associated with road construction.

A review of Folsom Dam construction photos from the 1950s shows that the area around Folsom Dam, including around the dikes, shoreline, and recreation areas, was heavily disturbed by earth moving activities. Blasting was used to remove rock in many places and large equipment was used to build up the dikes and recreation areas. The entire APE has been heavily disturbed by the original dam construction and the road construction, recreation use, and construction of the Dam Safety and Flood Damage Reduction features at Folsom Dam. Because of the historic earth moving activities, no previously undisturbed soil other than the area within the reservoir, would be affected by this project.

Native American Consultation

A list of potentially interested Native Americans was obtained from the California Native American Heritage Commission in October 2011. Those individuals were contacted on multiple occasions regarding the public scoping meeting for the project and the overall proposed project. The Corps met with the United Auburn Indian Community of the Auburn Rancheria (UAIC) in December 2011 to discuss the project and the Tribe's interests and concerns. In a letter dated January 12, 2012, the UAIC concluded they did not have any archaeological concerns for the project beyond recommendations for the use of native plans and resources in potential mitigation banking activities. The Shingle Springs Band of Miwok Indians (SSB) requested information on the project and to meet with the Corps regarding the project. The Corps provided project information and background, as requested, and met with representatives of the SSB on March 16, 2012. The SSB indicated they are interested in activities occurring within the project area and they requested a site visit. A site visit with SSB was conducted on July 19 2012. Follow up phone calls and emails to the SSB did not indicate that the SSB had any further questions or concerns about the project. No other responses from potentially interested Native Americans have been received. Correspondence related to Section 106 consultation is included in Appendix J.

Field Surveys

The majority of the APE has undergone archaeological survey in the last five years. Pacific Legacy, Inc. surveyed most of the APE in 2007 to support USBR's Dam Safety effort and the Folsom Dam Safety and Flood Damage Reduction EIS/EIR. In 2004, the Corps and USBR also surveyed portions of the APE to support the Corps' Folsom Bridge Project and the USBR's geologic testing around Folsom Dam. The only areas of the APE that have not undergone intensive archaeological survey are the haul road between Dikes 7 and 8, portions of the Dike 8 disposal site, and the in-reservoir features (spur dike, approach channel, transload facility, and sediment placement). The haul road between Dikes 7 and 8 is an existing road that has been extensively used in the last five years of construction at and around Folsom Dam. It exists in an area previously disturbed during the creation of the reservoir and the dikes. The portions of the Dike 8 disposal site that have not been previously surveyed will be intensively surveyed for potential historic properties prior to ground disturbing activities.

The portions of the APE that include the spur dike, approach channel, transload facility, and sediment placement are inundated by the Folsom Lake reservoir pool and cannot be intensively surveyed for archaeological resources at this time. In the event that the lake level lowers and the in-reservoir areas become accessible, those areas will be intensively surveyed for potential historic properties. Although an intensive archaeological survey of the inundated reservoir has not been completed, two sites were recorded in 1977 as located within the reservoir, and are within, or in the vicinity of, the APE. CA-SAC-358H is a cement structure likely associated with two holding pads that may be within the area designated within the reservoir for sediment placement and the transload facility. Based on the 1977 recordation that indicates the site was already 95% destroyed at that time, and in consultation with the State Historic Preservation Officer (SHPO), CA-SAC-358H has been determined to be most likely destroyed and without sufficient integrity to be considered as a historic property. The other site, CA-SAC-358H is located well outside the APE and will not be affected. There are no other known cultural resources near the APE within the unsurveyed reservoir.

3.11 TOPOGRAPHY AND SOILS

This section discusses the regulatory and environmental setting on topography and soils in the project area.

3.11.1 Regulatory Setting

Federal

National Pollutant Discharge Elimination System Permit

In California, the State Water Resources Control Board (SWRCB) administers regulations promulgated by the U.S. Environmental Protection Agency (55 CFR 47990). In turn, the SWRCB's jurisdiction is administered through nine regional water quality control boards. To comply with Federal regulations, an operator must obtain a general permit through the National Pollutant Discharge Elimination System (NPDES) Stormwater Program for all construction activities with ground disturbance of 1 acre or more. The general permit requires best management practices (BMPs) to be implemented to reduce sedimentation into surface waters and to control erosion. A storm water pollution prevention plan (SWPPP) must also be prepared. It must address the control of water pollution, including sediment, in runoff during construction. Section 4.4, Water Quality, includes more information about the NPDES and SWPPPs.

State

California Building Standards Code

The California Building Standards Code (CBSC) is certified in the California Code of Regulations (CCR), Title 24, Part 2, which is a portion of the California Building Standards Code. Title 24 is assigned to the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Published by the International Conference of Building Officials, the Uniform Building Code (UBC) is a widely adopted model building code in the United States. The UBC requires extensive geotechnical analysis and engineering for grading, foundations, retaining walls, and other structures, including criteria for seismic design.

In addition, the California Building Standards Code states that "the soil classification and design-bearing capacity shall be shown on the (building) plans, unless the foundation conforms to specified requirements." The CBSC provides standards for various aspects of construction, including excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss.

3.11.2 Environmental Setting

Topography

The project area is located within the American River watershed, which ranges in elevation from 10 feet above mean sea level at the confluence with the Sacramento River to 10,000 feet in the Sierra Nevada Mountains. Folsom Reservoir is located within the westernmost extent of the Sierra Nevada Foothills, set within the valley created by the confluence of the north and south forks of the American River. Folsom Reservoir extends upstream on the north fork to just south of Auburn and about a mile east where Salmon Falls Road crosses the south fork. The slopes surrounding Folsom Reservoir are generally steep to moderate with exception to the flatter areas of the Peninsula Campground area, Goose Flat, and Granite Bay.

Currently the project area consists of the excavated auxiliary spillway chute and the ongoing construction of the control structure. In addition, Folsom Overlook and the rock plug combine to create manmade peninsula within Folsom Reservoir. The rock plug forms a natural rock barrier between the chute and Folsom Reservoir. As a result, this existing topography allows for the rock plug to function as a temporary natural dam. The haul routes and disposal areas are existing features that have been used for previous phases of the project. The haul route extends along the Folsom Reservoir shoreline and consists of a berm built into the natural slopes. The Dike 7 and MIAD disposal areas are in naturally hilly areas that are previously disturbed from ongoing JFP disposal activities.

<u>Soils</u>

Review of the soil data provided through the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) Soil Survey of Sacramento County, California indicates that near-surface soils in the project area identified as Andregg coarse sandy loam; Andregg coarse sandy loam, sandy loam; Andregg-Urban land complex; and Xerolls on top of weathered bedrock. Andregg soil is moderately deep and well-drained with moderately rapid permeability rate. Runoff is slow or medium and the hazard of water erosion is slight to moderate. Andregg soils have a low shrink-swell potential of the surface layer. Urban land consists of areas covered by impervious surfaces or structures, such as roads, driveways, sidewalks, buildings, and parking lots. The soil material under the impervious surfaces is similar to that of the Andregg soil, although it may have been truncated or otherwise altered. Xerolls are well-drained soils on terrace escarpments and steep hill slopes near the Folsom Dam spillway. Permeability is moderately rapid to moderately slow in the Xerolls. Runoff is rapid or very rapid and the hazard of water erosion is severe.

Expansive soils comprised mainly of clays have the ability to swell when water is absorbed or shrink when dry. The shrink-swell potential can result in differential movements beneath foundations. Soils with high clay content tend to be the most affected by expansion. Although soils within the project area contain various levels of clay in their compositions, according to NRCS, the soils types have a low shrink-swell potential (2011).

3.12 VEGETATION AND WILDLIFE

3.12.1 Regulatory Setting

<u>Federal</u>

Fish and Wildlife Coordination Act (FWCA)

The FWCA (16 USC 661 et seq.) provides that fish and wildlife resources shall receive equal consideration with other features throughout the planning process of water resources development projects. The FWCA requires Federal agencies to consult with Federal and 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 Federal and State fish and wildlife resource agencies in project reports and to include measures to reduce impacts on fish and wildlife in project plans.

Executive Order 13112, Invasive Species

This Executive Order requires that Federal agencies, to the extent possible, use relevant programs and authorities to (i) prevent the introduction of invasive species, (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner, (iii) monitor invasive species populations accurately and reliably, (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them.

Local

Sacramento County Ordinance, Chapter 19.12, Tree Preservation and Protection

This ordinance regulates the removal or disturbance to all species of oak trees native to Sacramento County. These species include valley oak (*Quercus lobata*), interior live oak (*Quercus wislizeni*), blue oak (*Quercus douglasii*), oracle oak (*Quercus x moreha*), and black oak (*Quercus kelloggii*). The ordinance applies to any native oak tree. Typically, only trees 6 inches in diameter at breast height (dbh), or greater, are protected.

3.12.2 Environmental Setting

Vegetation

There are five different types of vegetation communities in the project area: (1) open water/ reservoir shoreline fluctuation zone; (2) ruderal herbaceous; (3) oak savannah; (4) transitional wetland; and (5) developed/disturbed areas (Plate 7). These communities and associated wildlife are described below. In addition, the Mormon Island Wetland Preserve is located outside of the project area, but within one-half mile of the MIAD disposal area. The Preserve contains a series of wetlands and ponded areas, some of which remain wet for most of the year.

Open Water/ Reservoir Shoreline Fluctuation Zone

Approximately 175 acres of open water habitat is located within the project area. Folsom Reservoir experiences extreme seasonal water level fluctuations ranging from elevation 425 feet to 466 feet, which corresponds with the minimum and maximum pool volumes for the reservoir. Following the recession of lake waters, the shoreline zone is seasonally vegetated with a mix of ruderal (disturbed, weedy) and grassland species, with large areas that remain mostly barren shorelines with rip rap on the upper slopes. Willow shrubs (*Salix* sp.) are sporadic at the very lowest elevations of the shore. Open water habitat in the project area is largely unvegetated. These areas are frequently inundated and have saturated soil conditions. Animals that use ruderal and barren areas are species associated with open habitats, such as grasslands and oak savannas. Open water habitat provides foraging habitat for waterfowl and other wetland species.

Ruderal Herbaceous

Ruderal herbaceous community is a native community that occurs in and around the project area. This community is dominated by annual grasses such as ripgut brome (*Bromus diadrus*), wild oat (*Avena fatua*), and forbs including horsetail (*Equisetum hyemale*). Ruderal herbaceous community provides cover and foraging habitat for resident and migratory songbirds, small mammals, and reptiles. The ruderal herbaceous community exists primarily along the haul road and the perimeter of the project area, including within the previously undisturbed proposed Dike 8 disposal area.

Oak Savannah

Oak savannah habitat occurs adjacent to the haul road, and within the proposed Dike 8 disposal area. The predominant oak species include valley oak, and live oak. Several wildlife species depend on woodland trees and shrubs for their habitat requirements. Numerous nesting locations and perching sites for birds exist within this area.

Transitional Wetland

Dike 8 disposal area, along the haul route, consists primarily of transitional wetland habitat. This area is flooded when reservoir levels are high by a culvert beneath the haul route, but remains dry when reservoir levels are low. When flooded, this area provides foraging habitat for waterfowl and other wetland species.

Developed/Disturbed Areas

The greater project area is highly disturbed and largely devoid of vegetation, with the exception of small areas of annual grasses and forbs. These areas are categorized as developed/disturbed habitat areas. Various buildings, dams, water control facilities, and related facilities have been constructed near the project area. The lands surrounding these structures are often heavily disturbed during construction. The Folsom Overlook staging area and MIAD and Dike 7 disposal sites are previously disturbed areas of State and Federal land. These areas have been developed under previous actions of the Folsom JFP and are active construction zones. This area provides little to no habitat for wildlife and has little to no vegetation or ground cover.

Wildlife

The project area has poor to non-existent wildlife habitat due to the presence of the dam and continuous dam improvements. The lack of vegetation for cover, nesting, and forage is not conducive for wildlife. The project area is of low habitat quality to migratory birds and lacks suitable nesting areas. However, cliff swallows (*Petrochelidon pyrrhonota*) have been observed nesting under the water pipeline across the auxiliary spillway chute.

The adjacent oak woodland habitat, Mormon Island Wetland Preserve, and transitional wetland at Dike 8 provide habitat to many bird species. Surveys documented acorn wood pecker (*Melanerpes formicivorus*), Anna's hummingbird (*Calypte anna*), Bewick's wren (*Thryomanes bewickii*), bushtit (*Psaltriparus minimus*), golden-crowned sparrow (*Zonotrichia atricapilla*), red-tailed hawk (*Buteo jamaicensis*), ash-throated flycatcher (*Myiarchus cinerascens*), tree swallow (*Tachycineta bicolor*), western kingbird (*Tyrannus verticalis*), great-horned owl (*Bubo virginianus*), and wild turkey nests near the haul road and disposal areas (USBR 2010). Many open water and wetland species are known to forage within a half mile of the project area including the great egret (*Ardea alba*), great blue heron (*Ardea herodias*), Canada goose (*Branta Canadensis*), mallard (*Anas platyrhynchos*), and bald eagle (*Haliaeetus leucocephalus*). The Mormon Island Preserve also provides a perennial wetland for many species including pond turtles.

3.13 SPECIAL STATUS SPECIES

3.13.1 Regulatory Setting

Federal

Federal Endangered Species Act (16 U.S.C. 1531 *et seq*.)

The Federal Endangered Species Act requires that any action authorized by a Federal agency not be likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the Endangered Species Act, as amended, requires Federal agencies to consult with the USFWS and NMFS to ensure that project actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species.

Migratory Bird Treaty Act (16 USC §703-712)

This act implements treaties that the United States has signed with a number of countries to protect birds that migrate across national borders. The act makes unlawful the taking, possessing, pursing, capturing, transporting, or selling of any migratory bird, its nest or its eggs.

State

California Endangered Species Act (Fish and Game Code 2050 *et seq*.)

The California Endangered Species Act (CESA) generally parallels the main provisions of the Federal Endangered Species Act and is administered by CDFG. CESA prohibits take of listed species and state candidate species. State lead agencies are required to consult with CDFG to ensure that any action it undertakes is not likely to jeopardize the continued existence of any endangered or threatened species, or result in destruction or adverse modification of habitat.

3.13.2 Environmental Setting

A listing of Federally-listed proposed, candidate, threatened, or endangered species (listed species) and their associated critical habitat was reviewed for the Folsom and Clarksville 7.5 Minute USGS Quadrangles (USFWS 2011). Ten listed animal species were shown to have the potential to occur within the project area. In addition, six listed plant species were shown to have the potential to occur within the project area; however, further investigations indicated that the highly disturbed habitat within the project area does not have the potential to support listed plant species.

Records from the California Natural Diversity Database were reviewed for State endangered or threatened species (CDFG 2011). Two state species of concern, tricolored blackbird and Ricksecker's beetle, were shown to occur within a quarter mile of the project area. No suitable nesting habitat is present due to the absence of emergent marshland habitat within the project area. The habitat within the project area could not support either species.

Additionally, biological field surveys identified coopers hawk, white tailed kite, and yellow warbler within a half mile of the project area. Table 17 lists the special status animal species, and provides their listing status, basic habitat requirements, and potential to occur in the project area. A complete list from both the USFWS and California Natural Diversity Database searches is presented in Appendix J.

Table 17. Special Status Species with Potential to Occur in Project Area.

Species	Status	Habitat	Potential for Occurrence
Invertebrates			
Conservancy fairy shrimp *Branchinecta conservatio*	FE	Inhabits vernal pools	Unlikely; no vernal pools are within the project area.
vernal pool fairy shrimp *Branchinecta lynchi*	FT	Endemic to the grasslands of the Central Valley, Central Coast mountains, and South Coast mountains, in rain-filled pools. Inhabit small, clear-water sandstone-depression pools and grassed swales, earth slumps, or basalt-flow depression pools.	Unlikely; no vernal pools are within the project area.
valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT	Occurs only in the Central Valley of California, in association with blue elderberry (*Sambucus mexicana*); primarily in riparian woodland and scrub habitat	Potential to occur. Four elderberry shrubs are located in the proposed Dike 8 disposal area.
vernal pool tadpole shrimp *Lepidurus packardi*	FE	Inhabits vernal pools in the Central Valley.	Unlikely; no vernal pools are within the project area.

Species	Status	Habitat	Potential for Occurrence
Ricksecker's water scavenger beetle *Hydrochara rickseckeri*	SSC	Inhabits weedy, shallow, open water, associated fresh water seeps, springs, farm ponds, vernal pools, and slow moving stream habitats.	Unlikely; no vernal pools are within the project area.
Fish			
Central Valley steelhead *Oncorhynchus mykiss*	FT	Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally in inundated floodplains, rivers, tributaries, and Delta.	No; Folsom Dam blocks passage to suitable habitat.
Central Valley spring run Chinook salmon *Oncorhynchus tshawytscha*	FT	Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally in inundated floodplains, rivers, tributaries, and Delta.	No; Folsom Dam blocks passage to suitable habitat.
Central Valley winter run Chinook salmon *Oncorhynchus tshawytscha*	FE	Requires cold, freshwater streams with suitable gravel for spawning; rears seasonally in inundated floodplains, rivers, tributaries, and Delta.	No; Folsom Dam blocks passage to suitable habitat.
Amphibians and Reptiles			
California tiger salamander, central population *Ambystoma californiense*	FT	California endemic, a lowland species restricted to the grasslands and lowest foothill regions of Central and Northern California, which is where its breeding habitat (long-lasting rain pools) occurs. During dry-season, uses small mammal burrows as refuge, travelling up to 1.6 kilometers (km).	No. Outside the Spawning range for the species.
California red-legged frog *Rana draytonii*	FT, SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development and must have access to aestivation habitat.	Unlikely to occur; Folsom Reservoir is unsuitable for this species

Species	Status	Habitat	Potential for Occurrence
Giant garter snake *Thamnophis gigas*	FT	Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals & irrigation ditches. This is the most aquatic of the garter snakes in California..	Unlikely to occur; no suitable habitat is in project area.
Birds			
tricolored blackbird *Agelaius tricolor*	SSC	(Nesting colony) Highly colonial species, most numerous in Central Valley and vicinity: largely endemic to California. Requires open water, protected nesting substrate, & foraging area with insect prey within a few kilometers of the colony.	Unlikely to occur; no suitable habitat is in project area.
Cooper's hawk *Accipiter cooperii*	SSC	Nests in dense stands of oak and conifer woodlands, and valley foothill riparian habitat. Forges in savanna/ grassland edge habitat.	Unlikely to occur; no suitable nesting or forging habitat is located within project area.
yellow warbler *Dendroica petechia*	SSC	Nests in riparian woodland or forest dominated by cottonwoods and willows. Occurs principally as a migrant and summer resident from late March through early October; breeds from April to late July.	Unlikely; no suitable nesting or forging habitat is present within project area. Could be observed during migration in California.
white tailed kite *Elanus leucurus*	FP	Nests in woodlands and isolated trees; forges in grasslands, shrublands, and agricultural fields	Potential to occur. Suitable nesting and forging habitat is present at the proposed Dike 8 disposal area.

(FE) Federal Endangered Species (FT) Federal Threatened Species
(SE) State Endangered Species (ST) State Threatened Species
(FP) State Fully Protected (SSC) California Species of Special Concern

Special status species that were not identified as occurring or having habitat in the project area are not discussed further in this document. The following Federal and State listed special status species were identified as having the potential to occur at the proposed Dike 8 disposal area:

- Valley elderberry longhorn beetle (Federal Threatened)
- White-tailed kite (State Fully Protected)

Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (VELB) is endemic to the riparian habitats in the Sacramento and San Joaquin Valleys where it resides on elderberry (*Sambucus* spp.) plants. The VELB's current distribution is patchy throughout the remaining riparian forests of the Central Valley from Redding to Bakersfield (USFWS, 1984). The VELB is a pith-boring species that depends on elderberry plants during its entire life cycle. Throughout its range, the VELB is estimated to inhabit only about 10% of all suitable elderberry shrubs. Although a recent review of the beetle's status by the USFWS recommends the species for delisting, such action has not yet been finalized.

Elderberry shrubs in the Central Valley are commonly associated with riparian habitat, but also occur in oak woodlands and savannahs, as well as in disturbed areas. In surveys conducted by Corps and USFWS biologists, it was established that there are four non-riparian elderberry shrubs in the oak savannah habitat at the proposed Dike 8 disposal area. The results of this survey are included in Appendix J. Additionally, three elderberry shrubs have begun to grow along the left wing dam approximately 0.25 miles from the approach channel project area.

White-tailed Kite

The white-tailed kite (*Elanus leucurus*) is a common to uncommon, year-long resident in valley lowlands and is rarely found away from agricultural areas. The main prey of the white-tailed kite is voles and other small, diurnal mammals, but it occasionally preys on birds, insects, reptiles, and amphibians. White-tailed kites forage in undisturbed, open grasslands, meadows, farmlands, and emergent wetlands. Nests are made of loosely piled sticks and twigs lined with grass, straw, or rootlets and placed near the top of a dense oak, willow, or other tree stand. Nests are usually found 20 to 100 feet above ground. Suitable nesting habitat for white-tailed kite occurs at the proposed Dike 8 disposal area.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter discusses the potential effects of the alternative plans on the significant environmental resources described in Chapter 3. The conditions described for each resource in this chapter are compared with future conditions with each alternative plan in place.

Both beneficial and adverse effects are considered, including direct effects during construction and indirect effects resulting from the alternatives. Each section, where appropriate, contains a discussion of the methods used to analyze effects. In addition, the bases of significance (criteria) for each resource are identified to evaluate the significance of any adverse effects. Finally, measures are proposed to avoid, minimize, or mitigate any significant adverse effects for each resource.

Many of the resources evaluated in this chapter were initially analyzed in the 2007 FEIS/EIR, in terms of the projected overall effects of the JFP. The FEIS/EIR addressed all appropriate measures to avoid, minimize, or mitigate potential adverse effects to environmental resources for the defined project area. However, as each phase of construction is completed for the JFP, the existing environmental conditions of the area have changed.

The bases of significance for each resource are based on CEQ NEPA implementing regulations (40 CFR 1508.27) and CEQA Guidelines. The Corps has integrated NEPA requirements into its regulations, policies, and guidance. The Corps' Engineering Regulation 1105-2-100, "Planning Guidance Notebook," April 2000, establishes the following institutional, public, and technical significance criteria:

- Significance based on institutional recognition means that the importance of the effects is acknowledged in the laws, adopted plans, and other policy statements of public agencies and private groups. Institutional recognition is often in the form of specific criteria.
- Significance based on public recognition means that some segment of the general public recognized the importance of the effect. Public recognition may take the form of controversy, support, conflict, or opposition expressed formally or informally.
- Significance based on technical recognition means that the importance of an effect is based on the technical or scientific criteria related to critical resource characteristics.

For this SEIS/EIR, these three NEPA criteria apply to all resources and are not repeated for each resource. The CEQA requirements are more specific to the resource and are listed in Appendix G of the CEQA Guidelines. The CEQA criteria relevant to the project area, as well as other agency criteria and thresholds of significance that apply to each resource, are identified under the appropriate resource.

4.2 AIR QUALITY

This section presents and compares potential adverse effects to air quality as compared to the existing conditions discussed in Section 3.6. Potential temporary effects could result from the construction of the alternatives described in Chapter 2. Potentially adverse effects are discussed with respect to emissions resulting from project construction. The methodology for this analysis is described below.

4.2.1 Methodology

The methods for evaluating impacts are intended to satisfy the Federal and State air quality requirements, including the Federal general conformity rule (GCR), and to disclose effects for NEPA and CEQA. The analysis focuses on short-term construction emissions because once constructed, the project would not result in operational (indirect) emissions. Construction emissions for this project were analyzed in detail in a technical report attached as Appendix A.

Several emission models were used to calculate construction emissions. These include the CARB Emission Factor (EMFAC2007/ EMFAC2011) models (onroad vehicle emission factor model) and the CARB OFFROAD2011 model. Daily and total project emissions were estimated from appropriate emission factors from the models or USEPA AP-42 guidance, the type of equipment being operated, the level of equipment activity, and the associated construction schedules. The CARB Harbor Craft Model was utilized to calculate marine emissions. The models estimated criteria pollutants from a variety of construction-related emission sources including mobile sources (trucks, worker vehicles, etc.), construction equipment (marine equipment), and/or fugitive dust sources. Details of modeling assumptions for each project alternative and methodology are provided in Appendix A.

The following construction sources and activities were analyzed for emissions:

- On-site construction off-road equipment emissions (all criteria pollutants) – based on OFFROAD2011 emission factors and estimated equipment schedules.
- On-site construction marine equipment emissions (all criteria pollutants) utilizing CARB Harbor Craft Model – based on USEPA marine guidance emission factors (USEPA 2000), and estimated equipment schedules.
- On-site pickup trucks, on-site haul trucks and off-site haul trucks emissions (all criteria pollutants) – based on EMFAC2007/EMFAC2011 models and estimated vehicle miles traveled.
- Off-site worker vehicle emissions (all criteria pollutants) – based on EMFAC2007/EMFAC2011 models and estimated vehicle miles traveled.
- On-site pickup trucks, on-site haul trucks, off-site haul truck and off-site worker vehicles entrained fugitive dust emissions for paved and unpaved road entrained dust (PM10 and PM2.5) – based on AP-42 methodology and estimated vehicle miles traveled.

- On-site material storage piles handling and wind erosion (PM10 and PM2.5) – based on AP-42 methodology, volume and surface area of storage pile, wind speed and moisture content.
- On-site excavation (cut/fill) fugitive dust (PM10 and PM2.5) – from the URBEMIS model.
- On-site blasting emissions (PM10 and PM2.5) – based on methodology provided in the Blue Rock Quarry Draft Environmental Impact Report (Sonoma County 2005), number of blasts, and approximate size of area subject to blasting activity.
- On-site rock crushing facility (PM10 and PM2.5) – based on AP-42 methodology and the annual production of the one rock crushing facility
- On-site concrete batch plant (PM10 and PM2.5) – based on AP-42 emission methodology and the amount of concrete processed at the one batch plant
- On-site (Dike 7) and off-site (Prison) staging areas used to store equipment and materials (PM10 and PM2.5) – based on AP-42 emission methodology, and volume and surface areas of storage piles, including wind speed moisture content.
- On-site disposal areas (PM10 and PM2.5) – based on AP-42 methodology, volume and surface area of disposal areas, wind speed, and moisture content.

Preliminary air quality emissions calculations indicated that approach channel construction would result in air emissions that could lead to violations of applicable CAAQS and not comply with the Federal Clean Air Act. Due to this concern, SMAQMD, CARB, and the USEPA were contacted for assistance. SMAQMD further requested the Corps to:

- Analyze and disclose the amount and duration of construction related emissions including nitrogen oxides (NO_X), reactive organic gases (ROG), and exhaust and fugitive dust particulate matter (PM), greenhouse gas emissions (GHG), toxic air contaminants (TAC) and odors.
- Determine if each construction-related pollutant would cause significant impacts by comparing the emissions levels to local significance thresholds, State and Federal air quality standards, and transportation and general conformity regulations.
- Provide a thorough discussion of diesel exhaust emissions and naturally-occurring asbestos (NOA) in the soil.
- Identify sensitive receptors in proximity to the project.
- Describe all feasible mitigation measures that would be implemented to avoid and/or minimize significant impacts for each pollutant.
- Include innovative and additional mitigation measures to reduce project air impacts.
- Identify, analyze, and disclose any operation emissions, and if necessary, determine significance and describe feasible mitigation that would be implemented for the project.
- Include all analyses assumptions, calculations, and modeling runs in the document.

- Apply SMAQMD rules to all projects at the time of construction.

4.2.2 Basis of Significance

This section identifies the basis of significance (criteria) for impacts to air quality, discusses how these criteria are determined for both NEPA and CEQA, and provides specific air quality standards, thresholds, or other measurements for the various pollutants. The alternatives under consideration would result in a significant impact related to air quality if they would:

- Increase NOx emissions by more than 85 pounds per day
- Increase NOx emissions by more than 25 tons per year
- Fail to demonstrate conformity to the State Implementation Plan and the Federal general conformity *de minimis* thresholds.
- Increase ROG emissions by more than 25 tons per year,
- Increase PM10, PM2.5, or CO impacts by more than 100 tons per year,
- Disturb more than 15 acres per day of exposed soils or increase PM10 concentrations by more than five percent of the California Ambient Air Quality Standards (2.5 micrograms per cubic meter over 24 hours, or by more than 1 microgram per cubic meter averaged over a year.
- Substantially increase health risks to residents from exposure to diesel particulate matter and NOA,
- Expose residents to excessive odors.

State Implementation Plan and General Conformity *De Minimis* Thresholds

Federal actions need to demonstrate conformity to any SIPs of the regional air basin. Each action must be reviewed to determine whether it 1) qualifies for an exemption listed in the General Conformity Rule (GCR), 2) results in emissions that are below GCR *de minimis* emissions thresholds, or 3) would produce emissions above the GCR de minimis thresholds applicable to the specific area. The General Conformity *de minimis* levels for this project are shown below (Table 18). These thresholds were applied to the project's estimated emissions and used to determine effect significance as detailed below.

Table 18. General Conformity De Minimis Thresholds.

Pollutant	Federal Attainment Status	Threshold Values (tons/yr)[1]
Ozone precursor (NO_x)	Nonattainment: Severe	25
Ozone precursor (ROGs)	Nonattainment: Severe	25
CO	Maintenance	100
SO_2	Attainment	N/A
PM2.5	Nonattainment	100
PM10	Nonattainment: Moderate	100
Pb	No designation	N/A

Source: USEPA 2011
Notes: (1) Thresholds from 40 CFR Parts 51 and 93.

SMAQMD CEQA Thresholds

Relevant SMAQMD CEQA thresholds of significance are summarized below. As the project would not include any Folsom Dam or auxiliary spillway operational activities that generate emissions, only thresholds applicable to construction are presented.

The SMAQMD has established an emission significance threshold for NOx from construction activities. If the project construction emissions exceed the daily CEQA NOx threshold of 85 pounds per day (lbs/day) after on-site mitigation, the project applicant must pay mitigation fees to offset any excess emissions. The SMAQMD currently assesses mitigation fees of $17,080 per ton of NOx but these fees may change annually depending on updates to the applicable guidance.

For construction projects disturbing more than a maximum daily area of 15 acres, PM10 CAAQS are applied as thresholds except for areas with existing or projected nonattainment designations for the PM10 CAAQS. Due to the SVAB's nonattainment designation, SMAQMD has determined that a project's emissions in the SVAB would be significant and considered substantial contributors if they equal or exceed 5 percent of the PM10 CAAQS. The substantial contribution thresholds of the PM10 CAAQS are 2.5 micrograms per cubic meter over 24 hours or more than 1 microgram per cubic meter averaged over a year project.

If a construction project implements all Basic Construction Emission Control Practices (SMAQMD 2011) and a project's maximum daily disturbed area is less than 15 acres, SMAQMD does not consider a project to have the potential to exceed or contribute to the concentration-based threshold of significance for PM10 (Table 19). In this situation, PM10 impacts are considered less-than-significant with incorporation of mitigation.

SMAQMD has also designated the CAAQS as construction thresholds for PM2.5, CO, and SO_2. SMAQMD has not designated a construction threshold for ROG. The CAAQS thresholds for PM10, PM2.5, CO, and SO_2 are shown in Table 19. Because PM2.5 is a subset of PM10, SMAQMD assumes that construction projects that do not generate concentrations of PM10 that exceed the concentration-based threshold of significance would also be considered less-than-significant for PM2.5 impacts. For other criteria pollutants, NO_x, SO_2, and CO,„

SMAQMD requires that the proximity of a project to sensitive receptors and the duration of emissions be used to determine whether concentrations need to be estimated (SMAQMD 2011). Because the project's emission sources in relation to sensitive receptors are greater than 500 feet, the assessment meets the ARB guidance distance and no further roadway-related air quality evaluation of pollutant concentrations is recommended (SMAQMD 2011).

Table 19. SMAQMD Ambient Concentration Thresholds for Criteria Pollutants.

Criteria Pollutant	Project Type	Concentration(mg/m^3)
PM10	24-hour	2.5
	Annual arithmetic mean	1.0
PM2.5	Annual arithmetic mean	0.6
CO	8-hour	500
	1-hour	1,150
SO_2	24-hour	5.25
	1-hour	32.75

Note: SMAQMD has designated the CAAQS as CEQA significance thresholds. CAAQS thresholds for PM10, PM2.5, CO, and SO_2 are shown above. For PM10, a substantial threshold is applicable because the SVAB is in nonattainment. A substantial contribution is considered an emission that is equal to or greater than 5 percent of a CAAQS. The substantial contribution thresholds are indicated above.
Source: SMAQMD 2009, SMAQMD 2011

Offensive Odors

Specific significance thresholds are not available for offensive odors; however, a project would be considered to have significant adverse air quality impacts if it has the potential to create objectionable odors affecting a substantial number of people. In addition, SMAQMD Rule 402 prohibits any person or source from emitting air contaminants that cause detriment, nuisance, or annoyance to a considerable number of persons or the public (SMAQMD 2011). SMAQMD recommends that significance determinations be made on a case-by-case basis and considering parameters such as the Recommended Odor Screening Distances, or odor complaint history.

Toxic Air Contaminants

Diesel Particulate Matter

The use of off-road heavy-duty diesel equipment for site grading and excavation, paving, hauling, and other construction activities would release DPM emissions, which were identified as a TAC by CARB in 1998. The SMAQMD has not established a quantitative threshold of significance for construction-related TAC emissions. Therefore, the SMAQMD recommends that project applicants address this issue on a case-by-case basis, taking into consideration the specific construction-related characteristics of each project and the project's proximity to off-site receptors (SMAQMD 2011).

Naturally Occurring Asbestos

At the request of SMAQMD, the California Geological Survey (formerly the California Division of Mines and Geology) prepared a report called the Relative Likelihood for the Presence of Naturally Occurring Asbestos in Eastern Sacramento County, California (California Geological Survey 2006). To date, NOA has not been located within the project site. However, the report map shows that this project is located in an “area moderately likely to contain NOA.” Given this, earth disturbing activities may expose sensitive receptors to unsafe levels of NOA leading to potentially significant effects (SMAQMD 2011). If NOA is discovered, the Corps will implement CARB’s Asbestos ATCM Mitigation Measures, which would reduce the impacts from NOA to less-than-significant.

4.2.3 Alternative 1 – No Action

Under the No Action alternative, the project construction would not take place. Therefore, there would be no emissions associated with construction activities under the project. Similarly, there would be no long term operational (indirect) emissions under this alternative.

4.2.4 Alternative 2 – Cutoff Wall

Alternative 2 criteria pollutant construction equipment exhaust emissions include PM10, PM2.5, NO_x, ROG, CO, and SO_2. Equipment exhaust emissions would be generated by off-road equipment, off-site haul trucks and worker vehicles, on-site pickup trucks and haul trucks, and by marine equipment. In addition, PM10 and PM2.5 would be emitted as fugitive dust generated by disturbances of unpaved and paved road dust, cut and fill activities, stockpile handling, blasting of rock in-the-dry, rock crushing, wind erosion of stockpiles, and concrete batch plant operations.

Details of the equipment types or construction activities required for each project activity, as well as the resulting criteria pollutant emissions from these equipment types or construction activities, are provided in Appendix A. The primary sources of each criteria pollutant from this alternative’s activities are:

- PM10 and PM2.5: fugitive dust sources, especially unpaved roads and the concrete batch plant;
- NOx: marine and off-road equipment;
- ROG and CO: off-road and marine equipment; and
- SO2: off-site haul trucks.

Alternative 2 unmitigated annual criteria pollutant emissions are provided in Tables 20 and 21. These emissions would exceed the qualitative SMAQMD PM10 threshold and the quantitative SMAQMD NO_x threshold. This alternative’s unmitigated emissions would also exceed the general conformity thresholds for PM10 and NO_X and would not exceed the applicable general conformity thresholds for the other criteria pollutants. However, as shown in Table 23, Alternative 2's implementation of the required SMAQMD basic construction emission control practices, and fugitive dust and exhaust emission mitigation measures would reduce estimated PM10 construction emissions to less than the general conformity threshold. As shown in Table 23, implementation of mitigation measures would reduce NO_x emissions below the general conformity threshold of 25 tons/yr. Therefore, Alternative 2 construction-related emissions would be less-than-significant with mitigation.

Table 20. Unmitigated Alternative 2 Annual Emissions Summary for CEQA.

Activity	Pollutant (lbs/yr)					
	ROG	**NO_x**	**CO**	**PM10**	**PM2.5**	**SO_2**
2013 Total	2,662	43,112	18,587	196,609	41,067	39
2014 Total	1,766	19,538	10,327	189,769	35,790	16
2015 Total	2,047	23,557	13,656	80,441	24,959	14
2016 Total	5,872	68,643	33,438	211,945	39,501	21
2017 Total	6,486	83,009	38,423	204,606	24,741	9
Total (lbs)	18,833	237,859	114,431	883,370	166,058	99
Daily Emissions (lbs/day)	12	152	73	566	106	<1
SMAQMD Thresholds (lbs/day)	N/A	85	N/A	N/A	N/A	N/A

As described in the methodology section above, EMFAC 2011 results were used for the CEQA effect analysis (based on SMAQMD guidance). Total emissions (lbs) were divided by total number of days in the construction period (1,560) to estimate the daily emissions (lbs/day)

Table 21. Unmitigated Alternative 2 Annual Emissions Summary for NEPA.

Activity	Pollutant (tons/yr)					
	ROG	**NO_x**	**CO**	**PM10**	**PM2.5**	**SO_2**
2013 Total	2	21	10	98	21	<1
2014 Total	1	9	5	95	18	<1
2015 Total	1	12	7	40	12	<1
2016 Total	3	34	17	106	20	<1
2017 Total	3	40	20	102	12	<1
General Conformity *De Minimis* Levels	25	25	100	100	100	N/A

Based on USEPA guidance, EMFAC 2007 results were used for the NEPA effect analysis.

Table 22. Mitigated Alternative 2 Annual Emissions Summary for CEQA.

Activity	Pollutant (lbs/yr)					
	ROG	**NO_x**	**CO**	**PM10**	**PM2.5**	**SO_2**
2013 Total	1,118	14,690	7,350	57,365	9,087	39
2014 Total	821	9,005	6,569	34,399	4,605	16
2015 Total	898	9,962	8,868	13,617	2,441	14
2016 Total	2,318	28,850	22,180	38,612	5,301	21
2017 Total	2,648	30,439	24,785	56,448	7,542	9
Total (lbs)	7,803	92,946	69,752	200,441	28,977	99
Daily Emissions (lbs/day)	5	60	45	128	19	<1
SMAQMD Thresholds (lbs/day)	N/A	85	N/A	N/A	N/A	N/A

Table 23. Mitigated Alternative 2 Annual Emissions Summary for NEPA.

Activity	Pollutant (tons/yr)					
	ROG	**NO_x**	**CO**	**PM10**	**PM2.5**	**SO_2**
2013 Total	1	7	4	29	5	1
2014 Total	<1	4	3	17	2	<1
2015 Total	<1	5	4	7	1	<1
2016 Total	1	14	11	19	2	1
2017 Total	1	15	12	28	3	1
General Conformity *De Minimis* Levels	25	25	100	100	100	N/A

To comply with the qualitative SMAQMD CEQA significance threshold for PM10 and minimize particulate (PM10 and PM2.5) emissions, Alternative 2 would implement mitigation measures discussed in Section 4.2.7 below, including SMAQMD's basic construction emission control practices, construction area particulate matter mitigation measures, fugitive dust mitigation measures, and exhaust emission mitigation measures. As shown in Tables 22 and 23, Alternative 2 mitigated PM10 emissions would be substantially reduced from the unmitigated emissions. As a result, this impact is less-than-significant with mitigation.

Implementation of the exhaust emission mitigation measures would reduce NO_x emissions from the project but maximum daily emissions could potentially exceed the SMAQMD threshold. Therefore, NO_x mitigation fees could apply to the project. However, it is difficult to determine the worst-case daily NO_x emissions due to potential changes in equipment type, timing, and use. At the time of construction, project contractors will coordinate with SMAQMD to determine the level of mitigation fees that must be paid. According to the SMAQMD's CEQA guidance, payment of a mitigation fee to the SMAQMD, would reduce the significance of the alternative's NO_x emissions to a less-than-significant level. Therefore, this impact is less-than-significant with mitigation.

The emissions calculations listed in Tables 20 through 24 were conducted assuming a worst-case scenario for construction equipment emissions. Potential changes to reduce the emission calculation figures include the following:

- Deposition of excavated material at the spur dike (overlook expansion) rather than the MIAD disposal site. Haul trips to MIAD would be reduced as a result of this change.
- Reduction of material required for transload facility construction. Relocation of the transload facility to a shallower reservoir location could potentially reduce the amount of rock haul needed for construction, from 230,000 cy to 40,000 cy, which would reduce haul truck emissions.

Prior to the start of construction, the contractor will coordinate the final projected emissions with SMAQMD and adjust the required mitigation, as discussed in Section 4.2.7 below, based on all updated project conditions. Emission levels will not exceed the emission figures listed in Tables 20 through 24 throughout the project, and thus would be less-than-significant.

Table 24. Alternative 2 Construction NO_x Mitigation Fee Calculation for CEQA.

Parameter	Alternative 2
Total Unmitigated NO_x Emissions (lbs)	428,326
Total Mitigated NO_x Emissions (lbs)	230,935
Average Daily Unmitigated NO_x Emissions (lbs/day)	275
Average Daily Mitigated NO_x Emissions (lbs/day)	148
Total Over Threshold (lbs/day)	63
Total days of Construction	1,560
Total Mitigated Tons over Threshold (tons)	49.17
Mitigation Fee per ton	$17,080
Administrative Fee	5%
Total Fee	**$881,815**

Notes: (1) Total days of construction for Alternative 2 over 5 years assuming 6 days of construction per week = 1560 Days.
(2) Current Threshold for NOx is 85 lbs/day.
(3) 5 % administrative fee applied to the product of the total mitigated tons over the threshold and the mitigation fee.
(4) As described above, EMFAC 2011 results were used for the CEQA effect analysis and mitigation fee calculation (based on SMAQMD guidance).

<u>Construction Emissions of TACs</u>

The TACs of interest to this alternative are DPM and NOA. DPM would be emitted from on-site off-road heavy duty construction equipment, on-site pickup trucks, on-site haul trucks, and off-site haul trucks. DPM is considered a carcinogen and the project would expose nearby receptors to these emissions during the construction period.

Sensitive receptors within 1,000 feet of the Alternative 2 construction area, including the disposal and staging areas or haul road, are residences between the western intersection of Briggs

Ranch Drive and East Natoma Street to the intersection of Green Valley Road and East Natoma Street, and the Folsom Church of Christ. Therefore, these sensitive receptors could be potentially exposed to the DPM cancer risk from the project.

However, health risks associated with exposure to carcinogenic substances are typically measured over 70 years of exposure. Since the proposed project is a short-term construction project lasting only five years, the potential human exposure to DPM from this alternative would be short-term. In addition, all off-site receptors are located near the staging areas or haul roads, where the only construction activities would involve the on-site pickup trucks and on-site haul trucks. In the worst-case scenario, they will be exposed to daily DPM mass emissions (using PM10 emissions as a substitute for DPM emissions) of 2 lbs per hour (lbs/hr) for Alternative 2.

Implementation of the required SMAQMD basic construction emission control practices, the construction area particulate matter, fugitive dust, and exhaust emission mitigation measures would substantially reduce DPM emissions to less than 1 lb/hr. Consequently, the project's health risks associated with DPM would be less-than-significant.

Construction workers for Alternative 2 or local sensitive receptors would potentially be exposed to NOA, if present in the project area, from fugitive dust sources such as excavation, stockpiling, or blasting activities. A previous investigation of the project area's geology, including soil testing efforts, indicated that the project area overlies granitic rock except for the MIAD area, which overlies metamorphic rock (ultramafic rocks) (USBR 2009). The granitic material would not be expected to contain any NOA materials. Although no NOA has been discovered in the MIAD area (Corps 2010), ultramafic rock near this area could include NOA and pose a risk to construction workers or sensitive receptors.

This alternative could expose offsite sensitive receptors to NOA through track-out-related fugitive dust emissions or transport of any uncovered soils. However, measures identified in Section 4.2.7 below would reduce the potential for ingress/egress of construction vehicles to track–out soils and expose sensitive receptors to airborne NOA. These measures would also comply with CARB's Asbestos ATCM and would include implementation of truck speed limits, street sweeping, watering of soils, covering haul trucks or allowing free board space, and creating paved surfaces as soon as possible. The alternative's implementation of mitigation measures to reduce PM10 emissions and comply with CARB's Asbestos ATCM would reduce the potential for workers or sensitive receptors to be exposed to airborne NOA. Therefore, Alternative 2 construction emissions of NOA would be less-than-significant with mitigation.

Construction-Related Odor Emissions

Alternative 2 construction activities could emit offensive odors through SO_2 emissions. As described above, SO_2 emissions during the construction period would be less than 1 ton/yr. The closest sensitive receptors to potential odor emissions are located within 1,000 feet from the Alternative 2 construction area. However, because ultra-low sulfur diesel fuel is now required in California, the potential for diesel-related odor effects is minimal. Odor impacts resulting from Alternative 2 construction activities would therefore be less-than-significant.

4.2.5 Alternative 3 – Cofferdam

Alternative 3 criteria pollutant construction emissions include PM10, PM2.5, NOx, ROG, CO, and SO_2 emitted as equipment exhaust. Equipment exhaust emissions would be generated by off-road equipment, off-site haul trucks and worker vehicles, on-site pickup trucks and haul trucks, and by marine equipment. In addition, PM10 and PM2.5 would be emitted as fugitive dust generated by disturbances of unpaved and paved road dust, cut and fill activities, stockpile handling, blasting of rock in-the-dry, rock crushing, wind erosion of stockpiles, and concrete batch plant operations.

Details of the equipment types or construction activities required for each project activity, and the resulting criteria pollutant emissions from these equipment/construction activities, are provided in Appendix A. The primary sources of each criteria pollutant from this alternative's activities are:

- PM10 and PM2.5: fugitive dust sources, especially unpaved roads and the concrete batch plant;
- NOx: marine and off-road equipment;
- ROG and CO: off-road and marine equipment; and
- SO2: off-site haul trucks.

Alternative 3 unmitigated PM10 and PM2.5 annual emissions are shown in Tables 25 and 26. These emissions would exceed the qualitative SMAQMD PM10 threshold and the quantitative SMAQMD NO_x threshold. This alternative's unmitigated emissions would also exceed the general conformity thresholds for PM10 and NO_X and would not exceed the applicable general conformity thresholds for the other criteria pollutants. However, as shown in Table 28, Alternative 3 implementation of the required SMAQMD basic construction emission control practices, and fugitive dust and exhaust emission mitigation measures would reduce estimated PM10 construction emissions to less than the general conformity threshold. As shown in Table 28, implementation of mitigation measures would also reduce NO_x emissions below the general conformity threshold of 25 tons/yr. Therefore, Alternative 3 construction-related emissions would be less-than-significant with mitigation.

Table 25. Unmitigated Alternative 3 Annual Emissions Summary for CEQA.

Activity	Pollutant (lbs/yr)					
	ROG	**NO_x**	**CO**	**PM10**	**PM2.5**	**SO_2**
2013 Total	3,414	50,698	21,113	235,951	40,974	46
2014 Total	1,237	13,760	7,623	124,802	24,510	16
2015 Total	1,773	18,667	10,797	41,193	16,307	20
2016 Total	1,229	13,765	7,666	202,583	32,272	12
2017 Total	8,000	98,793	46,223	206,790	25,741	108
Total (lbs)	15,653	195,683	93,422	811,319	139,804	202
Daily Emissions (lbs/day)	10	125	60	520	90	<1
SMAQMD Thresholds (lbs/day)	N/A	85	N/A	N/A	N/A	N/A

As described in the methodology section above, EMFAC 2011 results were used for the CEQA effect analysis (based on SMAQMD guidance). Total emissions (lbs) were divided by total number of days in the construction period (1,560) to estimate the daily emissions (lbs/day).

Table 26. Unmitigated Alternative 3 Annual Emissions Summary for NEPA.

Activity	Pollutant (tons/yr)					
	ROG	**NO_x**	**CO**	**PM10**	**PM2.5**	**SO_2**
2013 Total	2	24	11	118	21	<1
2014 Total	1	7	4	62	12	<1
2015 Total	1	9	5	21	8	<1
2016 Total	1	6	4	101	16	<1
2017 Total	4	48	24	104	13	<1
General Conformity *De Minimis* Levels	25	25	100	100	100	N/A

Based on USEPA guidance, EMFAC 2007 results were used for the NEPA effect analysis.

Table 27. Mitigated Alternative 3 Annual Emissions Summary for CEQA.

Activity	Pollutant (lbs/yr)					
	ROG	**NO_x**	**CO**	**PM10**	**PM2.5**	**SO_2**
2013 Total	2,949	17,261	10,251	67,740	10,353	46
2014 Total	1,196	5,281	5,208	24,071	3,527	16
2015 Total	1,768	6,801	7,404	8,230	1,910	20
2016 Total	1,251	4,273	4,775	38,784	4,913	12
2017 Total	8,101	37,804	31,327	57,674	8,024	108
Total (lbs)	15,266	71,420	58,964	196,499	28,727	202
Daily Emissions (lbs/day)	10	46	38	126	18	<1
SMAQMD Thresholds (lbs/day)	N/A	85	N/A	N/A	N/A	N/A

Table 28. Mitigated Alternative 3 Annual Emissions Summary for NEPA.

Activity	Pollutant (tons/yr)					
	ROG	**NO_x**	**CO**	**PM10**	**PM2.5**	**SO_2**
2013 Total	1	9	5	34	5	1
2014 Total	<1	4	3	12	2	<1
2015 Total	1	5	4	4	1	1
2016 Total	<1	4	3	20	3	<1
2017 Total	2	20	16	29	4	2
General Conformity *De Minimis* Levels	25	25	100	100	100	N/A

To comply with the qualitative SMAQMD CEQA significance threshold for PM10 and minimize particulate (PM10 and PM2.5) emissions, Alternative 3 would implement SMAQMD's basic construction emission control practices, construction area particulate matter mitigation measures, fugitive dust mitigation measures, and exhaust emission mitigation measures. As shown, in Tables 27 and 28, Alternative 3 mitigated PM10 emissions would be substantially reduced from the unmitigated emissions.

Implementation of exhaust emission mitigation measures discussed in Section 4.2.7 below would reduce NO_x emissions from the project but maximum daily emissions could potentially exceed the SMAQMD threshold. Therefore, NO_x mitigation fees could apply to the project. However, it is difficult to determine the worst-case daily NO_x emissions due to potential changes in equipment type, timing, and use. Project contractors and the Corps will need to maintain accurate equipment use records to determine the level of mitigation fees that must be paid to SMAQMD to mitigate the project. According to the SMAQMD's CEQA guidance, payment of a mitigation fee to the SMAQMD would reduce the significance of the alternative's NO_x emissions to a less-than-significant level. The estimated emissions of ROG, CO, and SO_2 would not exceed significance criteria. Therefore, this impact is less-than-significant with mitigation.

As discussed for Alternative 2, the emissions calculations listed in Tables 25 through 29 were conducted assuming a worst-case scenario for construction equipment emissions. Potential changes to reduce the emission calculation figures include the following:

- Disposal of excavated material at the spur dike (overlook expansion) rather than the MIAD disposal site. Haul trips to MIAD would be reduced as a result of this change.
- Reduction of material required for transload facility construction. Realignment of the transload facility could potentially reduce the amount of rock haul needed for construction, from 230,000 cy to 40,000 cy, which would reduce haul truck emissions.

Prior to the start of construction, the contractor will coordinate the final projected emissions with SMAQMD and adjust the required mitigation, as discussed in Section 4.2.7 below, based on all updated project conditions. Emission levels will not exceed the emission figures listed in Tables 25 through 29 throughout the project.

Table 29. Alternative 3 Construction NO_x Mitigation Fee Calculation for CEQA.

Parameter	Alternative 3
Total Unmitigated NO_x Emissions (lbs)	319,580
Total Mitigated NO_x Emissions (lbs)	172,496
Average Daily Unmitigated NO_x Emissions (lbs/day)	205
Average Daily Mitigated NO_x Emissions (lbs/day)	111
Total Over Threshold (lbs/day)	26
Total days of Construction	1,560
Total Mitigated Tons over Threshold (tons)	19.95
Mitigation Fee per ton	$17,080
Administrative Fee	5%
Total Fee	$357,783

Notes:
(1) Total days of construction for Alternative 3 over 5 years assuming 6 days of construction per week = 1560 Days.
(2) Current Threshold for NO_x is 85 lbs/day.
(3) 5 % administrative fee applied to the product of the total mitigated tons over the threshold and the mitigation fee. This is an estimated fee based on current data; fee estimates will be based later on actual NOx production.
(4) As described in the methodology section above, EMFAC 2011 results were used for the CEQA effect analysis and mitigation fee calculation (based on SMAQMD guidance).

Construction Emissions of TACs

The TACs of interest to this alternative are DPM and NOA. DPM would be emissions, sensitive receptors, and health risks as discussed under Alternative 2. In the worst-case scenario, people living in residences identified as sensitive receptors will be exposed to daily DPM mass emissions (using PM10 emissions as a substitute for DPM emissions) of 3 lbs/hr for Alternative 3.

The proposed project’s mitigation measures include the use of MY 2010 haul trucks, which would substantially reduce DPM emissions to less than 1 lbs/hr. Consequently, the project’s health risks associated with DPM would be less-than-significant.

Construction workers for Alternative 3 or local sensitive receptors would potentially be exposed to NOA, as discussed under Alternative 2. The alternative’s implementation of mitigation measures to reduce PM10 emissions and comply with CARB’s Asbestos ATCM would reduce the potential for workers or sensitive receptors to be exposed to airborne NOA.

This alternative could expose offsite sensitive receptors to NOA through track-out-related fugitive dust emissions or transport of any uncovered soils. However, mitigation measures identified in Section 4.2.7 below would reduce the potential for ingress/egress of construction vehicles to track–out soils and expose sensitive receptors to airborne NOA. These measures would also comply with CARB’s Asbestos ATCM and would include implementation of truck speed limits, street sweeping, watering of soils, covering haul trucks or allowing free board space, and creating paved surfaces as soon as possible. Therefore, Alternative 3 construction emissions of NOA would be less-than-significant with mitigation.

Construction-Related Odor Emissions

Alternative 3 construction activities could emit offensive odors through SO_2 emissions. As described above, SO_2 emissions during the construction period would be less than 1 ton/year. The closest sensitive receptors to potential odor emissions are located within 1,000 feet from the Alternative 3 construction areas. However, because ultra-low sulfur diesel fuel is now required in California, the potential for diesel-related odor effects are minimal. Odor impacts resulting from Alternative 3 construction activities would be less-than-significant.

4.2.6 Comparison of the Alternatives

The Alternative 2 and Alternative 3 air quality pollutant effects would be similar except that Alternative 3 would generate less overall emissions with two pollutant exceptions. Table 30 compares the Alternative 2 and Alternative 3 mitigated total emissions for the air quality pollutants analyzed above. For PM2.5 and SO_2 (EMFAC 2007 conditions), the Alternative 2 emissions would be less than Alternative 3 emissions. Under the EMFAC 2011 conditions, the Alternative 2 ROG and SO_2 emissions would be less than Alternative 3 emissions. Otherwise, Alternative 3 emissions would range from approximately 2 to 25 percent (%) less than the Alternative 2 emissions. For NO_x, this emissions difference of approximately 29 tons would produce a savings of approximately $ 495,320 in SMAQMD NO_x mitigation fees if Alternative 3 was implemented instead of Alternative 2.

Table 30. Comparison of Mitigated Alternative 2 and Alternative 3 Total Emissions.

Activity	Pollutant (tons)					
	ROG	NO_x	CO	PM10	PM2.5	SO_2
2007 EMFAC Results						
Alt. 2	10	115	94	102	15	<1
Alt. 3	8	92	73	100	16	<1
Difference (Alt. 2 - Alt. 3)	2	24	21	2	**(1)**	**(<1)**
Percent Emissions Reduction	**16%**	**20%**	**22%**	**2%**	**-5%**	**-97%**
2011 EMFAC Results						
Alt. 2	10	115	95	102	16	<1
Alt. 3	14	86	71	100	16	<1
Difference (Alt. 2 - Alt. 3)	(5)	29	24	3	**<1**	**<1**
Percent Emissions Reduction	**-50%**	**25%**	**25%**	**2%**	**4%**	**-52%**

4.2.7 Mitigation Measures

As described above, some emissions from the project would exceed applicable CEQA and NEPA significance criteria. Therefore, the Corps would implement the following mitigation measures to reduce the potential air quality effects of the project. Emission reductions associated with these mitigation measures are discussed in further detail in Appendix A and are summarized in Tables 22, 23, 27, and 28.

SMAQMD's Basic Construction Emissions Control Practices

The SMAQMD requires construction projects to implement basic construction emission control practices to control fugitive dust and diesel exhaust emissions (SMAQMD 2011). The Corps would comply with the following control measures for the project:

- Water all exposed surfaces twice daily. Exposed surfaces include but are not limited to: soil piles, graded areas, unpaved parking areas, staging areas, and access roads.
- Cover or maintain at least two feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would travel along freeways or major roadways should be covered.
- Use wet power vacuum street sweepers to remove any visible trackout mud or dirt from adjacent public roads at least once a day. Use of dry power sweeping is prohibited.
- Complete all roadways, driveways, sidewalks, or parking lots to be paved as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.
- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes [required by California Code of Regulations, Title 13, sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the site entrances.
- Maintain all construction equipment in proper working condition according to the manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.
- Interim Tier 4 and/or Final Tier 4 off-road equipment would be used beginning in year 2015.
- In addition to using Tier 3 and Tier 4 off-road equipment, contractors would report their equipment specifications to the SMAQMD and the Corps to ensure the mitigation is implemented.

Construction Area Particulate Matter Mitigation Measures

If the project's construction contractor determines that the construction activities would actively disturb more than 15 acres per day, then the contractor would be required to conduct PM10 and PM2.5 dust modeling. If that modeling shows violations of SMAQMD's PM10 or PM2.5 CAAQS thresholds, then the contractor would be required to implement sufficient mitigation (SMAQMD 2011) to avoid exceeding SMAQMD significance thresholds.

Fugitive Dust Emission Mitigation Measures

Fugitive dust mitigation would require the use of adequate measures during each construction activity and would include frequent water applications or application of soil additives, control of vehicle access, and vehicle speed restrictions. The Corps would implement the dust mitigation measures listed below.

A geologist would monitor the project area for the presence of NOA during all construction activities. All grading/excavation projects at Folsom Dam are required by SMAQMD to produce an Asbestos Dust Mitigation Plan and fee payment to be submitted to the District 90 days prior to commencement of grading and/or other soil impacting activities. The Corps would comply with the CARB's Section 93105, 2002-07-09 Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations (CARB 2008). The Corps would additionally ensure implementation of the fugitive dust mitigation measures below, which are similar to those required under an Asbestos Dust Control Plan.

- Limit vehicle speeds on unpaved roads to 15 miles per hour, or
- Water at least every two hours of active construction activities or sufficiently often to keep the area adequately wetted.
- Remove any visible track-out from a paved public road at any location where vehicles exit the work site: this removal effort shall be accomplished using wet sweeping of a HEPA filter-equipped vacuum device daily.
- Install one or more of the following track-out prevention measures:
    - A gravel pad designed using good engineering practices to clean the tires of exiting vehicles.
    - A tire shaker
    - A wheel wash system
    - Pavement extending for not less than 50 feet from the intersection with the paved public road, or
    - Any other measure(s) as effective as the measures listed above.
- Pre-wet the ground to the depth of anticipated cuts, and
- Suspend any excavation operations when wind speeds are high enough to result in dust emissions across the property line, despite the application of dust mitigation measures.

- To mitigate stockpile handling and stockpile wind erosion fugitive dust emissions, active storage pile would be kept adequately wetted using wet suppression controls.
- To mitigate fugitive dust emissions from storage piles that would remain inactive for more than seven days, the Corps would ensure implementation of one or more of the following measures:
    - Wet suppression controls
    - Establishment and maintenance of surface crusting sufficient to satisfy the surface crusting test identified in the Asbestos ATCM
    - Apply chemical dust suppressants or chemical stabilizers,
    - Cover with tarp(s) or vegetative cover, and/or
    - Install wind barriers across open areas.
    - Install wind barrier of 50 percent porosity around three sides of storage piles, and/or
    - Any other measure(s) as effective as the measures listed above.
- To mitigate fugitive dust emissions from in-dry blasting operations, water would be applied every 4 hours within 100 feet of the demolition area.
- To mitigate fugitive dust emissions from the rock crushing facility, wet suppression controls would be implemented.
- To mitigate fugitive dust emissions from the concrete batch plant operations, one or more of the following measures would be implemented:
    - Apply water sprays,
    - Set up enclosures, hoods, curtains, shrouds, movable and telescoping chutes, and/or
    - Install a central dust collection system.
    - To mitigate staging area or haul road emissions, the Corps would upon completion of the project, accomplish post-construction stabilization of disturbed surfaces by using one or more of the following measures:
    - Establishing a vegetative cover,
    - Placing at least 12 inches of non-asbestos-containing material,
    - Paving, and/or
    - Implementing any other measure deemed sufficient to prevent wind speeds of 10 miles per hour or greater from causing visible dust emissions.

Exhaust Emission Mitigation Measures

Cleaner Off-Road Equipment

The project will incorporate some of the Los Angeles County Metropolitan Transportation Authority (LACMTA) Green Construction Policy (LACMTA 2011) requirements for the on-site construction off-road equipment. The Corps will use Tier 3 off-road equipment for the first two years of construction (2013-2014), and use interim Tier 4 off-road equipment beginning in 2015.

The project will ensure that emissions from all off-road diesel powered equipment used on the project site do not exceed 40% opacity for more than three minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) shall be repaired immediately. Non-compliant equipment will be documented and a summary provided to the Corps and SMAQMD monthly. A visual survey of all in-operation equipment shall be made at least weekly, and a monthly summary of the visual survey results shall be submitted throughout the duration of the project, except that the monthly summary shall not be required for any 30-day period in which no construction activity occurs. The monthly summary shall include the quantity and type of vehicles surveyed as well as the dates of each survey.

Marine Engine Standards

The USEPA adopted Tier 3 and Tier 4 standards for newly-built marine engines in 2008. The Tier 3 standards reflect the application of technologies to reduce engine PM and NO_x emission rates. Tier 4 standards reflect application of high-efficiency catalytic after-treatment technology enabled by the availability of ultra-low sulfur diesel (ULSD). These Tier 4 standards would be phased in over time for marine engines beginning in 2014 (USEPA 2008).

The Corps will use Tier 2 and 3 marine engines standards to reduce marine exhaust emissions. Due to uncertainty as to the availability of Tier 4 marine engines within the required project timeline, this mitigation measure does not require the use of Tier 4 marine engines. However, should they become available during the appropriate construction periods, use of these engines would further lower project emissions.

Haul Truck Controls

MY 2010 or newer haul trucks will be used for the duration of the project. Use of these trucks will provide the best available emission controls for NOx and PM emissions.

Use of Electrical Equipment

Construction equipment powered by electricity, rather than diesel fuel, eliminates criteria pollutant emissions from diesel combustion. Electrification would result in a small amount of indirect CO_2 emissions due to the operation of the electric grid. Various types of construction equipment may feasibly be run on electricity. The Corps will electrify the concrete batch plant and the rock crushing facility.

NO_x Mitigation Fee

The Contractor would provide payment of the appropriate SMAQMD-required NO_x mitigation fee to offset the project's NO_x emissions when they exceed SMAQMD's threshold of 85 lbs/day. Estimated calculations for these mitigation fees are included under each alternative's effects analysis in Tables 24 and 29. The NOx Mitigation Fee applies to all emissions from the project: on-road (on-and off site), off-road, portable, marine and stationary equipment and vehicles.

SIP Inclusion

The Folsom JFP is expected to exceed the General Conformity de minimis threshold for NOx over the life of the project when mitigated. Therefore, the Corps must demonstrate conformity by (1) showing the project will meet all ozone SIP control requirements; and (2) meeting one of following options:

- Demonstrate that the total direct and indirect emissions are specifically identified and accounted for in the applicable SIP.
- Demonstrate that the total direct and indirect emissions would not exceed the emissions budgets specified in the applicable SIP.
- Obtain a written commitment from the State to revise the SIP to include the emissions from the action.
- Fully offset the total direct and indirect emissions by reducing emissions of the same pollutant or precursor in the same non-attainment or maintenance area.

The option applicable to this project is to obtain a written commitment from the State Governor or the Governor's designee for SIP actions, as described in 40 CFR §93.158(a)(5)(i)(B), to revise the SIP to achieve the needed emission reductions prior to the time emissions from the Federal action would occur, such that total direct and indirect emissions from the action do not exceed the 2011 SIP emissions budgets.

An analysis of the project's estimated emissions was conducted by SMAQMD, in coordination with CARB and USEPA. This analysis indicated that the project's emissions could be included in the 2011 SIP emissions budget. SMAQMD prepared a conformity analysis which is included with this SEIS/EIR as Appendix B. In order to comply with SMAQMD's analysis, the Corps has committed to use the following mitigation measures to reduce the total project NOx, PM10, and PM2.5 emissions:

- Off-road construction equipment complying with the LACMTA Green Construction Policy. Use Tier 3 off-road equipment for first two years of construction (2013-2014) and Tier 4 off-road equipment beginning 2015.
- Marine engines complying with USEPA Tier 2 and Tier 3 engine standards. Use Tier 2 marine engines for the first two years of construction (2013-2014) and Tier 3 marine engines beginning 2015.

- Use of model year 2010 or newer haul trucks beginning in 2013.
- Electrification of concrete batch plant and rock crushing plant.
- Fugitive dust controls which include watering controls on blasting operations, unpaved roads, excavation, wet suppression on stockpiles, and speed control.
- Ensure that air pollution specifications are incorporated into all construction contracts. Those specifications will require that contractors limit annual emission to levels that do not exceed the annual estimates shown in Table 23 (for Alternative 2) or Table 28 (for Alternative 3).

4.3 CLIMATE CHANGE

This section identifies the basis of significance for impacts to climate change, discusses how these criteria are determined for both NEPA and CEQA, provides specific emissions standards, thresholds, or other measurements for the various pollutants and, as necessary, applicable mitigation measures.

4.3.1 Methodology

The methods for evaluating impacts are intended to satisfy Federal and State requirements, including NEPA and CEQA. Construction emissions for this project were analyzed in detail in a technical report that is attached to the SEIS/EIR as Appendix A. As discussed in the air quality assessment (Section 4.2.1), emissions were estimated based on the type of equipment being used, the level of equipment activity, and the associated construction schedules.

In general, the construction emissions were estimated using several emission models and spreadsheet calculations, depending on the source type and data availability. The primary models that were used for this GHG analysis included the CARB Emission Factor models (EMFAC2007 and EMFAC2011), and the OFFROAD2011 model for off-road equipment. The three most common GHG pollutants estimated for this project are CO_2, CH_4, and N_2O. Emissions for these individual GHG pollutants were estimated, and then converted to CO_2e using the GWP discussed in Section 3.3.2. A summary of the scenarios in which each model was used is included in Appendix A.

In addition, the following four criteria were considered and incorporated into the GHG analysis:

- Is the design of the proposed project is inherently energy efficient?
- Are all applicable BMPs that would reduce GHG emissions incorporated into the design of the proposed project?
- Would the proposed project implement or fund its fair share of a mitigation strategy designed to alleviate climate change?
- Would implementing the proposed program improve processes or efficiency, resulting in a net reduction of GHG emissions?

4.3.2 Basis of Significance

SMAQMD has not established thresholds for GHG emissions; instead, each project is evaluated on a case-by-case basis using the most up-to-date methods of calculation and analysis. The impacts of the proposed project alternatives related to climate change should be evaluating using the criteria listed below. According to Appendix G of the CEQA Guidelines, the proposed project could result in significant impacts if it would do either of the following:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

The following significance criteria will be used to determine the significance of GHG emissions from this project:

- If the relative amounts of GHG emissions resulting from implementation of the proposed project are substantial compared to emissions major facilities are required to report (25,000 CO_2e per year).
- If the proposed project has the potential to contribute to a lower carbon future.

No existing threshold levels for GHGs have been developed at the Federal level for NEPA projects. USEPA has established a reporting threshold of 25,000 metric tons of CO2 that applies to most entities that emit more than 25,000 metric tons per year.

4.3.3 Alternative 1 – No Action

Under Alternative 1, the project construction would not take place. Therefore, there would be no GHG emissions associated with construction activities under the project. Similarly, there would be no long term operational (indirect) GHG emissions under this alternative.

4.3.4 Alternative 2 - Cutoff Wall

GHG emissions associated with Alternative 2 would be entirely associated with construction. GHG emissions would be emitted from the project due to fuel combustion from onsite construction vehicles, as well as indirect emissions from the electricity used to operate the rock crusher and concrete batch plant. In addition to the construction vehicles, there would also be GHG emissions from the workforce vehicles. Workers would commute from their homes to the construction site and park in one of the staging areas.

Table 31 shows the results of the emissions modeling that was conducted based on the estimates for all construction activities discussed above. All GHG emissions were converted into CO_2e. The results of the modeling determined that Alternative 2 would not violate the 25,000 metric tons per year reporting level for any year of construction. Additionally, there would be no long-term operational emissions associated with this alternative.

Table 31. Unmitigated Alternative 2 Annual Emissions Summary.

Year	CO_2e (metric tons/year)
2013 Total	5,507
2014 Total	4,006
2015 Total	4,261
2016 Total	6,350
2017 Total	5,118
Federal GHG Reporting Level	**25,000**

While the emissions associated with this alternative would not violate the GHG reporting threshold, these emissions would still be contributing to the overall cumulative GHG emissions, as discussed in the cumulative analysis discussion below (Section 5.4.2). As a result, the Corps would implement mitigation measures, as discussed below, to increase this alternative's energy efficiency and minimize the GHG emissions from this alternative. Consequently, this alternative's GHG emissions, with mitigation, would be reduced from the emission levels shown in Table 31. Therefore, Alternative 2's construction-related GHG emissions would be less-than-significant with mitigation.

However, by providing decreased risk of catastrophic flooding with associated loss of infrastructure, this project is expected to prevent extra carbon production which would be associated with demolition, repair, and reconstruction of flood-induced infrastructure losses.

4.3.5 Alternative 3 – Cofferdam

GHG emissions associated with Alternative 3 would be entirely associated with construction. GHG emissions would be emitted from the project due to fuel combustion from onsite construction vehicles, as well as indirect emissions from the electricity used to operate the rock crusher and concrete batch plant. In addition to the construction vehicles, there would also be GHG emissions from the workforce vehicles. Workers would commute from their homes to the construction site and park in one of the staging areas.

Table 32 shows the results of the emissions modeling that was conducted based on the estimates for all construction activities discussed above. All GHG emissions were converted into CO_2e. The results of the modeling determined that Alternative 3 would not violate the 25,000 metric tons per year reporting level for any year of construction. Additionally, there would be no long-term operational emissions associated with this alternative.

Table 32. Unmitigated Alternative 3 Annual Emissions Summary.

Activity	CO_2e (metric tons/year)
2013 Total	3,078
2014 Total	2,760
2015 Total	2,905
2016 Total	2,755
2017 Total	6,082
Federal GHG Reporting Level	**25,000**

While the emissions associated with this alternative would not violate the GHG reporting threshold, these emissions would still be contributing to the overall cumulative GHG emissions, as discussed in the cumulative analysis discussion below (Section 5.4.2). As a result, the Corps would implement the mitigation measures in Section 4.3.6 to increase this alternative's energy efficiency and minimize the GHG emissions from this alternative. Consequently, this alternative's GHG emissions, with mitigation, would be reduced from the emission levels shown in Table 32. Therefore, Alternative 3's construction-related GHG emissions would be less-than-significant with mitigation.

4.3.6 Mitigation Measures

Implementations of the mitigation discussed in the air quality analysis (Section 4.2.7), including the use of the LACMTA Green Construction Policy requirements for the on-site construction off-road equipment would further reduce the GHG emissions associated with this project (LACMTA 2011). In addition, SMAQMD recommends the following mitigation measures for reducing GHG emissions from construction projects. The use of electric equipment is already listed above and will reduce direct GHG emissions from fuel-based equipment.

The Corps will implement the following mitigation measures:

- Improve fuel efficiency from construction equipment:

  Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to no more than 3 minutes (5 minute limit is required by the state airborne toxics control measure [Title 13, sections 2449(d)(3) and 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site.

  The following mitigation measures are relevant to impacts, but will likely not be required by the Corps. However the selected contractor will be encouraged to implement these measures where practical:

- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.
- Train equipment operators in proper use of equipment.
- Use the proper equipment size for the job.
- Use equipment with new technologies (repowered engines, electric drive trains).
- Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).
- Use a CARB approved low carbon fuel for construction equipment. (NO_x emissions from the use of low carbon fuel must be reviewed and increases mitigated.)
- Encourage and provide carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes.
- Recycle or salvage non-hazardous construction and demolition debris (goal of at least 75% by weight).
- Use locally sourced or recycled materials for construction materials (goal of at least 20% based on costs for building materials, and based on volume for roadway, parking lot, sidewalk and curb materials). Wood products utilized should be certified through a sustainable forestry program.
- Produce concrete on-site if determined to be less emissive than transporting ready mix.
- Use SmartWay certified trucks for deliveries and equipment transport.
- Develop a plan to efficiently use water for adequate dust control.

4.4 WATER QUALITY

In this section, the potential project effects on relevant water quality issues identified in Section 3.4, including mercury bioaccumulation potential, are evaluated.

4.4.1 Methodology

In this section, the assessment methods for project effects on surface water and water quality conditions in the vicinity are evaluated. The types of water quality contaminants were determined based on the potential to be present in association with disturbed soils and sediments.

Potential impacts associated with each alternative were assessed through both qualitative and quantitative evaluations. Information presented in the existing conditions as well as construction practices and materials, location, and duration of construction were evaluated during the assessment process to develop a qualitative assessment of the potential for project activities to impair water quality for conventional pollutants (pH, turbidity, DO, nutrients, bacteria, and oil and grease). Quantitative analysis was performed on the potential for project activities to cause water quality to exceed thresholds for trace elements (arsenic and the metals cadmium, chromium, copper, lead, nickel, and zinc. These constituents were chosen based on the beneficial uses of Folsom Lake, (see Section 3.4.1) and the types of disturbances likely to be caused by project activities (see Section 3.4.2). The assessment of mercury bioaccumulation potential relies upon a qualitative analysis using the conceptual model for mercury methylation and bioaccumulation in Folsom Lake discussed earlier.

The qualitative assessment for conventional pollutants evaluated the following questions:

- What is the likelihood that project activities would exceed thresholds of significance?
- Are there mitigating measures that would reduce the potential effects to below thresholds of significance?

The quantity of water quality contaminants present in sediments was determined from previous assessments performed within the project area (Reclamation 2006; USACE 2008; USACE 2011). It was assumed that those assessments are representative of sediment that would be disturbed from project activities. The qualitative assessment also assumed that the principal mechanism for pollutant mobilization would be sediment disturbance and resuspension.

Water Quality Parameters

The quantitative assessment for metals and arsenic used a dissolved-solid partition model to evaluate the circumstances under which numeric thresholds would be exceeded. Numeric thresholds for metals and arsenic are based on dissolved concentrations. Dissolved metal concentrations tend to vary with the concentration of suspended sediments, the concentration of metals present on suspended sediments, and the tendency of metals to adsorb to sediments (quantified by a term called the “partition coefficient”). Details of the partition coefficient analysis are presented in Appendix C.

Table 33. Summary of Potentially Significant Water Quality Effects.

Threshold	Rationale for Evaluating Potential Effects
Fecal Coliform Bacteria: ≤ 100/ml (median) No more than 10 percent of samples ≥ 200/1000ml	Effects not likely since potential bacteria sources are not associated with the project.
pH: 6.5 (min) – 8.5 (max)	Release of concrete wash water without treatment or approved BMPs
Hexavalent Chromium: "no detectable increase"	Active treatment applied to concrete wash water, cured concrete grindings
DO: ≥ 5 mg/L	Dewatering discharges with high chemical / biochemical oxygen demand, low DO
Oil and Grease: "no visible sheen or adverse effects"	Use of heavy equipment
TDS: ≤ 100 mg/L (90^{th} percentile)	Chemicals used in Active Treatment Systems (if implemented as part of an approved SWPPP)
Turbidity: ≤ 10 ntu	Dewatering discharges with high turbidity; dredging, dredge material handling and dewatering operations that cause high turbidity
Nutrients: "no nuisance or adverse effects"	
Metals in Water: See Table 36	
Mercury and Methylmercury: See Table 34	

Mercury Standards

The water-quality objective for mercury established by in the CTR criterion is 50 ng/L, for protection of human health via drinking water and fish consumption. The methylmercury TMDL for the Sacramento San Joaquin River Delta includes a methylmercury implementation goal of 0.06 ng/L in water. Although it is not clear that the same goal would be applicable to Folsom Lake, the establishment of a methylmercury goal supports "no net increase" in the long term average methylmercury concentration of Folsom Lake as a threshold for significance. For fish tissue, EPA and the SWRCB recommend a target of an average of no more than 0.3 mg/kg of methylmercury for protection of human health. The Delta Mercury TMDL also establishes numeric targets of 0.08 mg/kg in trophic level 3 fish such as carp and salmon, and 0.03 mg/kg for trophic level 2 and level 3 fish less than 50 mm in length. These targets are intended to protect pisciverous wildlife. Numeric targets for smaller fish are expressed in this analysis as "no net increase" in sentinel species. Sentinel species are defined by the CALFED Mercury Program as organisms with high site fidelity whose tissue mercury concentrations are good indicators of local bioaccumulation risk. Examples of sentinel species that may be appropriate to Folsom Lake include minnows, inland silverside, and crayfish. Numeric thresholds for mercury and methylmercury are presented in Table 34 below.

Table 34. Water Quality, Sediment Quality, and Fish Tissue Mercury Criteria.

Parameter	Criteria	Basis	Threshold	
Water Quality	Total Mercury[1] (Drinking Water)	CTR	50 ng/L	
	Methylmercury (Freshwater)	Delta TMDL	Do not increase	
Freshwater Sediments	Total Mercury[2]	SWRCB SQO Guidance	mg/kg	1.06
Fish Tissue	Methylmercury[3]	USEPA, SWRCB	mg/kg	0.3
Sentinel species	Methylmercury	CALFED	Do not increase	

Notes:
(1) Water Quality Criterion for the Protection of Human Health: Methylmercury. USEPA. EPA-823-R-01-001.
(2) Revision to the Clean Water Act Section 303(d) List of the Water Quality Limited Segments, Volume 1. SWRCB, November 2006.
(3) Water Quality Criterion for the Protection of Human Health: Methylmercury. USEPA. EPA-823-R-01-001.

In summary, the analysis factors for mercury bioaccumulation effects are:

- Mercury concentrations in lake sediments are low.
- Low dissolved oxygen is a risk factor for mercury methylation.
- Increased mercury bioavailability is a risk factor for mercury methylation.
- The processes that affect mercury bioavailability are site-specific, and not well understood.
- Containment of any increased methylation effect using physical barriers would also localize uptake by zooplankton and small fish.
- The significance of effects on larger fish and birds would be in proportion to their dietary intake of affected smaller fish.

Because there are uncertainties, it is difficult to quantify potential methylmercury-related effects of the Project. To address this uncertainty, monitoring is recommended. Monitoring would focus on sentinel organisms, such as small fish and invertebrates. The purpose of monitoring would be to the extent to which mitigation measures maintain the assessment criteria below thresholds of significance and, if thresholds are exceeded, trigger additional mitigation measures.

Evaluation of the “no net increase” for methylmercury in water would compare methylmercury concentrations in water outside the working zone of the Project before, during and after construction. Evaluation of sentinel species would compare methylmercury concentrations in the tissues of sentinel organisms (e.g., crayfish, minnows, inland silversides) in Folsom Lake before, during and after construction.

4.4.2 Basis of Significance

This section identifies the basis of significance for effects on water quality, discusses how these criteria are determined for both NEPA and CEQA and provides specific water quality standards, thresholds, or objectives for the various pollutants. The alternatives under consideration would result in a significant impact related to water quality if they would:

- Substantially alter the existing drainage pattern of a site or an area in a manner that would result in substantial erosion or siltation on or off the site, resulting in flooding on or off the site, or exceed the capacity of existing or planned stormwater drainage systems.
- Violate any water quality standards or waste discharge requirements, including Section 401 of the CWA; create or contribute runoff water that would provide substantial additional sources of polluted runoff; or otherwise substantially degrade water quality.
- Substantially degrade surface water quality such that it would violate criteria or objectives identified in the CVRWQCB basin plan or otherwise substantially degrade water quality to the detriment of beneficial uses.
- Have a substantial adverse effect on Federally-protected wetlands of other waters of the U.S. as defined by Section 404 of the CWA through direct removal, filling, hydrological interruption or other means.

<u>Water Quality Assessment Methods</u>

Water quality standards adopted by the CVRWQCB are the primary basis for thresholds of significance in this analysis. Water quality standards consist of beneficial uses and numeric and narrative water quality objectives intended to protect those beneficial uses. The beneficial uses that apply to the project are summarized in Table 35 along with the water quality parameters used to assess the potential for impacts in this analysis.

Bacteria are used as an indicator of risk of pathogen exposure through water contact for water contact recreation (REC-1). The CVRWQCB also considers sport fishing as an activity that directly exposes people to the aquatic environment (through consuming fish), and so mercury bioaccumulation relates to REC-1 as well. Thresholds for mercury bioaccumulation are discussed below.

Numeric and narrative thresholds applicable to Warm Water (WARM) and Cold Water (COLD) habitat beneficial uses are protective of Wildlife habitat (WILD). Parameters of pH, DO and turbidity have numeric thresholds established by Water Quality Objectives in the Basin Plan. The narrative threshold of “no sheen or adverse effects” for oil and grease is interpreted, practically, as a threshold of “non-detect” for oil and grease using readily available methods (i.e., <5 mg/L).

Table 35. Summary of Beneficial Uses and Associated Basis of Significance.

Beneficial Use	Water Quality Parameters And Thresholds
Water contact recreation (REC-1)	**Fecal coliform bacteria:** ≤ 100/ml (median) No more than 10 percent of samples ≥ 200/1000 ml **Mercury Bioaccumulation** (See explanation in text)
Freshwater fish habitat (WARM and COLD)	**pH:** 6.5 (min) – 8.5 (max) **DO:** ≥ 5 mg/L **Turbidity:** ≤ 10 ntu **oil and grease**: “no visible sheen or adverse effects” **nutrients**: “no nuisance or adverse effects” **metals**: (See explanation in text)
Wildlife habitat (WILD)[1]	**Mercury Bioaccumulation:** (See explanation in text)
Municipal Water Supply[1] (MUN)	**TDS**: ≤ 100 mg/L (90^{th} percentile) **Hexavalent chromium**: “no detectable increase” **nutrients**: “no nuisance or adverse effects”

(1) Thresholds for MUN, other than TDS, are less stringent than thresholds for WARM and COLD. Thresholds for WARM and COLD, other than mercury bioaccumulation, are also protective of WILD.

Nutrient (nitrogen, phosphorous) thresholds are evaluated according to the Basin Plan narrative objective for biostimulatory substances. Release of excess nutrients has the potential to cause algal blooms, and this would comprise the measureable threshold for effects. In terms of monitoring metrics, the project would avoid nuisance algal blooms if water column concentrations of nitrogen and phosphorous during construction are comparable to pre-project concentrations summarized in Table 9.

Numeric thresholds for metals (including the metalloid, arsenic) are summarized in Table 36 below. The numeric thresholds in Table 36 are based on chronic water quality criteria established in the California Toxics Rule (CTR), which is incorporated into the Basin Plan by reference.

Table 36. Thresholds for Metals and Arsenic.

Metal	Threshold (µg/L)
Arsenic	≤ 150
Cadmium[1]	≤ 0.92
Chromium[1] (Total)	≤ 66
Chromium (Hexavalent)	≤ 11 No detectable increase[2]
Copper[1]	≤ 3.2
Lead[1]	≤ 0.66
Nickel[1]	≤ 19
Zinc[1]	≤ 43

[1] Threshold calculated according to hardness-based formulas in the CTR, assuming a hardness of 309 mg/L.
[2] No detectable increase for hexavalent chromium is based on the OEHHA PHG of 0.02 µg/L.

As noted in the Regulatory Setting, OEHHA has established a PHG of 0.02 µg/L for hexavalent chromium. Although this PHG has not yet been established as an MCL with force of law, it does set the public expectation that extremely low concentrations of hexavalent chromium are desirable in municipal water supplies. For the purposes of this assessment, the threshold for a significant effect is a detectable increase in hexavalent chromium.

Sediment Quality Guidelines

Sediment quality guidelines are under development by the SWRCB. In November 2006, the SWRCB published "Revision of the Clean Water Act Section 303(d) List of the Water Quality Limited Segments, Volume 1." The purpose of this staff report was to present the SWRCB section 303(d) listing methodology.

The SWRCB values for freshwater sediments were based on the sediment quality guidelines (SQG) developed by MacDonald, et al. (2000), in the document entitled, "Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems." This document was an effort to develop standardized limits using various published SQGs. For each contaminant of concern, two SQGs were developed from the published SQGs—a threshold effect concentration (TEC) and a probable effect concentration (PEC). TECs would indicate a reliable basis for predicting the absence of sediment toxicity. Similarly, PECs provide a reliable basis for predicting sediment toxicity. Sediment quality guidelines for freshwater sediments are presented in Table 37.

Table 37. Sediment Quality Guidelines for Freshwater Sediments.

Substance	Probable Effect Concentrations (PEC), mg/kg
Arsenic	33.0
Cadmium	4.98
Chromium	111
Copper	149
Lead	128
Mercury	1.06
Nickel	48.6
Zinc	459

Source: MacDonald et al. (2000)

In general, trace element concentrations in sediments as presented in Table 9 are below PECs shown in Table 37. The one exception is nickel, which has an average nickel concentration in the 2006 data set (76.28 ppm) that exceeds the PEC (48.6 ppm). The elevated concentration of nickel in Folsom Lake sediments is likely due to the natural occurrence of serpentine minerals, which are abundant in California watersheds.

4.4.3 Alternative 1 - No Action

Alternative 1 assumes no action would be taken by any agency. If the approach channel is not completed to improve dam safety and flood damage reduction, public safety would be at risk in a flood event. High water associated with a flood event could increase erosion and turbidity levels in the reservoir, or could overwhelm local stormwater and sewage systems.

4.4.4 Alternative 2 - Cutoff Wall Alternative

The project purpose is to address increasing discharge capability during extreme flood events above the 200-year event level. The new auxiliary spillway is a major feature that will address the need to safely pass part or the entire PMF event. Long-term changes to the rate and amount of surface runoff in the form of hydromodification could potentially affect local drainages. Hydromodification is a change in the hydrograph (change in flow rate, timing of peak flows, flow duration, and flow volume). Long term operations of the auxiliary spillway are currently being studied under the Folsom Dam Flood Management Operations Study that underway by the Corps, USBR, CVFPB, and SAFCA. Operation and maintenance of the auxiliary spillway is outside of the scope of this assessment. The Flood Management Operations Study for Folsom Dam will develop, evaluate, and recommend changes to the flood control operations at Folsom Dam and to update the facility's Water Control Manual.

Alternative 2 would neither increase the occurrence of impervious surfaces such as parking lots or buildings nor change the existing land uses such that hydromodification would occur. Existing drainage infrastructure (function and capacity) would not be altered from the approach channel construction. Overall the drainage patterns would not be substantially altered; therefore, this affect to local drainage would be less-than-significant. Implementation of the SWPPP would ensure that there is no exceedance of the capacity of stormwater drainage infrastructure, and therefore, effects to this infrastructure would be less-than-significant, with mitigation.

Project activities such as drilling, blasting, excavating and hauling, dredging, and fill placement may disturb or mobilize sediments, which have the potential to affect total suspended solids (TSS), pH, turbidity, and dissolved oxygen (DO). Re-suspension of sediments may also affect the concentrations of metals (arsenic, cadmium, chromium, copper, lead, nickel, and zinc) in the water column by releasing metals that are present in lake sediments from both natural and human sources. The Technical Analysis discussing water quality and bioaccumulation can be found in Appendix C. Project activities from construction in the dry and construction in the wet could impact water quality and are discussed in greater detail below. In addition, effects associated with the placement of fill in waters of the U.S. are discussed in greater detail below.

Construction in the Dry

Installation of the cutoff wall, operations of the concrete batch plant, concrete placement of the approach channel slabs and walls, and use of the identified staging areas could have short-term impacts on water quality from ground-disturbing activities. Once the cutoff wall is installed, excavation for the approach channel slab and walls would require a combination of ripping and blasting to facilitate the rock excavation. Approximately 600,000 cy of granitic material would be removed in the dry. The construction of the approach channel slab and walls would require large quantities of temperature controlled concrete.

Construction of the cutoff wall and placement of concrete for the approach channel slab and walls would disturb approximately 3 acres of land (Plate 5). Exposed soil could potentially erode as a result of significant runoff events, causing increased turbidity in local waterways. In addition, debris and inadvertent spills of fuels, oils, or concrete mix materials from construction equipment, work areas, staging areas, or the concrete batch plant could be a source of contamination into adjacent waterways.

Run-off could result from excavation activities with potentially higher concentrations of TSS. Should run-off reach the reservoir, there is a potential to create turbidity and introduce associated contaminates to the receiving waters. Additionally, since there would be some seepage from the reservoir into the excavation area, dewatering would be necessary. This water would be pumped for treatment with other project construction water under an approved SWPPP and ATR plan.

Adjacent waterways that could potentially be affected include Folsom Reservoir, the outflow channel below Folsom Dam, Lake Natoma, and the Lower American River. In order to protect water resources and maintain existing water quality conditions and beneficial uses of these waterways, the CVRWQCB has recommended obtaining and complying with three water quality permits for this project. Each permit is relevant to different aspects involved in construction and the potential pollutants associated with each activity. The following NPDES permits would be acquired:

- Construction Storm Water Permit: NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ; NPDES No. CAS000002)
- Industrial Storm Water Permit: NPDES General Permit for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities (Order No. 97-03-DWQ; NPDES No. CAS000001)
- Limited Threat Discharge Permit: NPDES Permit for Limited Threat Discharges of Treated/Untreated Groundwater from Cleanup Sites, Wastewater from Superchlorination Projects, and other Limited Threat Wastewaters to Surface Water (Order No. R5-2008-0082; NPDES No. CAG995002)

The contractor would be required to obtain an NPDES Construction Storm Water Permit from the CVRWQCB, because the project would disturb more than one acre of land. Across the entire construction site, debris, soil, or oil and fuel spills could temporarily adversely affect the water quality of Folsom Lake and the Lower American River (including Lake Natoma) downstream. The construction storm water permit pertains to the prevention of increased turbidity of adjacent waterways as resulting from site erosion and sedimentation, as well as debris, soil, fuel, and oil spill prevention. The contractor would be required to design and implement a SWPPP prior to initiating construction activities, and to implement standard BMPs (see "Mitigation" below). There is also a potential for fugitive dust and construction runoff to enter waterways due to soil excavation, equipment use, cutoff wall construction, and movement of trucks in the project area and along the haul routes. However, frequent watering of haul routes, proper coverage and control of material stock piles (e.g. dirt, aggregate, etc.), and the installation of K-rails to prevent any construction related materials or vehicles from entering the waterways, would help to prevent such pollution impacts. All these measures would be required of the contractor.

The NPDES Industrial Storm Water Permit requires that a SWPPP is designed and implemented, and is specific to the concrete batch plant operation. Pertaining to the concrete batch plant site, debris, oil and fuel, or concrete mix material spills could temporarily adversely affect the water quality of Folsom Lake and the Lower American River (including Lake Natoma) downstream. The industrial storm water permit addresses potential pollution inputs due to storm water runoff that are associated with all activities at the concrete batch plant. The contractor would be required to cover and control all material stock piles in order to prevent suspension of dust or concrete mix material due to wind. The contractor would also be required to coordinate the handling of all waste waters generated from concrete production with the CVRWQCB.

In accordance with the NPDES Limited Threat Discharge Permit, groundwater must be tested for priority pollutants prior to dewatering activity in order to determine if any treatment would be required before discharging into Folsom Reservoir. Once cleared for dewatering, periodic, routine, and standardized sampling of the groundwater must be conducted before discharge into Folsom Reservoir occurs. This routine sampling ensures that the groundwater either meets or exceeds the water quality standards listed for beneficial uses of Folsom Reservoir and the Lower American River. Groundwater would be pumped into a holding tank where it is to be tested to meet water quality standards before being surface-discharged into Folsom Reservoir. All mandatory groundwater samples analyzed, both prior to commencement of dewatering activity and during ongoing dewatering operations, must be conducted by a State Certified Lab and meet the Reporting Minimum Levels.

By obtaining NPDES permits and the implementation of BMPs, water quality standards or waste discharge requirements associated with earth moving activities in the dry would be met, therefore, impacts would be less-than-significant.

Construction in the Wet

Installation of the haul road embankment, transload facility, and spur dike could have short-term impacts on water quality from dredging, construction, and disposal activities. In addition, wet excavation of the approach channel and hydraulic dredging could have short term impacts on water quality. In the wet construction has a high potential to affect water quality and the bioaccumulation of mercury in the aquatic environment.

Dredging

Dredging material under the footprint of the haul road embankment (approximately 40,000 cy), transload facility ramp (approximately 20,000 cy) and spur dike (up to 80,000 cy) may be required depending on the soils at the lake bottom. These construction processes have the potential to cause turbidity in Folsom Lake, thus affecting water quality and increasing the potential for the bioaccumulation of mercury. Mechanical clamshell or suction cutterhead dredging would be used to remove small fines at the footprint of these three structures could be necessary prior to the placement of fill material. In addition, fines would be dredge from the footprint of the approach channel prior to blasting and excavation. Approximately 120,000 cy of material would be clamshell or hydraulically dredged from the lake bottom.

Sediment testing results did not exceed the Waste Discharge Requirement General Order maintenance criteria (Appendix C). Therefore, impacts to groundwater via infiltration and surface water due to stormwater discharge from the placement site are not expected. Dredging operations would result in less-than-significant effects to water quality standards with mitigation and compliance with the CVRWQCB certification thresholds. An analysis with sediment plume modeling to determine water quality conditions during dredging activities was prepared by Ben C. Gerwick, Inc. (Appendix E). The analysis indicated that the approach channel excavation sediment containment is possible by confining the zones where dredging and in-lake disposal of dredged materials would take place. A full range of BMPs are identified in the mitigation measures below.

Dredging may initially result in the complete removal of benthic organisms from the excavation site. Dredging could reduce local bed elevation by as much as three feet. Any change in benthic habitat as a result of dredging would only be short-term since construction of the transload facility, haul road embankment, and spur dike would require the placement rock fill material in the dredge areas. Habitat changes could cause changes in benthic organism composition within localized areas. It is unlikely that an overall change in the reservoir's benthic organisms would be detectable. The change in bathymetry resulting from dredging would be a less-than-significant, long-term impact.

Construction of Project Features

Construction and removal of the transload facility, haul road embankment, and the construction of the spur dike would require materials to be placed directly into the water. Clean fill would be imported for the construction of the transload facility and the haul road embankment. Additional processed, clean rock material that is currently stockpiled at Dike 7 would also be used for the haul road embankment. Decomposed granite for the spur dike would be excavated from the approach channel. Fill material for the spur dike would be processed and analyzed prior to installation to ensure that no pollutants, such as mercury, would be re-introduced into the reservoir.

Fine content of the fill material would be reduced as much as possible to limit water turbidity during placement of material. Construction of the transload facility, haul road embankment, and spur dike would result in less-than-significant effects to water quality with mitigation.

Construction of the transload facility, haul road embankment and the spur dike would raise local bed elevation by as much as 60 ft. This change in topography would change the relative abundance of habitat types available at various reservoir levels. Habitat changes could cause changes in species composition within localized areas. The transload facility and haul road embankment would be removed upon project completion and the area would be restored to pre-project conditions. Benthic organisms from adjacent habitat would recolonize the area. The change in bathymetry resulting from the transload facility and haul road embankment would be a less-than-significant, long-term impact. Any change in benthic habitat as a result of the spur dike would only be relevant for part of the year since the water level within the reservoir varies so widely. It is unlikely that an overall change in the reservoir's benthic organisms would be detectable.

Approximately 400,000 cy of material from the approach channel would be removed during in-the-wet conditions. Removal of coarse material from the approach channel would be accomplished by drill and blast methods. To limit the blast over-pressures, all charges would be confined by rock burden and crushed stone stemming. The in-the-wet excavation activities (dredging and blasting) have the potential to create substantial turbidity, thus affecting water temperature and dissolved oxygen concentrations. These activities also have the potential to mobilize existing contaminants such as mercury with potential for the bioaccumulation of mercury in the aquatic environment.

Implementation of mitigation measures would reduce impacts to water quality. Silt curtains and a monitoring plan would be necessary to avoid impacting water quality and assist in mitigating bioaccumulation effects. In addition, adaptive management would be implemented during the construction period. Samples for water quality, sediment concentration, and toxicity tests would be collected to assess the effects of construction dredging and blasting to water quality and the aquatic environment. Excavation in-the-wet impacts on water quality would result in less-than-significant effects with mitigation.

Disposal

Under Alternatives 2, dredged and excavated material that is not used for spur dike construction would be disposed at one of the proposed disposal sites, including potentially the in-reservoir disposal site (Plate1).

Two types of material would be generated from dredging activities that may require different dredging and placement methods, the fine materials, sand, and smaller in grain size to be dredged from the lake bottom and the coarse material from the approach channel excavation. If suction dredging is used, then the only placement alternative is in open waters of Folsom Lake. Mechanical dredging material could either be barged to the proposed in-water placement site or transported via barge and trucked to upland placement sites.

Dredged material placed in open waters at the proposed in-reservoir disposal site and/or at the spur dike have the potential to create substantial turbidity, thus affecting water temperature and dissolved oxygen concentrations. These activities also have the potential to mobilize existing contaminants such as mercury with potential for the bioaccumulation of mercury in the aquatic environment. A thorough monitoring plan would be implemented to avoid significant effects upon water quality. and to assist in mitigating bioaccumulation effects. These mitigation measures would reduce effects on water quality to a less-than-significant level.

Benthic organisms would be smothered by the discharge of dredged material at the in-reservoir disposal site; however, benthic organisms from adjacent habitat would recolonize in the disposal site. Because of the small area disturbed by the disposal of dredge material, and the rapid recovery and recolonization by benthic organisms, the disturbance to bottom habitat is considered adverse, but less-than-significant, long-term impact.

If mechanical dredging methods are used and the materials are barged to the proposed in-water placement site, impacts would be the same as stated above. The same mitigation measures would be implemented to reduce impacts on water quality to less-than-significant. If the material is transported via barge and trucked to upland placement sites the contractor would be required to design and implement a SWPPP prior to initiating construction activities, and to implement standard BMPs. Implementation of these measures would reduce water quality effects due to mechanical dredging to less-than-significant.

Excavated material not suitable for fill, such as vegetation, debris, and old fill, would be disposed of at a local landfill. Asphalt, concrete, and other material from the old roadway segments would be removed, incorporated into roadway fill, or recycled. Land-based disposal sites have a low potential to affect water quality and no potential to affect the bioaccumulation of mercury onto the aquatic environment. Mitigation measures would reduce water quality effect to a less-than-significant level.

Impacts to Waters of the United States

Aerial photography was used to identify 175.0 acres of waters of the United States within the project area including wetlands. A conservative approach was taken and all vegetated areas adjacent to the lake shoreline were mapped as transitional wetlands. Impacts of Alternative 2 on jurisdictional waters was determined by using a GIS database representing existing conditions and overlaying proposed project features, including both permanent and temporary impact zones and construction work areas, onto GIS layers of the jurisdictional waters.

Permanent impacts to jurisdictional waters would occur at the spur dike and the proposed Dike 8 disposal area. Up to 1.4 million cy of granitic material would be placed over up to 22 acres for the construction of the spur dike. Although the spur dike would result in the placement of fill material into 22 acres of open waters of the U.S, the spur dike would not cause the permanent loss of functions and/or values of the water. The net loss of functions and services of aquatic resources due to the spur dike is 9 acres of surface waters that would be converted to upland. Disposal of materials at Dike 8 could impact 2.5 acres of transitional wetlands.

Temporary impacts would occur at the transload facility, the haul road embankment, and open water disposal areas in Folsom Lake. Up to approximately 250,000 cy of rock material would be placed for the construction of the transload facility over 2.5 acres, and approximately 400,000 cy of rock material would be placed over 1 acre for the construction of the haul road embankment. These areas would be restored to preconstruction conditions following the completion of construction in the area. Up to 220,000 cy of dredge material would be placed over 85 acres in Folsom Lake by methods discussed above. Dredging activities would relocate sediment from the footprints of each feature and place it in a designated disposal area near Dike 7. Although dredge activities would involve fill placement into waters of the U.S. the function and capacity of Folsom Lake would remain the same, therefore, dredge activities are considered a temporary impact. The acreages of permanently and temporarily adversely impacted areas resulting from the implementation of Alternative 2 are listed in Table 38.

Table 38. Alternative 2 Fill of Jurisdictional Waters of the U.S.

Project Component	Impact Type	Folsom Lake (Acres)	Dike 8 (Acres)	Total (Acres)
Transload Facility	Temporary	2.5		2.5
Haul Road Embankment	Temporary	1.0		1.0
Disposal	Temporary	85.0		85.0
	Permanent		2.5	2.5
Spur Dike	Permanent	9.0		9.0
Total Acreage Filled	**Temporary**	**88.5**		**88.5**
	Permanent	**9.0**	**2.5**	**11.5**
Total Mitigation Required[1]		9.0	2.5	11.5
New Jurisdictional Acres Created[2]		-2.5		-2.5
Net Permanent Change				**9.0**

Notes:
(1) Minimum mitigation acreage required to ensure no net loss of waters of the United States. Greater mitigation acreage may be required based on further analysis required under section 404(b)(1) guidelines.
(2) New Corps jurisdictional areas from the creation of the Approach Channel

The Folsom Reservoir is a man-made facility that is well regulated. While many fish species currently inhabit the reservoir, a majority of them are either stocked in the reservoir and/or are non-native species. In total, Alternative 2 would result in permanent adverse impacts to 11.5 acres of waters of the United States (including wetland and non-wetland waters), temporary impacts to 88.5 acres of open water, and would create 2.5 acres of new open water habitat through the excavation of the approach channel. This would result in a permanent net loss of 9 acres of waters of the United States, which would be a significant impact unless mitigation is implemented.

Further analysis of the relative practicability of alternatives that avoid and minimize impacts to waters of the United States, including wetland areas is included in the Corps'

404(b)(1) analysis (40 C.F.R. Part 230) to determine the Least Environmentally Damaging Practicable Alternative (Appendix D). The 404(b)(1) analyzed impacts to aquatic species and habitat from the placement of fill and dredge materials in the Reservoir. Alternative 3 has a higher risk of failure in a flood event. Failure of either the cutoff wall or cofferdam would have significant environmental effects, both in the human and downstream aquatic environment. In addition, Alternative 2 has less temporary impacts to waters of the U.S. than Alternative 3.

The evaluation of impacts and the development of appropriate mitigation measures were also used to demonstrate compliance with 33 C.F.R. Part 332, Compensatory Mitigation for Losses of Aquatic Resources (Mitigation Rule). It is assumed that all mitigation would be initiated within two years after impacts occur. In the event that mitigation is not initiated within this two-year period, the mitigation ratios would increase by 0.5:1 if initiated within two to five years, and by 1:1 if mitigation is initiated more than five years after the permanent or temporary impacts occur.

Impacts to 29.37 acres of waters of the U.S. at the spur dike location were previously evaluated and fill placement was permitted to expand the original Folsom Overlook under a 404 permit issued to USBR in 2007. A condition of the permit is to create 10 acres of riparian wetland at Mississippi Bar to offset impacts associated with the overlook construction. As a result, compensatory mitigation has already been required to offset any loss of function at the Folsom Overlook. The additional fill material for the construction of the spur dike would not result in additional acreage impacts or losses in functions that have not already been accounted for under the USBR 404 permit. USBR's mitigation is sufficient to adequately compensate for the impacts associated with construction of the spur dike. However, the Corps would assist USBR with their mitigation requirements to ensure that the 10 acres of riparian wetlands would be initiated by 2013.

The discharge of dredge materials would temporarily impact approximately 85 acres of waters of the U.S. The haul road embankment and transload facility are temporary project elements and would be removed after three to four years. Through the incorporation of mitigation measures which would require the restoration of temporary impact zones, impacts would be minimal. However, the Corps would also assist Reclamation to create an additional 2 to 5 acres of riparian wetlands at Mississippi Bar to compensate for temporal losses from these elements.

It has been determined that the ordinary high water mark of the Folsom Reservoir is at 466' elevation, which is the upper limit of the fluctuation zone for the Folsom Reservoir. However, Appendix D shows a graph showing the "Folsom Dam Reservoir Water Surface Elevations" between 1955 and 2005. This document shows the percentage of time that the Folsom Reservoir water levels are over a certain elevation. According to the table, the water level within the reservoir only reaches the 466' elevation approximately 1.1% of the time. In addition, almost 50% of the time, the reservoir is above the 429' elevation, and 100% of the time is above the 347' elevation.

The proposed fill material at Dike 8 would generally be placed between the reservoir elevation of 420-feet and 460-feet. Based on Appendix D, the fill material would be under water and suitable for fish habitat between approximately 1% and 68% of the time, with the majority of the fill material being suitable fish habitat less than 50% of the time. In addition, the proposed fill material, which would consist of primarily gravel and cobble material, and would have only minor impacts to aquatic wildlife habitat.

Therefore, a mitigation ratio of less than 1:1 for compensatory mitigation is appropriate to mitigate for losses to fish habitat function of the Folsom Reservoir. However, because the areas to be filled would provide suitable fish habitat for an average of 50% of the time, compensation for the loss of functions of the Folsom Reservoir related to fish habitat is required.

If Dike 8 is used as a disposal area then the Corps would purchase 2.5 acres of seasonal wetlands at an approved bank to compensate for the loss of fish habitat function. In the event that mitigation is not initiated within a two-year period, the mitigation ratios would increase by 0.5:1 if initiated within two to five years, and by 1:1 if mitigation is initiated more than five years after the impacts occur.

Although this mitigation is off-site and out-of-kind mitigation, it would compensate for losses at Folsom Reservoir, and would provide valuable fish and wildlife habitat at an alternate location. The off-site mitigation would provide fish and wildlife habitat within an area that is not heavily regulated for flood control and water supply, which would provide more benefits to fish and wildlife species than additional mitigation within the Folsom Reservoir. The proposed off-site mitigation would be sufficient to compensate for the losses of function at the Folsom Reservoir due to the proposed project.

4.4.5 Alternative 3 - Cofferdam

The analysis of potential effects associated with the capacity of stormwater drainage systems under Alternative 3 are the same as Alternative 2. The effects to water quality and impacts to jurisdiction waters under Alternative 3 for construction of the spur dike and transload facility, as well as the excavation of the approach channel and the placement of dredged materials and discharges into Folsom Reservoir would be the same as described in Alternative 2. Effects on water quality and jurisdiction waters unique to Alternative 3 pertain to the construction of the cofferdam.

Cofferdam construction has the potential to affect water quality and the bioaccumulation of mercury within Folsom Lake’s aquatic environment. Implementation of the mitigation measures described below would also protect the aquatic environment, and reduce impacts to a less-than-significant level. Specifically, a silt curtain placed around the perimeter of the excavation would be required to control turbidity and the potential for the mobilization of mercury within the lake.

In addition, an adaptive management plan would be implemented during construction. Samples for water quality, sediment quality, and toxicity tests would be collected and compared to water quality standards to assess the effects of construction activities. If water quality parameters for mercury exceed 0.05 mg/L (and as specified in the 401 Certification), additional response actions would be implemented.

After the cofferdam is installed, the downstream area that has impounded water would be dewatered to create the in-the-dry excavation area. The dewatering system would be used to conduct an initial mass dewatering between the cofferdam and the rock plug/excavation area and subsequently address seepage from the lake to the excavation area. This water would be fed into the SWPPP project system to avoid effects on water quality and potential mercury bioaccumulation. Implementation of BMPs would reduce effects to water quality to a less-than-significant level and the adaptive management plan would assist in evaluating and controlling the concentration of mercury that may be present in the sediment from affecting the lake water quality.

The removal of the cofferdam would commence by flooding the finished construction area until water levels on both sides of the reservoir were level. This could potentially lead to turbidity should the water entering the construction site stir up bottom sediment. Following this process, it would be necessary to excavate the fill from the cofferdam while also pulling out the sheet piles. This would involve the mobilization of equipment on the water surface opening up the potential for a fuel spill. Also, removing the sheet piles could potentially cause turbidity within the reservoir. This has the potential to affect water quality and the potential for the bioaccumulation of mercury within the lake. BMPs listed in the mitigation discussion below would reduce effects to water quality to less-than-significant level. The effects associated with the construction and removal of the cofferdam on water would be less-than-significant with mitigation.

As described in Alternative 2, permanent impacts to jurisdictional waters would occur at the spur dike, Dike 8 disposal area. Temporary impacts would result from the installation and removal of the cofferdam and transload facility, and dredging activities. The acreages of permanently and temporarily adversely impacts resulting from the implementation of Alternative 3 are listed in Table 39.

Table 39. Alternative 3 Fill of Jurisdictional Waters of the U.S.

Project Component	Impact Type	Folsom Lake (Acres)	Dike 8 (Acres)	Total (Acres)
Transload Facility	Temporary	2.5		2.5
Cofferdam	Temporary	2		2.0
Disposal	Temporary	85.0		85.0
	Permanent		2.5	2.5
Spur Dike	Permanent	9.0		9.0
Total Acreage Filled	**Temporary**	**88.5**		**89.5**
	Permanent	**9.0**	**2.5**	**11.5**
Total Mitigation Required[1]		9.0	2.5	11.5
New Jurisdictional Acres Created[2]		-2.5		-2.5
Net Permanent Change				**9.0**

Notes: 1 Minimum mitigation acreage required to ensure no net loss of waters of the United States. Greater mitigation acreage may be required based on further analysis required under section 404(b)(1) guidelines.
2 New Corps jurisdictional areas from the creation of the Approach Channel.

In total, Alternative 3 would result in permanent adverse impacts to 11.5 acres of waters of the United States (including wetland and non-wetland waters), temporary impacts to 89.5 acres of open water, and would create 2.5 acres of new open water habitat through the excavation of the approach channel. This would result in a permanent net loss of 9 acres of waters of the United States, which would be a significant impact unless mitigation is implemented. Further analysis of the relative practicability of alternatives that avoid and minimize impacts to waters of the United States, including wetland areas, is included in the Corps' 404(b)(1) alternative analysis (40 C.F.R. Part 230) to determine the Least Environmentally Damaging Practicable Alternative (Appendix D).

Permanent impacts would be mitigated to a less-than-significant level through incorporation of mitigation measures described under Alternative 2. Temporary impacts would be mitigated to a less-than-significant level through the incorporation of mitigation measures which would require the restoration or temporary impact zones.

4.4.6 Mitigation

Implementation of the below mitigation measures by the contractor would reduce the significant impacts on water quality, and jurisdictional waters to a less-than-significant level. Compliance and evaluation as a part of the provisions stated for the various permits discussed below would serve to minimize and mitigate potential hydrologic impacts due to construction activities.

- An NPDES permit would be obtained prior to construction activities, commencing by filing a Notice of Intent (NOI) with the CVRWQCB and preparing a SWPPP. As required under the General Permit, the SWPPP would identify implementation measures necessary to mitigate potential construction-related water quality concerns. These measures would include BMPs and other standard pollution prevention actions such as erosion and sediment control measures, proper control of non-stormwater discharges, and hazardous spill prevention and response. The SWPPP would also include requirements for BMP inspections, monitoring, and maintenance. The NOI indicates the intent to comply with the General Permit which outlines conditions to minimize sediment and pollutant loading. The following items are examples of BMPs that could be implemented during construction:
    - Erosion control BMPs such as use of mulches or hydro seeding to prevent detachment of soil following guidance presented in the California BMP Handbooks – Construction (CASQA 2003). A detailed site map would be included in the SWPPP outlining specific areas where soil disturbance may occur, and drainage patterns associated with excavation and grading activities. In addition, the SWPPP would provide plans and details for the BMPs to be implemented prior, during and after construction to prevent erosion of exposed soils and to treat sediments before they are transported offsite.
    - Sediment control BMPs such as silt fencing or detention basins that trap soil particles.
    - Construction staging areas designed so that stormwater runoff during construction would be collected and treated in a BMP such as a detention basin.
    - Management of hazardous material and wastes to prevent spills.
    - Vehicle and equipment fueling BMPs so these activities occur only in designated staging areas with appropriate spill controls.
    - Maintenance checks of equipment and vehicles to prevent spills or leaks of liquids of any kind.
- Measures to control on-site spills would be included in the SWPPP. In addition to the spill prevention and control BMPs presented above, the SWPPP would contain a visual monitoring program and a chemical monitoring program for pollutants that are non-visible to be implemented if there is a failure of BMPs. Proper storage and handling of materials and equipment servicing would only occur in designated areas. If a spill occurs, appropriate steps would be taken to inform local regulatory agencies as well as implementation of a spill response program as outlined in the SWPPP. The following BMPs would be implemented as part of the SWPPP and spill response program:
    - All barge and boat maintenance activities would be conducted outside the reservoir, with appropriate hazardous material containment measures in place.
    - All hydraulic dredge hoses and lines would be regularly inspected for cracks and leaks and appropriately maintained to prevent contamination.

- Drilling activities should not use ammonium nitrate fuel oil (ANFO) as it would dissolve in water and release ammonia and nitrates.
- Contractors would submit plans for containment measures for drilling fluids caused by hose breaks and other sources, shut down and clean up of spills.
- All terrestrial based construction equipment would be refueled and oiled at least one hundred feet from the reservoir high water mark with appropriate hazardous material containment measures in place.
- All barges and boats would be clean before they are launched.
- Refueling would be conducted outside the reservoir when practical, with appropriate hazardous material containment measures in place.

- If on-shore refueling is not feasible, over-water refueling activities would include the following fuel and oil spill avoidance and minimization measures:
  - A dedicated refueling area would be created. The refueling area would be located to minimize exposure to wind and waves, and would be equipped at all times with spill containment equipment, such as environmentally inert oil sorbent spill booms, absorbent pads, and appropriate waste disposal vessels to contain at least 100 gallons of fuel or oil.
  - At least two appropriate fire extinguishers would be easily accessible and prominently displayed on site.
  - Appropriate communication devices would be available at all times in case of emergencies.
  - Fuel would be stored in a double walled tank or other appropriate secondary containment structures.
  - Fueling would take place only under calm wind and wave conditions such that spilled fuel would be visible and recoverable.
  - If refueling activities would take place after sundown, adequate light would be used so that any spill would be easily visible.
  - If more than 55 gallons of fuels are stored onsite, the contractor would file a Hazardous Materials Business Plan with the county.
  - The refueling station would store less than 1.320 gallons of fuel above ground at any time. If storage of 11,320 gallons or more of fuels is required, the contractor would file a Spill Prevention, Control and Countermeasure (SPCC) Plan with the Regional Board.
  - During refueling operations, fuel bibs, fuel collars, fuel vent collection vessels, and/other appropriate spill minimization equipment would be used to prevent overflow fuel from reaching the water.
  - In the event of a spill into the water, environmentally inert sorbent booms and absorbent material would be deployed by trained personnel to contain and clean up the spill. The spill would not be treated by the use of any agent which would disperse, emulsify or coagulate the spilled material.

  - The discharge of any quantity of oil that violates state water quality standards, causes a film or sheen on the water surface, or leaves sludge or emulsion beneath surface would be reported immediately 24 hours a day to the U.S. Coast Guards National Response Center (NRC) at 1-800-424-8802 or 1-202-426-2675 and the USACE and the USBR.

- The Corps would obtain a Section 401 permit from the CVRWQCB and comply with all requirements of the permit to ensure compliance with Section 401 of the CWA.
- If water quality parameters for mercury exceed 0.05 mg/L (and as specified in the 401 Certification), additional response actions would be implemented to reduce parameters to threshold.
- Guidance would be obtained from the CVRWQCB for testing earthen materials before constructing or adjacent to the reservoir to ensure any potentially associated pollutants, particularly concrete or concrete runoff, would not be introduced into the reservoir that would violate water quality standards.. Fill material would be placed in the reservoir during periods of lower water elevation, when possible. BMPs, as discussed in the 401 permit and 404(b)(1) analysis (Appendix D), would be adhered to in order to minimize water quality impacts during the placement of fill in the reservoir.
- The Corps would obtain a dewatering permit from CVRWQCB and would implement applicable water quality monitoring by a qualified water quality specialist during dewatering activities. Mitigation measures to minimize water quality impacts due to construction within and along the reservoir shoreline would be developed in consultation with CVRWQCB staff. These measures may include placement of a silt curtain surrounding the construction zone or construction of cofferdams. If appropriate, routine water samples would be collected at the start and completion of each dredging and/or blasting period. Water quality monitoring by a qualified water quality specialist would be performed outside the silt curtain to verify that they are effective at keeping turbidity, sediment, and associated pollutants from dispersing into the Lake. Water quality monitoring would involve grab sampling by boat during operations, and could also include deployment of continuous monitoring devices that log turbidity, conductivity, and pH. Those details would be worked out with the CVRWQCB through development of the SWPPP and monitoring plan.
- A water quality monitoring plan would be developed for review by the CVRWQCB prior to any in reservoir construction work. The plan would address sampling requirements during dredging, blasting, excavation, and placement of fill within the reservoir. If turbidity readings exceed action level values established by the CVRWQCB, corrective actions would be implemented in accordance with the plan.
- The Corps would assist USBR with their mitigation requirements to ensure the 10 acres of riparian wetlands would be initiated by 2013. The Corps would also assist USBR to create up to an additional 5 acres on riparian wetlands at Mississippi Bar to compensate for temporal losses.
- To mitigate for the 2.5 acres of transitional wetlands associated with fill placement at Dike 8, the Corps would purchase 2.5 acres of seasonal wetlands at a Corps approved mitigation bank.

- In the event that mitigation is not initiated within this two-year period, the mitigation ratios would increase by 0.5:1 if initiated within two to five years, and by 1:1 if mitigation is initiated more than five years after the permanent or temporary impacts occur

Following development of sentinel species and trigger levels, baseline levels in sentinel species would be monitored so that changes in response to construction activities can be detected. It is important to note that the fish tissue samples in Folsom Lake indicate that these species are already impacted by mercury, so it would be expected that many sentinel species would exceed desirable levels of mercury for a healthy ecosystem under baseline conditions.

The following mitigation measures are relevant to impacts, but will likely not be required by the Corps. However the selected contractor will be encouraged to implement these measures where practical:

- During the process of dredging material to construct the approach channel for the auxiliary spillway, sediment containing mercury would be controlled using a variety of methods, including, but not limited to, silt curtains, silt fences, as well as other BMPs and construction methods approved by the CVRWQCB.
- Details on the proper use of silt curtains to protect water quality are available in guidance developed by the Corps Engineer Research and Development Center (Corps 2005). The following BMPs from this guidance should be considered during the use of silt curtains to ensure compliance with turbidity guidelines as established by the CVRWQCB:
    - Silt curtains should be selected, designed, and installed to meet permit and water quality certification requirements where applicable.
    - Silt curtains should be designed to pass water either under or through their walls. Curtains are designed to confine suspended sediment and to allow it to settle or be filtered, not to impede the movement of water.
    - In applications where the curtain will be extended to the bottom of the waterway in moving water conditions, a heavy woven permeable filter fabric should be designed into the curtain to relieve pressure on the curtain wall.
    - In all but the slowest current flows, curtains will "billow out" in the downstream direction, allowing water to pass beneath the curtain, thereby reducing the effective skirt depth.
    - Extra length (up to 10 to 20 percent) and depth (slack) of curtains should be included in designs to allow for exchanges of water within the curtain.
    - Special designs may be required for applications of curtains at depths greater than 10 to15 feet or with currents exceeding 1 ½ knots. At greater depths, loads or pressures on curtains and mooring systems become excessive and could result in failure of standard construction materials.

  - Minimize the number of joints in the curtain; a minimum continuous span of 15 m (50 feet) between joints is a "good rule of thumb."
  - Curtains of a bright color (yellow or "international" orange) are recommended to enhance visibility for boaters.
  - Anchor lines should be attached to the flotation device, not to the bottom of the curtain.
  - Care should be taken during removal of silt curtains to avoid or minimize resuspension of settled solids.
  - Removal of settled solids trapped by the silt curtain is optional and should only be considered if the resulting bottom contour elevation is significantly altered.
  - Designs should conform to relevant contract specifications and manufacturer recommendations and guidelines for installation and safety measures.
- In addition to the above BMPs regarding silt curtains, the following could be implemented by the contractor, as needed, to further reduce turbidity:
  - When dredging contaminated sediment, installing silt curtains within continuous or intermittent sheetpile walls to provide anchoring points has proven to be more effective than using silt curtains alone.
  - Aquatic habitat can be protected with deflection curtains provided they are properly designed and deployed, taking into consideration site-specific conditions.
  - Regular inspections should be performed to verify the integrity and proper installation of the silt curtains.

- In addition to the above-listed mitigation measures, an Adaptive Management Plan is recommended as a mitigation control measure to assist with the management of construction control BMPs and monitor the effects onto the aquatic environment. It is difficult to predict the precise effects construction activities would have on turbidity, sedimentation and on the increase on total mercury and methylation of mercury. Therefore, monitoring and adaptive management of construction controls are critical components of protecting against significant effects to bioaccumulation. The Adaptive Management Plan would consist of monitoring the environment outside of the construction zones as specified in the 401 Water Quality Permit, and would specify triggers for adaptive management actions to avoid exceeding significance thresholds for turbidity and mercury.

4.5 FISHERIES

4.5.1 Methodology

Potential impacts of the Folsom Dam Modification Project, Approach Channel were qualitatively evaluated based on the construction practices, the location and duration of the activities, and the potential for adverse impacts on aquatic habitats adjacent to the project area and/or the fish community that could be occupying these habitats. This qualitative evaluation occurred for the following reasons: 1) lack of data on specific aquatic organism response to created conditions; 2) unknown variables of seasonal fluctuations; and 3) unknown sediment parameters of excavation and blasting. The variation in response by individual fish species, and fish of differing developmental stages, cannot be assessed quantitatively at this time against potential variables inherent in potential and unknown construction scenarios under varying seasonal conditions. Biological assessment is conducted on a qualitative order, based upon current resource status, available literature, and magnitude of duration and intensity of affects.

4.5.2 Basis of Significance

The alternatives under consideration would result in significant effects to fisheries if they would:

- Substantially change the diversity or numbers of any; aquatic community or species or interfere with the survival, growth, or reproduction, of affected populations;
- Introduce nonnative and invasive aquatic species;
- Cause substantial deterioration or adverse alteration of existing fish habitat. Substantial is qualified as long term effects that can be verified by repeated measurement or includes habitat designated as, “Critical Habitat” by NFMS;
- Substantially reduce or curtail game fish populations for recreational fishing, reducing the availability or quality of existing angler opportunities in Folsom Lake; or
- Have a substantial adverse effect, either directly or through habitat modifications on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies or regulations, or by the CDFG, NMFS, or USFWS.

Criteria listed above are discussed below within alternatives, and are not considered to be significantly affected with the adoption of recommended project design and mitigation measures during construction activities. A comparison of effects and significance is summarized in Table 40.

4.5.3 Alternative 1 - No Action

Under the No Action Alternative, the Corps would not participate in construction of the proposed alternatives; therefore, existing conditions would be maintained. There would be no potential for release of contaminants or increased sedimentation or turbidity from the approach channel construction or introduction of invasive or nonnative species.

4.5.4 Alternative 2 – Cutoff wall

The project area would be temporarily closed to recreational fishing activity for safety reasons from years 2013 through 2017. The project area would exclude less than 3 percent of the Folsom Lake surface area from sport fishing for up to five years; this acreage is not expected to significantly affect angler opportunities in Folsom Lake. Folsom Point boat launch would remain accessible to all recreational and boating activity. Further assessment of project effects to recreation opportunities in the FLSRA is included in Section 4.7 below.

Project construction activities that could affect fish populations include dredging of fine sediments prior to the placement of the haul road embankment, transload facility, and the spur dike, in-water disposal of construction material through hydraulic or mechanical placement, and dredging and blasting of the approach channel. Underwater construction activities would be conducted at low reservoir levels whenever possible to avoid silt contribution or resuspension of sediments. The highest magnitude of effects on aquatic species would occur under Alternative 2 due to increased construction and excavation conducted in-the-wet (wet soils or underwater). The project could potentially affect aquatic life in the following ways:

- Increased turbidity within the water column;
- Bioaccumulation of mercury;
- Blasting and acoustic (vibration and sound energy) actions
- Introduction of contaminants, fuel and oil spills;
- Physical crushing;
- Water temperature increase and;
- Introduction of nonnative quagga or zebra mussels from marine vessels and nonnative and invasive vegetation.

Folsom and Nimbus Dam effectively impede all fish migration. Special status salmonids traveling up the American River cannot enter Folsom Reservoir due to these barriers. Hardhead (*Mylopharodon conocephalus*) is a California Species of concern found in cold water habitat in foothill streams. Hardhead could be found in the tributaries above Folsom Reservoir but the habitat within the project area is not suitable for the species. It is expected that no candidate, sensitive, or special status species are found within the project area (J. Rowan, pers. com) and would not be affected by the project. Aquatic construction equipment and boats would be decontaminated of invasive species prior to placement in Folsom Lake per approval by CDFG and invasives establishment is expected to be a less-than-significant effect.

<u>Turbidity Effects</u>

Turbidity is created by any activity that disturbs bottom sediments or introduces outside particulate matter with the result that the sediments are suspended in the water column. Turbidity is a component of water quality and is addressed in detail in Section 4.4 above.

Construction of the transload facility, spur dike, excavation and dredging activity, and in-water material disposal could create turbidity that would adversely affect fish health, mortality, and reproduction. Under Alternative 2, construction activities of underwater dredging, excavation, in-water disposal, fill placement, and blasting have the potential to cause up to 500 days of construction related turbidity affects on aquatic organism. Dredging of sediment layers prior to fill placement and blasting would initially increase turbidity, but would reduce the overall effect of sediment in the water column. If turbidity is insufficiently contained, significant effects could result to aquatic organisms and game fish.

Ecological Effects

Excessive turbidity in aquatic systems can lead to indirect effects that could impact aquatic species. Increased turbidity alters aquatic light regimes that directly affect primary productivity, species distribution, behavior, foraging, reproduction and survival of aquatic biota (Wilber and Clarke 2001). Aquatic system productivity may also be reduced. As an indirect effect, the suppression of aquatic productivity is not as apparent as observable direct effects on larger organisms. It is possible for sustained turbidity to adversely shade primary phytoplankton, zooplankton and invertebrates which serve as food for smaller fish, and larval fish upon which game fish forage (Lloyd 1987).

- Sufficient turbidity can result in direct lethal or sublethal effects on fish (Newcombe and Jensen 1996). An increase of resuspended dissolved or particulate organic carbon from the sediment may decrease dissolved oxygen (DO) concentrations. Reduction in DO availability for aquatic species causes reduced oxygen uptake by the organism. At sufficient concentrations, turbidity will clog fish and amphibian gills and cause physical abrasion to the level of sub-lethal or lethal effect. Settling of suspended sediment can coat fish and amphibian eggs, reducing or eliminating DO uptake required for development or survival. The eggs and larvae of non-salmonids are particularly sensitive. Hatching was delayed for striped bass and white perch eggs exposed to sediment concentrations of 800 and 100 mg/L (Wilbur and Clarke 2001). Prolonged exposure and increases in turbidity levels can interfere with the survival and growth of populations. A condition of prolonged exposure and turbidity increase within or directly adjacent would be expected with dredging, excavation, disposal and material placement, and may cause localized fish mortality. However, recommended silt curtains would be expected to keep turbidity contained and cause less effect to the total number of fish within the project area. Conduct continuous monitoring on sublethal and lethal blast effects on fish. Conduct adaptive management to reduce effects of blasting on fish if significance thresholds for sublethal and lethal effects established by CDFG, USFWS and the Corps are exceeded.

  The fish species expected to be impacted in greatest numbers at the project site is wagasaki smelt due to prior populations found here. With active disturbance occurring during construction, substantial numbers of fish are not expected to remain in direct proximity with construction activities, and fish will be excluded where possible from the interior of silt curtains. Prolonged exposure and adverse turbidity is not expected outside of the immediate construction area if water quality CVRWQCB thresholds per the Section 401 Certification are maintained, and required BMPs and mitigations are conducted. Assuming strict contractor compliance with water quality mandates, mitigation, and BMPs, less-than-significant effects are expected for fish habitat and mortality related to turbidity.

Fish Behavior

Avoidance is the most common result of increases in turbidity and sedimentation. Fish generally will not occupy areas unsuitable for survival unless they have no other option. Reduction of the water visibility from suspended silts in the water can reduce fish, amphibian and aquatic reptile foraging and predator avoidance. Some fish species experience reduction in immune system health and behavioral changes including avoidance and displacement (Lloyd 1987; Birtwell 1999). Turbidity effects vary considerably between fish species; many fish species avoid turbid water for foraging while some species are able to increase the effectiveness of foraging up to a certain sediment concentration (Wilbur and Clarke 2001). Substantial increases in turbidity would negatively affect foraging for most species in Folsom Reservoir. Centrarchids such as smallmouth and largemouth bass, and most larval fish are more impacted by small increases in turbidity than salmonid species (Berry et al 2003).

Under most dredging scenarios, fish and other motile aquatic organisms encounter localized suspended sediment plumes for exposures of minutes to hours, unless avoidance or attraction to the plume occurs. Intermittent localized plumes could be expected for the approach channel project, but it is difficult to assess fish behavior prior to such exposure. Construction actions would cause localized degradation of fish habitat within the project site due to disturbance and turbidity increases and fish may avoid this area or incur physical degradation or mortality. High turbidity resulting from construction-related activities would likely preclude some species from occupying habitat utilized for successful completion of one or more life stages but this would be limited to less than 50 acres at the project site and not affect Folsom Reservoir outside the project footprint.

There are no known preferred foraging habitat or breeding sites that would be affected by increased and localized water turbidity in the project area. The affected area is not known to be integral to life stages of game fish within Folsom Reservoir. Adverse effects upon Reservoir habitat outside the construction footprint are not expected due to containment of silts. Turbidity increases are expected only from summer of year 2013 to the fall of 2017. Benthic community replacement is expected to occur rapidly. Turbidity effects on fish habitat would have potential to be significant, however, with the implementation of mitigation measures, BMPs and compliance with CVRWQCB thresholds, the project effect is expected to be less-than-significant.

Silt Dosage

Exact levels of turbidity which cause effect are also difficult to determine due to the large number of environmental factors involved in measurement efforts (Berry 2003) and the behaviors and physical sensitivities of specific fish species. Effects of suspended sediment upon fish are not only a function of concentration, but are also related to the duration of turbid conditions (Clarke 2001; Wilbur and Clarke 2001). Silt concentration alone is poorly correlated with salmonid fish responses to suspended sediments; dosage (amount over time) is more strongly associated with fish response (Newcombe and MacDonald 1991). In a conservative range of measured effects, sublethal behavioral effects to juvenile and adult salmonids was caused by a concentration of 100 mg/L over a period of less than one day; under a longer duration with similar concentration, mortality resulted in ten days (Wilbur and Clarke 2001). Sustained low sediment levels over a long duration may produce effects for some species, while others are more affected by high concentrations over a short time period.

Projects generating persistent, high suspended-sediment concentrations represent the most problematic situation as it is difficult to assess the effects of exposures at low concentrations over longer time periods, particularly with aquatic construction scenarios that are undefined at this time. A salient resolution includes preventative measures and turbidity controls to reduce effects to a level where they are not detrimental to the aquatic environment. It is expected that persistent turbidity directly at or adjacent to in-water material placement, disposal, placement, dredging and excavation will be high and will exceed levels for fish health and habitat protection over the duration in-water construction in an area up to approximately 50 acres. However, CVRWQCB water quality thresholds within Section 401 certifications are established to maintain aquatic organism projection. Adherence to CVRWQCB thresholds and implementation of mitigation measures and State water quality thresholds would be expected to maintain sufficiently low dosages of silt within the reservoir proper and not adversely affect aquatic organisms. As a result, the issue of sustained silt concentration at low dosages in Folsom Reservoir is expected to be less-than-significant with mitigation.

Silt Curtains

Engineering controls, avoidance mitigation and BMPs conducted for the project are effective at avoiding turbidity effects on aquatic species. Resuspension or introduction of silt into the water column could be contained to the project area with the recommended deployment of silt curtains. Silt curtains, also called turbidity curtains, have been used to effectively manage project turbidity (USEPA 2004; USEPA 2005). With appropriate use of silt curtains, turbidity levels outside silt curtains are not expected to cause adverse effects to native and game fish populations and habitat outside the project area. Fish entrapped within silt curtains may experience sublethal or lethal effects. Compared to use in rivers and ocean channels, a higher degree of efficiency is expected with the silt curtains in the relatively low water currents of Folsom Reservoir.

Silt curtains are vertical flexible structures of a synthetic material that extend downward from the water surface to a specified depth, usually one to two feet above the lakebed, to effectively contain suspended silts and allow them to settle out of the water in a controlled area (Corps 2005). The silt curtain does not indefinitely contain turbid water but controls dispersion usually by diverting flow to an elevated space under the curtain to minimize turbidity in the water column outside the silt curtain. It is recommended that all construction activities that risk resuspension or introduction of sediments would be enclosed in silt curtains including excavation, blasting, dredging, and in-water disposal and fill placement, for the Approach channel, transload facility and spur dike. Silt curtains could also be employed in the construction and removal of the transload facility and during hydraulic silt material disposal directly to the lake bottom. It is expected that with State water quality threshold compliance, impacts to water quality and fish or other aquatic habitats due to increased sedimentation and turbidity would be less-than-significant.

Specific design features are recommended to address site specific needs of Folsom Reservoir according to the Corps (2005) guidelines, and to comply with water quality mandates. Adjustments would be conducted to maintain effectiveness during water level fluctuations, construction equipment changes, and for aquatic protection needs. Silt release at the curtain bottom would cause a plume or localized turbidity that could affect fish adjacent to the curtains. Reduced DO and visibility could affect individual fish attracted to the plume or adjacent to the lower sections of the silt curtain. Rainbow trout can be alternately attracted or exhibit avoidance behavior around turbid plumes depending upon the availability of associated food sources (Berry 2003). It is expected that salmon would move freely from the area to avoid localized turbidity (Lloyd 1987). Incidental fish that remain adjacent to the bottom plume area would be at risk for sublethal effects, but this is not expected to be a substantial number of organisms. There are no known preferred foraging habitat or breeding sites in the affected area. It is expected that effects associated with incidental silt release at the bottom of the silt curtain would produce less-than-significant effects on fish populations and sport fishing. In Folsom Reservoir.

Open space at the silt curtain bottom, which allows water and sediment flow, and gateways at the top of the silt curtain would provide opportunity for incidental fish passage into interior construction zones where they could incur mortality. It is recommended that silt curtains be securely adjusted to prevent fish passage and entrainment. If lake levels remain high during in-the-wet excavation, water flow over the partially excavated rock plug could entrap fish. Also, frequent lowering and shifting of the silt curtains to provide passage for vessels and equipment could allow silt dispersion into the water column and passage of fish with subsequent entrainment. Passage by small numbers of fish under the curtain or around the structure during installation or adjustments would be expected to occur, predominantly by wakasagi smelt. Fish that move into direct contact with excavation activity would be at risk of turbidity impacts that could cause injury or mortality. Salmonids are known to seek deeper, colder water located at the front of Folsom Dam adjacent to the project area in summer months. There is risk for salmon entrainment with increasing number and size of silt curtains utilized, but salmon are also likely to avoid the areas due to turbidity and noise (Lloyd 1987). It is unlikely that an overall change in the reservoir's fish population or sport fishing would result. Effects resulting from entrapment of fish within the silt curtain would be less-than-significant.

Shallow water breeding areas for fish are not found within the project vicinity. With adherence to State water turbidity thresholds, siltation of breeding habitat in other areas of the reservoir is not expected. Silt material escaping the silt curtain is expected to drop out of the water column before transport occurs within the lake proper or to downstream waters below Folsom Dam. As a result of turbidity containment and the low underwater currents, no silt within the Reservoir proper is expected to affect native fish concentrations at the upstream junction of the north and south forks of the American River. No special status species are expected to be affected since hardhead, the only special status species found within Folsom Reservoir, would not utilize the project area for breeding or foraging. Fish within the project area could be expected to incur higher levels turbidity-caused effects, but seasonal movement, species, and numbers of fish are unknown and quantitative prediction cannot be made at this time. With the implementation of water quality mitigation measures discussed in Section 4.4.6, impacts from turbidity would be expected to be less-than-significant with mitigation.

Water Quality Thresholds

Construction activities would be permitted under state and federal water quality regulations, and compliance with mandates for water quality would be conducted to avoid effects on aquatic organisms (see Water Resources and Quality Section 4.5). Due to the large environmental and project variability, most regulatory agencies have not established thresholds for fish protection, but instead have instituted turbidity thresholds to address aquatic protection. Project turbidity compliance would be achieved by constant monitoring of turbidity levels within the project area to standards prescribed by the SWRCB. The SWRCB values for freshwater sediments were based on the SQG developed by MacDonald, et al (2000), in the document entitled, "Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems". This document was an effort to develop standardized limits using various published SQGs. These standards have attempted to prescribe thresholds with a magnitude lower than concentrations and durations that would begin to effect fish health.

Prior water certification standards provided by the CVRWQCB for construction of the Folsom Overlook, prescribed a surface water concentration not to exceed 0.1 ml/l in surface waters measured 300 feet downstream of the project site; this concentration is well below documented effects upon fish. Fish begin to show stress at approximately 10 Nephelometric Turbidity Units (NTUs) over duration of days (Wilbur and Clarke 2001). SWRCB water quality thresholds are set below this amount with the exception of in-water working periods, which could allow a turbidity increase of approximately 15 NTUs over background turbidity. Effective use of silt curtains would be a critical action to prevent turbidity increases that could affect summer habitat of salmon in front of Folsom Dam. Salmon utilize the colder, deeper water area directly in front of Folsom Dam for summer habitat. During summer, cold water does not circulate to the surface and aquatic organisms can deplete available oxygen in lower lake levels. Leakage from silt curtains or flow of silt into this oxygen deprived stratified layer could lead to further oxygen reduction for the Reservoir salmon, compromising habitat and fish health. Disposal of excavation material at the overlook site presents the greatest risk to affecting salmon summer habitat. Additional turbidity monitoring from June through October is recommended for summer and fall habitat, particularly at depths from 35 feet to lake bottom, to ensure that turbidity levels do not exceed CVRWQCB thresholds. If monitoring indicates that thresholds are exceeded, contributing construction activities should be discontinued until sediment controls are achieved and the turbidity level is resolved to threshold. Adaptive change in construction activities and methods to comply with state certification thresholds would ensure that significant effects to aquatic organisms do not occur.

As mentioned, CVRWQCB compliance turbidity monitoring would commence throughout the project's water-based construction. If turbidity thresholds are reached, construction activity would be adjusted to produce conditions that meet state and federal water quality mandates. Though adverse alteration of fisheries habitat is expected within the project footprint during in-the-wet construction, suspended sediments resulting from project activities are a temporary condition, and are not expected to cause long term effects after the project. Turbidity effects as mitigated would not substantially change the diversity or numbers of any aquatic community or species, or interfere with the survival, growth, or reproduction, of affected populations in Folsom Reservoir. Use of mitigations, BMPs, and turbidity monitoring, as discussed in Section 4.4.6, is expected to reduce the turbidity effects upon aquatic populations in Folsom Reservoir to less-than-significant.

Sediment Transport and Temperature

Transport of fill material across the reservoir on barges creates risk for potential sediment releases into the reservoir. Material on barge transports would not be contained by silt curtains and could be discharged directly into open water that would cause localized turbidity. To reduce the risk of this source of turbidity, dredge loading and unloading areas would be contained by onshore and aquatic sedimentation barriers and any fill spilled during these activities would be contained to the loading and unloading areas. All fill material would be contained on barges such that it would not slide or fall off and enter the water column during transport or storage. Fill material on barges would be covered in the event of adverse weather so that no material is washed or blown off by precipitation or wind. With containment measures in place and implementation of required BMPs, sediment releases are not expected to produce a significant effect.

Water temperature increase due to turbid water is possible inside and outside the silt curtains, which depending upon affected fish tolerances and season, would result in a temporary beneficial, neutral or negative effect in the immediate area. Sufficient temperature rise is not expected to cause effects to the reservoir due to the relatively small volume of water affected. Impacts to aquatic species associated with water temperature increase would be less-than-significant.

Bioaccumulation

Bioaccumulation in game fish can create indirect effects on fisheries and human health. Prediction of mercury accumulation cannot be quantified due to project variables and unknown quantities of exposure associated with consumption by project area organisms. Sediment containing mercury would be exposed and suspended for a potentially increased production of methylmercury during excavation of the approach channel. Potential for methylmercury bioaccumulation would be increased with increases in excavation and dredging activity. Silt material placed back into the lake body for disposal presents a greater risk for bioaccumulation because sediment movement would increase availability of mercury and potential for methylmercury accumulation. Dredging and construction of the spur dike and transload facility could also increase mercury exposure and potential for methylmercury uptake. Turbidity reduction is the most effective method of reducing the risk of bioaccumulation. As discussed in Section 4.4, the risk of bioaccumulation can be assessed by monitoring sentinel species for increased elevations of mercury (Section 4.4). Increases found in methylmercury of sentinel species would be reported to USFWS and regulatory agencies.

Use of terrestrial disposal sites, rather than aquatic sites, for excavated and dredged material would reduce risk for methylmercury to be incorporated into fish of game size, and would not cause significant increases of methylmercury in the Folsom Reservoir fish population. With appropriate turbidity control and mitigation measures, it is reasonable to expect that bioaccumulation of methylmercury will not be significant for the following reasons:

- Prior and recent sediment testing of approach channel sediments showed mercury concentrations below State thresholds (Corps 2011).
- Period of sediment suspension is temporary and projected to last approximately 500 days.
- Sentinel species and small fish species have limited life spans, reducing risk of fish uptake and the biomagnification factor. The major forage fish in the area, wakasagi smelt, have a one year life span.
- Resuspended sediments would be contained to a localized area. Uptake by zooplankton and algae would be concentrated within silt curtain enclosures.
- Higher trophic fish are expected to avoid construction areas for feeding.
- Turbidity and mercury water content would be monitored to comply with CVRWQCB certification thresholds..

Therefore, the potential of bioaccumulation of methylmercury to increase in aquatic organisms and sport fish is expected to be less-than-significant with mitigation.

<u>Acoustic and Blasting Effects</u>

Acoustic

Under Alternative 2, underwater noise could be expected to occur for up to 500 days. Underwater sound from blasting has potential to adversely affect fish inhabiting Folsom Lake. General noise characteristics relative to the project are addressed in Section 4.9. With the exception of blasting, acoustic noise would result primarily from marine engines, dredge equipment scraping sediments, airlift use, and rock placement. NMFS and USFWS have set interim criteria for injury to fish from blasting. The current thresholds for injury are 206 dB peak, 187 dB cumulative sound exposure level (SEL) for fish greater than 2 grams and 183 dB cumulative SEL for fish less than 2 grams. The current threshold for disturbance is 150 dB rms. Small recreational boats with large outboard motors can reach up to 175 dB peak; these vessels can be found in Folsom Reservoir and would be excluded from the project area. Marine barges, used for material transport and drilling, are expected to remain below 175 dB peak.

Extremely loud sound levels can have negative effects on fish that include permanent or temporary deafness, tissue damage and mortality. Gas oscillations induced by high sound pressure levels can burst small capillaries or cause damage to gas containing organs (Caltrans 2009). Fish response to sound can be varied, ranging from classic fright response to packing, polarizing, increasing swimming speed, diving or avoidance (Olsen 1969). Varying noise effects upon different species are difficult to predict. Fish can either ignore repetitive construction noise, or avoid noises sources, resulting in temporary displacement. Adverse effects are usually manifested by a reduction in the ability to evade predation (stunning or reduced swimming ability), a change in behavior that leads to increased exposure to predation, or an inability to detect predators or prey effectively (temporary or permanent deafness) (Olsen 1969).

Construction equipment in Alternative 2 is expected to generate up to 120 dB on an intermittent basis. Construction activities that require the placement of riprap in the water for the spur dike, transload facility and cofferdam would generate noise only underwater in the immediate vicinity of where the activities are taking place. Drilling generates noise from both the drill bit striking the rock near the collar of the holes, as well as from mechanical equipment and compressors used on the drills. Drilling from platforms would not occur in less than 35 feet of water, and thus is not expected to generate measurable noise in air. It is likely that some fish would be disturbed during drilling, but underwater sound levels are not expected to result in injury or death to fish. The project is not expected to generate acoustic energy that would exceed NMFS thresholds for injury, but noise, particularly dredging and excavation acoustics, may cause intermittent disturbance to fish and cause them to avoid the project area over the life of the project

Fish species within Folsom reservoir are considered to be sound generalists and would be affected to a lesser degree by general construction noise than sound specialists. Optional silt curtains and optional bubble curtain options would serve to dampen amplitudes of acoustic wave energy generated by construction equipment. The Folsom Reservoir fish population is not expected to be significantly affected by temporary displacement from the project site as it does not contain a concentrated food source, species of concern or nesting habitat. Construction activity, with the exception of blasting, is not expected to exceed NMFS SEL standards or adversely affect fish populations within Folsom Reservoir. Therefore, effects on aquatic organisms due to an increase in acoustic noise would be less-than-significant.

High Explosives

High explosives would be utilized to fragment rock, which can cause damage or mortality to aquatic organisms. Blasting operations for the approach channel excavation are expected to occur over a period of approximately 400 days in Alternative 2. High explosives, normally used in excavation operations, cause the most severe sound effects that result from a high amplitude shock wave caused by the initial impulse and the negative pressure wave reflected by the water surface (Turnpenny and Nedwell 1994; Houghton and Munday 1987). Extremely loud sound levels can have considerable negative effects on fish including temporary or permanent deafness, tissue damage, and acute mortality. The detonation of explosives in or near water produces post –detonation compressive shock waves characterized by a rapid rise to a high peak pressure followed by a rapid drop to below ambient hydrostatic pressure. The latter pressure deficit causes most impacts on fish (D.G. Wright and G.E.Hopky 1998). Studies (Wright 1982) show that an overpressure in excess of 100 kPa will result in these effects. The degree of damage is related to the type of explosive, size and pattern of the charge(s), method of detonation , distance from the point of detonation, water depth, and species, size and life stage of fish. Tissue damage arises when the wave oscillates and passes through tissues of different densities. A wave passed through tissues at different speeds can result in shearing, and in extreme cases the tissues can be torn apart. Underwater blasting without protective mechanisms could cause substantial mortality to fish in the project area.

Explosion related damage causes most effect on gas containing organs such as lungs and stomach, which undergo rapid expansion and contractions from rapid oscillations in wave forms (Wiley 1981). Aquatic species containing swim bladders are particularly susceptible to explosive blasts that can rupture with sufficient negative pressures as summarized by Keevin (1998). With the exception of sculpins, fish species in Folsom Reservoir contain swim bladders. Fish with specific types of swim bladders most susceptible to affects of blasting include bass, crappie and blue gill. Rainbow trout, salmon, white suckers and bullheads are less affected due to morphology of their swim bladders. Aquatic arthropods and crusteaceans are not as vulnerable due to the lack swim bladders and presence of protective shells. Mammals are considered most affected by blast pressures due to larger air containing organs and tympanic membranes with sensitive pressures in the inner ear. Blast injuries include middle ear ossicular fractures and inner and middle ear hemorrhage; disruption and hemorrhage to liver, intestines, larynx, stomach, and cerebral expansion.

Information as summarized by Keevin (1998) also suggests that fish weight influences vulnerability to explosions; smaller animals sustain greater tissue trauma than larger bodies when exposed to the same pressure. It is expected that Folsom Reservoir fish of smaller size such as wakasagi would incur more mortality than mature trout or salmon. However, smolts or juvenile fish of smaller body mass would also be at greater risk as they are sensitive to small pressure increases (Govoni and West 2008). Severity and number of impacted tissues also declines with decreasing pressure. O’Keefe and Young (1984) characterized physical trauma to fish on a numerical scale to cover the range of gross visible effects from exposure to large high amplitude shockwaves:

1. No damage (fish survives)
2. Light hemorrhaging (fish survives)
3. Light hemorrhaging and some kidney damage (impaired escape response and possible increased vulnerability to predation)
4. Swim bladder bursts and gross kidney damage (fish killed)
5. Incomplete body wall break and gross internal damage (fish killed)
6. Complete rupture of body cavity and organ destruction (fish killed)

Predictive mathematical mortality models have been developed to estimate fish mortality (Keevin 1987), but most models are based upon explosive charges set in open water, and do not apply well to the approach channel project. Explosives to be used for the approach channel excavation would not be conducted in open water, but would be stemmed into existing rock substrate. In stemming, the explosive is placed into a drilled hole into the rock substrate and covered with angular gravel or crushed stone. This technique decreases the amount of gas energy that is lost out of the drill hole and reduces impacts to the aquatic environment.

According to Keevin and Hempen (1989), a user friendly computer program was developed by coastline Environmental Service Ltd. (1986) that uses an impulse strength model (IBlast) and the energy flux density model (Eblast) to predict effects for both midwater charges and charges that are drilled and buried in rock substrate. Although problems are noted with these models (Hempen and Keevin 1995; Keevin 1995) they can provide an approximation of the potential fish kill radius of a given explosive charge. The pressure level below which most fish remain unaffected by blast pressures is instantaneous pressure change (i.e. overpressure in the swimbladder of a fish) of approximately 14.5 psi corresponding to the 100 kPa figure defined in Canadian codes as the safe limit for marine species (Wright and Hopky 1998). Blast pressure decreases as energy disperses from the source blast. Blast pressures limits have been established for the project to provide for human safety; 5.8 psi at 2,500 feet from the blast point, and 19 psi at the bulkhead gates to protect recently constructed structures. With a maximum initial blast of 100 psi, it could be expected that a psi pressure of 14.5 would not be achieved until a distance of approximately 800 to 1000 feet away from the blast point is attained (Appendix E). As a result, most fish within the blast area extending from the blast point to about 800 to 1000 feet, would suffer lethal or sublethal effects. Most fish outside this distance would not incur lethal or sublethal effects. Peak (or initial blasts), are not expected to exceed 100 psi in order to protect human safety; smaller initial blasts to protect structures could also be expected that would result in lesser underwater pressures producing a lesser amount of fish mortality. The contractor will determine initial blasts to maintain human safety and structure protection thresholds. In a worst case scenario, a 1,000 foot radius drawn from the blast point constitutes an affected blast zone greater than 14.5 psi, where sublethal or lethal effects can be expected for most fish.

Considerable variation of blast effect would occur due to blasting techniques utilized and existing environmental conditions. Effects to fish would vary with contractor choices regarding blasting techniques, mitigations and frequency of blasts. The contractor’s blasting plan will be reviewed by the Corps and regulatory agencies, with final approval provided by the Corps. Sublethal or lethal effects are expected for fish, particularly those entrapped within silt curtains during blasting. Though recommended for overall fish protection, contractors will determine whether silt curtains used during blasting activity as a method to achieve State water threshold standards. While this option by provides contractor flexibility, it may reduce other protections that could be afforded for fish by silt curtain use. Lethal results are expected for fish entrained within a standing silt curtain surrounding the blast point, but use of silt curtains around the blast point would also serve to exclude most fish from the most impacted zone. Effective use of a silt curtain during blasting could reduce pressure wave intensity by inhibiting or dampening amplitude shock waves beyond the curtained area. The degree to which amplitudes can be lessened by silt curtains, has not been quantified. While it would be less impacting to conduct blasting when salmonids move to upstream locations, the project schedule is not expected to accommodate seasonal fish movements.

Movement of species, fish quantity and seasonality of fish within the area is not sufficiently known to provide quantitative estimates of potential fish mortality by species or number. This information is currently incomplete and not available. Preblast sampling surveys are reported to provide limited value in determining fish kill (Keevin and Hempen 1997) due to variability of fish presence within the affected area. Seasonal use of the project area by varying fish species is expected as water levels drop or rise and food sources and water temperatures change. Environmental variables will cause variation in the species composition and numbers within the project area that will be affected by blasting. However, the affected blast area is relatively low in habitat quality as it lacks habitat elements for optimum fish reproduction and development due to the lack of vegetation and cover. Quantification of salmonid juvenile and larval fish use within the project area has not been conducted, but lower quality habitat is not expected to attract high concentrations of fish within these life stages.

Blasting is not expected to affect fish in front of Folsom Dam adjacent to the project area, but salmonids could be expected to pass through the blast zone more frequently during months of high water temperature in order to reach the colder deeper waters directly in front of Folsom Dam. As a result, salmonids could experience a higher degree of sublethal and lethal effects during this period, and it is important that consistent fish kill monitoring be conducted during this time. From the results of prior fish removal actions in the project area, it could be expected that wakasagi would constitute the highest number of fish affected by project blasting.

Keevin and Hempen (1997) discussed blasting techniques to reduce fish mortality, including stemming, blast delay and decking. Non-explosive acoustic deterrents to fish, could be conducted as mitigation, but acoustic deterrents have varying success depending upon method and fish species; in some cases, fish are attracted to the site (Corps 1995, Keevin and Hempen 1997). Acoustic and bubble curtain deterrents have been effectively utilized to deflect salmon and other species from blasting zones, but these will not be utilized in the project as a result of engineering decision. Explosive detonations to scare fish have shown varied results and often result in sublethal injury or mortality. As a result, most state agencies with blasting regulations prohibit explosive detonations as a scaring technique (Keevin and Hempen 1997).

Minimization measures to reduce blasting effects to aquatic species have been recommended and some of these have been incorporated into the project, including decking, stemming, and time delay of blast charges. Maximum water pressures achieved by the blast shots will be monitored with a transducer recording system (Corps 2004). Pre-production test shots will be conducted to ensure blast pressure thresholds of 5.8 psi at 2,500 feet and 19 psi at the bulkhead gates can be achieved for production blasts. Blast plan review and monitoring of fish kill numbers, species and size would be conducted with the coordination of CDFG. Surface collection of floating fish would be executed to gain an index to blast-caused mortality and to prevent scavenging by birds in the construction area. Recognition should be made, however, that floating fish recovered after the blast would provide only a representation of mortality, because not all fish species float to the surface after incurring sublethal and lethal effects. In addition, counts of floating fish can provide an underestimate of mortality when physical collection fails in retrieving all carcasses. Carcasses can be evade detection during collection efforts and can be difficult to access under different conditions. Sublethal effects are not visually evident, do not normally float to the surface, and usually remain undetected resulting in a miscount of actual mortality numbers. Thresholds for fish mortality were not provided by regulatory agencies, but reinvestment into the sport fishery has been requested by CDFG (J. Thomas 2011). At the request of CDFG, stocking would be conducted by the Corps for 6,000 triploid rainbow trout to mitigate temporary effects of angler displacement from the project and potential reduction of numbers of sport fish.

The affecting blast radius of approximately 1,000 feet and the restricted fishing zone of 3,000 feet, constitutes less than 3 percent of the reservoir surface. Due to the relatively small size of the blast affected area, and low fisheries habitat value within the blast zone, it is not expected that sufficient numbers of fish will be effected by mitigated blasting to result in a substantial change of diversity or numbers of aquatic species in Folsom Reservoir. Alteration of habitat and the reduction of angler opportunities in Folsom Reservoir due to blasting will be temporary and is not considered significant. No significant decrease in species diversity, habitat or recreational fishing opportunity is expected within Folsom Reservoir as a result of blasting. With implementation of BMPS and mitigation measures, the effect on fisheries due to blasting is expected to be less-than-significant.

Bubble Curtains

A contractor option exists to utilize bubble curtains to reduce effects of blasting upon aquatic species. The demonstrated effectiveness of stemming and bubble curtains suggests that only minor fish damage or mortality would be expected (Keevin 1987). Bubble curtains are considered a costly but considerably effective measure as they can reduce up to 98 percent of the blast effect (T. Keevin pers. comm.). Because blasting operations would be conducted for up to 280 days, the extended period of blasting justifies the use of a bubble curtain for protection of the aquatic system and recreational fishery resource. Air bubbles serve to increase compressibility by several orders of magnitude, effectively reducing the velocity and increasing the attenuation of acoustic waves. Blast energy intercepted by bubble curtains causes the bubbles to oscillate, dissipating afterwards at a slower rate back into the aquatic environment primarily as heat. Bubble curtains are created by injecting compressed air into horizontal pipes containing small holes to release a continuous vertical rise of bubbles from the lakebed to the surface. Pipe manifolds placed in an enclosed array around the explosive charges, provide an effective bubble blanket that dampens the effects of the charges. The most effective bubble curtains are created with numerous small holes that provide a dense release of bubbles (T. Keevin pers. comm.).

Chemical, Fuel and Oil Contamination

Alternative 2 has a higher risk for chemical contamination of aquatic life , due to the increased period of in-the- wet or underwater excavation, blasting and dredging.. Marine equipment and in-water construction activity present risks of oil and fuel spills. Contaminants could include occasional or remote small spills of oil and fuel from over-water fueling and operation of boats and gas-powered equipment on-water. More remote risks of leakage from drill hoses during drilling operations and contamination from materials present in blasting explosives are possible. Substantial impacts to water quality and aquatic life could be sustained with a large contaminant spill. Lack of appropriate containment material for a large oil or fuel spill could result in unacceptable damage and mortality on fish. An uncontained contaminant spill could cause direct mortality to fish, particularly in larval stages. Contamination of shallow water breeding areas could affect years of reproduction of bass and other nesting species and reduce numbers of game fish in Folsom Reservoir. With the improbable occurrence of an uncontained large spill, indirect effects could occur that would decrease phytoplankton numbers with a subsequent reduction both in fish and forage biomass.

Silt curtains around aquatic construction activities could serve as secondary containment devices; however, marine vessels and fueling activities would be most at risk for contributing oil and fuel spills and would not be contained by silt curtains. Increased use of marine equipment associated with the option to dispose excavation and dredging material into the lake will increase the risk of chemical, fuel and oil contamination. Up to twenty marine vessels may be utilized during the construction project, and weekly or daily fuel and gas line inspections would be required for all vessels as well as hydraulics for cranes and other dredging equipment. Since fueling of marine vessels presents the most risk for small fuel and oil spills, fueling operations must be conducted over absorbent surfaces or within contained booms with spill materials on hand. Compliance point monitoring for contaminant of concern for Folsom Reservoir, identified under the CVRWQCB Basin Plan (CVRWQCB 1998) would be required as a condition of the 401 water Quality Certification. If elevated contaminant levels or low oxygen levels are found at these points during project activities, mechanical controls such as using a closed bucket, environmentally safer dredge, replacing drill hoses, or using environmentally safer fueling methods may be necessary to reduce effects to aquatic life. Close adherence to outlined BMPs (Section 4.5.6) and required spill containment equipment is expected to reduce risk of contaminant introduction into Folsom Reservoir. Efficient containment measures and materials would be required for all construction activities. Adherence to Section 401 Water Quality Certification requirements and BMPs would reduce risk of contamination to an acceptable risk and less-than-significant effects with mitigation are expected to fish populations, habitat or recreational fishing opportunities.

Physical crushing

Incidental physical crushing of fish could result from entrapment of fish and placement of fill material, dredging, dredging, air lift operation, and underwater blasting. Alternative 2 presents the highest risk of damage or mortality to fish because it involves the greatest amount of underwater excavation. Most fish could be excluded from crushing actions due to the presence of an optional silt curtain, however, placement of rock into the lake for the spur dike and transload facility could crush small numbers of fish that enter silt curtains and become entrained or entrapped. Operation of the air lift to remove dredge and blast debris could vacuum up fish within or without a silt curtain enclosure.

In addition, hydraulic dredging could crush fish. Hydraulic dredging would also cause lethal effects to fish and other aquatic organisms by entrainment into the suction dredging pipes. Protective actions are recommended for hydraulic equipment to prevent fish intake into hydraulic dredging pipes, but the cutter head attachment precludes deterrence into the hydraulic pipe. Numbers and species of entrained fish can be monitored by inserting a screen or 3/8 inch diameter punch-holed steel plate over an outlet tube (Corps 2012). Larval fish, in particular are susceptible to entrainment by hydraulic dredging and these fish would be expected to incur higher mortality than subadult or adult fish.

In the event that substantial numbers of fish are trapped between the control structure and the rock plug due to high lake levels, fish rescue would be conducted to avoid injury or mortality. Fish entrainment by construction vessel propwash would be minimized by limiting boat speeds. Sufficient amounts of fish mortality due to physical crushing are not expected to affect fish populations and angler opportunities. Effects upon Folsom Lake fish populations and angler opportunity from crushing are expected to be less-than-significant with mitigation.

4.5.5 Alternative 3 - Cofferdam

Alternative 3 would incur the same effects as listed under Alternative 2 but with a reduced amount of risk for adverse effects. The smaller amount of underwater or in-the-wet construction afforded by the construction of a cofferdam, and the risk of potential adverse effects upon aquatic organisms would be decreased in Alternative 3. Cofferdam construction would reduce the length of underwater construction in the approach channel by 300 feet and require less substrate removal (64,300 cy) conducted by blasting and dredging in-the-wet. These construction actions would be conducted in a shortened time period of 45 days in-the-wet versus up to180 days for Alternative 3.

Similar turbidity effects due to blasting and dredging under Alternative 2 would be produced for Alternative 3, but with a reduced magnitude relative to a shorter in-the-wet construction period. Likewise, reduced effects or risk of effects would be expected in for bioaccumulation, and acoustic based injury and displacement. A reduced risk of incidental fish loss due to combined construction activities would be expected under Alternative 3. Also, under this alternative, risk is reduced for gas and oil contamination of water during excavation and dredging activity. Effects upon the Folsom Lake fish populations and sport fishing opportunity is expected to be less-than-significant.

Cofferdam construction

Several construction actions unique to Alternative 2 could contribute additional effects on aquatic species. Turbidity would result from coffer dam construction within the lakebed. As in Alternative 2, use of a turbidity curtain and continual monitoring to meet state and federal mandates would control silt that would otherwise affect fish and other aquatic organisms. Incidental crushing of fish could result during construction of the cofferdam due to underwater installation of metal sheeting, rock fill, and removal of the cofferdam after project completion. Fish rescue could be necessary to remove fish trapped within cells or behind the cells as the approach channel is drained. Based upon previous dewatering experiences, wakasagi smelt and small bass could be expected to be the primary fish trapped in the project area.

Water contained within the cofferdam would be expected to exceed the temperature level of the reservoir and could reach sublethal levels. Release of warm cofferdam water into the reservoir could cause a temporary increase in blue green algae. To avoid adverse effects during cofferdam dewatering, warm water discharge to the reservoir would be cooled with a spray system to maximize evaporative cooling and dilute the warm water over a larger area. Water returned to the lake would not be allowed to exceed existing reservoir temperatures by more than five degrees Celsius. These actions would reduce or remove potential adverse temperature effects for fish.

In Alternative 3, sheet piles for construction of the cofferdam would be drive by a vibratory hammer. Vibratory hammers use oscillatory hammers that vibrate the pile, causing sediment to liquefy and allow pile penetration. Peak sound pressure levels for vibratory hammers can exceed 180 dB. This range is diagnostic for direct trauma due to high amplitude shockwaves; however, the sound from these hammers rises relatively slowly, generally producing an impact that is lower than pile driving (Caltrans 2009). Vibratory pile driving also produces sustained, versus intermittent, sound during sheet metal installation. In the absence of established thresholds for vibratory hammers, decibels between 187 and 220 dB have been assessed (Caltrans 2009) as a relative measurement of decibels associated with vibratory driving. Pile driving activities that utilize pile drivers with power ratings between 136 to 203 kilojoules are expected to generate noise levels underwater near 188 to 189 dB RMS at a distance of 328 feet (100 meters) from the pile driver. Sheet pile construction sound attenuation would be mitigated below NMFS thresholds and is not expected to produce significant effects to fish and special status species. Construction actions specific to the cofferdam alternative would not cause significant effects to fish, habitat or special status species found within Folsom Reservoir.

Table 40. Summary and Comparison of Fisheries Effects and Significance.

Environmental Effects/Consequences	**Alternative 1**	**Alternative 2 - Cutoff Wall**	**Alternative 3 – Cofferdam**
Change diversity or numbers of fish	NE	LTSWM	LTSWM
Adverse alteration of fish habitat	NE	LTSWM	LTSWM
Effects on special status species	NE	NE	NE
Reduce game fish populations	NE	LTSWM	LTSWM

LTS: Less-than-significantLTSWM: Less-than-significant With Mitigation NE: No Effect

4.5.6 Mitigation

The following section addresses mitigation measures and potential BMPs that would be conducted to reduce effects to fish populations and habitat. Additional mitigation to address turbidity, storm water runoff, fuel containment and oil spills are addressed under water quality in Section 4.4.6.

- Aquatic construction equipment and boats would be decontaminated of invasive species prior to placement in Folsom Lake per approval by CDFG. One month prior to placement of construction vessels in Folsom Lake, the contractor will coordinate with CDFG to discuss invasive species quagga and zebra mussel decontamination and inspection species. A decontamination period of up to one month may be required on vessels originating from infested water bodies.
- Speeds would be limited for construction vessels (dredges, barges) to 2 knots or less when approaching or operating in dredging locations. Smaller support vessels carrying personnel and supplies would be limited to 5 knots.
- The contractor’s blasting plan would be coordinated with regulatory agencies and approved by the Corps to reduce adverse blast effects to aquatic organisms.

- Surface fish kill would be collected to avoid bird scavenging and to conduct surface monitoring of fish. Assessment of numbers, size and species would be conducted by a qualified fisheries specialist to provide an index of blast caused mortality. These results would be reported to CDFG within the first 24 hours after blasting.
- The contractor would record maximum water pressures achieved by the blast shots by a transducer recording system to ensure compliance with blast thresholds.
- Total mercury monitoring would be conducted for water and sentinel species by a qualified specialist. USFWS and regulatory agencies would be advised of levels in water and sentinel organisms..
- Fish would be removed as possible from enclosed areas subjected to construction activity. Fish would be recovered and relocated as possible from dewatered construction areas.
- A monitoring plan would be implemented to evaluate turbidity effects on fish within the project area. Monitor turbidity levels at limnetic, profundal and benthic zones in the project area as specified by the CVRWQCB. Turbidity levels must not increase to effect summer salmon habitat in front of Folsom Dam. Additional monitoring of turbidity levels are to be conducted in front of Folsom Dam from June through October to ensure turbidity levels do not exceed CVRWQCB thresholds. This monitoring will be conducted by the Corps.

Regulatory agencies and the Corps would implement a stocking program in Folsom Lake to compensate for lost angler opportunity and fish incurring mortality from project effects. At a minimum, approximately 6,000 catchable size triploid rainbow trout will be purchased by the Corps and stocked in Folsom Lake. Fish restocking numbers and species composition will be subject to change to compensate for mortality and recreational fishing losses. The following mitigation measures are relevant to impacts, but will likely not be required by the Corps. However, the selected contractor will be encouraged to implement these measures where practicable:

- Silt curtains should be installed at excavation, in-water disposal, dredging, blasting, and fill placement sites as a method to comply with CVRWQB Section 401 turbidity thresholds and exclude fish from the blast point. Use of this mitigation method will be decided by the contractor, but is expected in order to achieve compliance with CVRWQB Section 401 turbidity thresholds.

  Charges should be placed in drilled holes with stemming utilizing adequate angular material to reduce energy dispersal to the environment. Use of this mitigation will be decided by the contractor.

- The blasting plan should be designed to minimize the weight of explosive charges per delay and the number of days of explosive exposure. Use of this mitigation would be decided by the contractor.

  Explosives should be subdivided using delays to reduce total pressure. Use of this mitigation will be decided by the contractor.

- Where possible use decking in drill holes to reduce total pressure. Use of this mitigation would be decided by the contractor.

- Use shaped charges for superficial charges to focus the blast energy, reducing energy released to the aquatic environment during demolition. Use of this mitigation will be decided by the contractor.
- Blasting arrays should be configured with maximum charge weights located in the middles of lesser charge weights as decided by the contractor.
- Conduct continuous monitoring on sublethal and lethal blast effects on fish. Conduct adaptive management to reduce effects of blasting on fish if significance thresholds for sublethal and lethal effects established by CDFG, USFWS and the Corps are exceeded.
- Bubble curtains are recommended for use during blasting and vibratory hammer use in under water construction. Bubble curtains, when effective, could reduce the velocity of sound waves and increase sound attenuation
- If bubble curtains are implemented, clean air compressors would be used without oil or contaminants.
- Acoustic fish scare methods are an option and may be used prior to blasting as a deterrent to fish within the blast affected area if determined to be effective. If pre-blast deterrence is used, non-detonated methods such as decompressed air are recommended; detonated blasts can cause harm to aquatic organisms and are not recommended.
- Install and adjust silt curtains to prevent incidental fish passage. Erect additional barriers as needed to eliminate potential fish passage during installation and adjustment of silt curtains. Use effective acoustic noise where appropriate to discourage fish from the curtain area. Utilize other materials as necessary to prevent incidental fish passage.
- When possible, schedule blasting during months when salmonids are using upstream tributaries (e.g. February through June for rainbow trout) and exclude blasting during summer months when some species (e.g. salmon) utilize colder water directly in front of the Folsom Dam. It is unlikely that this mitigation measure will be implemented due to project schedule constraints.
- Blasting methodology will be adapted to reduce game and native fish mortality if fish kill numbers are above an acceptable threshold established by regulatory agencies and the Corps.
- Submerge the dredge cutterhead within the substrate to the maximum extent practical when the dredge pumps are engaged, and utilize a slow rotation speed where feasible.
- Utilize entrainment lessening equipment where applicable on hydraulic dredging apparatus to minimize fish kill.
- Cutterheads would be no greater than 3 feet from the lakebed floor when cleaning the pipeline. Pipeline clearing will be kept to the minimum amount necessary.

4.6 AESTHETICS AND VISUAL RESOURCES

This section presents and compares potential adverse effects to aesthetics and visual resources as compared to the existing conditions discussed in Section 3.6. Potential temporary and permanent effects could result from the construction of the alternatives described in Chapter 2. Potentially adverse effects are discussed with respect to changes in the scenic attractiveness, as well as the number and sensitivity of affected viewers. The methodology for this analysis is described below.

Visual resources could be temporarily affected by construction equipment and excavated materials processing facilities. Visual resources could be permanently impacted by disposal areas, the transload facility, spur dike, and approach channel. Table 41 below includes a summary of the potential effects and their significance.

4.6.1 Methodology

Analysis of the impacts was based on evaluation of the changes to the existing visual resources that would result from implementation of the project. In making a determination of the extent and implications of the visual changes, consideration was given to:

- Specific changes in the visual composition, character, and valued qualities of the affected environment;
- The visual context of the affected environment;
- The extent to which the affected environment contained places or features that have been designated in plans and policies for protection or special consideration; and
- The numbers of viewers, their activities, and the extent to which these activities are related to the aesthetic qualities affected by the project-related changes.

Potential receptors in the area include motorists and bicyclists viewing the project from the road, residents viewing the project from homes on the surrounding hillsides, and boaters and other water based recreationists viewing the project from the reservoir. All groups of viewers were taken into account during analysis of impacts.

The visual sensitivity of the receptors at each of the project areas is a major factor to be considered during the aesthetics analysis. The residents near the project area are rated as the highest sensitivity receptors because of the long-term, constant nature of their exposure to the visual changes in the project area. Recreationists are also considered highly sensitive, because they come to the areas for extended durations to enjoy the scenery and relax. The commuter traffic along Folsom Lake Crossing has a reduced sensitivity to the construction, because they have fewer viewing opportunities from the road, and the duration of their viewing is short.

4.6.2 Basis of Significance

Pursuant to the CEQA guidelines, a proposed alternative would result in a potentially significant impact to aesthetics and visual resources if it would:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings; or,
- Substantially degrade the existing visual character or quality of the site and its surroundings.

4.6.3 Alternative 1 – No Action

Under the no action alternative, the Corps and the CVFPB would not participate in the excavation of the approach channel and, therefore, would not cause any additional effects to visual resources. Under this alternative, the conditions in the project area would remain consistent with current conditions. The haul route, Dike 7, MIAD disposal site, and Folsom Overlook would remain highly disturbed and of low aesthetic quality.

4.6.4 Alternative 2 – Cutoff Wall

There would be no indirect effects associated with construction of Alternative 2. Direct effects that would result from this alternative include the temporary effect of ongoing construction activities due to equipment, boats, and haul trucks operating in the area, the permanent effect of the change in shoreline due to construction of the approach channel and spur dike, and the potentially permanent disposal of material in the proposed disposal areas. These effects are discussed in greater detail below.

Construction of the cutoff wall would create a temporary effect to aesthetics and visual resources due to the amount of equipment necessary for construction of the wall. Equipment necessary for construction of the cutoff wall would include large drills, trucks, and the operation of a concrete batch plant and rock crusher. The drills and trucks would be present on the rock plug throughout the duration of construction of the cutoff wall, and would be visible to recreationists on the lake, as well as drivers and bikers using Folsom Lake Crossing. However, while the use of this equipment would be a visual effect during construction, it would also be consistent with the existing condition at the Folsom Overlook, rock plug, and auxiliary spillway site, as these areas are currently in use for construction of the control structure. As a result of both the temporary nature of this feature, and the ongoing activity at the project area, construction of the cutoff wall would be considered a less-than-significant effect on aesthetics and visual resources.

Approach Channel and Spur Dike

Excavation of the approach channel would also consist of a temporary effect associated with the operation of various types of construction equipment. Much of the excavation activities would be shielded from the view of sensitive receptors on Folsom Lake Crossing and Folsom Lake by the rock plug and the control structure, however, cranes and trucks would be visible on the Folsom Overlook and rock plug during in-the-dry excavation. Additionally, barges would be operating on the lake during in-the-wet excavation, and the excavation area would be visually exposed to boaters on the lake. The operation of construction equipment, while a temporary effect, is considered less-than-significant as it is consistent with existing conditions in the project area during ongoing construction of the control structure.

Construction of the spur dike would permanently modify the shape of the shoreline. However, the existing condition of the shoreline is of a low visual quality due to the unvegetated, riprapped slopes of the Folsom Overlook area. Construction of the spur dike would consist of an expansion of the Overlook area, and would remain visually consistent with the Overlook. Like the Overlook, the spur dike would likely remain unvegetated, with riprapped banks. As a result, the construction of the spur dike would not contrast dramatically with the existing views, and would be considered a less-than-significant impact.

The approach channel would also consist of a permanent modification to the existing shoreline. The majority of the approach channel would be submerged after completion, except at low lake levels. Yearly fluctuations in reservoir levels will vary this visual parameter. During years of high precipitation, reservoir levels would be retained at a high level throughout the summer until release in the fall season in order to provide capacity for incoming winter flows. However, during years of low precipitation, the low reservoir levels would result in an exposed approach channel, which would be of extremely low visual quality.

While the approach channel is considered a permanent change to the shoreline, and thus a potentially adverse effect, the southern shore of Folsom Lake is of a low visual quality due to the presence of Folsom Dam. As a result, the permanent change of the approach channel would be considered consistent with the overall aesthetic quality of the southern shore of Folsom Lake, and would not substantially degrade the existing visual character or quality of the site. Therefore, effects to aesthetics from the construction of the approach channel would be considered less-than-significant.

Haul Route, Dike 7, and Transload Facility

The haul route is located along the shoreline from the Folsom Overlook to the MIAD disposal area, and is part of the project's existing condition. Use of the haul route would be visible by recreationists on the lake, the residents on the hills above Dike 7, and in some rare cases, by drivers on East Natoma Street. Views of the trucks on the haul route are considered a temporary effect throughout the duration of project construction, as they will be occurring intermittently throughout construction. Aesthetic effects due use of the haul route would remain consistent with the analysis from the 2007 FEIS/EIR.

Dike 7 is located halfway between Folsom Overlook and the MIAD disposal area, and has been actively used as a disposal site throughout the multi-phase JFP construction. As a result, aesthetically, the use of Dike 7 as a disposal area is consistent with existing conditions at the start of the approach channel construction effort. Aesthetic effects due to use of the Dike 7 disposal area would be consistent with the analysis from the 2007 FEIS/EIR.

The temporary transload facility would be constructed adjacent to Dike 7, and would be considered an effect to the views for the residents above Dike 7 and for recreationists at Folsom Point and on the lake. Up to 200,000 cy of fill would be deposited in the reservoir to create a ramp, which would modify the shoreline. However, as the southern shoreline of Folsom Lake is highly disturbed and modified due to the flood control facilities associated with Folsom Dam and Dike 7, this effect would not be considered a substantial degradation to the shoreline. Since the transload facility would be removed at the conclusion of the project, this effect would be considered less-than-significant.

Activities at the transload facility would include the loading and unloading of material using barges, cranes, and trucks for up to nine hours per day during construction. Barges in transit to and from the transload facility would be visible to the residents above Dike 7 and to recreationists at Folsom Point and on the lakebed. However, since this is a temporary effect that would be present intermittently during in-the-wet excavation, this effect would not have a substantial adverse effect on the scenic vistas associated with Folsom Lake and is considered less-than-significant.

MIAD and Dike 8 Disposal Areas

The MIAD disposal area is visible to residents in the neighborhoods on Green Valley Road and East Natoma Street, as well as shoppers at the strip malls at the intersection of these two streets. Additionally, the Dike 8 disposal area would be visible to residents on Nature Way, as well as from the Folsom Point Church on East Natoma Street. A large volume of soil could be deposited at MIAD or Dike 8, permanently affecting views in their vicinities.

The deposited materials would contrast with the existing landscape during temporary disposal activities, and would permanently alter the natural landscape after the completion of construction. Since the view from these neighborhoods is of the hills, disposal of material at MIAD would not substantially alter the residents' long-term viewshed. With implementation of the mitigation discussed below, disposal at MIAD and Dike 8 would be considered to have a less-than-significant effect on aesthetics.

4.6.5 Alternative 3 – Cofferdam

Alternative 3 would temporarily affect views and temporarily limit viewing opportunities from the south end of the reservoir. Direct and indirect effects associated with Alternative 3 would be the same as Alternative 2 at the MIAD disposal area, Dike 7, Dike 8, spur dike, and the haul road. The transload facility would be active for a longer period of time during construction under this alternative, since it would be a necessary feature for construction of the cofferdam at the beginning of project construction, as well as for the removal of material during in-the-wet excavation.

Under Alternative 3, the viewshed at the Folsom Overlook would be temporarily altered during construction. Construction equipment, traffic, and activities will be visible from the homes on the hillside and Folsom Lake Crossing. The cofferdam would be an additional engineered feature in the reservoir beside the Folsom Overlook area. The cofferdam, as a freestanding structure, would shield recreationists on the lake and at Folsom Point from viewing the excavation area. However, the haul route would be routed over the cofferdam, connecting the Folsom Overlook area to the haul road during excavation of the rock plug. As a result, there would be a temporary visual impact to recreationists from trucks and other equipment on the crown of the cofferdam. Since effects associated with the cofferdam are temporary, and the area is highly disturbed, this would not be considered a substantial alteration of the overall visual character of the area.

Table 41. Comparison of Aesthetics Effects and Significance.

Environmental Impacts/Consequences	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 – Cofferdam
Temporary Effects			
Transload facility would temporarily modify shoreline.	NE	LTS	LTS
Staging and stockpile would affect views from road, reservoir, and residences.	NE	LTS	LTS
Construction activities would limit access to viewing opportunities on reservoir.	NE	LTS	LTS
Cofferdam would obstruct views from Folsom Lake Crossing road and Folsom reservoir.	NE	NE	LTS
Cutoff wall or cofferdam would affect views from residences.	NE	NE	NE
Excavation would affect views from reservoir.	NE	LTS	NE
Excavation would affect views from the road.	NE	LTS	LTS
Excavation would affect views from residences	NE	NE	NE
Construction activities and equipment for cutoff wall or cofferdam would affect views from the road, reservoir, and residences.	NE	LTS	LTS
Permanent Effects			
Spur dike would permanently alter the shoreline.	NE	LTS	LTS

Environmental Impacts/Consequences	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 – Cofferdam
Approach Channel would permanently alter the shoreline.	NE	LTS	LTS
Disposal would result in additional earth at disposal sites	NE	LTSWM	LTSWM

LTS: Less-than-significantLTSWM: Less-than-significant With Mitigation NE: No Effect

4.6.6 Mitigation

The primary effects described above are associated with the disposal of soil. There is the potential that some of this soil would be used by USBR for construction of a large landside berm at the auxiliary dam, however, it is assumed that not all of the material at the disposal sites would be reused. As a result, the excess material would be recontoured and landscaped to maintain visual consistency with the surrounding hills. The contractor would revegetate the disposal areas with native grasses to provide ground cover, erosion control, and to allow it to regain some aesthetic consistency with the surrounding areas.

Additionally, since the approach channel is the final phase of the overall JFP, the haul road would be removed following project construction. The area would be regraded and revegetated with native grasses to return the area to a natural state consistent with the shoreline of Folsom Lake.

4.7 RECREATION

4.7.1 Methodology

The FLSRA supports a diverse range of outdoor recreation activities and opportunities. Impacts on recreations are evaluated qualitatively based on temporary and permanent changes to those resources that would occur with the implementation of the project. In making a determination of the extent and implications of recreational changes, consideration was given to:

- The closure or reduced public availability to recreational sites and access points;
- Truck traffic and construction activities interfering with recreation activities and access points;
- Require the construction or expansion of recreation facilities.

Potential receptors in the area include staff, day use recreationist, campers, boaters and other water based recreationists. All recreational groups were taken into account during analysis of impacts.

4.7.2 Basis of Significance

The alternatives under consideration would result in a significant impact related to recreation if they would:

- Substantially restrict or reduce the availability or quality of existing recreational facilities and opportunities in the project vicinity;
- Implement operational or construction-related activities that would cause a substantial long-term disruption of any institutionally recognized recreational activities; or
- Displace recreation from sites affected by construction would substantially contribute to overcrowding or exceed the facility capacity at other recreation sites (including sites within the FLSRA).

4.7.3 Alternative 1 - No Action

Under the No Action Alternative, the Corps and the CVFPB would not participate in construction of the proposed alternatives; therefore, the project would not disturb existing recreational opportunities. The conditions at FLSRA would remain similar to existing conditions. The public would have continued use of the FLSRA without any closures or access restrictions.

4.7.4 Alternative 2 - Cutoff wall

During construction, the waters around the spur dike, approach channel, and transload facility would be excluded from public access due to safety concerns. The contractor would be required to construct a physical barrier 3,000 feet from the blast zone which would be maintained throughout the construction period. Buoys would be installed from approximately Dike 7 to the Overlook to rope off restrict waters. The safety exclusion boundary would permit access from the Folsom Point boat access. Because the approach to Folsom Point launch site would be reduced during low water levels, a safety route and boat hazards will be identified by floating markers as needed. Recreational boats may need to reduce speeds upon launch point entry when water levels drop. The Bureau normally closes Folsom Point launch to the public when the lake level drops to 405 feet (General Plan 2007). The safety exclusion boundary is shown on Figure 17. Boat patrols would be required before, during and immediately after blasts. Construction would begin in 2013 and continue through 2017. Upon completion of the project the waters in front of the approach channel would remain blocked off from public use for security reasons.

The surface area of Folsom Lake at gross pool is 11,450 acres (USBR 2009). The safety exclusion boundary from Dike 7 to Folsom Overlook would be approximately 295 acres which is less than 3% of Folsom Lake's surface area. Recreation access and reservoir levels would not be affected by the recreation safety boundary. The safety boundary is not expected to change as reservoir levels change. Thus, the exclusion of this area from public access is not a substantial reduction in the water based recreational opportunities available at the FLSRA. During construction there would be no impacts to trails or camping facilities. As a result, long-term effects to recreational activities would be considered less-than-significant.

Direct effects associated with implementation of Alternative 2 include limiting recreational activities near Folsom Dam, as discussed above, which would be less-than-significant. Potential indirect effects could be associated with the relocation of those activities to other local recreation areas. Increased usage at other local recreation areas could potentially cause wear and tear to recreational facilities. However, all existing recreational areas near the construction area, including Folsom Point, would remain open during construction. The area limited by construction area is minimal, so it is assumed that the majority of the recreation activity would not change. As a result, indirect effects associated with the construction of Alternative 2 would be less-than-significant. In addition, potential visitors use declines when lake levels fall between 435 feet and 400 feet in elevation (General Plan 2007) due to limited access. Beal's Point becomes impacted when lake levels reach 430 feet, Granite Bay becomes out of service at 425 feet, and boats must be removed from the slips at the Marina at 412 feet, and Folsom Point closes when water levels reach 405 feet (GP 2007). Therefore as lake levels decline, fewer water based recreationalist would be affected by the safety boundary. During construction there would be no impacts to trails or camping facilities. As a result, long-term effects to recreational activities would be considered less than significant.

Day Use Facilities

During off-peak seasons, recreational use within the FLSRA is generally low; therefore, construction would not cause major restrictions to recreation. During peak summer season, recreational use is high on weekdays and on weekends. All recreation access points to FLSRA would not be interrupted during the construction period. Picnic facilities, restrooms, boat launches, and recreational facilities would remain accessible to the public. Internal haul routes would be used by trucks to reduce impacts to recreationist entering the FLSRA. Construction traffic would occur during the scheduled hours indentified in Section 2.4.6.

Folsom Point would be used for the initial launch site to begin construction of the transload facility. Construction of the transload facility would begin in May 2013. The Corps would coordinate with USBR and/or State Parks for use of Folsom Point. Use of the site would be short term (6 to 8 hours) and temporary. The Corps would minimize use of Folsom Point during peak visitor hours. As a result, any short-term effects would be considered less-than-significant.

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Figure 17 - Recreation and Blast Safety Boundary

Folsom Dam Modification Project,
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Camping

Camping facilities would remain open during construction. Construction would not occur near the campgrounds or result in any closure of camping facilities. Traffic and noise from construction activities would not affect camping facilities. Therefore, no significant impacts would occur. Further discussion regarding noise effects to the Beal's Point Campground is included in the noise analysis in Section 4.9.

Recreational Trails

There would be no permanent construction-related closures to recreational trails during the construction period. However, the excavation of the approach channel and rock plug would require use of explosives, causing the temporary closure of Folsom Lake Crossing, including the bike trail associated with the Folsom Lake Crossing Bridge. The blasting could occur once a day between 1:30 p.m. and 2:30 p.m., over 44 months (estimated February 2014 to October 2017). There would be additional provisions for a second blast in the morning between 10:00 a.m. and 11:00 a.m. The blasting would require an encroachment permit from the City of Folsom. The contractor would coordinate with the City of Folsom and provide adequate notification to the public, include signage, prior to beginning blasting. Since the closures would be temporary in nature (no longer than one hour), consistently scheduled, and proper notification would occur, any short-term effects would be considered less-than-significant.

4.7.5 Alternative 3 - Cofferdam

Implementation of Alternative 3 would have similar direct and indirect effects and levels of significance as Alternative 2. Recreational activities between Folsom Dam and Dike 7 would be restricted. The waters around the spur dike location, transload facility, and approach channel would be excluded from public access during construction. Construction of the transload facility would begin May 2013. The area from Dike 7 to Folsom Overlook would remain blocked off from public use for security reasons upon completion of the project. As in Alternative 2, Folsom Point would be used for the initial launch site to begin construction of the transload facility. During construction there would be no impacts to trails or camping facilities, and therefore no significant effects would occur.

4.7.6 Mitigation

The following measure would be taken to keep the public informed of the project and reduce effects on recreational activities.

- To ensure public safety, warning signs and signs restricting access would be posted before and during construction, as necessary. Public outreach will be conducted through mailings, posting signs, coordination with interested groups, and meetings, if necessary, in order to provide information regarding changes to recreational access in and around

Folsom Lake. Public outreach would also explain the purpose of the safety exclusion barrier around the blast site and the effects that underwater blasting can have on people if they are in the water and in range of the blast.

- At low water levels, a safety route and hazards will be marked for recreational boater's access into Folsom Point launch area as needed.

With the implementation of these measures, any effects to recreation would be considered less-than-significant and no further mitigation would be required.

4.8 TRAFFIC AND CIRCULATION

This section presents an assessment of the potential traffic effects during the construction of the proposed project.

4.8.1 Methodology

This analysis considers the range of foreseeable traffic conditions on roadways in and near the project area and identifies the primary ways that construction of the project could affect existing traffic conditions. This analysis focuses on construction-related traffic effects and effects of implementing the action alternatives on existing roadways. Therefore, any incremental transportation impacts associated with the project are limited to the proposed construction years. The project is expected to be under construction from 2013 through 2017. On-site haul routes were not analyzed since they are not considered part of the public roadway network system.

Available literature, including documents published by Federal, State, county, and city agencies that document traffic conditions, were reviewed for this analysis. The information obtained from these sources was reviewed and summarized to establish existing conditions and to identify potential environmental effects based on the significance criteria presented below.

This analysis evaluates the existing conditions of the project area roadways, as well as, the peak construction year traffic. Two components of traffic growth are typically considered when evaluating future year conditions. First, an annual background growth rate is determined based on historical data. Second, any increase in traffic volumes expected from approved development projects are added into the network.

The Sacramento Area Council of Governments (SACOG) Projections Data Set, approved by the Board of Directors December 16, 2004 (SACOG 2004), has been utilized to develop an appropriate growth rate. According to the projections, the area is generally expected to experience a growth rate of 2% or less per year beyond 2010. Therefore, a conservative annual growth rate for the local routes has been selected as 2% per year compounded through 2017. Effects associated with potential developments in the vicinity of the project area are already incorporated into the population, household and job growth rates used to develop the 2 percent growth rate. Consequently, only the growth rate would be applied to each construction year with no additional development project-specific traffic volume increases.

The roadway network adjacent to the construction access and a site is well developed with multiple access patterns. There are two basic categories of traffic accessing the site 1) daily workers and staff and 2) material deliveries and hauling operations due to earthwork activities. The daily workers would access the site via the adjacent roadway network depending on their origin and destinations.

Traffic effects associated with the project are evaluated in two ways; one regarding average daily traffic and two, in terms of specific time periods during the day (i.e., hourly basis, as needed). The analysis is based on the following criteria:

- Material hauling activity would occur during normal work hours, from 7am to 7pm.
- Equipment hauling activity would occur during normal work hours, from 7am to 7pm.
- The construction schedule would be 10 hrs a day, 6 days per week, except dredging and underwater drilling for which double shifts. The 24 hours shifts schedule may be requested under special requirements to meet the schedule, or other special circumstances; double shifts schedule would be temporary and short-term.

All material excavated would be hauled and disposed of on-site at the proposed disposal areas. Any other vehicles using the site due to earthwork operations and heavy materials and equipment deliveries are expected to access the site via one of two approved and pre-determined haul routes, one from I-80 and one from Highway 50 (Figure 18). The route originating from I-80 would proceed south to Sierra College Boulevard, east on Douglas Boulevard, then south on Auburn-Folsom Road towards the project site and vice-versa. The route originating from Highway 50 would be via East Bidwell Street, Oak Avenue, Blue Ravine Road to East Natoma Street and vice-versa. The aforementioned project haul routes are consistent with city and county designated truck routes. Additionally, no trucks are allowed to use Auburn-Folsom Road north of Douglas Boulevard.

Due to the nature of the excavations and earthwork, blasting operations would be required. Current construction activities associated with the spillway's control structure are implementing blasting techniques. The anticipated blasting operations for the approach channel excavation are detailed in Section 2.4. Blasting would be conducted during off-peak periods, at consistent times during the day, and would be permitted through the City of Folsom.

4.8.2 Basis of Significance

Project alternatives under consideration would result in a significant impact related to traffic and circulation if they would:

- Substantially increase traffic in relation to existing traffic load and capacity of the roadway system.
- Substantially disrupt the flow and/or travel time of traffic.

- Exceed the Institute of Transportation Engineers (ITE) significance threshold of 50 or more new peak-direction trips during the peak hour.
- Expose people to significant public safety hazards resulting from construction activities on or near the public road system.
- Reduce supply of parking spaces sufficiently to increase demand above supply.

4.8.3 Alternative 1 – No Action

Under Alternative 1, the Corps would not participate in construction of the proposed alternatives; therefore, the project would not create addition traffic around the project area. The existing roadway network, types of traffic, and circulation patterns would be expected to increase traffic by 2% each year. Table 42 shows the increase in traffic based on normal growth due to other unrelated development projects, general population job and household growth in the area. The resultant roadway LOS was based on the roadway capacity thresholds summarized in Table 13 in Section 3.8. Table 42 indicates the pre-project roadway segment LOS conditions under Alternative 1 (by year baseline conditions).

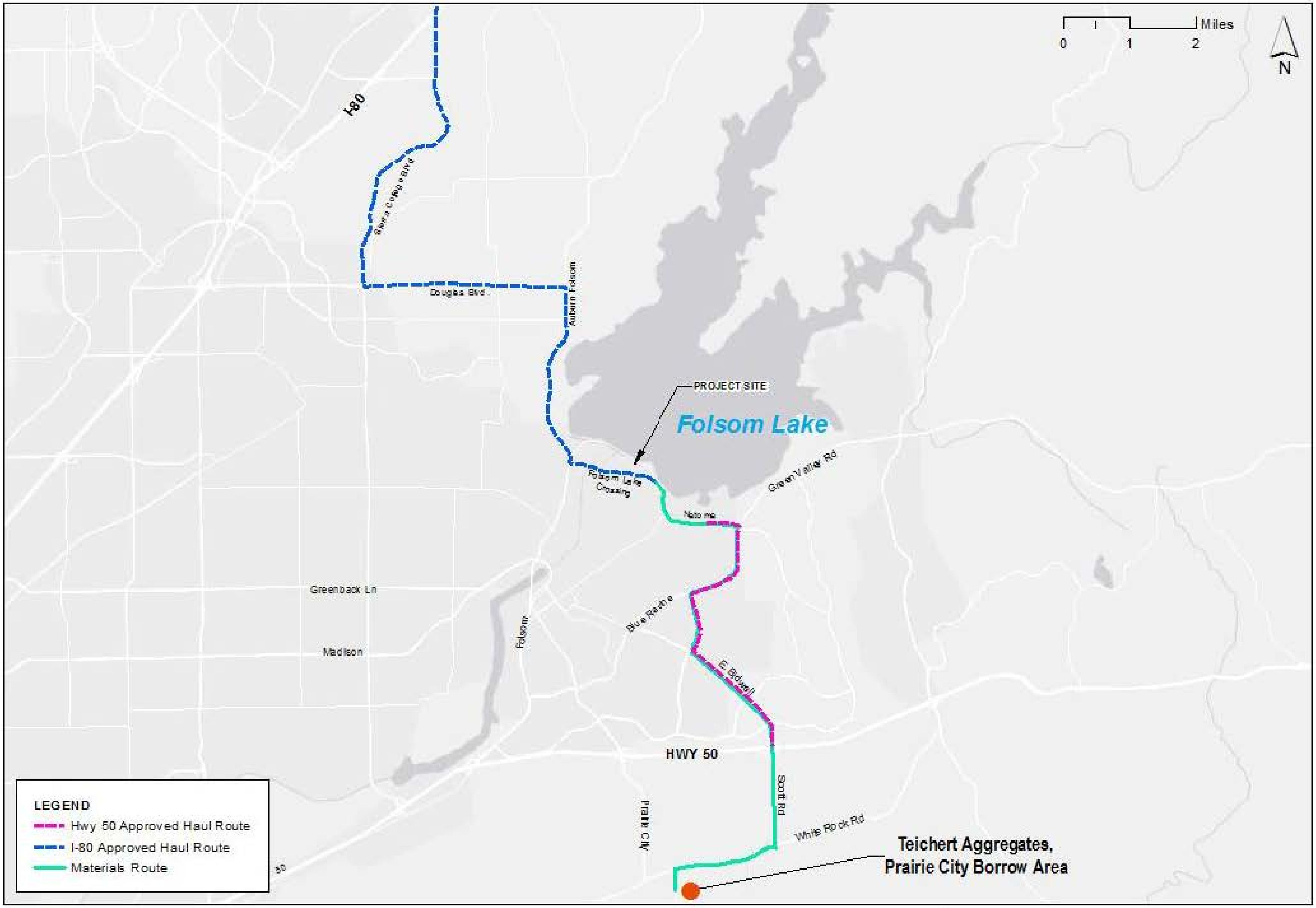

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Figure 18 - Project Transportation Routes

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Table 42. Existing and Baseline LOS Results.

Roadway Segment	Functional Class	Capacity (LOS C/D/E)	Year 2011 Traffic Volumes		Year 2013 Traffic Volumes		Year 2014 Traffic Volumes		Year 2015 Traffic Volumes		Year 2016 Traffic Volumes		Year 2017 Traffic Volumes	
			Traffic Volumes	LOS	Traffic Volumes	LOS	Traffic Volumes	LOS	Traffic Volumes	LOS	Traffic Volumes	LOS	Traffic Volumes	LOS
Douglas Boulevard – Barton Rd to Folsom-Auburn Rd	4AD	35,400	44,806	**F**	46,598	**F**	47,494	**F**	48,390	**F**	49,287	**F**	50,183	**F**
Folsom-Auburn Road – Douglas Blvd to Folsom Dam Rd	4AD	37,400	44,918	**F**	46,715	**F**	47,613	**F**	48,511	**F**	49,410	**F**	50,308	**F**
Folsom-Auburn Road – Folsom Lake Crossing to Greenback Ln	4AD	37,400	36,335	**E**	37,788	**F**	38,515	**F**	39,242	**F**	39,969	**F**	40,695	**F**
Folsom Boulevard – Greenback Ln to Iron Point Rd	4AD	37,400	42,131	**F**	43,816	**F**	44,659	**F**	45,501	**F**	46,344	**F**	47,187	**F**
Greenback Lane – Natoma Street to Folsom Boulevard/Folsom Auburn Road[2]	2A	18,700	52,281	F	54,372	F	55,418	F	56,463	F	57,509	F	58,555	
Greenback Lane - Hazel Ave to Madison Ave	4AMD	36,000	26,861	C	27,935	C	28,473	C	29,010	D	29,547	D	30,084	D
East Natoma Street – Cimmaron Cir to Folsom Lake Crossing	4AU	28,900	18,502	D	19,242	D	19,612	D	19,982	D	20,352	D	20,722	D
East Natoma Street – Folsom Lake Crossing to Green Valley Rd	4AU	28,900	30,205	**F**	31,413	**F**	32,017	**F**	32,621	**F**	33,226	**F**	33,830	**F**
Green Valley Road – East Natoma St to Sophia Pwy	4AU	28,900	35,667	**F**	37,094	**F**	37,807	**F**	38,520	**F**	39,234	**F**	39,947	**F**
Oak Avenue Parkway – Blue Ravine Rd to East Bidwell St	6AD	56,000	24,744	C	25,734	C	26,229	C	26,724	C	27,218	D	27,713	D
East Bidwell Street – Clarksville Rod to Iron Point Rd	6AD	56,000	43,803	D	45,555	D	46,431	D	47,307	D	48,183	D	49,059	D
Blue Ravine Road – Oak Avenue Pwy to Green Valley Rd	4AD	37,400	21,734	D	22,603	D	23,038	D	23,473	D	23,907	D	24,342	D
U.S. 50 – Hazel Ave to Folsom Blvd[1]	4FA	89,800	130,183	**F**	135,390	**F**	137,994	**F**	140,598	**F**	143,201	**F**	145,805	**F**
U.S. 50 - Folsom Blvd to East Bidwell St[1]	4F	71,400	110,344	**F**	114,758	**F**	116,965	**F**	119,172	**F**	121,378	**F**	123,585	**F**
U.S. 50 – East Bidwell St to County line[1]	4F	71,400	91,284	**F**	94,935	**F**	96,761	**F**	98,587	**F**	100,412	**F**	102,238	**F**
Folsom Lake Crossing Bridge	4AHD	40,000	29,425	C	30,602	C	31,191	C	31,779	C	32,368	D	32,956	D
I-80 – north of Douglas Blvd[1]	6F	107,100	156,060	**F**	162,302	**F**	165,424	**F**	168,545	**F**	171,666	**F**	174,787	**F**
I-80 – Douglas Blvd to Greenback Ln[1]	6F	107,100	182,580	**F**	189,883	**F**	193,535	**F**	197,186	**F**	200,838	**F**	204,490	**F**
I-80 – south of Greenback Ln[1]	6F	107,100	190,000	**F**	197,600	**F**	201,400	**F**	205,200	**F**	209,000	**F**	212,800	**F**

Note : Year 2011 traffic volumes from Folsom Control Structure study - calculated from 2010 ADTs (Average Daily Traffic) with an annual 2% growth rate. Future year 2013-2017 volumes calculated using annual 2% growth rate.
* LOS E is the threshold for all roadway segments in Sacramento County while LOS C is applied to Caltrans and Placer County segments. Capacity is calculated as the maximum volume at satisfactory LOS C/E.
1) Data obtained from Caltrans Traffic Data Branch - calculated from 2010 ADTs with an annual 2% growth rate. Future year 2013-2017 volumes calculated using annual 2% growth rate. Level of Service (LOS) evaluated using Caltrans V/C thresholds.

4.8.4 Alternative 2 – Cutoff Wall

Construction of Alternative 2 would have temporary direct effects on the traffic and circulation in the project area. There are no anticipated indirect effects associated with construction of Alternative 2. Traffic generated by the proposed action would result in growth in two categories: labor force accessing the project site on a daily basis, and truck trips due the import of aggregate material for the transload facility and spur dike and large deliveries. New trips have been determined by calculating the number trips generated by the quantity of materials and equipment deliveries required for the project construction, as well as trips generated by construction labor forces. This is estimated trips per day, based on the construction activities and durations as shown in Table 43. The traffic numbers developed are expected to be worst case/maximum amounts of traffic volumes based on anticipated work schedules and activities.

Table 43. Alternative 2 Project Daily Trip Generation.

Construction Year	Alternative 2			
	Worker	Aggregate	Delivery	Total
2013	24	256	6	286
2014	16	16	6	37
2015	40	16	6	62
2016	36	16	6	58
2017	40	256	6	302

An estimated 8 to 20 workers would be onsite each day during construction depending on scheduled actives. These workers would access the area via regional and local roadways, and park their vehicles at the staging area. Approximately 82% of the employees are located in the Sacramento area; approximately 11% are located in Placer County and approximately 7% are located in El Dorado County. Table 44 presents the assumptions used on where the workers are expected to originate their trips.

Table 44. Distribution of Labor Force

Region	Worker Distribution
Rocklin area (Placer County to the north)	5%
Roseville area (Placer County to the west)	5%
Folsom	5%
El Dorado area (Green Valley Road)	2.5%
El Dorado area (US50)	2.5%
Sacramento area (I-80)	40%
Sacramento area (US50)	40%
Total	100%

Based on the above assumptions, approximately 2 to 8 worker vehicles would add to I-80 and Highway 50 traffic during commute hours. Approximately one to two worker vehicles would add to commute traffic in the other regions. All workers would access the staging area parking from Folsom Lake Crossing. The increase in traffic due to the project's labor force in relation to existing traffic load and capacity of the roadway system would be less-than-significant.

Construction vehicles accessing the site would be bringing aggregate materials and large deliveries. These deliveries would vary during the year depending on construction activities. The project site is assumed to receive aggregate and batch plant materials from the Tiechert Prairie City Borrow Source located on Scott Road south of White Rock Road in Sacramento County. Offsite materials and equipment would be delivered to the project area via East Bidwell Street to East Natoma Road to Folsom Lake Crossing. Aggregate deliveries would be approximately 13 trucks per hour during the first year and last year of construction due to the installation and removal of the transload facility. Deliveries to the project area include steel and other construction materials would average three per day. The increase in traffic due to the deliveries of aggregate and other large deliveries in relation to existing traffic load and capacity of the roadway system would be less-than-significant. Materials for blasting are assumed to be brought to the project area on a daily basis from Jamestown, CA or Suisun City, CA. One truck trip a day during blasting periods would not result in a significant impact to traffic.

To determine the significant of the increase truck traffic, the number of haul trips was estimated for each alternative. Then this number was compared with the ITE significance threshold of 50 additional peak-hour truck trips. Traffic analysis did not show a LOS deterioration during any project year. While some roadways in certain years would experience an increase in volume/ capacity, in all cases the increase is less than the 50 or more new truck trips during the a.m. peak hour or the p.m. peak hour threshold of significance. Furthermore, the haul trucks trips at any given access route would be short-term. Therefore, construction related traffic impacts under Alternative 2 would not substantially disrupt the flow and/or travel time of traffic or exceed the ITE significance threshold. This impact would be less-than-significant. Full results of the traffic study, including traffic volumes, LOS, and volume/capacity ratio are in Appendix F.

An additional element of the environmental consequences is the traffic effects due to blasting operations. Due to the nature of the proposed excavation there would be the required use of explosives for blasting, causing the temporary closure of some roads. A safety fly rock zone of 2500 feet would be maintained for human safety. Under Alternative 2, approximately 400 blasts in-the-wet and 200 blasts in-the-dry would occur from February 2014 to August 2017 (approximately 1,100 days of work). This results in an approximately one blast every other day. Blasting would require an encroachment permit from the City of Folsom, and the contractor would coordinate with the City of Folsom and provide adequate notification to the public, include signage, prior to blasting. The contractor's blasting plan would be approved by the Corps prior to blasting commencement.

The blasting would not be permitted to interfere with peak traffic flow, would occur at consistent time(s) and would require an encroachment permit from the city of Folsom. Folsom Lake Crossing would experience temporary traffic disruptions during construction at the roadways that would need to be closed during the rock excavation phase, which would require blasting. Folsom Lake Crossing would need to be closed for two hours for each blasting event. This two hour period would allow for 30 minutes to close the road, one hour to conduct the blasting and 30 minutes to reopen the roadway. Blasting is estimated to be needed during the excavation of the rock plug. During the blasting period, traffic desiring to cross the American River via Folsom Lake Crossing would be detoured through Historic Folsom using the same route that was used prior to the construction of Folsom Bridge.

The traffic effects caused by any short-term roadway stoppage are not considered to be significant factors to the current and projected traffic conditions in the area. The blasting activities would be scheduled for off-peak traffic hours thereby minimizing the affects to the existing traffic patterns. General traffic volumes during off-peak hours are significantly lower and the short term stoppages due to blasting activities would have no significant degradation to service levels. Blasting activities would be conducted during a consistent time throughout the day so the local driving public can be better prepared and adjust their driving patterns accordingly. The contractor would also provide public information notices for the blasting operations and associated road closures. These items are generally part of the blasting permit issued by the local jurisdiction. With the implementation of the road closers, any public safety hazards resulting from construction activities on or near the public road system would be less-than-significant.

Implementation of the proposed project would draw a construction workforce, which, in turn, would create the need for worker vehicle parking areas. Parking would be available at the staging areas; therefore, the project would not affect the availability of parking spaces and no significant effects would occur.

4.8.5 Alternative 3 - Cofferdam

Construction of Alternative 3 would create similar temporary traffic increases as discussed in Alternative 2. There are no anticipated indirect effects associated with Alternative 3. Construction activities could potentially affect the types, volumes, and movement of traffic, and public safety in and near the project area.

As discussed in Alternative 2, traffic generated by the proposed action would result in growth by labor force accessing the project site on a daily basis, and truck trips due the import of aggregate material and large deliveries. New trips were determined by calculating the number of trips generated by the quantity of materials and equipment deliveries required for the project construction, as well as trips generated by construction labor forces. Estimated trips per day for Alternative 3, based on the construction activities and durations as shown in Table 45. The traffic numbers developed are expected to be worst case/maximum amounts of traffic volumes based on anticipated work schedules and activities.

Table 45. Alternative 3 Project Daily Trip Generation.

Construction Year	Alternative 3			
	Worker	Aggregate	Delivery	Total
2013	12	256	8	270
2014	24	16	6	36
2015	40	16	6	53
2016	40	16	6	53
2017	48	256	6	306

An estimated 6 to 24 workers would be onsite each day during construction depending on scheduled actives. These workers would access the area via regional and local roadways, and park their vehicles at the staging area. Table 44, listed above, presents the assumptions used on where the workers are expected to originate their trips. Based on the above assumptions, approximately 5 to 10 worker vehicles would add to I-80 and Highway 50 traffic during commute hours. Approximately one to ten worker vehicles would add to commute traffic in the other regions. All workers would access the staging area parking from Folsom Lake Crossing. The increase in traffic due to the project's labor force in relation to existing traffic load and capacity of the roadway system would be less-than-significant.

As discussed in Alternative 2, aggregate and batch plant materials would be received from the Tiechert Prairie City Borrow Source and blasting materials would be received from Jamestown, CA or Suisun City, CA. Offsite materials and equipment would be delivered to the project area via the same routes. Aggregate deliveries would be approximately 13 trucks per hour during the first year and last year of construction due to the installation and removal of the transload facility. Deliveries to the project area include steel and other construction materials would average four times per day the first year and three times the subsequent years. The increase in traffic due to the deliveries of aggregate and other large deliveries in relation to existing traffic load and capacity of the roadway system would be less-than-significant.

Alternative 3 would temporarily add construction related traffic in the near term that could affect roadway congestion near the project area. Traffic analysis did not show an LOS deterioration during any project year. While some roadways in certain years would experience an increase in volume/ capacity, in all cases the increase is less than the 50 or more new truck trips during the a.m. peak hour or the p.m. peak hour threshold of significance. Furthermore, the haul trucks trips at any given access route would be short-term. Therefore, construction related traffic impacts under Alternative 2 would not substantially disrupt the flow and/or travel time of traffic or exceed the ITE significance threshold. Therefore, project impacts to traffic would be less-than-significant. Full results of the traffic study, including traffic volumes, LOS, and volume/capacity ratio are in Appendix F.

Under Alternative 3, Folsom Lake Crossing would need to be closed for a two hour period during blasting events. As discussed under Alternative 2, the two hour period would allow for 30 minutes to close the road, one hour to conduct the blasting and 30 minutes to reopen the roadway. Under Alternative 3, there would be approximately 200 blasts in-the-wet and 280 blasts in-the-dry from February 2014 to August 2017 (approximately 1,100 days of work). This results in approximately one blast every other day. Detoured route, timing of blasting activities, and public information notices would be under Alternative 2. With the implementation of the road closers, any public safety hazards resulting from construction activities on or near the public road system would be less-than-significant.

As discussed in Alternative 2, parking would be available at the staging areas; therefore, the project would not affect local parking spaces and no significant effects would occur.

4.8.6 Mitigation

Since there would be no significant effects on traffic and circulation, no mitigation would be required. However, the following measures would be implemented to avoid or minimize any effects, as well as ensure public safety on area roadways.

- The construction contractor would be required to prepare a traffic management plan, outlining proposed routes to be approved by the appropriate agencies, and implement the plan prior to initiation of construction. High collision intersections would appropriate local entity, and implement it be identified and avoided if possible. Drivers would be informed and trained on the various types of haul routes, and areas that are more sensitive (e.g., high level of residential or education centers, or narrow roadways).

The construction contractor would develop and use signs to inform the public of the haul routes, route changes, detours, and planned road closures to minimize traffic congestion and ensure public safety.

4.9 NOISE

This section presents and compares potential adverse effects noise as compared to the existing conditions discussed in Section 3.9.

4.9.1 Methodology

Potential noise impacts were assessed at human and wildlife noise-sensitive receiver sites for noise generated by the proposed project. Project activities that were assessed include: approach channel excavation, spur dike construction, transload facility construction and demolition, batch plant operation, cutoff wall construction, and cofferdam construction and demolition. Noise from blasting, pile driving, and traffic are also analyzed. Potential human noise-sensitive receptor sites within the city of Folsom, Sacramento County, Placer County, and El Dorado County were considered.

Noise effects for the proposed project were predicted using CadnaA for general construction activities, or all construction activities excluding blasting. BNoise2 was used alongside CadnaA to model noise effects from blasting. These models are detailed in the Folsom JFP Noise Technical Report (Appendix G). The assumptions used to calculate the on-site haul road traffic noise is also detailed in the Technical Report.

For general construction activities, worst-case noise impact scenarios were modeled at both human and wildlife noise-sensitive receivers, during the highest noise years for each project Alternative. The data inputs used for noise models can be found in Appendix G. In order to capture the worst case noise scenario, any individual construction activity expected to occur at all during any particular year was assumed to occur concurrent with all other construction activities expected during that year. The noisiest activities for Alternative 2 would occur in 2017 and the noisiest construction activities for Alternative 3 would occur in 2013.

Most general construction activity is proposed to occur during construction noise exempt times. However, some activities may occur during non-exempt nighttime hours. Nighttime activities are analyzed separately for project Alternatives 2 and 3. The noisiest nighttime construction activities would occur in 2017 for both Alternatives 2 and 3.

The Folsom JFP Noise Technical Report (Appendix G) presents the results of the noise study, and the potential effects to all of the sensitive receptors discussed in Section 3.9.2. The results of the noise study indicated that there would be no effects to wildlife receptors, therefore, they are not discussed further in this section. The full analysis of wildlife receptors can be found in Appendix G. Effects to fish species from noise are discussed in the Fisheries analysis in Section 4.5.

4.9.2 Basis of Significance

For the purpose of this project, the City of Folsom's standards (Table 15) will be used to determine effect levels, because it is the closest jurisdiction with the most restrictive noise ordinance. The assessment standards are the daytime exterior L_{50} of 50 dBA from 7 a.m. to 10 p.m. and the nighttime exterior L_{50} of 45 dBA from 10 p.m. to 7 a.m. If these criteria are met within the city of Folsom, noise standards for other nearby jurisdictions will also be achieved.

The City of Folsom's construction noise exempt hours allow for noise generated by construction to be free from the exterior noise standard limits. These exempt times extend from 7:00 a.m. to 6:00 p.m. during weekdays and 8:00 a.m. to 5:00 p.m. on weekends. In the event that the measured ambient noise level exceeds the applicable noise level standard, the applicable standard shall be adjusted so as to equal the ambient noise level. The ambient noise level measurement data was reviewed and the published (unadjusted) daytime and nighttime exterior noise standards are applicable at all related noise-sensitive receptors. Therefore, for project noise effects from general construction activities to human sensitive receptors, noise would be considered significant if:

- The City of Folsom assessment standards are exceeded outside of the City's exempt hours and permitted thresholds.
- The project results in a change in the noise level that would cause a substantial number of people to be highly annoyed by the project's noise.

In determining the significance of noise effects, some of the considerations include noise source levels, the ambient noise, the distance to the noise source, the time of day, the duration of the noise, and the zoning of the areas in question.

CEQA requires the consideration of adverse effects associated with the generation of groundborne noise levels capable of damaging sensitive structures or interfering with land use activities near the project area. There are no sensitive structures near the project area that have the potential to be damaged by project construction activities, including blasting. Any potential vibration generated by project activities would not interfere with land use activities near the project area.

4.9.3 Alternative 1 – No Action

Under Alternative 1, the Corps and the CVFPB would not participate in the excavation of the approach channel or the completion of the auxiliary spillway. As a result, there would be no effect to the acoustic environment as there would not be any construction or operational activities.

4.9.4 Alternative 2 – Cutoff Wall

Noise-sensitive receptors may be affected by increased noise levels due to their close proximity to the proposed project area and amount of possible noise generated by construction activities related to the proposed project. There would be no indirect effects to noise associated with Alternative 2. Potential sources of noise from the approach channel excavation include both on-site construction and off-site construction traffic-related noise sources. Construction noise related to on-site construction would be associated with noise levels generated by approach channel excavation, spur dike construction, blasting, batch plant and staging area activities, and usage of the haul road near noise-sensitive receptors. Construction noise generated by on-site construction related activities is also assessed quantitatively at noise-sensitive wildlife receptor sites and qualitatively for fish located in Folsom Lake. Construction noise related to off-site traffic would be associated with workers and truck deliveries going to and from the project area via both local and regional roadways.

Construction activities that may be conducted for Alternative 2 are identified in Table 46. The area that the construction activity would take place, the sound pressure generated by the activity at 50 feet, and sound power level generated by the construction activity are listed. Non-exempt hour construction activities are identified in the table. Almost all of the construction activities have the potential to be conducted during non-exempt hours.

Any construction activities and equipment that would be used during the worst-case year of 2017 were modeled simultaneously with all other construction equipment. All on-site haul road usage, disposal, and off-site deliveries to the project site were assumed to be conducted during construction noise exempt hours. Under Alternative 2, if construction activities are conducted during construction noise exempt hours, noise effects from construction activities would be considered less-than-significant.

If construction activities are conducted during non-exempt hours, there is the potential for significant effects. Significance is dependent on the number, type, and location of construction activities during nonexempt hours, including any mitigation. As several construction activities could occur simultaneously during non-exempt hours (Table 46), a very large number of activity combinations could occur. For this reason, night time noise contributing activities were identified near each noise-sensitive receptor and illustrative example combinations were modeled. Different potential construction activity combinations were modeled, using a combination of individual activities paired with the quietest and loudest construction activities ("intake approach walls and slab" and "drill, blast, and dredge rock in the wet", respectively), to determine if the nighttime noise standard of 45 dBA L50 would be exceeded. The following tables (and accompanying figures) reflect those modeling results:

- Table 47 lists each individual activity's noise impact when paired with the loudest non-exempt hour construction activity that could be conducted at the Approach Channel/Spur Dike Area.
- Table 48 shows the cumulative noise levels at noise-sensitive receptors if specific construction activities would or would not be conducted simultaneously with the loudest individual construction activity, and provides demonstrations of a number of nighttime construction activity combinations.
- Table 49 lists the individual activity's noise impact when paired with the quietest non-exempt hour construction activity that would be conducted at the Approach Channel/Spur Dike Area.
- Table 50 shows the cumulative noise levels at noise-sensitive receptors if specific construction activities would or would not be conducted simultaneously with the quietest individual construction activity, and provides demonstrations of a number of nighttime construction activity combinations.

Table 46. Alternative 2 Areas of Construction Activity and Associated Noise Levels.

Construction Activity	Area of Construction								Total SPL @ 50 Feet per Construction Activity (dBA Leq)	Total PWL per Construction Activity (dBA Leq)
	Approach Channel / Spur Dike	Transload Facility	MIAD Staging and Disposal Area	Dike 7 Staging Area	Overlook Staging Area	Prison Staging Area	Dike 8 Disposal Area	Haul Road		
Drill and Blast / Dredge Rock In-the-Wet***	X	--	--	--	--	--	--	--	96.4	131.0
Dredge Common Material to Rock*	X	--	--	--	--	--	--	--	96.0	130.6
Teardown, Clean Up, and Site Restoration***	X	--	--	--	--	--	--	--	96.0	130.6
Set up and Operate Silt Curtain/ possible Bubble Curtain**	X	--	--	--	--	--	--	--	93.1	127.7
Site Prep / Haul Road Prep	X	--	--	--	--	--	--	--	93.0	127.6
Transfer Excavation Material to Disposal Site*	X	--	--	--	--	--	--	--	92.7	127.3
Remove Transload Facility***	--	X	--	--	--	--	--	--	91.6	126.2
Construct Transload Facility*	--	X	--	--	--	--	--	--	91.6	126.2
Rock Excavation In-the-Dry*	X	--	--	--	--	--	--	--	91.2	125.8
Common Excavation to Disposal*	X	--	--	--	--	--	--	--	90.5	125.1
Cutoff Wall Concrete Placement*	X	--	--	--	--	--	--	--	89.9	124.5
Mobilization for Approach Walls*	X	--	--	--	--	--	--	--	89.7	124.3
Spur Dike Riprap***	X	--	--	--	--	--	--	--	89.3	123.9
Haul Road Embankment*	X	--	--	--	--	--	--	--	89.3	123.9
MIAD Staging Area w/ Rock Crusher and Batch Plant	--	--	X	--	--	--	--	--	88.0	122.6

Construction Activity	Area of Construction								Total SPL @ 50 Feet per Construction Activity (dBA Leq)	Total PWL per Construction Activity (dBA Leq)
	Approach Channel / Spur Dike	Transload Facility	MIAD Staging and Disposal Area	Dike 7 Staging Area	Overlook Staging Area	Prison Staging Area	Dike 8 Disposal Area	Haul Road		
Overlook Staging Area w/ Rock Crusher and Batch Plant	--	--	--	--	X	--	--	--	88.0	122.6
MIAD Staging Area w/ Batch Plant*	--	--	X	--	--	--	--	--	86.4	121.0
Overlook Staging Area w/ Batch Plant*	--	--	--	--	X	--	--	--	86.4	121.0
Prison Staging Area w/ Batch Plant*	--	--	--	--	--	X	--	--	86.4	121.0
Intake Approach Walls and Slab Construction*	X	--	--	--	--	--	--	--	84.9	119.5
MIAD Disposal and Staging Area*	--	--	X	--	--	--	--	--	83.8	118.4
Overlook Staging Area*	--	--	--	--	X	--	--	--	83.8	118.4
Prison Staging Area*	--	--	--	--	--	X	--	--	83.8	118.4
Dike 7 Staging Area*	--	--	--	X	--	--	--	--	83.8	118.4
Dike 8 Disposal Area*	--	--	--	--	--	--	X	--	83.8	118.4
On-Site Haul Road Usage to and From Excavation Site and MIAD* [a]	--	--	--	--	--	--	--	X	52.6	n/a
On-Site Haul Road Usage for Construction of Transload Facility* [a]	--	--	--	--	--	--	--	X	52.6	n/a
On-Site Haul Road Usage for Removal of Transload Facility* [a]	--	--	--	--	--	--	--	X	52.6	n/a

*potential nighttime activity
**potential nighttime activity (four 1500 CFM compressors only)
***nighttime activity with exception of blasting
[a] total SPL is 52.6 dBA Leq from 4.5 haul truck round-trips along haul road per hour

For noise modeling purposes, the following conditions are assumed during non-exempt hours:

- Haul roads are being utilized.
- As a worst-case scenario, batch plants are in operation at each modeled staging area if the staging area is being utilized.
- Rock crushing and blasting activities would not be conducted during nighttime hours.

While the City of Folsom uses the L_{50} metric as its baseline noise criterion, modeling outputs yield potential construction noise in terms of L_{eq}, a more conservative value. Table 47 lists the noise levels generated at noise-sensitive receptors by individual construction activities, including "drill and blasting and dredging rock in-the-wet", at specific areas of the proposed project during non-exempt hours. At the bottom of the table, the cumulative noise level is listed under each noise-sensitive receptor column if the construction activities would be conducted simultaneously from each respective construction activity area for the proposed project. Figure 19 illustrates potential noise contours which would result from these construction activities being conducted simultaneously. Table 48 illustrates, for comparative purposes, potential combinations of construction activities and lists the modeled noise levels at noise-sensitive receptors if specific activities are removed from simultaneous non-exempt hour construction activities. In both Tables 47 and 48, individual and cumulative noise levels are highlighted in gray where nighttime noise threshold would be exceeded.

Table 49 lists the noise levels generated at noise-sensitive receptors by individual construction activities, including "intake approach walls and slab construction", at specific areas of the proposed project during non-exempt hours. At the bottom of the table, the cumulative noise level is listed under each noise-sensitive receptor column if the construction activities would be conducted simultaneously from each respective construction activity area for the proposed project. Figure 20 depicts the noise contours assuming these construction activities are conducted simultaneously. Table 50 explores potential combinations of construction activities and lists the modeled noise levels at noise-sensitive receptors if specific activities are removed from simultaneous non-exempt hour construction activities. In both Tables 49 and 50, individual and cumulative noise levels are highlighted in gray if the nighttime noise threshold would be exceeded.

Table 47. Alternative 2 Non-Exempt Hour Construction Activities with Drill and Blast and Dredging Rock In-the-Wet.

Construction Activity	Noise Levels Generated by Individual Construction Activities at Noise-Sensitive Receptor During Non-Exempt Hours (Drill and Blast / Dredging Rock In-the-Wet)											
	MR-1a	**MR-1b**	**LT-2**	**LT-3**	**LT-4**	**LT-5**	**LT-6**	**ST-7**	**ST-8**	**MR-9**	**MR-10**	**MR-11**
Drill and Blast / Dredging Rock In-the-Wet	44	42	46	55	41	37	43	46	51	44	49	45
Prison Staging Area w/ Batch Plant	39	35	31	33	21	22	45	32	28	27	32	24
Transload Facility Construction/Removal	40	36	46	56	41	36	35	37	55	47	43	46
Dike 7 Staging Area	30	29	46	59	21	25	24	23	33	31	54	28
Dike 8 Disposal Area	27	21	35	39	35	30	24	23	57	47	31	54
MIAD Disposal and Staging Area w/ Batch Plant	26	20	33	34	60	42	24	22	43	53	29	36
Overlook Staging Area w/ Batch Plant	35	32	33	41	30	26	35	37	36	33	37	34
Haul Road	14	13	21	34	28	14	9	4	37	32	24	30
Cumulative Noise Level	47	44	51	62	60	44	48	47	60	55	55	55

Note: Noise effects are highlighted in gray if construction (1) could be conducted outside of construction noise exempt hours and (2) would exceed either the daytime exterior noise standard of 50 dBA L_{50} or the nighttime exterior noise standard of 45 dBA L_{50}.

Table 48. Alternative 2 Simultaneous Non-Exempt Hour Construction Activity Combinations with Drill and Blast and Dredging Rock In-the-Wet.

Construction Activity Combinations	Overall Noise Levels Generated by Simultaneous Construction Activity Combinations at Noise-Sensitive Receptor During Non-Exempt Hours (Drill and Blast/Dredging Rock In-the-Wet)											
	MR-1a	MR-1b	LT-2	LT-3	LT-4	LT-5	LT-6	ST-7	ST-8	MR-9	MR-10	MR-11
Cumulative Noise Level (Without Drill and Blast and Dredging Rock In-the-Wet)	43	40	49	61	60	43	46	41	59	55	54	55
Cumulative Noise Level (Without Prison Staging Area w/ Batch Plant)	46	44	51	62	60	44	45	47	60	55	55	55
Cumulative Noise Level (Without Transload Facility Construction)	46	44	49	60	60	43	48	46	58	55	55	55
Cumulative Noise Level (Without Dike 7 Staging Area)	46	44	49	59	60	44	48	47	60	55	50	55
Cumulative Noise Level (Without Dike 8 Disposal Area)	47	44	51	62	60	44	48	47	56	54	55	49
Cumulative Noise Level (Without MIAD Disposal and Staging Area w/ Batch Plant)	47	44	51	62	45	40	48	47	60	51	55	55
Cumulative Noise Level (Without Overlook Staging Area w/ Batch Plant)	46	44	51	62	60	44	48	46	60	55	55	55
Cumulative Noise Level (Without MIAD Disposal and Staging Areas and Dike 8 Disposal Area)	46	44	51	62	44	40	48	47	56	49	55	49
Cumulative Noise Level (Without Transload Facility Construction and Dike 7 Staging Area)	45	43	47	55	60	43	48	46	58	55	49	55
Cumulative Noise Level (With Drill and Blast and Dredging Rock In-the-Wet, Overlook Staging Area w/ Batch Plant, and Haul Road Only)	44	43	46	55	41	37	44	46	51	44	49	45

Note: Noise effects are highlighted in gray if construction (1) could be conducted outside of construction noise exempt hours and (2) would exceed either the daytime exterior noise standard of 50 dBA L_{50} or the nighttime exterior noise standard of 45 dBA L_{50}.

Table 49. Alternative 2 Non-Exempt Hour Construction Activities with Intake Approach Walls and Slab Construction.

Construction Activity	Noise Levels Generated by Individual Construction Activity at Noise-Sensitive Receptor											
	MR-1a	MR-1b	LT-2	LT-3	LT-4	LT-5	LT-6	ST-7	ST-8	MR-9	MR-10	MR-11
Intake Approach Walls and Slab	32	31	35	43	29	25	32	34	39	32	37	33
Prison Staging Area w/ Batch Plant	39	35	31	33	21	22	45	32	28	27	32	24
Transload Facility Construction/Removal	40	36	46	56	41	36	35	37	55	47	43	46
Dike 7 Staging Area	30	29	46	59	21	25	24	23	33	31	54	28
Dike 8 Disposal Area	27	21	35	39	35	30	24	23	57	47	31	54
MIAD Disposal and Staging Area w/ Batch Plant	26	20	33	34	60	42	24	22	43	53	29	36
Overlook Staging Area w/ Batch Plant	35	32	33	41	30	26	35	37	36	33	37	34
Haul Road	14	13	21	34	28	14	9	4	37	32	24	30
Cumulative Noise Level	**44**	**40**	**49**	**61**	**60**	**43**	**46**	**41**	**59**	**55**	**54**	**55**

Note: Noise effects are highlighted in gray if construction (1) could be conducted outside of construction noise exempt hours and (2) would exceed either the daytime exterior noise standard of 50 dBA L_{50} or the nighttime exterior noise standard of 45 dBA L_{50}.

Table 50. Alternative 2 Simultaneous Non-Exempt Hour Construction Activity Combinations with Intake Approach Walls and Slab Construction.

Construction Activity Combinations	Overall Noise Levels Generated by Simultaneous Construction Activity Combinations at Noise-Sensitive Receptor During Non-Exempt Hours (Intake Approach Walls and Slab Construction)											
	MR-1a	**MR-1b**	**LT-2**	**LT-3**	**LT-4**	**LT-5**	**LT-6**	**ST-7**	**ST-8**	**MR-9**	**MR-10**	**MR-11**
Cumulative Noise Level (Without Intake Approach Walls and Slab Construction)	43	40	49	61	60	43	46	41	59	55	54	55
Cumulative Noise Level (Without Prison Staging Area w/ Batch Plant)	42	39	49	61	60	43	40	41	59	55	54	55
Cumulative Noise Level (Without Transload Facility Construction)	42	38	47	59	60	42	46	40	58	54	54	54
Cumulative Noise Level (Without Dike 7 Staging Area)	44	40	47	57	60	43	46	41	59	55	45	55
Cumulative Noise Level (Without Dike 8 Disposal Area)	44	40	49	61	60	43	46	41	55	54	54	47
Cumulative Noise Level (Without MIAD Disposal and Staging Area w/ Batch Plant)	44	40	49	61	43	38	46	41	59	50	54	55
Cumulative Noise Level (Without Overlook Staging Area w/ Batch Plant)	43	40	49	61	60	43	46	40	59	55	54	55
Cumulative Noise Level (Without MIAD Disposal and Staging Areas and Dike 8 Disposal Area)	44	40	49	61	42	37	46	41	55	47	54	47
Cumulative Noise Level (Without Transload Facility Construction and Dike 7 Staging Area)	41	38	41	47	60	42	46	40	58	54	42	54
Cumulative Noise Level (With Intake Approach Walls and Slab Construction, Overlook Staging Area w/ Batch Plant, and Haul Road Only)	37	35	37	46	34	29	37	39	42	37	40	37

Note: Noise effects are highlighted in gray if construction (1) could be conducted outside of construction noise exempt hours and (2) would exceed either the daytime exterior noise standard of 50 dBA L_{50} or the nighttime exterior noise standard of 45 dBA L_{50}.

A brief description of the major noise contributing construction activities that could generate noise impacts at each noise-sensitive receptor is included below. Major noise contributing construction activities are defined as activities that generate noise levels of 35 dBA or higher any noise-sensitive receptors.

- At Folsom State Prison (MR-1a and MR-1b), it is assumed that the prison structures would provide a minimum of 30 dBA attenuation due to the concrete walls and small, thick glass windows. It is also assumed that the exterior concrete walls surrounding the prison facility would provide an additional 5 dBA of attenuation. Taking these assumptions into account noise levels at Folsom State Prison would not be significant.
- At Tacana Drive and East Natoma Street (LT-2), drill and blasting and dredging rock in-the-wet, transload facility construction/removal, and Dike 7 staging area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at LT-2 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, and utilization of the Dike 7 staging area.
- At Mountain View Drive (LT-3), drill and blasting and dredging rock in-the-wet, transload facility construction/removal, and Dike 7 staging area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at LT-3 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Dike 7 and Overlook staging areas, and utilization of the Dike 8 disposal area.
- At East Natoma Street and Green Valley Road (LT-4), MIAD disposal and staging area utilization would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if it was utilized without any other simultaneous construction activities. The major noise contributing activities at LT-4 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Dike 8 disposal area, and utilization of the MIAD disposal and staging areas.
- At East of Folsom Auburn Rd. and Pierpoint Circle (LT-6), utilization of the Prison staging area would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if it was utilized without any other simultaneous construction activities. The major noise contributing activities at LT-6 would be Approach Channel/Spur Dike construction activities, utilization of the Prison or Overlook staging areas, and transload facility construction/removal activities.
- At the Beal's Point Campground (ST-7), guests would be staying overnight. Drill and blasting and dredging rock in-the-wet construction activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if it would be conducted by itself without any other simultaneous construction activities. The major noise contributing activities at ST-7 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Overlook staging area.

- At Folsom Point Park (ST-8), guests would not be staying overnight. Therefore, there are no anticipated noise impacts during non-exempt hours.
- At East Natoma Street and Briggs Ranch Drive (MR-9), transload facility construction/removal, Dike 8 disposal area utilization, and MIAD staging and disposal area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at MR-9 are Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Dike 8 disposal area, and utilization of the MIAD disposal and staging area.
- At Lorena Lane (MR-10), drill and blasting and dredging rock in-the-wet and Dike 7 staging area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at MR-10 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Dike 7 staging area, and utilization of the Overlook staging area.
- At Folsom Church of Christ (MR-11), drill and blasting and dredging rock in-the-wet, transload facility construction/removal, and Dike 8 disposal area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at MR-11 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Dike 8 disposal area, and utilization of the MIAD disposal and staging area.

Due to the uncertainty in regards to the time and location of construction activities and equipment that would be utilized during nighttime hours, it is difficult to ascertain when there would or would not be noise impacts at specific noise-sensitive receptors.

Under Alternative 2, mitigation measures would be necessary for all of these long-term, short-term, and modeled receiver sites where the daytime and nighttime exterior noise standards would be exceeded outside of construction noise exempt hours. Implementation of the mitigation measures discussed in Section 4.9.6 would reduce the construction noise effects during non-exempt hours at human noise sensitive receptors to less-than-significant. Additionally, if noise complaints are to occur from construction activities in non-exempt hours, it is expected that the Corps contractor would address those complaints and implement further mitigation, as needed, to reduce these effects. As a result, it is assumed that any significant effects associated with noise would be reduced to less-than-significant, with the implementation of the mitigation discussed in Section 4.9.6, and by responding to noise complaints when they are received. Furthermore, due to the many variables that need to be taken into account for non-exempt construction activities, it is recommended that a noise monitoring program be instituted in order to ensure compliance and establish the necessary mitigation measures where they are needed.

4.9.5 Alternative 3 – Cofferdam

Any construction activities and equipment that would be used during the worst-case year of 2013 was modeled simultaneously with all other construction equipment within that year. Models assumed that all on-site haul road usage, disposal, and off-site deliveries to the project site would be conducted during construction noise exempt hours. There would be no indirect effects to noise associated with Alternative 3. Under Alternative 3, if construction activities are conducted during construction noise exempt hours, noise effects from construction activities would be considered less-than-significant at all human and wildlife noise-sensitive receptor sites.

Construction activities that may be conducted for Alternative 3 are identified in Table 51. The area where the construction activity would take place, the sound pressure generated by the activity at 50 feet, and the sound power level generated by the construction activity are listed. Non-exempt hour construction activities are identified in the table. Almost all of the construction activities have the potential to be conducted during non-exempt hours.

If construction activities are conducted during non-exempt hours, there is the potential for significant effects. Significance is dependent on the number, type, and location of construction activities during nonexempt hours, including any mitigation. As several construction activities could occur simultaneously during non-exempt hours (Table 51), a very large number of activity combinations could occur. For this reason, night time noise contributing activities were identified near each noise-sensitive receptor and illustrative example combinations were modeled. Different potential construction activity combinations were modeled, using a combination of individual activities paired with the quietest and loudest construction activities ("intake approach walls and slab" and "fill cells", respectively), to determine if the nighttime noise standard of 45 dBA L50 would be exceeded. The following tables (and accompanying figures) reflect those modeling results:

- Table 52 lists each individual activity's noise impact when paired with the loudest non-exempt hour construction activity that could be conducted at the Approach Channel/Spur Dike Area.
- Table 53 shows the cumulative noise levels at noise-sensitive receptors if specific construction activities would or would not be conducted simultaneously with the loudest individual construction activity, and provides demonstrations of a number of nighttime construction activity combinations.
- Table 54 lists the individual activity's noise impact when paired with the quietest non-exempt hour construction activity that would be conducted at the Approach Channel/Spur Dike Area.
- Table 55 shows the cumulative noise levels at noise-sensitive receptors if specific construction activities would or would not be conducted simultaneously with the quietest individual construction activity, and provides demonstrations of a number of nighttime construction activity combinations.

Table 51. Alternative 3 Areas of Construction Activity and Associated Noise Levels.

Construction Activity	Area of Construction								Total SPL @ 50 Feet per Construction Activity (dBA Leq)	Total PWL per Construction Activity (dBA Leq)
	Approach Channel / Spur Dike	Transload Facility	MIAD Staging and Disposal Area	Dike 7 Staging Area	Overlook Staging Area	Prison Staging Area	Dike 8 Disposal Area	Haul Road		
Fill Cells*	X	--	--	--	--	--	--	--	102.2	136.8
Construction of Sheet Pile Cells*	X	--	--	--	--	--	--	--	101.7	136.3
Common Dredge Below Cofferdam*	X	--	--	--	--	--	--	--	96.8	131.4
Drill and Blast / Dredge Rock In-the-Wet***	X	--	--	--	--	--	--	--	96.3	130.9
Dredge Common Material to Rock*	X	--	--	--	--	--	--	--	96.0	130.6
Teardown, Clean Up, and Site Restoration***	X	--	--	--	--	--	--	--	96.0	130.6
Dewater Behind Cofferdam*	X	--	--	--	--	--	--	--	95.9	130.4
Remove Sheets*	X	--	--	--	--	--	--	--	94.4	128.9
Mobilization for Cofferdam	X	--	--	--	--	--	--	--	93.2	127.8
Set up and Operate Silt Curtain**	X	--	--	--	--	--	--	--	92.8	127.4
Transfer Excavation Material to Disposal Site*	X	--	--	--	--	--	--	--	92.7	127.3
Construct Transload Facility*	--	X	--	--	--	--	--	--	91.6	126.2
Remove Transload Facility***	--	X	--	--	--	--	--	--	91.2	125.8
Rock Excavation In-the-Dry*	X	--	--	--	--	--	--	--	91.1	125.7
Common Excavation Below Cofferdam*	X	--	--	--	--	--	--	--	90.4	124.9
Mobilization for Approach Walls*	X	--	--	--	--	--	--	--	89.7	124.3
Spur Dike Riprap***	X	--	--	--	--	--	--	--	89.3	123.9
MIAD Staging Area w/ Rock Crusher	--	--	X	--	--	--	--	--	88.0	122.6

Construction Activity	Area of Construction								Total SPL @ 50 Feet per Construction Activity (dBA Leq)	Total PWL per Construction Activity (dBA Leq)
	Approach Channel / Spur Dike	Transload Facility	MIAD Staging and Disposal Area	Dike 7 Staging Area	Overlook Staging Area	Prison Staging Area	Dike 8 Disposal Area	Haul Road		
Overlook Staging Area w/ Rock Crusher	--	--	--	--	X	--	--	--	88.0	122.6
Remove Cell Rubble Fill*	X	--	--	--	--	--	--	--	87.7	122.3
MIAD Staging Area w/ Batch Plant*	--	--	X	--	--	--	--	--	86.4	121.0
Overlook Staging Area w/ Batch Plant*	--	--	--	--	X	--	--	--	86.4	121.0
Prison Staging Area w/ Batch Plant*	--	--	--	--	--	X	--	--	86.4	121.0
Intake Approach Walls and Slab*	X	--	--	--	--	--	--	--	84.9	119.5
MIAD Disposal and Staging Area*	--	--	X	--	--	--	--	--	83.8	118.4
Overlook Staging Area*	--	--	--	--	X	--	--	--	83.8	118.4
Prison Staging Area*	--	--	--	--	--	X	--	--	83.8	118.4
Dike 7 Staging Area*	--	--	--	X	--	--	--	--	83.8	118.4
Dike 8 Disposal Area*	--	--	--	--	--	--	X		83.8	118.4
On-Site Haul Road Usage to and From Excavation Site and MIAD* [a]	--	--	--	--	--	--	--	X	52.6	n/a
On-Site Haul Road Usage for Construction of Transload Facility* [a]	--	--	--	--	--	--	--	X	52.6	n/a
Import of Construction Material* [a]	--	--	--	--	--	--	--	X	52.6	n/a
On-Site Haul Road Usage for Removal of Transload Facility* [a]	--	--	--	--	--	--	--	X	52.6	n/a

*potential nighttime construction activity
**potential nighttime construction activity (four 1500 CFM compressors only)
***nighttime activity with exception of blasting
[a] total SPL is 52.6 dBA Leq from 4.5 haul truck round-trips along haul road per hour

For noise modeling purposes, the following conditions are assumed during non-exempt hours:

- Haul roads are being utilized
- As a worst-case scenario, batch plants are in operation at each modeled staging area if the staging area is being utilized
- Rock crushing and blasting activities would not be conducted during nighttime hours

Table 52 lists the noise levels generated at noise-sensitive receptors by individual construction activities, including “fill cells”, at specific areas of the proposed project during non-exempt hours. At the bottom of the table, the cumulative noise level is listed under each noise-sensitive receptor column if the construction activities would be conducted simultaneously from each respective construction activity area for the proposed project. Figure 21 depicts the resulting cumulative noise contours if these construction activities were conducted simultaneously. Table 53 explores potential combinations of construction activities and lists the modeled noise levels at noise-sensitive receptors if specific activities are removed from simultaneous non-exempt hour construction activities. In Tables 52 and 53, individual and cumulative noise levels are highlighted in gray if the 45 dBA L_{50} nighttime noise threshold would be exceeded during non-exempt hours at each noise-sensitive receptor.

Table 54 lists the noise levels generated at noise-sensitive receptors by individual construction activities, including “intake approach walls and slab construction”, at specific areas of the proposed project during non-exempt hours. At the bottom of the table, the cumulative noise level is listed under each noise-sensitive receptor column if the construction activities would be conducted simultaneously from each respective construction activity area for the proposed project. Figure 19 illustrates the resulting cumulative noise contours if these construction activities were conducted simultaneously. Table 55 explores potential combinations of construction activities and lists the modeled noise levels at noise-sensitive receptors if specific activities are removed from simultaneous non-exempt hour construction activities. In Tables 54 and 55, individual and overall noise levels are highlighted in gray if the 45 dBA L_{50} nighttime noise threshold would be exceeded during non-exempt hours at each noise-sensitive receptor. As with Alternative 2, modeling outputs in terms of L_{eq} provide conservative comparisons to L_{50} values.

Table 52. Alternative 3 Non-Exempt Hour Construction Activities with Fill Cells Activities.

Construction Activity	Noise Levels Generated by Individual Construction Activities at Noise-Sensitive Receptor During Non-Exempt Hours (Fill Cells)											
	MR-1a	MR-1b	LT-2	LT-3	LT-4	LT-5	LT-6	ST-7	ST-8	MR-9	MR-10	MR-11
Fill Cells	49	48	52	61	46	42	49	51	56	49	54	51
Prison Staging Area w/ Batch Plant	39	35	31	33	21	22	45	32	28	27	32	24
Transload Facility Construction/Removal	40	36	46	56	41	36	35	37	55	47	43	46
Dike 7 Staging Area	30	29	46	59	21	25	24	23	33	31	54	28
Dike 8 Disposal Area	27	21	35	39	35	30	24	23	57	47	31	54
MIAD Disposal and Staging Area w/ Batch Plant	26	20	33	34	60	42	24	22	43	53	29	36
Overlook Staging Area w/ Batch Plant	35	32	33	41	30	26	35	37	36	33	37	34
Haul Road	14	13	21	34	28	14	9	4	37	32	24	30
Cumulative Noise Level	**50**	**49**	**54**	**64**	**60**	**46**	**51**	**52**	**61**	**56**	**57**	**56**

Note: Noise effects are highlighted in gray if construction (1) could be conducted outside of construction noise exempt hours and (2) would exceed either the daytime exterior noise standard of 50 dBA L_{50} or the nighttime exterior noise standard of 45 dBA L_{50}.

Table 53. Alternative 3 Simultaneous Non-Exempt Hour Construction Activity Combinations with Drill and Blast and Dredging Rock In-the-Wet.

Construction Activity Combinations	Overall Noise Levels Generated by Simultaneous Construction Activity Combinations at Noise-Sensitive Receptor During Non-Exempt Hours (Fill Cells)											
	MR-1a	MR-1b	LT-2	LT-3	LT-4	LT-5	LT-6	ST-7	ST-8	MR-9	MR-10	MR-11
Cumulative Noise Level (Without Fill Cells)	43	40	49	61	60	43	46	41	59	55	54	55
Cumulative Noise Level (Without Prison Staging Area w/ Batch Plant)	50	49	54	64	60	46	50	52	61	56	57	56
Cumulative Noise Level (Without Transload Facility Construction)	50	49	53	63	60	45	51	52	60	55	57	56
Cumulative Noise Level (Without Dike 7 Staging Area)	50	49	53	62	60	46	51	52	61	56	55	56
Cumulative Noise Level (Without Dike 8 Disposal Area)	50	49	54	64	60	46	51	52	59	55	57	52
Cumulative Noise Level (Without MIAD Disposal and Staging Area w/ Batch Plant)	50	49	54	64	48	44	51	52	61	53	57	56
Cumulative Noise Level (Without Overlook Staging Area w/ Batch Plant)	50	49	54	64	60	46	51	52	61	56	57	56
Cumulative Noise Level (Without MIAD Disposal and Staging Areas and Dike 8 Disposal Area)	50	49	54	64	48	43	51	52	59	52	57	52
Cumulative Noise Level (Without Transload Facility Construction and Dike 7 Staging Area)	50	49	52	61	60	45	51	52	60	55	55	56
Cumulative Noise Level (With Fill Cells, Overlook Staging Area w/ Batch Plant, and Haul Road Only)	50	48	52	61	47	43	49	52	56	50	54	51

Note: Noise effects are highlighted in gray if construction (1) could be conducted outside of construction noise exempt hours and (2) would exceed either the daytime exterior noise standard of 50 dBA L_{50} or the nighttime exterior noise standard of 45 dBA L_{50}.

Table 54. Alternative 3 Non-Exempt Hour Construction Activities with Intake Approach Walls and Slab Construction.

Construction Activity	Noise Levels Generated by Individual Construction Activity at Noise-Sensitive Receptor											
	MR-1a	**MR-1b**	**LT-2**	**LT-3**	**LT-4**	**LT-5**	**LT-6**	**ST-7**	**ST-8**	**MR-9**	**MR-10**	**MR-11**
Intake Approach Walls and Slab	32	31	35	43	29	25	32	34	39	32	37	33
Prison Staging Area w/ Batch Plant	39	35	31	33	21	22	45	32	28	27	32	24
Transload Facility Construction/Removal	40	36	46	56	41	36	35	37	55	47	43	46
Dike 7 Staging Area	30	29	46	59	21	25	24	23	33	31	54	28
Dike 8 Disposal Area	27	21	35	39	35	30	24	23	57	47	31	54
MIAD Disposal and Staging Area w/ Batch Plant	26	20	33	34	60	42	24	22	43	53	29	36
Overlook Staging Area w/ Batch Plant	35	32	33	41	30	26	35	37	36	33	37	34
Haul Road	14	13	21	34	28	14	9	4	37	32	24	30
Cumulative Noise Level	**44**	**40**	**49**	**61**	**60**	**43**	**46**	**41**	**59**	**55**	**54**	**55**

Note: Noise effects are highlighted in gray if construction (1) could be conducted outside of construction noise exempt hours and (2) would exceed either the daytime exterior noise standard of 50 dBA L_{50} or the nighttime exterior noise standard of 45 dBA L_{50}.

Table 55. Alternative 3 Simultaneous Non-Exempt Hour Construction Activity Combinations with Intake Approach Walls and Slab Construction.

Construction Activity Combinations	Overall Noise Levels Generated by Simultaneous Construction Activity Combinations at Noise-Sensitive Receptor During Non-Exempt Hours (Intake Approach Walls and Slab Construction)											
	MR-1a	**MR-1b**	**LT-2**	**LT-3**	**LT-4**	**LT-5**	**LT-6**	**ST-7**	**ST-8**	**MR-9**	**MR-10**	**MR-11**
Cumulative Noise Level (Without Intake Approach Walls and Slab Construction)	43	40	49	61	60	43	46	41	59	55	54	55
Cumulative Noise Level (Without Prison Staging Area w/ Batch Plant)	42	39	49	61	60	43	40	41	59	55	54	55
Cumulative Noise Level (Without Transload Facility Construction)	42	38	47	59	60	42	46	40	58	54	54	54
Cumulative Noise Level (Without Dike 7 Staging Area)	44	40	47	57	60	43	46	41	59	55	45	55
Cumulative Noise Level (Without Dike 8 Disposal Area)	44	40	49	61	60	43	46	41	55	54	54	47
Cumulative Noise Level (Without MIAD Disposal and Staging Area w/ Batch Plant)	44	40	49	61	43	38	46	41	59	50	54	55
Cumulative Noise Level (Without Overlook Staging Area w/ Batch Plant)	43	40	49	61	60	43	46	40	59	55	54	55
Cumulative Noise Level (Without MIAD Disposal and Staging Areas and Dike 8 Disposal Area)	44	40	49	61	42	37	46	41	55	47	54	47
Cumulative Noise Level (Without Transload Facility Construction and Dike 7 Staging Area)	41	38	41	47	60	42	46	40	58	54	42	54
Cumulative Noise Level (With Intake Approach Walls and Slab Construction, Overlook Staging Area w/ Batch Plant, and Haul Road Only)	37	35	37	46	34	29	37	39	42	37	40	37

Note: Noise effects are highlighted in gray if construction (1) could be conducted outside of construction noise exempt hours and (2) would exceed either the daytime exterior noise standard of 50 dBA L_{50} or the nighttime exterior noise standard of 45 dBA L_{50}.

Many of the construction activities listed in Table 51 have the potential to be conducted simultaneously and there is no definitive time and place where construction activities would be conducted during non-exempt construction hours. Tables 52-54 illustrate that certain construction activities generate noise impacts at specific receptors more than other receptors. A brief description of the major noise contributing construction activities that could generate noise impacts at each noise-sensitive receptor is included below. Major noise contributing construction activities would be activities that generate noise levels of 35 dBA or higher at noise-sensitive receptors.

- At Folsom State Prison (MR-1a and MR-1b), it is assumed that the prison structures would provide a minimum of 30 dBA attenuation due to the concrete walls and small, thick glass windows. It is also assumed that the exterior concrete walls surrounding the prison facility would provide an additional 5 dBA of attenuation. Taking these assumptions into account, noise would not be an issue at the prison.
- At Tacana Drive and East Natoma Street (LT-2), fill cells, transload facility construction/removal, and Dike 7 staging area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at LT-2 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, and utilization of the Dike 7 staging area.
- At Mountain View Drive (LT-3), fill cells, transload facility construction/removal, and Dike 7 staging area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at LT-3 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Dike 7 and Overlook staging areas, and utilization of the Dike 8 disposal area.
- At East Natoma Street and Green Valley Road (LT-4), fills cells and MIAD disposal and staging area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at LT-4 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Dike 8 disposal area, and utilization of the MIAD disposal and staging areas.
- At East of Folsom Auburn Rd. and Pierpoint Circle (LT-6), fills cells and Prison staging area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at LT-6 would be Approach Channel/Spur Dike construction activities, utilization of the Prison or Overlook staging areas, and transload facility construction/removal activities.
- At the Beal’s Point Campground (ST-7), guests would be staying overnight. Fill cells construction activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if it would be conducted by itself without any other simultaneous construction activities. The major noise contributing activities at ST-7 would be

Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Overlook staging area.

- At Folsom Point Park (ST-8), guests would not be staying overnight. Therefore, there are no anticipated noise impacts during non-exempt hours.
- At East Natoma Street and Briggs Ranch Drive (MR-9), fill cells, transload facility construction/removal, Dike 8 disposal area utilization, and MIAD staging and disposal area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at MR-9 are Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Dike 8 disposal area, and utilization of the MIAD disposal and staging area.
- At Lorena Lane (MR-10), fill cells and Dike 7 staging area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at MR-10 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Dike 7 staging area, and utilization of the Overlook staging area.
- At Folsom Church of Christ (MR-11), fill cells, transload facility construction/removal, and Dike 8 disposal area utilization activities would generate noise levels that exceed the 45 dBA L_{50} nighttime exterior noise standard if the activities would be conducted individually. The major noise contributing activities at MR-11 would be Approach Channel/Spur Dike construction activities, transload facility construction/removal activities, utilization of the Dike 8 disposal area, and utilization of the MIAD disposal and staging area.

Due to the uncertainty in regards to the time and location of construction activities and equipment that would be utilized during nighttime hours, it is difficult to ascertain when there would or would not be noise impacts at specific noise-sensitive receptors. Under Alternative 3, mitigation measures would be necessary for all of these long-term, short-term, and modeled receiver sites where the daytime and nighttime exterior noise standards would be exceeded outside of construction noise exempt hours. Implementation of the mitigation measures discussed in Section 4.9.6 is expected to reduce the construction noise effects during non-exempt hours at human noise sensitive receptors to less-than-significant. Additionally, if noise complaints are to occur from construction activities in non-exempt hours, the Corps contractor would address those complaints and implement further mitigation or reduction of activity producing excessive noise, as needed, to reduce these effects. As a result, it is reasonable to expect that any significant effects associated with noise would be reduced to less-than-significant, with the implementation of the mitigation discussed in Section 4.9.6, and by responding to noise complaints when they are received. Furthermore, due to the many variables that need to be taken into account for non-exempt construction activities, it is recommended that a noise monitoring program be instituted in order to ensure compliance and establish the necessary mitigation measures where they are needed.

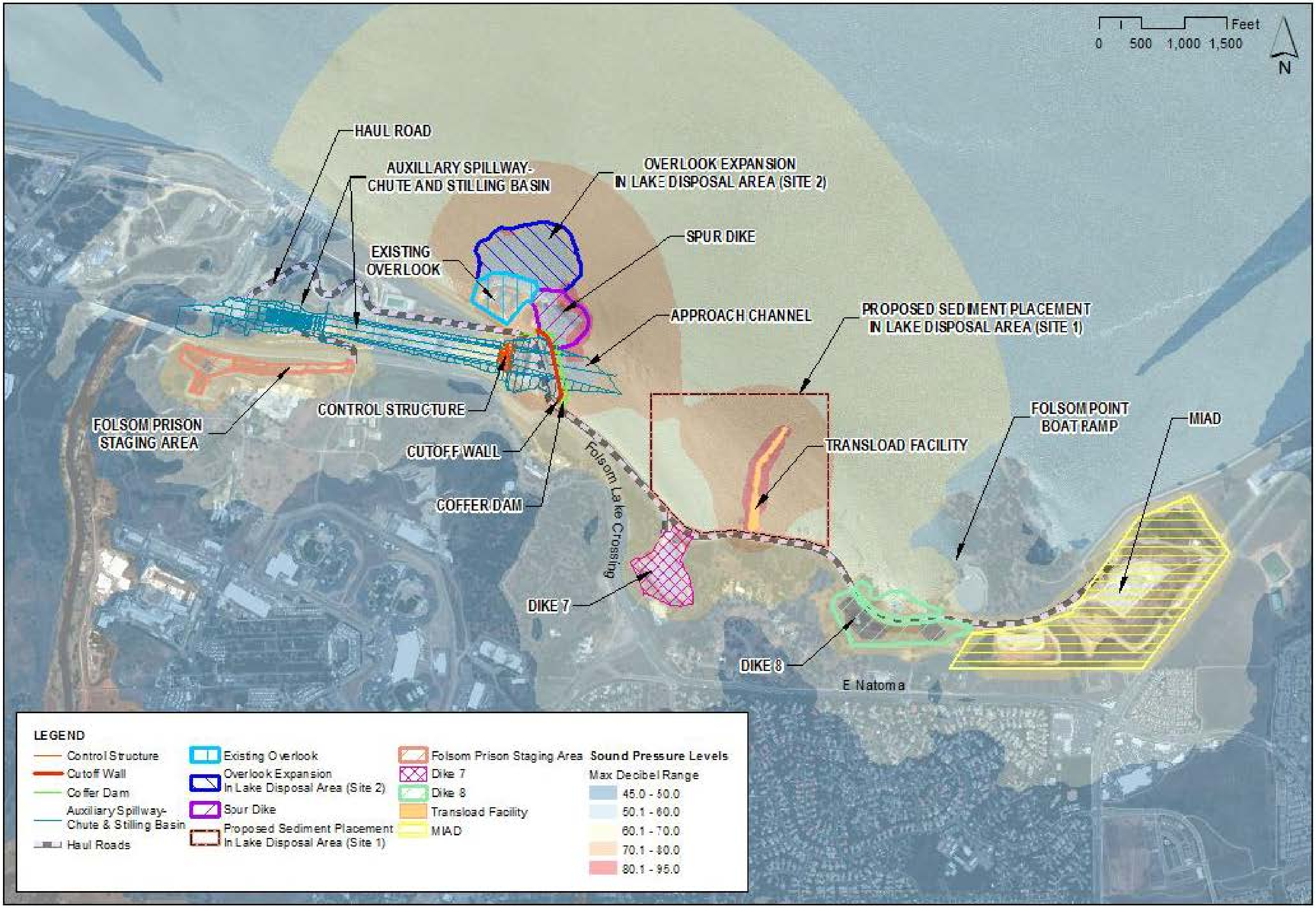

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Figure 19 - Alternative 2 - Noise Level Contours

Folsom Dam Modification Project, Approach Channel SEIS/ EIR Decmeber 2012

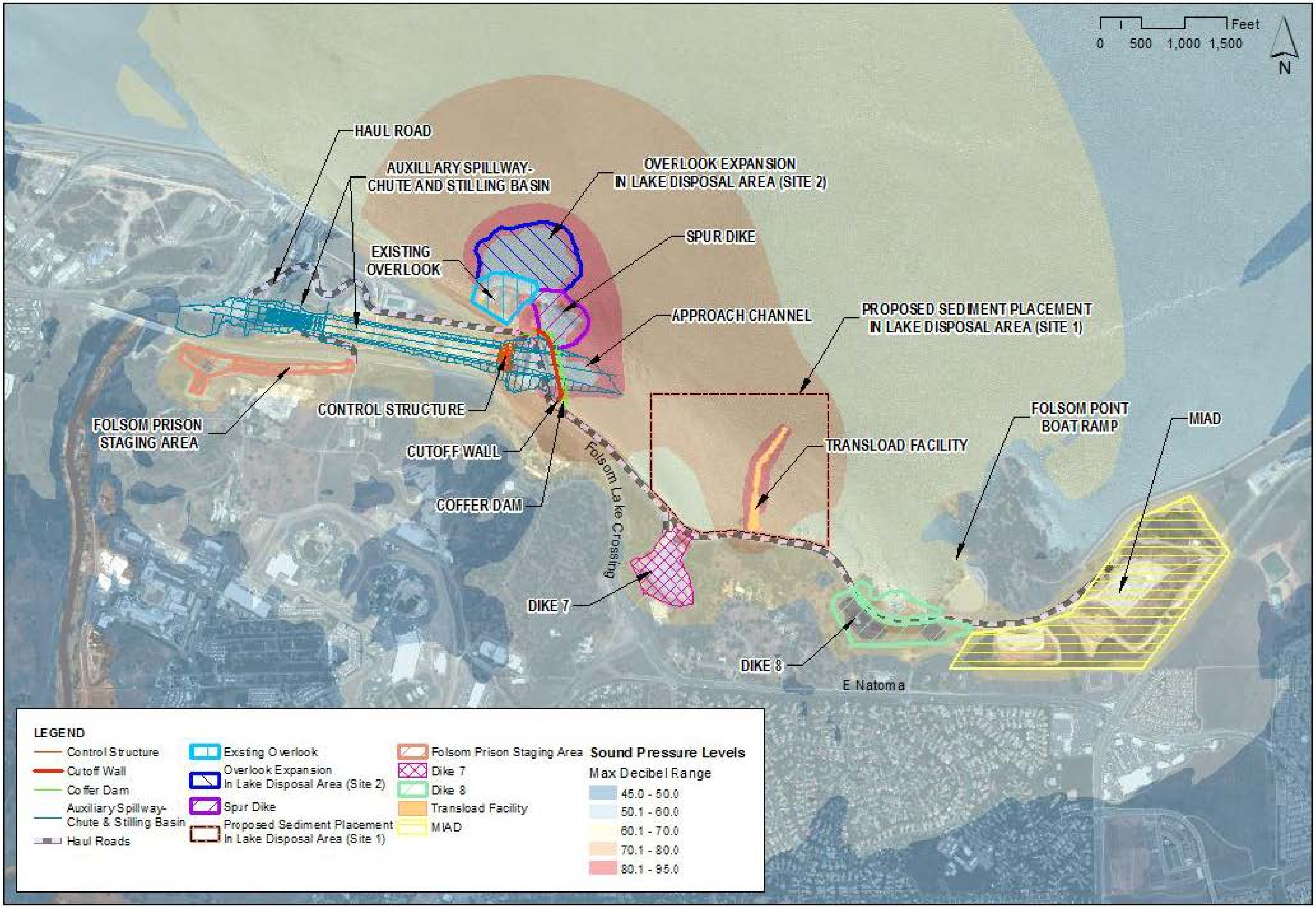

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Figure 20 - Alternative 3 - Noise Level Contours

Folsom Dam Modification Project, Approach Channel SEIS/EIR December 2012

4.9.6 Mitigation

The following measures would be implemented in order to reduce noise effects from general construction activities to less-than-significant. Any activity that would generate noise that could not be mitigated to less-than-significant would be conducted only during those hours when construction noise is exempt.

- Conduct the loudest construction activities during construction noise exempt hours, or as permitted by the City of Folsom. These activities include blasting, drilling, and dredging.
- Establish a noise monitoring program for construction activities that may exceed noise thresholds outside of construction noise exempt hours in order to maintain compliance with exterior noise standards and permits. See Appendix G for monitoring program guidelines.
- Maintain a standard 24 hour hotline for noise complaints.
- Contractor would be responsible for maintaining equipment in best possible working condition.
- Each piece of construction equipment would be fitted with efficient, well-maintained mufflers.
- Schedule truck loading, unloading, and hauling operations during exempt construction hours as much as practical.
- Locate construction equipment as far as possible from nearby noise-sensitive receptors. In particular, locating the batch plant at the Folsom Overlook staging area would reduce noise effects on sensitive receptors during non-exempt hours.
- Situate construction equipment so that natural berms or aggregate stockpiles are located in between the equipment and noise-sensitive receptors.
- Enclose pumps that are not submerged and enclose above-ground conveyor systems in acoustically treated enclosures.
- Line or cover hoppers, conveyor transfer points, storage bins and chutes with sound-deadening material.
- Acoustically attenuating shielding (barriers) and shrouds would be used when possible.
- Use blast mats to cover blasts in order to minimize the possibility of fly rock.
- For construction activities being conducted outside of construction noise exempt hours, the Contractor would obtain a permit from all nearby cities and counties in the vicinity of the project and maintain compliance with established limits.
- For drilling activities in the water, the use of down-the-hole-hammers are recommended, which produce much less noise than top-hammer drills from the striking bar.

4.10 CULTURAL RESOURCES

This section presents and compares potential adverse effects to cultural resources as compared to the existing condition discussed in Section 3.11.2. Adverse effects could result from the implementation of the three alternatives described in Chapter 2. Potentially adverse effects are discussed with respect to changes in the characteristics and integrity of historic properties within the APE for the preferred alternative.

Cultural resources could be adversely affected by construction activities and physical alterations to buildings, structures, and objects that may be historic properties. The changes to the visual environment caused by the temporary and permanent construction activities could result in adverse effects to cultural resources if visual character is an important criterion that makes a cultural resource a historic property.

4.10.1 Methodology

Analysis of the impacts was based on evaluation of the changes to the existing historic properties that would result from implementation of the project. In making a determination of the effects to historic properties, consideration was given to:

- Specific changes in the characteristics of historic properties in the APE.
- The temporary or permanent nature of changes to the historic properties and the visual APE around the historic properties.
- The existing integrity considerations of historic properties in the APE and how the integrity was related to the specific criterion that makes a historic property eligible for listing in the NRHP.

4.10.2 Basis of Significance

Any adverse effects on cultural resources that are listed or eligible for listing in the NRHP are considered to be significant. Effects are considered to be adverse if they:

- Alter, directly or indirectly, any of the characteristics of a cultural resource that qualify that resource for the NRHP so that the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association is diminished.

In California, effects to a historic resource or unique archaeological resource are considered to be adverse if they

- Materially impair the significance of a historical or archaeological resource.

4.10.3 Alternative 1 - No Action

Under the no action alternative, the Corps would not participate in the excavation of the approach channel and, therefore, would not cause any additional effects to cultural resources. The conditions in the project area would remain consistent with current conditions. The haul road, areas around Dikes 7 and 8, MIAD disposal site, and the area around Folsom Dam would remain highly disturbed. The spur dike, approach channel, transload facility, and sediment placement locations within the reservoir would not be used as previously described. There would be no indirect effects to cultural resources under Alternative 1.

4.10.4 Alternative 2 - Cutoff Wall

Folsom Dam, which includes the right and left wing dams, has been found individually eligible for listing in the NRHP due to its role in flood control, hydropower, and irrigation in the Sacramento region and eligible as a contributing element to the larger CVP. Dikes 7 and 8 were found eligible for listing in the NRHP as integrated components of Folsom Dam and as important structural elements in the formation of Folsom Lake. Previous determinations of affect for activities relating to the Dam Safety and Flood Damage Reduction phases of the JFP have been made for USBR and Corps projects within the current project APE. Those determinations of affect have been that there would be no adverse effect to historic properties within the APE (Folsom Dam and Dikes 7 and 8).

The Corps has made the preliminary determination that construction of the cutoff wall would not result in an adverse effect to historic properties within the APE. Construction of the secant pile cutoff wall and removal of the rock plug would occur in existing solid rock or fill material placed since the construction of Folsom Dam. Excavation of the approach channel and construction of the spur dike, transload facility, and placement of sediment would occur within Folsom Lake. Some activities would require underwater excavation and in-the-wet construction. There are no known historic properties within the APE for the approach channel, spur dike, transload facility, and sediment placement site within Folsom Lake. Although an intensive archaeological survey of these areas could not be conducted due to the high lake level of the reservoir, there are not likely to be existing cultural resources in these areas. Photos of the construction of Folsom Dam show that the area adjacent to the dam and around the dikes was heavily disturbed by earthmoving activities. Additionally, the slope of the shoreline and hillside of this area is steep and would have likely precluded settlement. Equipment necessary for construction would use existing haul routes, borrow areas, and staging areas.

For those activities where excavation of material from within the reservoir would occur, where possible an archeological monitor will be present to examine the excavated material. If the reservoir lake level lowers and reveals previously unsurveyed areas within the APE that have been inundated in the past those areas will be surveyed for the presence of historic properties. If historic properties are discovered within the APE during these inventory efforts their eligibility for listing in the NRHP will have to be determined and an evaluation of effect made. If it is determined that a historic property will be adversely affected by the project a programmatic agreement or memorandum of agreement will be executed between the Corps and the SHPO in order to mitigate for adverse effects.

The historic properties and cultural resources in the APE are described in Section 3.1.2. CA-SAC-934H would be avoided by the proposed project. CA-SAC-358H may be affected by placement of disposal material within the reservoir but it has been determined to be likely destroyed and lacking sufficient integrity to make it eligible as a historic property.

The construction of the approach channel, spur dike, and transload facility would result in additional permanent flood risk management features associated with Folsom Dam and Dikes 7 and 8. Although Folsom Dam and Dikes 7 and 8 are historic properties and have made significant contributions to the broad patterns of our history, they would not be adversely affected by the proposed project. The proposed project would visually affect the landscape within the APE, but the landscape is not a characteristic with which Folsom Dam and Dikes 7 and 8 are eligible for listing in the NRHP.

The proposed project would not result in a change in the primary function of Folsom Dam and Dikes 7 and 8. The eligibility of Folsom Dam as a historic property that represents and functions as an important flood control, hydropower, and irrigation feature in the Sacramento region and as a contributing element to the larger CVP, would not be altered, resulting in no adverse affects to this historic property by the proposed project. The eligibility of Dikes 7 and 8 as historic properties that represent integrated components of Folsom Dam and as important structural elements in the formation of Folsom Lake would not be altered, resulting in no adverse affects to these historic properties by the proposed project, therefore the impacts would be less-than-significant. There would be no indirect effects to cultural resources under Alternative 2.

4.10.5 Alternative 3 – Cofferdam

Effects associated with Alternative 3 would be the same as Alternative 2 at the MIAD Disposal Area, Dike 7, spur dike, transload facility, sediment placement location, approach channel, and haul road. For potential adverse effects to historic properties, the Corps has made the preliminary determination that the construction of the cofferdam would be similar as those actions and affects described under Alternative 2 for the approach channel and spur dike. There are no known historic properties within the APE for the cofferdam within Folsom Lake. Although an intensive archaeological survey of these areas could not be conducted due to the high level of the reservoir, there are not likely to be existing cultural resources in this area. Photos of the construction of Folsom Dam show that the area adjacent to the dam and around the dikes was heavily disturbed by earthmoving activities. Additionally, the slope of the shoreline and hillside of this area is steep and would have likely precluded settlement.

The construction of the cofferdam would not result in additional potential adverse effects to Folsom Dam and Dikes 7 and 8, and therefore no significant effects would occur. The effects to these existing historic properties would be the same as described in Alternative 2. There would be no indirect effects to cultural resources under Alternative 3.

4.10.6 Mitigation

The Corps has made preliminary determinations of eligibility for all of the known historic properties within the APE and those potentially affected by the proposed project. For those areas where survey of historic properties may still be completed, if historic properties are discovered they will need to be recorded and evaluated for their eligibility for listing in the NRHP prior to approval of the EIS/EIR. Additionally, if consultation with potentially interested Native Americans results in the identification of potential historic properties within the APE, recordation and evaluation of effects to those properties would also need to be completed prior to approval of the EIS/EIR. Those determinations will be sent to the State Historic Preservation Officer (SHPO) for comment and concurrence. If the SHPO concurs with the Corps' preliminary determinations that construction of the proposed project would have no adverse effects on historic properties there would be no need for mitigation measures.

During inventory and evaluation efforts, if it is determined that a historic property may be adversely affected by the proposed project, a programmatic agreement or memorandum of agreement will be executed between the Corps and the SHPO in order to mitigate for adverse effects.

However, if archeological deposits are found during project activities, work would be stopped pursuant to 36 CFR 800.13(b), Discoveries without Prior Planning, to determine the significance of the find and, if necessary, complete appropriate discovery procedures.

4.11 TOPOGRAPHY AND SOILS

4.11.1 Methodology

This section evaluates whether construction of the project would result in potential adverse impacts related to the general topography and existing soil conditions. The evaluation and analysis of topography and soils are based, in part, on review of various soils maps and reports. The primary sources include available resources from the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), and some summaries of soil and topographical data (USBR 2007; Corps 2007). Both short-term and long-term program effects are analyzed to determine their significance under NEPA and CEQA.

4.11.2 Basis of Significance

Adverse affects on topography and soils were considered significant if implementation of an alternative would:

- Substantially change the elevation or surface relief of the area;
- Result in substantial soil erosion or the loss of topsoil.

4.11.3 Alternative 1 – No Action

Under Alternative 1, the Corps and the CVFPB would not participate in construction of the proposed alternatives. There would be no construction related effects involving direct ground-disturbing activities that could result in changes to topography and soils.

4.11.4 Alternative 2 – Cutoff Wall

Excavation of the approach channel would include permanently excavating the rock plug area, and would result in a permanent reduction of elevation of the shoreline. Approximately 700 linear feet of the rock plug would be removed which represents 0.18% of the total shoreline. The approach channel would be consistent with the land use on the southwest/downstream shoreline of the reservoir. The topographical change of the approach channel would be consistent with the functionality of the existing Folsom Dam.

The construction of the spur dike would change the topography of a small portion of the Folsom Lake area. The spur dike would be a permanent expansion of the Folsom Overlook area. The construction of the spur dike would alter approximately 1% of Folsom Reservoir's 75-miles of shoreline. The topography of the spur dike would be consistent with the surrounding shoreline of the Folsom Overlook area, and would not change the overall topography of the area

Construction of Alternative 2 would be conducted continuously over four years, to the extent feasible. These activities would result in substantial soil disturbance and the replacement of soils with concrete. Construction of the proposed project would temporarily expose disturbed areas to erosion caused by wind or early-season rainfall events. Soil types have a moderate to high erosion potential; because of the steep slopes within the project area, and the active excavation and grading of soil during construction activities, which could result in erosion. The construction contractors shall be required to prepare and implement a SWPPP and comply with the conditions of the NPDES general stormwater permit construction activity. Potential erosion during construction would be addressed through the implementation of BMPs. Further discussion of potential erosion concerns and the associated BMPs are addressed in Section 4.4, Water Quality.

There would be no indirect effects to topography and soils associated with Alternative 2. Discussion of the project area geology and seismicity are addressed in 3.1.1, Geology and Seismicity. The design and construction of the approach channel would comply with the regulatory standards of the Corps, USBR, and CVFPB and meet or exceed applicable design standards for static and dynamic stability, seismic-related ground failure including subsidence and landslides. As a result, less-than-significant effects are expected to topography and soils.

4.11.5 Alternative 3- Cofferdam

Under Alternative 3, the effects on topography and soils would be the same as described in Alternative 2. Alternative 3 also includes the construction of a cofferdam. Since topographical change resulting from the cofferdam would be short term and temporary, this effect would be less-than-significant. There would be no indirect effects to topography and soils associated with Alternative 2.

4.11.6 Mitigation

There would be no significant long-term effects on topography and soils, therefore, no mitigation would be required.

4.12 VEGETATION AND WILDLIFE

4.12.1 Methodology

The factors that are important for evaluating the context and intensity of impacts on vegetation and wildlife species include a qualitative assessment of whether the action would cause a substantial loss, degradation, or fragmentation of any sensitive natural vegetation communities or wildlife habitat or if it were to interfere with the movement of any resident or migratory wildlife species. The Corps and USFWS conducted field surveys in June and October 2012 to determine the existing conditions of vegetation and wildlife in the project area, and to evaluate the potential range of effects.

4.12.2 Basis of Significance

Effects on vegetation and wildlife would be considered significant if the alternative would result in any of the following:

- Substantial loss, degradation, or fragmentation of any natural communities or wildlife habitat.
- Substantial effects on a sensitive natural community, including Federally-protected wetlands and other waters of the U.S., as defined by Section 404 of the CWA.
- Substantial reduction in the quality or quantity of important habitat, or access to such habitat, for wildlife species.

4.12.3 Alternative 1 – No Action

Under Alternative 1, the Corps and the CVFPB would not participate in construction of the proposed alternatives. There would be no construction related effects to vegetation and wildlife, and conditions in the project area would remain consistent with those analyzed in Section 3.12.

4.12.4 Alternative 2 – Cutoff Wall

Vegetation

The majority of the project area is previously disturbed due to ongoing Folsom JFP construction. The previously undisturbed areas include the in-reservoir disposal site and Dike 8. The in-reservoir disposal site has no vegetation associated with it, and consists of open water habitat. Effects associated with the use of this disposal site, and proposed mitigation to reduce those effects, are discussed in Section 4.4, Water Quality. In addition, there would be temporary and permanent direct effects to open water habitat associated with the placement of fill in Folsom Reservoir to construct the spur dike, transload facility, and haul route embankment. Effects associated with the placement of fill in Folsom Reservoir are discussed in Section 4.4.

The Dike 8 disposal area consists of up to 15.8 acres of currently undisturbed habitat. Use of the Dike 8 disposal area would result in the permanent loss of ruderal herbaceous, oak savannah, transitional wetland, and open water/ reservoir shoreline fluctuation zone habitats on the north of the dike. A summary of the affected vegetation is shown in Table 56 below. The loss of vegetation habitat would be potentially significant, however, with the implementation of mitigation, this would be considered less-than-significant.

Table 56. Summary of Estimated Vegetation Effects at the Dike 8 Disposal Area.

Habitat Type	Effect	Acreage
Ruderal Herbaceous	Permanent	6.1
Oak Savannah	Permanent	4.2
Transitional Wetland	Permanent	2.5
Open Water/ Reservoir Shoreline Fluctuation Zone	Permanent	3.0
	Total	**15.8**

In addition to the habitat loss discussed above, there are up to 30 trees that have the potential to be removed. These trees are associated primarily with the oak savannah and transitional wetland habitat communities discussed above. Tree surveys were conducted by Corps and USFWS biologists on June 11, 2012, and October 2, 2012. The results of their survey are shown in Table 57. Tree data and map is located in Appendix I. In the project area there are 12 Valley Oaks and 2 Live Oaks at various sizes from less than 5 inches to 34 inches in diameter which have the potential to fall under the Sacramento County Oak Tree Ordinance. The Corps would coordinate with the County prior to removal of the oak trees.

Wildlife

Species utilizing the project area should be accustomed to the noise and activity of the area, due to the long-term nature of the Folsom JFP. The construction of the approach channel, transload facility, and spur dike would not increase disturbance to the area's wildlife species beyond current operations, with the exception of the increase of in-water work associated with the approach channel excavation, which has the potential to affect aquatic species. Potential affects to fish and other aquatic wildlife are discussed in Section 3.5, Fisheries.

The proposed Dike 8 disposal site is a previously undisturbed area. Use of this area has the potential to affect a variety of wildlife species, including duck species and any amphibian species that use the transitional wetland habitat in the northern reach of the Dike 8 area. It is anticipated that most of the terrestrial species using the area would temporarily relocate due to increased disturbance and activity in the area.

In order to preemptively avoid direct effects to amphibian and wetland species, materials would be placed during low water levels. In addition, the culvert under the haul route that allows the flooding of the Dike 8 area would be closed during low water levels prior to use of the Dike 8 area. As a result, this area would not flood, and the seasonal habitat would not be created for these species during the construction period. Since the flooding of this area fluctuates with reservoir levels, and does not annually flood, this would be considered a less-than-significant direct impact on these wildlife species. However, since the loss of the transitional wetland habitat would likely be permanent, as discussed above, this long-term habitat loss would be considered a significant indirect effect to these species, as they would no longer be able to seasonally access this habitat. As a result, mitigation for the permanent loss of transitional wetland habitat would be required. To mitigate for the 2.5 acres of transitional wetlands associated with fill placement at Dike 8, the Corps would purchase 2.5 acres of seasonal wetlands at a Corps approved mitigation bank.

Table 57. Trees Potentially Affected at the Dike 8 Disposal Area.

Species	Number of Trees	Total Diameter at Breast Height (inches)
Cottonwood	5	173.5
Conifer, unknown[1]	1	18
Eucalyptus[1]	3	125.5
Live Oak	2	68
Valley Oak	12	286
Willow	6	145
Total		**783.5**

Notes: [1] non-native

Additionally, if the trees discussed above are removed, this has the potential to affect nesting birds and raptors using this habitat. To ensure that there would be no effect to migratory birds, preconstruction surveys would be conducted, if needed, in and around the project area. If any migratory birds are found, a protective buffer would be delineated, and USFWS and CDFG would be consulted for further actions. Recommendations proposed by the USFWS in their Fish and Wildlife Coordination Act Report are listed in Section 4.15.

4.12.5 Alternative 3 – Cofferdam

Effects associated with Alternative 3 would be consistent with Alternative 2 for the proposed use of the Dike 8 disposal site and its associated effects to terrestrial vegetation and wildlife species. There is the potential for additional effects to aquatic habitat and species due to the construction of the cofferdam in the wet. Effects to water quality and fish species associated with the cofferdam are discussed in Sections 4.4 and 4.5, respectively.

4.12.6 Mitigation

Mitigation measures have been implemented since the start of the Folsom JFP construction in 2008. The mitigation measures listed below would continue to be implemented throughout the final phase, as committed to in the 2007 FEIS/EIR and ROD.

- To minimize dust impacts to wildlife, vegetation, and wetlands, unpaved access roads would be frequently watered with raw water using a sprayer truck during periods when trucks and other construction vehicles are using the roads, except during periods when precipitation has dampened the soil enough to inhibit dust. The speed limit on unpaved roads would be limited to avoid visible dust.
- Prior to bringing in equipment from other sites, contractors would clean all mud, soil, and plant/animal material from the equipment. This would help prevent the importation of plants that are exotic or invasive.
- The contractor would avoid impacts to native trees, shrubs, and aquatic vegetation to the greatest extent possible and that construction is implemented in a manner that minimizes disturbance of such areas to the extent feasible. Temporary fencing would be used during construction to prevent disturbance of native trees that are located adjacent to construction areas but can be avoided. The contractor would coordinate with Corps Biologist prior to beginning work.
- A Revegetation Plan would be developed to address potential losses to all habitats impacted within the project footprint, and a mitigation and monitoring plan. The Revegetation Plan would be implemented immediately following construction in accordance with requirements in the SWPPP, Planning Aid Letter, and Mitigation, Monitoring, and Reporting Plan (MMRP).

In addition, mitigation for the permanent loss of habitat discussed above would be required. This mitigation would be conducted in accordance with the recommendations provided in the Coordination Act Report. The final Coordination Act Report is included in Appendix I. The final Coordination Act Report outlines the specific mitigation requirements for the removal of trees and loss of habitat.

- All disturbed areas outside the reservoir area would be reseeded with forbs and grasses at the completion of construction.
- Pre-construction surveys for active nests along proposed construction site, haul roads, staging areas, and disposal/stockpile sites would be performed by a qualified biologist. Work activity around active nests should be avoided until the young have fledged. The following protocol from the CDFG for Swainson's hawk would suffice for the pre-construction survey for raptors.

  Note: A focused survey for Swainson's hawk nests would be conducted by a qualified biologist during the nesting season (February 1 to August 31) to identify active nests within 0.25 miles of the project area. The survey would be conducted no less than 14 days and no more than 30 days prior to the beginning of construction. If nesting Swainson's hawks are found within 0.25 miles of the project area, no construction would occur during the active nesting season of February 1 to August 31, or until the young have fledged (as determined by a qualified biologist), unless otherwise negotiated with the California Department of Fish and Game. If work is begun and completed between September 1 and February 28, a survey is not required.

- Any native trees or shrubs removed outside of the Dike 8 disposal area with a diameter at breast height of 2 inches or greater should be replaced on-site, in-kind with container plantings so that the combined diameter of the container plantings is equal to the combined diameter of the trees removed. These replacement plantings should be monitored for 5 years or until they are determined by USFW to be established and self-sustaining.
- The Corps would compensate for the loss of the 30 trees at Dike 8 with a dbh of 2 inches or greater known to be lost by the project by planting 3,134 seedlings (live and valley oaks, cottonwoods) on a 13.34 acre site(s). Development of this site would be coordinated with the Service and CDFG. These plantings should be monitored for 5 years or until they are determined to be established and self-sustaining. The planting site(s) would be protected in perpetuity. The compensation was derived by totaling the dbh of the 30 impacted trees (783.5 inches) and multiplying it by 4 (assumes each seedling is ¼-inch in diameter) to get 3,134 trees. The area (13.34 ac) was based on planting densities used for oak woodland on other Corps projects that were 235 plants per acre.

- All revegetated or disturbed areas would be monitored annually by the Corps for invasive non-native plant species, particularly French broom and pampas grass, for five years following completion of construction, with the assistance of a qualified botanist. If invasive species are becoming established on areas disturbed by project activities during the five-year period, invasive species would be removed at times that preclude the plants from setting new seed.

- The Corps would compensate for the loss of three acres of open water/ reservoir shoreline fluctuation zone by assisting USBR with restoration at Mississippi Bar or purchasing credits at a mitigation bank.

- To mitigate for the 2.5 acres of transitional wetlands associated with fill placement at Dike 8, the Corps would purchase 2.5 acres of seasonal wetlands at a Corps approved mitigation bank.
- In the event that mitigation is not initiated within this two-year period, the mitigation ratios would increase by 0.5:1 if initiated within two to five years, and by 1:1 if mitigation is initiated more than five years after the permanent or temporary impacts occur

The Corps would coordinate with Reclamation and Sacramento Country on site restoration, as necessary. Any additional mitigation that could not be conducted on site would be accomplished by purchasing credits at a USFWS approved mitigation bank. A summary of the preliminary USFWS recommendations are included in Section 4.18.

4.13 SPECIAL STATUS SPECIES

4.13.1 Methodology

A list of Federally-listed and candidate species, and species of concern that may be affected by projects in USGS quads Clarksville and Folsom was obtained on June 13, 2012 via the USFWS website. In addition, a search of the California Natural Diversity Database (CNDDB) conducted on June 18, 2012 indicated that there were no reported occurrences of the Federal or State listed species in the project reach. The USFWS and CNDDB lists are included in Appendix J.

4.13.2 Basis of Significance

Adverse effects on special status species were considered significant if an alternative would result in any of the following:

- Direct or indirect reduction in the growth, survival, or reproductive success of species listed or proposed for listing as threatened or endangered under the Federal or State Endangered Species Acts.
- Direct mortality, long-term habitat loss, or lowered reproduction success of Federally- or State-listed threatened or endangered animal or plant species or candidates for Federal listing.

- Direct or indirect reduction in the growth, survival, or reproductive success of substantial populations of Federal species of concern, State-listed endangered or threatened species, species of special concern, or regionally important commercial or game species.
- Have an adverse effect on a species' designated critical habitat.

4.13.3 Alternative 1 – No Action

Under Alternative 1, the Corps and the CVFPB would not participate in construction of the proposed alternatives. There would be no construction related effects to special status species, and conditions in the project area would remain consistent with those analyzed in Section 3.12.

4.13.4 Alternative 2 – Cutoff Wall

Use of the proposed Dike 8 disposal area has the potential to directly impact VELB habitat. Additionally, it could result in direct and indirect impacts to white-tailed kites, if they are nesting in the area. These effects would be considered significant, unless mitigation is implemented.

<u>Valley Elderberry Longhorn Beetle</u>

As discussed in Section 3.13, three elderberry shrubs have begun to grow back along the left wing dam approximately 0.25 miles from the approach channel project area; however, these shrubs would not be affected by approach channel construction activities. There is the potential for the four elderberry shrubs at Dike 8 to be directly affected by use of the proposed disposal site. Stem counts and data on the four elderberry shrubs are included in Table 58 below. No exit holes were visible on the four shrubs. Elderberry shrub data and map is located in Appendix J.

Table 58. Proposed Dike 8 Disposal Area Elderberry Shrub Data.

Shrub No.	**Stem Size**	**Number of Stems**	**Location**	**Exit Holes**
1	5" +	1	Non-Riparian	No
2	1-3"	1	Non-Riparian	No
3	1-3"	1	Non-Riparian	No
4	5" +	1	Non-Riparian	No
	Total	**4**		

Use of the proposed Dike 8 disposal area would result in direct and indirect effects to the four elderberry shrubs. Direct effects would include removal or trimming of the shrubs. Indirect effects, if the shrubs are not removed, would include physical vibration and an increase in dust during disposal activities. These effects would be considered significant, unless the mitigation discussed below is implemented.

White-tailed Kite

Use of the proposed Dike 8 disposal area could potentially result in direct and indirect effects to the white-tailed kite if they begin nesting in the area. Construction activities in the vicinity of a nest have the potential to result in forced fledging or nest abandonment by adult kites. Therefore, if present, the white-tailed kite could be adversely affected by use of the disposal site.

Prior to use of the proposed Dike 8 disposal area, preconstruction surveys would be conducted to determine if there are nests present within 1,000 feet of the disposal area. If the survey determines that there are active nests in the project area, CDFG would be contacted to determine the proper course of action. If necessary, a buffer would be delineated and the nests would be monitored during construction activities. With coordination and mitigation, as discussed below, it is anticipated that effects to white-tailed kite would be less-than-significant.

4.13.5 Alternative 3 – Cofferdam

Effects associated with Alternative 3 would be consistent with Alternative 2 for the proposed use of the Dike 8 disposal site and its associated potential effects to VELB and white-tailed kites. If used, disposal activities at Dike 8 would have potentially adverse effects to these listed species. The mitigation discussed in Section 4.13.6 would be implemented under either alternative, if the disposal site is used, in order to reduce effects to these species to less-than-significant.

4.13.6 Mitigation

If the proposed Dike 8 disposal site would be used during project construction, consultation was initiated with USFWS and CDFG to assess the impacts discussed above and determine appropriate mitigation measures. The following mitigation measures was proposed by the Corps during consultation to reduce the potentially significant effects associated with the Dike 8 disposal area to less-than-significant.

Valley Elderberry Longhorn Beetle

The Corps would compensate for the loss of the four elderberry shrubs, if they are removed. The four elderberry shrubs would be transplanted to USFW approved location and monitored for 5 years. Compensation would also consist of planting elderberry shrubs and associated natives at an existing Corps mitigation site in the American River Parkway or purchasing credits at a USFWS approved mitigation bank. If the shrubs are not removed, and the proposed Dike 8 disposal area is used, the following measures taken from the USFWS

"Conservation Guidelines for the Valley Elderberry Longhorn Beetle," July 1999 would be incorporated into the project to minimize potential take of the VELB:

- A minimum setback of 100 feet from the dripline of all elderberry shrubs would be established, if possible. If the 100 foot minimum buffer zone is not possible, the next maximum distance allowable would be established. These areas would be fenced, flagged, and maintained during construction.
- Environmental awareness training would be conducted for all workers before they begin work. The training would include status, the need to avoid adversely affecting the elderberry shrub, avoidance areas and measures taken by the workers during construction, and contact information.
- Signs would be placed every 50 feet along the edge of the elderberry buffer zones. The signs would include: "This area is the habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be readable from a distance of 20 feet and would be maintained during construction.

Impacts to VELB would be less-than-significant with the implementation of the USFWS conservation guidelines for the beetle.

White-tailed Kite

The following mitigation measures would be implemented prior to use of the proposed Dike 8 disposal area to reduce potential adverse effects to white-tailed kites:

- A qualified biologist would survey the project area, and all areas within one-half mile of the project, prior to initiation of construction. If the survey determines that a nesting pair is present, the Corps would coordinate with CDFG and/or USFWS, and the proper avoidance and minimization measures would be implemented.
- If a nesting pair is present, a biological monitor would be on-site during construction activities to ensure, in coordination with CDFG, that white-tailed kites are not adversely affected by project construction.
- To avoid potential impacts to birds and raptor species, any trees that must be removed prior to use of the Dike 8 disposal area would be removed during the time period of August 15 to February 15. If trees must be removed outside of that timeframe, a qualified biologist must survey the area prior to tree removal to verify the presence or absence of nesting birds.

With the implementation of these mitigation measures, effects to white-tailed kites associated with the proposed use of the Dike 8 disposal area would be less-than-significant.

4.14 UNAVOIDABLE ADVERSE EFFECTS

The CEQA Guidelines (Section 15126.2[b]) states that any significant environmental effects which cannot be avoided if the project is implemented must be described. This description includes significant adverse effects which can be mitigated, but not reduced to a level of insignificance. No effects were identified that were significant and unavoidable where mitigation would not be sufficient to reduce the impacts to a less-than-significant level.

The environmental effects of the project alternatives on environmental resources are discussed in Section 4. The analysis indicates that one or more of the project alternatives could result in adverse effects on air quality, water quality, fisheries, and noise. Most of these adverse effects can be avoided by implementing appropriate mitigation measures, and all adverse effects can be mitigated to less-than-significant. Some temporary adverse effects which cannot be avoided even when mitigation measures are implemented will affect air quality, water quality, fisheries, and noise, but these adverse effects would be less-than-significant.

Air quality has potential to exceed the Federal Clean Air Act General Conformity Ruling for the length of the project. Air emissions will rise in the immediate project area, but NO_x would be mitigated to less-than-significant by utilizing lower emission producing equipment, and by following prescribed mitigation measures. In addition, air quality basin offsets will be created by providing payment to SMAQMD's required NO_X mitigation fee to reduce the NO_x levels to 85 pounds per day (SMAQMD's threshold of significance), and by inclusion in the State Implementation Plan.

Water quality has potential to cause temporary adverse effects in the immediate project area due to the increase in turbidity, but compliance with Federal and State thresholds will retain effects at a less-than-significant level. Some individual fish could incur sublethal or lethal effects in the immediate project area due to turbidity and underwater blasting, but with mitigation, effects to fish populations, habitat, and recreational fishing would be less-than-significant.

Noise will increase while project construction occurs, with potential to exceed noise thresholds particularly during non-exempt construction hours. With mitigation actions of acoustic shielding, construction activity selection, and equipment placement, noise effects are expected to be less-than-significant.

4.15 RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

In accordance with NEPA, this section discusses the relationship between local short-term uses of the human environment and maintenance of long-term productivity for the project. Construction of Alternatives 2 and 3 would involve short-term uses of air quality, water quality, recreation and traffic. The alternatives would narrow the range of beneficial uses of these resources during construction.

However, adverse effects on these resources would be limited to the construction phase of the project. No short-term uses of the environment are expected after the project is placed in operation. The air quality, water quality, recreation, traffic and noise levels would return to pre-project levels after construction is completed. In addition, operation of the approach channel as part of the JFP would increase the long-term productivity of the environment by helping to ensure public safety and protecting natural resources.

4.16 IRREVERSIBLE AND IRRETRIEVABLE ENVIRONMENTAL CHANGES

In accordance with NEPA regulations (40 CFR 1502.16) and the CEQA Guidelines (Statute 21083, 21100.1, and Sections 15126.2[c] and 15127[c]), this supplemental EIS/EIR discusses any significant irreversible and irretrievable environmental changes that would be caused by the proposed project, should it be implemented. Significant irreversible environmental changes are defined as uses of nonrenewable resources during the initial and continued phases of the alternatives that may be irreversible due to the large commitment of these resources.

Alternatives 2 and 3 would result in the irretrievable commitment of lands and alteration to the reservoir, in addition to construction materials, fossil fuels, and other energy resources needed to construct the approach channel, spur dike and transload facility. The lands needed to construct the approach channel and spur dike would experience an irreversible change in land use. The approach channel would be compatible with the other dam-related uses of the surrounding area.

Construction would require the increased use of materials and fossil fuels. The proposed permanent approach channel and spur dike would result in the irretrievable commitment of construction material and fossil fuels during the construction phase of the project.

4.17 COMPARATIVE EFFECTS OF THE ALTERNATIVES

Table 59 summarizes the effects of Alternatives 1 through 3 for all resource areas.

Table 59. Comparative Summary of Environmental Effects, Mitigation, and Levels of Significance.

	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 - Cofferdam
Geology and Minerals			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	Not applicable.	Not applicable.
Hydrology and Hydraulics			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	Not applicable.	Not applicable.
Public Utilities and Services			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	Not applicable.	Not applicable.
Land Use and Socioeconomics			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	Not applicable.	Not applicable.
Public Health and Safety			
Effect	No effect.	Public safety risk associated with construction site access and the operation of heavy construction equipment. Public safety risk associated with blasting.	Public safety risk associated with construction site access and the operation of heavy construction equipment. Public safety risk associated with blasting.
Significance	Not applicable.	Less-than-significant with mitigation.	Less-than-significant with mitigation.
Mitigation	Not applicable.	A prepared Public Safety Management Plan and Blasting Plan will include notifications to the public, safety measures and BMPs. The public will be excluded from construction and blasting affected zones.	A prepared Public Safety Management Plan and Blasting Plan will include notifications to the public, safety measures and BMPs. The public will be excluded from construction and blasting affected zones.
Hazardous, Toxic, and Radiological Wastes			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	Not applicable.	Not applicable.

	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 - Cofferdam
Air Quality			
Effect	No effect.	NO_x will exceed Federal Clean Air Act, GCR *de minimis* threshold. Project exceeds SMAQMD air quality basin thresholds. Higher emissions of 3 NO_x tons per year produced than in Alt. 3.	NO_x will exceed Federal Clean Air Act, GCR *de minimis* threshold. Project exceeds SMAQMD air quality basin thresholds. Lower emissions of 3 NO_x tons per year produced than in Alt. 2.
Significance	Not applicable.	Less-than-significant with mitigation and inclusion into State Implementation Plan.	Less-than-significant with mitigation and inclusion into State Implementation Plan.
Mitigation	Not applicable.	Compliance with SMAQMD mitigation. To meet CAA, project will be included in SIP. Higher tiered and electrical equipment will be used to lower emissions. State mitigation fee payments for excess NOx emissions.	Compliance with SMAQMD mitigation. To meet CAA, project will be included in SIP. Higher tiered and electrical equipment will be used to lower emissions. State mitigation fee payments for excess NOx emissions.
Climate Change			
Effect	No effect.	CO_2e emissions would occur during project construction.	CO_2e emissions would occur during project construction.
Significance	Not applicable.	Less-than-significant with mitigation.	Less-than-significant with mitigation.
Mitigation	Not applicable.	Compliance with SMAQMD mitigations and use of higher tiered and electrical equipment.	Compliance with SMAQMD mitigation and use of higher tiered and electrical equipment.
Water Quality and Jurisdictional Waters			
Effect	No effect.	Higher risk of turbidity exceeding CVRWQCB thresholds than in Alternative 3. Higher risk of mercury bioaccumulation potential, and chemical, gas and oil introduction into reservoir during excavation and blasting than Alt. 3. Permanent effects to 11.5 acres of waters of the United States, temporary effects to 88.5 acres of open water, and creation of 2.5 acres of new open water habitat through approach channel excavation.	Lower risk of turbidity exceeding CVRWQCB thresholds than in Alternative 2. Risk of mercury bioaccumulation potential, and chemical, gas and oil introduction into reservoir. Permanent effects to 11.5 acres of waters of the United States, temporary effects to 89.5 acres of open water, and creation of 2.5 acres of new open water habitat through approach channel excavation.
Significance	Not applicable.	Less-than-significant with mitigation	Less-than-significant with mitigation.
Mitigation	Not applicable.	Mitigations, BMPs, monitoring, and compliance with CVRWQCB thresholds specified in the Section 401 certification. To address loss of open water, 10 acres of riparian wetlands at Mississippi	Mitigations, BMPs, monitoring, and compliance with CVRWQCB thresholds specified in 401 certification, To address loss of open water, 10 acres of riparian wetlands at Mississippi Bar

	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 - Cofferdam
		Bar would be created. Credits would be purchased at a Corps mitigation bank if 2.5 acres of seasonal wetland is utilized for disposal at Dike 8.	would be created. Credits would be purchased at a Corps mitigation bank if 2.5 acres of seasonal wetland is utilized for disposal at Dike 8.
Fisheries			
Effect	No effect.	Higher risk of sublethal and lethal effects on individual fish from turbidity and blasting than in Alternative 3. Risk for effects from chemical, oil and gas habitat contamination. Potential of physical crushing.	Lower risk of sublethal and lethal effects on individual fish from turbidity and blasting than Alternative 2. Risk for effects from chemical, oil and gas habitat contamination. Potential of physical crushing.
Significance	Not applicable.	Less-than-significant with mitigation	Less-than-significant with mitigation
Mitigation	Not applicable.	Mitigations, blasting minimization measures, monitoring, BMPs, compliance with state water quality certification. Rainbow trout would be restocked in Folsom Reservoir for recreational fishing.	Mitigations, blasting minimization measures, monitoring, BMPs, compliance with state water quality certification. Rainbow trout would be restocked in Folsom Reservoir for recreational fishing.
Aesthetics and Visual Resources			
Effect	No effect.	Permanent modification of shoreline from approach channel and spur dike. Permanent change in landscape at proposed disposal areas.	Permanent modification of shoreline from approach channel and spur dike. Permanent change in landscape at proposed disposal areas. Temporary visual effect of cofferdam surrounding the approach channel area within Folsom Lake.
Significance	Not applicable.	Less-than-significant.	Less-than-significant.
Mitigation	Not applicable.	Disposal areas would be recontoured to maintain visual consistency and revegetated with native grasses.	Disposal areas would be recontoured to maintain visual consistency and revegetated with native grasses.
Recreation			
Effect	No effect.	Temporary closure of the lake from Dike 7 or 8 to Folsom Overlook. Temporary closure of the Folsom Lake Crossing bike trail during scheduled blasts.	Temporary closure of the lake from Dike 7 or 8 to Folsom Overlook. Temporary closure of the Folsom Lake Crossing bike trail during scheduled blasts.
Significance	Not applicable.	Less-than-significant.	Less-than-significant.

	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 - Cofferdam
Mitigation	Not applicable.	Public outreach would ensure awareness of all closures. The majority of the FLSRA would remain unaffected.	Public outreach would ensure awareness of all closures. The majority of the FLSRA would remain unaffected.
Traffic and Circulation			
Effect	No effect.	Increased traffic on public road ways. Temporary closure of Folsom Lake Crossing during blasting.	Increased traffic on public road ways. Temporary closure of Folsom Lake Crossing during blasting.
Significance	Not applicable.	Less-than-significant.	Less-than-significant.
Mitigation	Not applicable.	Public outreach would ensure awareness of road closures. Schedule blasting activities during off-peak traffic hours.	Public outreach would ensure awareness of road closures. Schedule blasting activities during off-peak traffic hours.
Noise			
Effect	No effect.	Construction activities during non-exempt (night) hours could violate the local noise ordinance, if construction equipment (batch plant, rock crushers) are operated simultaneously at impactful areas (Dike 7).	Construction activities during non-exempt (night) hours could violate the local noise ordinance, if semi-permanent construction equipment (batch plant, rock crushers) are operated simultaneously at impactful areas (Dike 7).
Significance	Not applicable.	Less-than-significant with mitigation.	Less-than-significant with mitigation.
Mitigation	Not applicable.	Avoid overlap of construction activities during non-exempt time periods. Compliance with City of Folsom permits. Maintain equipment in best working condition. Use acoustic shielding. Monitor noise during non-exempt periods and reduce as noise as needed.	Avoid overlap of construction activities during non-exempt time periods. Compliance with City of Folsom permits. Maintain equipment in best working condition. Use acoustic shielding. Monitor noise during non-exempt periods and reduce noise as needed.
Cultural Resources			
Effect	No effect.	No effect.	No effect.
Significance	Not applicable.	Not applicable.	Not applicable.
Mitigation	Not applicable.	If archeological deposits are found during construction, work would be discontinued pursuant to 36 CFR 800.13(b), Discoveries without Prior	If archeological deposits are found during construction, work would be discontinued pursuant to 36 CFR 800.13(b), Discoveries

	Alternative 1 – No Action	Alternative 2 – Cutoff Wall	Alternative 3 - Cofferdam
		Planning, to determine the significance and, if necessary, complete appropriate discovery procedures.	without Prior Planning, to determine the significance and, if necessary, complete appropriate discovery procedures.
Topography and Soils			
Effect	No effect.	Permanent change in the shoreline topography. Temporary disturbance to soils during construction.	Permanent change in the shoreline topography. Temporary change in topography due to the cofferdam. Temporary disturbance to soils during construction.
Significance	Not applicable.	Less-than-significant.	Less-than-significant.
Mitigation	Not applicable.	Not applicable.	Not applicable.
Vegetation and Wildlife			
Effect	No effect.	Potential permanent loss of 15.8 acres of habitat and up to 30 trees with use of Dike 8 disposal site.	Potential permanent loss of 15.8 acres of habitat and up to 30 trees with use of Dike 8 disposal site.
Significance	Not applicable.	Less-than-significant with mitigation	Less-than-significant with mitigation
Mitigation	Not applicable.	Recommendations proposed by USFWS. Site restoration, planting of trees, and mitigation bank credits.	Recommendations proposed by USFWS. Site restoration, planting of trees, and mitigation bank credits.
Special Status Species			
Effect	No effect.	Potential permanent loss of up to 4 elderberry shrubs at Dike 8; if present, disturbance to white-tailed kites.	Potential permanent loss of up to 4 elderberry shrubs at Dike 8; if present, disturbance to white-tailed kites.
Significance	Not applicable.	Less-than-significant with mitigation	Less-than-significant with mitigation
Mitigation	Not applicable.	Planting elderberry shrubs at an existing Corps mitigation site in the American River Parkway. Conduct surveys for kites and if necessary implement CDFG recommendations.	Planting elderberry shrubs at an existing Corps mitigation site in the American River Parkway. Conduct surveys for kites and if necessary implement CDFG recommendations.

4.18 U.S. FISH AND WILDLIFE SERVICE RECOMMENDATIONS

USFWS submitted a preliminary draft CAR for the Folsom Dam Modification Project, Approach Channel February 2012. The recommendations from that CAR are presented below and the Corps responses follow each recommendation. The preliminary draft CAR is included in Appendix I.

The USFWS recommends that the Corps:

- Avoid impacts to native trees, shrubs, and aquatic vegetation outside of the Dike 8 disposal area. Any native trees or shrubs removed with a diameter at breast height of 2 inches or greater should be replaced on-site, in-kind with container plantings so that the combined diameter of the container plantings is equal to the combined diameter of the trees removed. These replacement plantings should be monitored for 5 years or until they are determined to be established and self-sustaining. The planting site(s) should be protected in perpetuity.

  Corps response: Impacts to native vegetation would be minimized to the greatest extent possible. However, up to 30 trees may be removed from Dike 8. The Corps would mitigate the tree removal by planting in-kind, on-site or at a USFWS approved mitigation site. Plantings would be monitored for 5 years or until they are determined to be established and self-sustaining by the Corps and USFWS.

- Avoid future impacts to the site by ensuring all fill material used for the spur dike is free of contaminants.

  Corps response: The Corps would comply with CVRWQCB requirements in a 401 water quality certification for the project which would ensure contaminants are not added by fill material placement. No contaminants were identified in the HTRW assessment.

- Avoid impacts to migratory birds nesting along the access routes and adjacent to the proposed construction sites by conducting pre-construction surveys migratory bird active nests along proposed construction site, haul roads, staging areas, and disposal/stockpile sites. Work activity around active nests should be avoided until the young have fledged. The following protocol from the CDFG for Swainson's hawk would suffice for the pre-construction survey for raptors.

  A focused survey for Swainson's hawk nests will be conducted by a qualified biologist during the nesting season (February 1 to August 31) to identify active nests within 0.25 miles of the project area. The survey will be conducted no less than 14 days and no more than 30 days prior to the beginning of construction. If nesting Swainson's hawks are found within 0.25 miles of the project area, no construction will occur during the active nesting season of February 1 to August 31, or until the young have fledged (as determined by a qualified biologist), unless otherwise negotiated with the California

Department of Fish and Game. If work is begun and completed between September 1 and February 28, a survey is not required.

Corps response: The Corps would avoid adverse effects to nesting migratory birds, by complying with the Migratory Bird Act and USFWS recommendations below.

- Avoid introducing aquatic invasive species into the reservoir by requiring the contractor to develop and implement a Hazard Analysis and Critical Control Point Plan (HACCP) as described above. This plan should be provided to the resource agencies for review and approval prior to any in-water work.

  Corps response: The Corps would require the contractor to develop and implement the HACCP plan. This plan would be provided to the resource agencies for review and approval. In addition, coordination with CDFG will be conducted prior to in-water work to avoid introduction of invasive species.

- Avoid introduction of fuels/lubricants by requiring containment on barges and conducting land-based fueling operation in areas where spills cannot enter the reservoir (containment areas).

  Corps response: The Corps would require the contractor to comply with the Fuel and Oil BMPs listed in Section 4.5.6.

- Minimize impacts to sport fishery resources by implementing the BMPs discussed above for all in-water blasting.

  Corps response: The Corps would work with the contractor to implement the BMPs recommended by the Corps and requested by the USFWS.

- Minimize project impacts by reseeding all disturbed areas outside the reservoir area at the completion of construction with forbs and grasses.

  Corps response: All disturbed areas that would not be used after the project is completed for maintenance would be seeded with native grasses.

- Minimize potential for mobilizing contaminated sediments outside the immediate work area (sediment removal area and transload facility) by developing a dredging plan prior to construction which utilizes silt curtains or other means to prevent sediment from being released into the lake and potentially the lower American River.

  Corps response: The Corps would not require the use of silt curtains and other means specified in BMPs to prevent sediment release, but would require the contractor to comply with water quality thresholds with the CVRWCQB through a Section 401 Certification. A plan would be required of the contractor for use of the silt curtains and turbidity threshold compliances and associated monitoring.

- Compensate for the loss of the 30 trees with a dbh of 2 inches or greater known to be lost by the project by planting 3,134 seedlings (live and valley oaks, cottonwoods) on a 13.34 acre site(s). Development of this site should be coordinated with the Service and CDFG. These plantings should be monitored for 5 years or until they are determined to be established and self-sustaining. The planting site(s) should be protected in perpetuity.

  Note: The compensation identified in Recommendation #10 above was derived by totaling the dbh of the 30 impacted trees (783.5 inches) and multiplying it by 4 (assumes each seedling is ¼-inch in diameter) to get 3,134 trees. The area for plantings was based on information provided by the Corps on planting densities used for oak woodland (235/acre) on other projects.

  Corps response: The Corps would compensate for the loss of 30 trees removed at Dike 8 by planting in-kind, on-site or at a USFWS approved mitigation site. Plantings would be monitored for 5 years or until they are determined to be established and self-sustaining by the Corps and USFWS.

- Compensate for losses to fish resources by stocking Folsom Reservoir with rainbow trout, Chinook salmon, and warm water sport fish. The quantity of stocking should be developed by a work group comprised of the Corps and resources agencies.

  Corps response: The Corps would respond to requests for stocking in Folsom Reservoir. CDFG has specified restocking of 6,000 trout.

- Contact NOAA Fisheries for possible effects of the project on federally listed species under their jurisdiction.

  Corps response: The Corps has contacted NOAA Fisheries. NOAA fisheries has not provided a response.

- Contact the CDFG regarding possible effects of the project on State listed species.

  Corps response: The Corps has coordinated with CDFG and received comments regarding concerns with project effects that are addressed by BMPs and mitigation measures in Section 4.5.6. CDFG also recommended the purchase of hatchery-raised trout for release for recreational fishing as an additional mitigation measure. CDFG requests that the Corps submit a fish rescue plan for dewatering of the cofferdam and recommends the Corps to conduct surveys of harmed or dead fish floating on the water surface after blasting.

5.0 CUMULATIVE AND GROWTH-INDUCING EFFECTS

NEPA and CEQA require the consideration of cumulative effects of the proposed action, combined with the effects of other projects. NEPA defines a cumulative effect as an effect on the environment that results from the incremental effect of an action when combined with other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7). The CEQA Guidelines (CERES 2007) define cumulative effects as "two or more individual effects which, when considered together, compound or increase other environmental impacts" (Section 15355

5.1 METHODOLOGY

The cumulative effects analysis determines the combined effect of the proposed project and other closely related, reasonably foreseeable projects. Cumulative effects were evaluated by identifying projects in and around the Folsom Dam vicinity that could have significant, adverse, or beneficial effects. These potential effects are compared to the potential adverse and beneficial effects of the proposed alternative to determine the type, length, and magnitude of potential cumulative effects. Additional detailed information on cumulative effects on the approach channel project is included in the 2007 FEIS/EIR (USBR 2007a). Mitigation of significant cumulative effects could be accomplished by rescheduling actions of proposed projects and adopting different technologies to meet compliances. Significance of cumulative effects is determined by meeting Federal and State mandates and specified criteria identified in this document for affected resources.

5.2 GEOGRAPHIC SCOPE

The geographic area that could be affected by project effects varies depending on the type of environmental resource being considered. Air and water resources extend beyond the confines of the project footprint since effects on these mediums would not necessarily be confined to the project area. When the effects of the project are considered in combination with those of other past, present, and future projects to identify cumulative effects, the other projects that are considered may also vary depending on the type of environmental effects being assessed. The following are the general geographic areas associated with the different resources addressed in the analysis:

- Air Quality: the air basin under the jurisdiction of SMAQMD.
- Climate Change: the air basin under the jurisdiction of SMAQMD.
- Water Quality: Folsom Lake.
- Fisheries: Folsom Lake.
- Aesthetics and Visual Resources: the FLSRA and surrounding neighborhoods in the City of Folsom.
- Recreation: the FLSRA.

- Traffic and Circulation: the roadways in the project region where traffic generated by multiple projects would interact with the public on a cumulative basis.
- Noise: the area under the jurisdiction of the City of Folsom and Sacramento County.
- Cultural Resources: the APE, as described in Section 3.10, Cultural Resources.

5.3 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE PROJECTS

The projects with the potential to contribute to cumulative effects during construction and operation of the approach channel project are briefly described below. Each of these projects is, or has been, required by Federal, state, and/or local agencies to avoid, minimize, and/or mitigate any significant adverse effects on environmental resources to less-than-significant, when possible. Those effects that cannot be reduced to less-than-significant are likely to have a greater cumulative effect. Sequencing and timing of construction for the projects would also affect the cumulative effects.

5.3.1 Folsom Joint Federal Project Activities

Due to the fact that the JFP is a multi-phased, accelerated effort, overlapping construction efforts would occur adjacent and in the vicinity of the project area throughout the course of construction of the approach channel. The concurrent activities on site include both the various aspects of the approach channel work upstream of the control structure, as analyzed in this SEIS/EIR, as well as other phases of the JFP that would be constructed by both the Corps and USBR. The approach channel construction window would extend from August 2013 through October 2017. Other activities associated with the Folsom JFP are discussed below. A timeline illustrating the overlap of these projects with the various aspects of the approach channel project can be seen on Plate 4.

Control Structure, Chute, and Stilling Basin

Spring 2011 to Fall 2017. Phase III of the JFP consists of construction of the auxiliary spillway control structure. This effort is currently under construction by the Corps and completion is expected during fall 2014. Concrete lining of the spillway chute and stilling basin will be conducted by the Corps as the final phase of the JFP. These actions will be constructed from approximately summer 2013 to fall 2017. Construction of the control structure, and the concrete lining of the chute and stilling basin were addressed under the Corps' 2010 EA/EIR (Corps 2010).

Mormon Island Auxiliary Dam Modification Project

The MIAD modification project improvements include excavation and replacement of the foundation, and placement of an overlay with drains and filters, which would occur concurrently with the first year of approach channel excavation. USBR released the Draft EIS/EIR for the MIAD Modification Project in December 2009. Phase 1 of the project, which involves installation of the key block is nearing completion. Recently the project design for the overlay portion of the project has changed from a static overlay to a seismic overlay, which requires a larger volume of construction material, particularly imported material. A supplemental EA/IS is expected to be completed by August 2013 to assess the design change. An air quality assessment results will determine the needed schedule length to distribute annual air emissions over a longer time period in order to comply with the CCA. In addition, all four action alternatives in the Draft Supplemental EIS/EIR include habitat mitigation proposed for up to 80 acres at Mississippi Bar on the shore of Lake Natoma to address impacts from the JFP.

Folsom Dam Water Control Manual Update

The JFP project currently under construction, will improve the ability of Folsom Dam to manage large flood events by allowing releases earlier in a storm event. In order to fully realize the benefits of the JFP, the current Folsom Dam and Reservoir Water Control Manual (WCM) must be updated.

The WCM update will identify, evaluate and recommend changes to the flood management operation rules of Folsom Dam and Reservoir to reduce flood risk to the Sacramento area by utilizing the new auxiliary spillway and y incorporating an improved understanding of the American River Watershed upstream of Folsom Dam. The finding of the evaluation will be used to help define the Dam's new flood operations plan, with the intention of meeting flood risk management objectives and dam safety requirements in a manner that conserves as much water as possible and maximizes all authorized Folsom Dam project uses to the extent practicable.

The study will result in a Corps Engineering Report and will be followed by WCM implementing the recommendations of the study. The initial WCM will implement the recommendation of the study, but will focus on the increased capabilities the JFP provides Folsom Dam. Future improved abilities provided by the Dam Raise and additional Common Features project improvements will be documented in the subsequent WCM updates when these projects have been completed.

Folsom Dam Raise

This project includes raising the Folsom Dam, Mormon Island Auxiliary Dam and the auxiliary dikes around Folsom Reservoir by 3.5 feet; replacing the three emergency spillway gates; and three ecosystem restoration projects downstream including Bushy and Woodlake site restoration. The ecosystem restoration projects have been prioritized at different levels and separated, and two downstream restoration sites are to be completed in approximately 2016-2017.

5.3.2 Other Local Projects

<u>Johnny Cash Folsom Prison Blues (Folsom Lake) Trail: Historic Truss Bridge to Green Valley Road Segment</u>

This project is planned to provide approximately 2.5 miles of Class I bike trail from the Historic Truss Bridge to Green Valley Road. A majority of the trail alignment will be within the Folsom Prison property. The project is broken into three major segments consisting of:

- Phase 1 - Folsom Lake Crossing bike/pedestrian overcrossing to the Hancock Drive intersection (currently under construction).
- Phase 2 - Folsom Prison entry road to Rodeo Park (existing trail end).
- Phase 3 - Hancock Drive intersection to the Folsom Prison entry road.
- Phase 4 - Folsom Lake Crossing bike/pedestrian overcrossing to the El Dorado County line.

Incorporation of a separated grade crossing at the new Folsom Lake Crossing/East Natoma Street re-alignment was included within the new bridge crossing construction. Construction would begin in 2012 with continued work expected through the earlier years of the approach channel project.

Widening of Green Valley Road

Green Valley Road runs between both the City of Folsom and El Dorado County. Both agencies have proposed projects to widen Green Valley Road from two to four lanes. The El Dorado County Green Valley Road widening project from the county line to Francisco Drive was constructed prior to 2009, with environmental mitigation to be completed from 2009 to 2012 (El Dorado County 2010). The City of Folsom plans to widen Green Valley Road; however, the ongoing construction of the Bureau's MIAD Modification project limits their ability to conduct the road widening project. There is currently no environmental compliance documentation and no construction schedule for the project within the City of Folsom. The project could take four years to construct.

El Dorado 50 – HOV lanes

California Department of Transportation will construct bus-carpool (HOV) lanes in the eastbound and westbound directions by widening U.S. Highway 50 from approximately El Dorado Hills Boulevard to just west of Greenstone Road. The project will ultimately extend the current HOV lane system to provide approximately 23 continuous miles of eastbound and westbound HOV lanes between Sacramento and El Dorado counties. The project also includes bridge modifications, lighting improvements and new asphalt overlay. The project will be constructed in three phases: Phase 1extend the current HOV lanes from west of El Dorado Hills Boulevard to west of Bass Lake Road. Phase 2 will extend the lanes from west of Bass Lake Road to approximately Ponderosa Road. Construction is currently targeted to begin in Summer 2013 with completion in Fall 2015. Phase 3, currently on hold pending determination of funding source, will extend the lanes from Ponderosa Road to Greenstone Road (Caltrans 2012).

Hazel Avenue Improvement Project.

Sacramento Department of Transportation completed Phase 1 of the Hazel Avenue Improvement Project. The primary portion of Phase 1 involved the widening of Hazel Avenue from four to six lanes over the American River Bridge from U.S. 50 to Curragh Downs Drive. Construction was completed in 2010. Phase 2 of the Hazel Avenue Projects includes widening Hazel Avenue from four to six lanes from Curragh Downs Drive to Madison Avenue. This phase will also include traffic signal modifications at Curragh Downs Drive, Winding Way, La Serena Drive, the fire station at Roediger Lane and a new signal at Phoenix Avenue. Construction of Phase 2 is currently targeted to begin in 2012 with completion in 2013.

5.4 CUMULATIVE EFFECTS

This section discusses the potential cumulative effects of the approach channel project when added to other past, present, and reasonably foreseeable future actions. If the project is not expected to contribute to a cumulative effect on a resource, that resource is not addressed; these resources include geology, topography, soils, minerals, hydrology, public utilities and services, socioeconomics, vegetation and wildlife, special status species, and HTRW. The 2007 Folsom Dam Safety and Flood Damage Reduction draft and final EIS/EIR addresses hydraulics and land use in detail. The other resources that could involve a cumulative effect are discussed in more detail below. Table 62 summarizes the effects and related mitigation measures.

5.4.1 Air Quality

The approach channel project's construction period (2012-2017) would overlap with other JFP construction activities, including the control structure, chute, and stilling basin projects (2010-2016). These other activities are referred to in this section as the "downstream project", and are considered to be a codependent project subject to evaluation for the General Conformity Rule by the USEPA.

Other concurrent projects listed above, with the exception of the downstream project and the Folsom Dam Raise, are considered discrete projects outside the consideration of the General Conformity Ruling for the approach channel project. Emission projections with the Folsom Dam Raise project, which may begin in 2017, were not considered here since the project is in early planning stages. When Folsom Dam Raise emission figures are determined, they may also require cumulative assessment with the approach channel and downstream project for the purpose of General Conformity determination.

Long-term emissions associated with the completion of the JFP would be analyzed as a part of the Folsom Dam Water Control Update. However, it is anticipated that any long-term emissions associated with operation of the auxiliary spillway would be well below State and Federal thresholds, and would not significantly contribute to the overall cumulative impacts.

Combined JFP (Upstream and Downstream Projects) Analysis

This section discusses the quantitative analysis of the cumulative short-term air quality effects of the approach channel project alternatives in combination with the other features of the JFP. Qualitative discussions of the cumulative effects of the approach channel project and the other projects identified in Section 5.3 are also included. Prior cumulative air quality effects assessed from the 2007 EIS/EIR did not specifically address the approach channel project and other regional projects. Air emission models, project elements, the NO_x *de minimis* threshold and resulting calculated emissions differed substantially between the 2007 EIS/EIR and the current Folsom Dam JFP project.

Sufficient construction activity information was available to perform a quantitative analysis of cumulative air quality effects, using the General Conformity *de minimis* thresholds, for the approach channel project and the downstream project. The methodology for emission estimates and assumed mitigation measures for the downstream project are detailed in Appendix A. Because these estimates are conducted for the USEPA rather than CEQA, emission calculations were estimated using OFFROAD2011 and EMFAC2007 models.

Table 60 summarizes total annual unmitigated emissions for ROG, NO_x, CO, SO_2, PM10, and PM2.5 for the project and the downstream project. Emissions in Table 60 are compared to the GCR *de minimis* thresholds for determination of impacts relative to compliance with the GCR. Based on Table 60, unmitigated NO_x and PM10 emissions would exceed their respective *de minimis* thresholds in all overlapping years (2013-2017) for Alternative 2. For Alternative 3, unmitigated NO_x and PM10 emissions would exceed their respective *de minimis* thresholds in all overlapping years except in 2016 for NO_x emissions. ROG CO, and PM2.5 unmitigated emissions would be below their respective *de minimis* thresholds in all overlapping years (2013-2017) for both alternatives.

Table 60. Combined JFP Cumulative Unmitigated Emission Summary for NEPA.

Activity	**Pollutant (tons/yr)**					
	ROG	**NO_x**	**CO**	**PM10**	**PM2.5**	**SO_2**
Alternative 2						
2013 Total	3	39	18	107	26	<1
2014 Total	3	33	17	189	77	<1
2015 Total	2	29	16	134	72	<1
2016 Total	4	49	25	192	74	<1
2017 Total	4	52	26	103	13	<1
General Conformity *de minimis* Levels	**25**	**25**	**100**	**100**	**100**	**N/A**
Alternative 3						
2013 Total	3	42	19	127	26	<1
2014 Total	3	30	15	157	73	<1
2015 Total	2	27	15	115	67	<1
2016 Total	2	22	13	188	70	<1
2017 Total	5	59	30	104	13	<1
General Conformity *de minimis* Levels	**25**	**25**	**100**	**100**	**100**	**N/A**

Note: For NEPA purposes, emission calculations are estimated using OFFROAD2011 and EMFAC2007 models. Emissions rates might not add up due to rounding.

Table 61 summarizes total annual mitigated emissions for ROG, NO_x, CO, SO_2, PM10, and PM2.5 for the project and the downstream project. Mitigation for the approach channel project is presented in Section 4.2.7. Mitigation measures for exhaust emissions at the downstream project were based on SMAQMD guidance for on-site off-road construction and on-site haul trucks (greater than 50 horsepower), including owned, leased, and subcontractor vehicles. Additional mitigation measures would include watering controls to reduce fugitive dust.

Based on Table 61, mitigated NO_x would exceed the *de minimis* thresholds in 2016 and 2017 for Alternative 2 and in 2017 for Alternative 3. Mitigated ROG, CO, PM10, and PM2.5 emissions would be below their respective *de minimis* thresholds in all overlapping years (2013-2017) for both alternatives. Therefore, the cumulative impact of the criteria pollutant emissions from the approach channel project and the downstream project would be less-than-significant for ROG, CO, SO_2, and PM2.5, less-than-significant with mitigation for PM10.

NO_x emissions associated with the combined JFP exceeds the GCR de minimis threshold. However, SMAQMD has evaluated the JFP’s exceedance and has prepared a conformity determination based on the estimated emissions discussed in this SEIS/EIR. The general conformity evaluation is included as Appendix B of this document. The evaluation determined that the current emissions estimated in the SIP were overestimated and as a result, the JFP emissions could be included as a part of CARB’s 2011 SIP amendment. As a result, the combined emissions associated with this project would be in compliance with the GCR and would be considered less-than-significant with mitigation.

Table 61. Combined JFP Cumulative Mitigated Emission Summary for NEPA.

Activity	Pollutant (tons/yr)					
	ROG	**NO_x**	**CO**	**PM10**	**PM2.5**	**SO2**
Alternative 2						
2013 Total	2	22	12	31	6	<1
2014 Total	2	24	15	24	4	<1
2015 Total	2	20	14	13	3	<1
2016 Total	2	28	19	24	4	<1
2017 Total	2	25	18	29	4	<1
General Conformity *de minimis* Levels	**25**	**25**	**100**	**100**	**100**	**N/A**
Alternative 3						
2013 Total	2	24	14	37	7	<1
2014 Total	2	24	15	19	4	<1
2015 Total	2	20	14	11	3	<1
2016 Total	2	17	12	24	4	<1
2017 Total	3	29	21	29	4	<1
General Conformity *de minimis* Levels	**25**	**25**	**100**	**100**	**100**	**N/A**

Note: For NEPA purposes, emission calculations are estimated using OFFROAD2011 and EMFAC2007 models. Emissions rates might not add up due to rounding.

Regional Cumulative Projects Analysis

Concurrent construction projects within and adjacent to Folsom Reservoir could have adverse cumulative air quality impacts, although these impacts would be temporary. Regional projects that could overlap with the Folsom JFP project include the Johnny Cash Folsom Prison Blues Trail (Historic Truss Bridge to Green Valley Road Segment projected for construction in year 2013 and unknown completion), the El Dorado 50 – HOV lanes (2013-2015), Hazel Avenue Improvement Project (2013) and the Mormon Island Auxiliary Dam Modification Project (years 2013-2014). The projected dates for widening of Green Valley Road are undetermined at this time. Each of these projects could temporarily overlap the Folsom Dam JFP project from one to two years and contribute to regional emissions.

It is expected that the primary impacts from these concurrent projects would result from construction activities. Construction of these projects would increase emissions of criteria pollutants, including ROG, NOx, CO, SO2, PM10, and PM2.5 emissions, from on-site construction activities, including transport of materials.

As defined by the Federal Clean air Act, the general conformity de minimis thresholds apply to the individual emissions from a project, but do not apply to the cumulative emissions from regional projects. With mitigation required by SMAQMD, individual construction projects would likely result in emission totals less than SMAQMD's CEQA significance threshold levels. However, if regional construction projects within the SMAQMD's are implemented concurrently, these combined construction activities could generate cumulative emissions above CEQA and general conformity thresholds. Since final emissions projections have not been finalized for these projects, exceedances are not known at this time.

The USBR has recently extended the MIAD Modification Project over a longer construction period in order to reduce annual emissions in order to comply with the SMAQMD thresholds. Though construction emissions would be mitigated below CEQA for the MIAD project, the cumulative emissions from these two projects (MIAD plus Folsom JFP project) could exceed the local air quality thresholds through years 2013 and 2014, and potentially, additional years as well. Additional regional project emissions within the boundaries of the SMAQMD could also contribute to exceedance of the emission thresholds.

However, incorporation of the Folsom JFP's emissions into the SIP by the SMAQMD, effectively accounts for the Folsom JFP's contribution to cumulative emissions, within the Sacramento Valley Air Basin. As a result, the Folsom JFP project would result in a less-than-significant contribution to cumulative air quality impacts.

5.4.2 Climate Change

It is unlikely that any single project by itself could have a significant impact on the environment with respect to GHGs. However, the cumulative effect of human activities has been clearly linked to quantifiable changes in the composition of the atmosphere, which, in turn, have been shown to be the main cause of global climate change (IPCC 2007). Therefore, the analysis of the environmental effects of GHG emissions is inherently a cumulative impact issue. While the emissions of one single project will not cause global climate change, GHG emissions from multiple projects throughout the world could result in a cumulative effect with respect to global climate change.

It is expected that the primary impacts from these concurrent projects would be due to construction activities. On an individual basis, these projects would mitigate emissions below the general reporting threshold. If these projects are implemented concurrently, the combined cumulative effects could be above reporting requirements for GHG emissions. If this was the case, concurrent construction projects within and adjacent to Folsom Dam could have adverse cumulative effects on climate change.

However, in order to reduce the significance of GHG emissions associated with this project, the Corps is implementing a number of mitigation and minimization measures, as discussed in Sections 4.2.6 and 4.3.6. By implementing the LACMTA Green Construction Policy, the Corps would reduce overall emissions associated with the Approach Channel project, and in doing so reduce the potential cumulative GHG emissions in the area. Additionally, the majority of the related projects in the area consist of flood risk management and dam safety seismic improvement actions. By implementing these actions, the Corps and USBR would be reducing potential future emissions associated with future flood emergency actions. As a result, the related projects could combine to reduce long-term potential GHG emissions in the Sacramento area. As a result, the overall cumulative GHG emissions from these concurrent project are considered to be less-than-significant.

5.4.3 Water Quality

Other concurrent projects were researched by the Corps, but they are not expected to contribute to water quality effects in Folsom Reservoir and as a result they are not considered significant. Folsom JFP construction would result in increased dam safety and flood risk mitigation. This long-term effect would be beneficial and therefore does not require mitigation. The Lower American River Common Features Project and Long-Term Reoperation of Folsom Dam and Reservoir have the potential to collectively increase the flood damage reduction in even greater amounts. These projects would culminate in long-term beneficial impacts for flood damage reduction and dam safety. None of these concurrent projects are expected to contribute to mercury bioaccumulation, and therefore cumulative impacts are not anticipated.

5.4.4 Fisheries

Cumulative effects are not expected for fisheries and as a result, not expected to be significant. Short-term land based activities of concurrent or cumulative projects would comply with federal and state water quality mandates to avoid contributions towards aquatic effects that could have an adverse effect on fisheries. Project compliance with Federal and State water quality regulations will ensure that effects are negligible or produce less-than-significant cumulative effects upon Folsom Reservoir fish. No effects are expected upon Federal or State species of concern or their habitat in conjunction with the Approach Channel project.

5.4.5 Aesthetics and Visual Resources

Excavation of the approach channel would overlap with construction of the control structure, concrete lining of the chute and stilling basin, and for only the first year of construction, the seismic improvements project at MIAD. Concurrent construction of the approach channel, spillway, and control structure will result in short-term cumulative effects on visual resources in the project area. Additional vegetation clearing, earth moving, construction equipment and stockpile from these projects could contribute to a larger temporary overall visual impact. The control structure will contrast with the existing shoreline, leading to a long-term permanent visual impact. However, cumulative effects are expected to be less-than-significant, because Folsom Lake's southern shoreline is of low visual quality and other large manmade features such as Folsom Dam are already well established in the landscape.

Improvements at MIAD, including excavation and replacement of the foundation, and placement of an overlay with drains and filters, would occur concurrently with the first year of approach channel excavation. Significant effects to the existing landscape at MIAD would be reduced by USBR with the creation of 80 acres of habitat mitigation at Mississippi Bar. The new overlay could use up to 775,000 cy of the excavated materials disposed at MIAD by the Corps under previous phases of the JFP, which would reduce the overall impact of the MIAD disposal area (USBR 2010). Therefore, the combination of the MIAD Improvement project and the approach channel excavation would reduce the overall visual cumulative effects associated with the MIAD disposal site.

5.4.6 Recreation

There is only one project considered in the cumulative analysis that would have the short-term potential to limit recreation at FLSRA, and three projects that have to potential to increase recreational access on a long-term basis.

The Corps completed construction of Folsom Lake Crossing in 2009, which has provided increased recreation opportunities due to the new bicycle and pedestrian lanes. Likewise, the Johnny Cash Folsom Prison Blues (Folsom Lake) Trail would increase bicycle and pedestrian access from the Historic Truss Bridge to Green Valley Road. The rough grading of the approach ramp was completed in October 2011. Construction of the bridge and trail is expected to begin in fall of 2012. Future construction of the bike trail has the potential to have a significant, long-term positive effect upon recreation and public access to the FLSRA.

The Mormon Island Auxiliary Dam Modification is currently being constructed and is scheduled to be completed in 2014; this project would produce short term impacts to recreation. The approach channel is scheduled to begin in summer 2013, therefore, the construction periods of these two projects would overlap by one and a half years. No construction is proposed on the waterside of MIAD so there would be no impacts to boating or aquatic activities. The Folsom-Brown's Ravine Trail atop MIAD and the parking lots at MIAD would be closed to the public during construction because of the potential public safety hazards at the construction site. Visitors would need to park at Brown's Ravine or find alternate parking areas. While these projects would have a cumulative effect on recreation, the MIAD Modification Project would only temporarily impact land-based activities, whereas the approach channel construction would impact water-based activities. Because the projects affect different recreation activities, and the MIAD Modification Project impacts would be temporary, it is not expected that visitation would be substantially reduced and with this order of magnitude, effects are not considered to be significant.

5.4.7 Traffic and Circulation

There are seven short-term projects that have the potential to effect traffic. The Hazel Avenue Improvement Project, widening of Green Valley Road, and the Folsom Bridge Project are completed projects that have benefited traffic volumes. There is the potential for future construction activities in the vicinity of the JFP to be constructed concurrently with the proposed action. It is anticipated that construction would be ongoing for the Control Structure, Chute, and Stilling Basin by the Corps' and the Mormon Island Auxiliary Dam Modification Project by

USBR. Caltrans has planned two Highway 50 improvement projects, the El Dorado 50 – HOV lanes, and Sacramento 50 Bus-Carpool Lane and Community Enhancements Project that have the potential to temporarily increase traffic levels along Highway 50.

Simultaneous construction of these projects would temporarily increase traffic levels from the transport of materials and the labor force's shift work. Deliveries of materials to the project site would range from two to three times a day. The addition of three truck trips along Highway 50 would not significantly add to congestion. Workers accessing the project area would do so during commute hours, whereas, Caltrans construction hours are during non-peak times. In acknowledgement, a growth factor of 2% per year consistent with previous studies was applied for future baseline projections on all study roadway segments in the traffic effects analysis to account for potential cumulative activities as well as ambient traffic growth in the area. Due to the staggered schedules, magnitude of vehicles involved and the short-term increase of traffic to existing roads, these projects are not expected to be cumulatively significant.

5.4.8 Noise

There is the potential for future construction activities in the vicinity of the JFP to be constructed concurrently with the proposed action. These projects are short-term projects that include the Mormon Island Auxiliary Dam Modification Project, Folsom Dam Raise, and the Johnny Cash Folsom Prison Blues Trail construction. No long-term effects are expected. In addition, it is anticipated that construction would be ongoing by the Corps' for the Control Structure, Chute, and Stilling Basin work associated with the JFP. Concurrent construction of these projects has the potential to temporarily increase noise levels in the surrounding areas.

Simultaneous construction of these projects would increase noise levels, from onsite construction and transport of materials. The worst case assumption indicates that simultaneous construction could potentially increase source noise emissions by 3 dBA. If these construction projects are implemented concurrently, the combined cumulative effects could be above significance thresholds. If this were the case, each project would need to mitigate individual noise effects which could decrease overall cumulative effects for less-than-significant effects.. However, without consideration of scheduling and sequence of activities, determination of whether concurrent construction projects within and adjacent to Folsom Lake could have significant cumulative noise effects is not possible. Construction involved with both the Folsom Dam JFP and the projects listed above are short-term and, therefore, there will be no long-term cumulative noise effects other than increases in noise levels during simultaneous construction activities.

5.4.9 Cultural Resources

None of the projects identified would result in a cumulative effect that would adversely or significantly affect cultural resources. The area around Folsom Lake is an established recreation and transportation corridor area and additional projects such as bike trails, widening of roads, HOV, and carpool lanes would not result in short-term or long-term adverse affects to any of the historic properties within the APE (Folsom Dam and Dikes 7 and 8) since the projects would not affect the characteristics that make those properties eligible for listing in the NRHP.

Construction of projects such as pipelines, office buildings, the ongoing Folsom Dam Safety and Flood Damage Reduction Projects, and the Folsom Dam Flood Management Operations Study also would not adversely affect the historic properties within the APE. As with the approach channel project, these projects would not affect the characteristics that make Folsom Dam and Dikes 7 and 8 eligible for listing in the NRHP.

5.4.10 Topography and Soils

There are two projects that have the potential to effect soils and topography. Both the Mormon Island Auxiliary Dam Modification and the Johnny Cash Folsom Prison Blues (Folsom Lake) Trail requires large volumes of soils to be moved. Mormon Island Auxiliary Dam Modification is currently being constructed and is scheduled to be completed in 2014. The first segment of the Folsom Lake Trail includes a bike/pedestrian overcrossing of the Folsom Lake Crossing Road and rough grading of the approach ramp has been completed. Although the construction of the projects would involve a substantial amount of soil moving activities, impacts associated with soil erosion and loss of topsoil would be mitigated. Upon completion of the projects, the general topography at the site would change from current conditions but would remain consistent with the areas land use. Cumulative effects associated with soil resources and topography would be less-than-significant.

5.4.11 Vegetation and Wildlife

In addition to the Folsom JFP approach channel excavation, the Mormon Island Auxiliary Dam Modification project has identified effects to vegetation and wildlife. To mitigate for their effects, USBR will create a mitigation site with associated riparian habitat at Mississippi Bar on Lake Natoma. Mitigation would also be created as a result of any vegetation and wildlife effects associated with the use of the proposed Dike 8 disposal area. Mitigation associated with riparian plantings on Lake Natoma or within the American River Parkway has the potential to increase the contiguous riparian corridor along the river and would increase habitat continuity. As a result, successful mitigation associated with both of these projects has the potential to increase overall habitat quality in the long-term. As a result, the cumulative effect of these two projects' habitat loss would be considered less-than-significant, with the implementation of the projects' proposed mitigation.

5.4.12 Special Status Species

In addition to the Folsom JFP approach channel excavation, prior to the onset of the MIAD Modification project USBR transplanted elderberry shrubs from their project footprint. To mitigate for the transplanting of these shrubs, USBR will include elderberry plantings in their Mississippi Bar mitigation site. VELB populations are highly affected by fragmented habitat, so by improving this site, USBR would also be improving the contiguous corridor for the VELB along the American River. Past Corps projects, including the Folsom Bridge Project, also included elderberry mitigation that added to this corridor. The four elderberry shrubs that could be removed with the use of the proposed Dike 8 disposal area are non-riparian and are disconnected from any contiguous habitat. If removed, mitigation conducted would include plantings, which would likely occur within the American River Parkway. As a result, the mitigation would benefit the species by adding habitat connectivity. As a result, the cumulative effect of these two projects' effects to elderberry shrubs would be considered less-than-significant, with the implementation of the projects' proposed mitigation.

Table 62. Summary of Potential Cumulative Effects and Mitigation

Resource	Significance	Effect	Mitigation
Air Quality	Less-than-significant with mitigation.	Project emissions of individual projects are included with the State Implementation Plan through air basin management by the SMAQMD.	Folsom JFP project emissions would be included in the SIP. SMAQMD mitigation will be implemented. State mitigation fees would be compensated. Use of higher tiered and electrical equipment .
Climate Change	Less-than-significant with mitigations	Emissions would exceed reporting threshold. No federal or state significance threshold established.	Compliance with SMAQMD recommended mitigation. Use of higher tiered and electrical equipment.
Water Quality	Less-than-significant with mitigation	Increased turbidity; risk for chemical, gas and oil introduction into reservoir.	Use of mitigation, and BMPs to achieve compliance with CVRWQCB certifications. Contaminants containment plan, and containment equipment on site
Fisheries	Less-than-significant with mitigation	Increased turbidity.	Use of mitigation, and BMPs to achieve compliance with CVRWQCB certifications. Contaminants containment plan, and containment equipment on site
Aesthetics and Visual Resources	Less-than-significant	Construction of concurrent projects would result in a permanent change to the visual landscape of the area.	The area is already highly disturbed due to flood control features in the area. Changes to the landscape would be consistent with the land use and visual character of the area.
Recreation	Less-than-significant	Construction of concurrent projects would include temporary closures to recreation areas.	Public outreach would be conducted to ensure that the boaters and hikers are aware of the closures.
Traffic and Circulation	Less-than-significant	Construction of concurrent projects would not significantly overlap truck	None required.

Resource	Significance	Effect	Mitigation
		traffic during peak hours.	
Noise	Less-than-significant with mitigation	Simultaneous construction could potentially increase source noise emissions by 3 dBA, and thus above significance thresholds.	Concurrent projects would each be responsible for mitigating their noise levels to below threshold levels. Additionally, each project would be required to comply with local jurisdictions' permitting requirements.
Cultural Resources	N/A	No Effect	None required.
Topography and Soils	Less-than-significant	Multiple projects with soil-moving activities.	None required.
Vegetation and Wildlife	Less-than-significant with mitigation	Multiple projects with associated permanent habitat loss.	Site restoration and habitat creation or credits purchased at a mitigation bank.
Special Status Species	Less-than-significant with mitigation	Multiple projects with removal of elderberry shrubs.	Transplanting and planting of new elderberry shrubs and associated natives to add connectivity to the American River corridor.

5.5 GROWTH-INDUCING EFFECTS

Section 15126.2 of the CEQA Guidelines requires an environmental document to:

> "*Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth*…" (CERES, 2007)

In general, an action would be considered growth inducing if it caused or contributed to economic or population growth. Growth-inducing effects would result in more economic or population growth than would have occurred otherwise from other factors. Thus, a growth-inducing action would promote or encourage growth beyond that which could be attributed to other factors known to have a significant relationship to economic or population growth.

Within the study area, growth and development are controlled by the local governments of the City of Folsom, and Sacramento, El Dorado, and Placer Counties. Consistent with California law, each of these local governments has adopted a general plan and each general plan provides an overall framework for growth and development within the jurisdiction of each local government. Local, regional, and national economic conditions also directly affect growth and development.

The alternatives currently considered for the approach channel excavation would not contribute directly to population or economic growth by constructing additional housing or by building new businesses. However, the overall JFP would generate additional economic benefits during construction and would contribute to greater flood risk management for the Sacramento area once complete. The potential for any growth-inducing effects associated with the overall JFP were analyzed under the 2007 FEIS/EIR (USBR 2007a)

The approach channel excavation is of a limited scope, and would not promote or contribute to any regional economic or population growth. Any future local growth would be required to remain consistent with the local general plans, as described above.

6.0 COMPLIANCE WITH APPLICABLE LAWS, POLICIES, AND PLANS

The status of the approach channel project's compliance with applicable Federal, State, and local environmental requirements is summarized below. Prior to initiation of construction, the project would be in compliance with all applicable laws, regulations, and Executive Orders.

6.1 FEDERAL LAWS, REGULATIONS, AND POLICIES

Clean Air Act of 1972, as amended (42 U.S.C. 7401, et seq.)

Full Compliance. Emissions estimates determined that the Approach Channel project operating concurrently with other JFP projects would be above the *de minimus* level. These emission reductions were incorporated into the project analysis. Even with implementation of mitigation measures identified in Section 4.2, emissions would not be reduced below the USEPA's general conformity *de minimis* threshold. Based upon preliminary analysis of air quality effects from the proposed action, it was evident that mitigated construction actions would result in exceeding SMAQMD standards for $NO_{x.}$ Compliance with the CAA was accomplished by inclusion in the State Implementation Plan and additional mitigation that implements a green construction policy requiring use of higher tiered construction equipment and electrified equipment where possible.

Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance, , October 5, 2009

Full Compliance. Executive Order 13514 requires federal agencies to set a 2020 GHG emissions reduction target within 90 days; increase energy efficiency; reduce fleet petroleum consumption; conserve water; reduce waste; support sustainable communities; and leverage federal purchasing power to promote environmentally-responsible products and technologies. The Corps is requiring lower emission (higher tiered) equipment for use in construction and electric batch plants and rock crushers

Clean Water Act of 1972, as amended (33 U.S.C. 1251, et seq.)

Full Compliance. The potential effects of the proposed project on water quality have been evaluated and are discussed in section 4.4. Prior to construction, the contractor will prepare and implement a Stormwater Pollution Protection Plan (SWPPP). The SWPPP will help identify the sources of sediment and other pollutants, and establish BMPs for storm water and non-storm water source control and pollutant control. Additionally, compliance with the CWA will be accomplished by obtaining certifications through the CVRWQCB and internally through the Corps. As part of the permits, contractors will be required to implement best management practices to avoid and minimize any adverse effects of construction on surface waters. The following National Pollutant Discharge Elimination System permits will be obtained:

1. Storm Water Permit: NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.
2. Industrial Storm Water Permit: NPDES General Permit for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities.
3. Limited Threat Discharge Permit: NPDES Permit for Limited Threat Discharges of Treated/Untreated Groundwater to Surface Water.

The CWA also requires that a permit be obtained from the USEPA and the Corps when discharge of dredged or fill material into wetlands and waters of the United States occurs. Section 404 of the CWA requires the USEPA and Corps to issue individual and general permits for these activities. The Corps does not permit itself but conducts an internal assessment to ensure that all requirements of Section 404 are met. A 404(b)(1) analysis has been completed and is included as Appendix D of this SEIS/EIR.

Endangered Species Act of 1973, as amended (16 U.S.C. 1531, et seq.)

Full Compliance. A list of threatened and endangered species that have potential to occur in the Folsom area was obtained from USFWS on June 13, 2012. Based on the analysis contained in this document, the Corps has determined that the project has the potential to affect Federally-listed threatened or endangered species if the proposed Dike 8 disposal site were used. If the proposed Dike 8 disposal site is selected for use, the Corps would initiate consultation with USFWS under Section 7(a) of the Endangered Species Act to assess the impacts to VELB and determine appropriate mitigation measures. USFWS consultation, or the decision to eliminate this proposed disposal site, would constitute full compliance with this law. There are no additional potential effects to Federally-listed species beyond the elderberry shrubs at Dike 8.

Executive Order 11988, Floodplain Management

Full Compliance. The objective of this Executive Order is the avoidance, to the extent possible, of long- and short-term adverse effects associated with the occupancy and modification of the base floodplain (1 in 100 annual event) and the avoidance of direct and indirect support of development in the base floodplain wherever there is a practicable alternative. The proposed project is a portion of the JFP, and it has been determined by the project partners and Congress that constructing the JFP is the only practicable way to reduce flood risk to the greater Sacramento area. The JFP, in combination with other area flood risk reduction projects, protects the existing urban population while providing residual risk information to the appropriate agencies making land use decisions in the area. Therefore, the proposed project does not contribute to increased development in the floodplain and is in compliance with the executive order.

Executive Order 11990, Protection of Wetlands

Full Compliance. This Executive Order directs Federal agencies, in carrying out their responsibilities, to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. There are 2.5 acres of transitional wetlands in the project area at Dike 8. If Dike 8 is used as a disposal area then the Corps would purchase 2.5 acres of seasonal wetlands at an approved bank to compensate for the loss of fish habitat function. Some wetlands are located within ¼ mile of the project area, on the landside of MIAD. These wetlands would not be directly impacted by any project activities. There is the potential for fugitive dust to affect the wetlands; however, dust suppression measures would be implemented throughout project construction. With the implementation of the dust suppression measures listed in Section 4.2, there would be no adverse effects to wetlands in the vicinity of the project area.

Executive Order 12989, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Full Compliance. This Executive Order states that Federal agencies are responsible for conducting their programs, policies, and activities that substantially affect human health of the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination under such programs, policies, and activities because of their race, color, or national origin. The proposed construction project is located on public lands and is not located near any minority or low income communities. The benefits of the JFP would extend to all areas of the greater Sacramento area; therefore it would not provide disproportionate benefits or effects to any minority or low income populations and is in compliance with this Executive Order.

Farmland Protection Policy Act (7 U.S.C. 4201, et seq.)

Full Compliance. There are no designated prime or unique farmlands within the project area; therefore there would be no adverse effects to farmland and the project is in compliance with this Act.

Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. 661, et seq.)

Full Compliance. Federal agencies undertaking water projects are required to fully consider recommendations made by the USFWS in the provided Coordination Act Report (CAR) or Planning Aid Letter associated with the project. USFWS and CDFG have participated in evaluating the proposed project, and USFWS has completed a final CAR which accompanies this document (Appendix I).

Magnuson-Stevens Fishery Conservation and Management Act (16. U.S.C. 1801)

Full Compliance. There is no essential fish habitat in the project area; therefore, the Corps has determined that the proposed action would have no effect on essential fish habitat. The project is in full compliance with this legislation.

Migratory Bird Treaty Act of 1936, as amended (16 U.S.C. 703, et seq.)

Full Compliance. The Migratory Bird Treaty Act implements various treaties and conventions between the United States, Canada, Japan, Mexico, and Russia, providing protection for migratory birds as defined in 16 U.S.C. 715j. The proposed action is located in an ongoing construction area, which has been active since 2008. There is potential nesting habitat located at the proposed Dike 8 disposal area. To ensure that the project does not affect migratory birds, preconstruction surveys would be conducted by a qualified biologist in areas adjacent to the project site. If breeding birds are found in the area, a protective buffer would be delineated and USFWS and CDFG would be consulted for further actions.

National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321, et seq.)

Full Compliance. NEPA applies to all Federal agencies and most of the activities they manage, regulate, or fund that affect the environment. This act requires full disclosure of the environmental effects, alternatives, potential mitigation, and environmental compliance procedures of proposed actions. NEPA requires the preparation of an appropriate document to ensure that Federal agencies accomplish the law's purposes. Full compliance will be achieved when the final EIS/EIR is filed with USEPA and the Corps issues a Record of Decision.

National Historic Preservation Act of 1966, as amended (16 U.S.C. 470)

Full Compliance. Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of a proposed undertaking on properties that have been determined to be eligible for, or included in, the National Register of Historic Places. The implementing regulations for Section 106 are 36 CFR § 800.

In a letter dated December 22, 2011, the Corps initiated consultation with the SHPO, informing the SHPO of the proposed project, and asked for comments on the determination of the APE and on the proposed efforts to identify historic properties within the APE. In a letter dated January 25, 2012, the SHPO did not object to Corps' determination of the APE and concluded that the Corps' efforts to identify historic properties were reasonable and sufficient.

Letters to potentially interested Native Americans were initially sent on October 13, 2011 to inquire if those individuals have knowledge of locations of archaeological sites, or areas of traditional cultural value or concern in or near the APE. Both the United Auburn Indian Community of the Auburn Rancheria (UAIC) and the Shingle Springs Band of Miwok Indians (SSB) contacted the Corps in reference to the proposed project. Corps staff met with representatives of the UAIC on December 6, 2011 to discuss the project and any concerns the UAIC had on the proposed project. The Corps provided information on the known historic properties and past surveys and determinations of affect to historic properties within the APE to both the UAIC and the SSB.

Follow up letters to potentially interested Native Americans were sent on December 22, 2011 requesting those individuals notify the Corps if they have any interest in the project. The UAIC responded in a letter dated January 12, 2012 that they did not have any further archaeological concerns for the project. The Corps met with representatives of the SSB on March 16, 2012. The SSB indicated they are interested in activities occurring within the project area and they requested a site visit. A site visit with SSB was conducted on July 19 2012. Follow up phone calls and emails to the SSB did not indicate that the SSB had any further questions or concerns about the project. No other responses from potentially interested Native Americans have been received. Correspondence related to Section 106 consultation is included in Appendix H.

The Corps has made preliminary determinations of affect for historic properties within the proposed project APE. The only historic properties identified were (1) Folsom Dam, including the right and left wing dams, which was found eligible for listing in the NRHP for its role in the history of flood control in the Sacramento region, and (2) Dikes 7 and 8, which were found eligible for listing in the NRHP for their role as integrated components of Folsom Dam and as an important structural element in the formation of Folsom Lake. The Corps has made a preliminary determination that the proposed project will not adversely affect these historic properties. Once the SHPO has concurred with the Corps' determination of effects, the project will be in compliance with Section 106.

Wild and Scenic Rivers Act (16 U.S.C. 1217, et seq.)

Full Compliance. This act was enacted to preserve selected rivers or sections of rivers in their free-flowing condition in order to protect the quality of river waters and to fulfill other national conservation purposes. The Lower American River, below Nimbus Dam, has been included in the Federal Wild and Scenic Rivers system since 1981. The proposed project is located above this reach of the American River, and, therefore, does not affect this portion of the river.

6.2 STATE OF CALIFORNIA LAWS, REGULATIONS, AND POLICIES

California Clean Air Act

Full Compliance. Section 4.2 of this document discusses the effects of the proposed project on the local and regional air quality. Emissions estimates determined that the Approach Channel project operating concurrently with other JFP projects would exceed existing local thresholds of the California Clean Air Act as administered by SMAQMD for NOx. However, inclusion of project emission within the SIP has addressed cumulative project concerns. It is anticipated that compliance with the California Clean Air Act would be reached with incorporated mitigations specified in section 4.2.

California Water Code

Full Compliance. The potential effects of the proposed project on water quality have been evaluated and are discussed in section 4.4. Compliance with the California Water Code will be accomplished by obtaining certifications through the CVRWQCB and completion of the Corps' 404(b)(1) analysis.

California Endangered Species Act

Full Compliance. This Act requires the non-Federal sponsor to consider the potential adverse affects of State-listed species. As a joint NEPA/CEQA document, this EIS/EIR has considered the potential effects to State-listed species and has determined that there is the potential for suitable habitat for State-listed species at Dike 8. If the Dike 8 disposal area is selected for use, biological surveys would be conducted and CDFG would be consulted for potential conservation measures, as needed. Completion of consultation with CDFG, if needed, would fulfill compliance with this law. If Dike 8 is not used, the project is in full compliance with CESA.

California Environmental Quality Act

Full Compliance. CEQA and the CEQA Guidelines require that state and local agencies identify the significant environmental impacts of their actions, including potential significant air quality and climate change impacts, and to avoid or mitigate those impacts, when feasible. The CEQA amendments of December 30, 2009, specifically require lead agencies to address GHG emissions in determining the significance of environmental effects caused by a project, and to consider feasible means to mitigate the significant effects of GHG emissions (California Natural Resources Agency 2012). The CVFPB, as the non-Federal sponsor, will undertake activities to ensure compliance with the requirements of this Act. CEQA requires the full disclosure of environmental effects, potential mitigation, and environmental compliance for the proposed project. This joint NEPA/CEQA document would fully comply with CEQA requirement. The CVFPB will consider certifying the final EIR, adopting its findings, adopting mitigation and monitoring plan, and approving design refinements.

Porter-Cologne Water Quality Control Act

Full Compliance. The potential effects of the proposed project on water quality have been evaluated and are discussed in section 4.4. This project expects to achieve full compliance with the Water Quality Control Act by achieving compliance with CVRWQCB certification mandates for Section 401.

7.0 PUBLIC INVOLVEMENT

This chapter describes the public involvement activities associated with the design and evaluation of the Folsom Dam Modifications Project, Approach Channel. These activities included agency meetings and coordination; a community outreach program with public workshops, notices, and media; and distribution of the draft documents for public review and comment.

7.1 AGENCY COORDINATION

The Corps has been coordinating with various agencies throughout the duration of the JFP effort to discuss the concerns and issues of these agencies regarding the project. The other agencies involved in the coordination include:

- U.S. Bureau of Reclamation
- Central Valley Flood Protection Board
- Sacramento Area Flood Control Agency
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- California Department of Fish and Game
- California Department of Water Resources
- California Air Resources Board
- Sacramento Metropolitan Air Quality Management District
- California Water Quality Control Board
- Central Valley Regional Water Quality Control Board
- California Department of Parks and Recreation
- City of Folsom
- United Auburn Indian Community of the Auburn Rancheria
- Shingle Springs Band of Miwok Indians

7.2 PUBLIC INTEREST

On October 20, 2011 the Corps and CVFPB staff held a public meeting to present the status of the approach channel project and obtain public input. The meeting was publicized in an NOI/NOP, the Sacramento Bee, and on the CVFPB’s website.

The purpose of the meeting was to continue the flow of information on the Folsom Dam Modification Project, Approach Channel, while gathering additional information and community comments from citizens who live, work, and commute near the project area. In attendance were agency partners from SAFCA, USBR, and CVFPB. Interested parties from SMAQMD, HDR, Northern California Power Agency, State Parks, El Dorado County, the City of Folsom, and two community members attended the meeting.

At the meeting, the Corps and CVFPB provided visual displays explaining the planning procedure, back ground information of Folsom Dam, project location, description of the control structure and approach channel, as well as, computer generated images. The Corps presented the history of the JFP, NEPA and CEQA, the current phase of the project, and scheduled completion dates. After the Corps presentation, one question was asked regarding changes to the operation of Folsom Dam once improvements are complete. The public was encouraged to submit written comments. No comments were received during the meeting.

A list of potentially interested Native Americans was obtained from the California Native American Heritage Commission in October 2011. Those individuals were contacted on multiple occasions regarding the public scoping meeting for the project and the overall proposed project. The Corps met with the United Auburn Indian Community of the Auburn Rancheria (UAIC) in December 2011 to discuss the project and the Tribe's interests and concerns. In a letter dated January 12, 2012, the UAIC concluded they did not have any archaeological concerns for the project beyond recommendations for the use of native plans and resources in potential mitigation banking activities. The Shingle Springs Band of Miwok Indians (SSB) requested information on the project and to meet with the Corps regarding the project. The Corps provided project information and background, as requested, and met with representatives of the SSB on March 16, 2012. The SSB indicated they are interested in activities occurring within the project area and they requested a site visit. A site visit with SSB was conducted on July 19 2012. Follow-up phone calls and emails to the SSB did not indicate that the SSB had any further questions or concerns about the project. No other responses from potentially interested Native Americans have been received. Correspondence related to Section 106 consultation is included in Appendix J.

7.3 COMMENTS ON THE NOI/NOP

The Notice of Intent (NOI) to prepare a draft EIS/EIR for the Folsom Modification Project, Approach Channel was published in the Federal Register on September 1, 2011. The Notice of Preparation (NOP) for a joint draft EIS/EIR for the project was also submitted to the Office of Planning and Research, State Clearinghouse, by the CVFPB on October 3, 2011 (Appendix K). No comments were received in response to the NOI.

Letters in response to the NOP were received from the CA Department of Parks and Recreation (State Parks), Sacramento Regional County Sanitation District (SRCSD), U.S. Coast Guard, FEMA, NOAA, and Sacramento Metropolitan Air Quality Management District (SMAQMD). State Parks and SRCSD have property and/or operations that could be directly affected by the project. State Parks manages recreation in the Folsom Lake area and expressed concerns to restricted recreational access, water quality, and public safety during construction. SRCSD operates two wastewater pipelines which cross under the American River and expressed concerns that potential changes to operations could impact their pipelines.

The other four agencies had specific comments related to the potential effects of the project. The U.S. Coast Guard stated the project is outside their jurisdiction and further coordination is no longer required. FEMA reviewed the actions needed to satisfy the requirements of the National Flood insurance Program related to floodplain management building requirements. NOAA requests that potential impacts to listed fish are address through an evaluation of any changes to dam operations, effects on flow and ramping in the American River, and identify potential effects upstream and downstream of the dam, and potential water quality effects. As a regulating agency, SMAQMD indicated the need to identify the amount and duration of construction related emissions and to determine if construction related emissions would cause a significant impact based on air quality criteria. In addition, SMAQMD indicated the need to analyze naturally occurring asbestos in the soils and identify sensitive receptors. SMAQMD also indicated the need to implement mitigation measures and BMPs to reduce emissions and to identify any operational emissions.

Comments received in response to the NOI/NOP are included in Appendix K.

7.4 PUBLIC REVIEW AND COMMENTS ON THE DRAFT EIS/EIR

A notice of availability (NOA) of the draft SEIS/EIR was published in the Federal Register and a Notice of completion was filed with the State Clearinghouse July 20, 2012. The 45-day public review period for the draft document began July 25 and ended September 10, 2012.

Two public workshops were held on August 23, 2012 by the Corps and the CVFPB at Folsom City Hall. The purpose of the meeting was to provide informational updates on the Folsom Dam Modification Project, Approach Channel and provide opportunity for comments on the draft SEIS. The SEIS /EIR presentation was conducted in a similar format as for the October 2011 meeting. A registered professional reporter certified in shorthand, recorded the proceedings. Public formal statements were solicited from the attendees. No formal comments were received during the meeting.

During the public review period, seven comment letters were received on the draft SEIS/EIR from Federal, State, and local agencies and one letter from a member of the public. Comments were received by letter, email, public workshop verbal comment transcription, and telephone. Comments addressed air quality, water quality, blasting, disposal of materials, erosion, wildlife and fisheries, recreational impacts and public safety, and site restoration.

All comments received during the public review period are addressed and incorporated into the final SEIS/EIR, as appropriate. The Response to Comments Appendix (Appendix L), contains copies of all written and email comments received on the draft SEIS/EIR and all verbal comments received at the August 23, 2012 workshop (in the form of the written transcripts of the meeting).

7.5 INTENDED USES OF THE SEIS/EIR

This SEIS/EIR is a public information document under both NEPA and CEQA. Its purpose is to inform public agency decision makers and the general public of the significant effects of the project. The document also identifies measures to avoid or minimize significant effects and describes reasonable alternatives to the project. The purpose or intent of an EIS/EIR is not to recommend either approval or disapproval of a project, but to disclose the potential effects of that project.

On the Federal level, after completion of the review process, the final SEIS/EIR will be submitted first to the District Engineer, who will issue a Record of Decision regarding the adequacy of the document and the desirability of going forward with the project as designed. If the District Engineer reaches a decision in favor of construction, the project would move directly to the construction phase. Congress has already authorized the project for construction.

On the State and local levels, the Central Valley Flood Protection Board, as the project's lead agency under CEQA, will consider staff recommendations and public comment and decide whether to certify the SEIS/EIR, adopt findings, adopt the mitigation and monitoring plan, and approve design refinements.

SAFCA and other local agencies may use the final SEIS/EIR when they consider permits or approvals that may be associated with the project. Coordination with agencies such as the SMAQMD will be necessary to obtain permits or approvals.

7.6 DOCUMENT RECIPIENTS

The following Federal, State, and local agencies and organizations would either receive a copy of the final EIS/EIR or a notification of document availability. Individuals who may be affected by the project or have expressed interest through the public involvement process would also be notified.

7.6.1 Elected Officials and Representatives

Governor of California
Honorable Edmund G. Brown, Jr.

United States Senate
Honorable Barbara Boxer
Honorable Dianne Feinstein

United States House of Representatives
Honorable Doris Matsui
Honorable Daniel E. Lundgren
Honorable Tom McClintock

California Senate
Honorable Ted Gaines
Honorable Darrell Steinberg
Honorable Doug LaMalfa
Honorable Lois Wolk

California State Assembly
Honorable Richard Pan
Honorable Alyson Huber
Honorable Beth Gaines
Honorable Roger Dickinson
Honorable Dan Logue

7.6.2 Government Departments and Agencies

U.S. Government Agencies

- U.S. Bureau of Reclamation
- Council on Environmental Quality
- U.S. Environmental Protection Agency
- Federal Emergency Management Agency
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- National Marine Fisheries Service
- Western Area Power Administration

State of California Agencies

- Senate Committee on Natural Resources
- Assembly Committee on Water, Parks, and Wildlife
- California Air Resources Board
- Central Valley Flood Protection Board
- Central Valley Regional Water Quality Control Board

- California Department of Conservation
- California Department of Corrections and Rehabilitation
- California Department of Fish and Game
- California Department of Parks and Recreation
- California Department of Transportation
- California Department of Water Resources
- Native American Heritage Commission
- State Office of Historic Preservation
- State Clearinghouse
- State Lands Commission
- State Water Resources Control Board
- Governor's Office of Emergency Services

Regional, County, and City Agencies

- Sacramento Area Flood Control Agency
- Sacramento County
- Placer County
- El Dorado County
- Sacramento Metropolitan Air Quality Management District
- City of Folsom

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Noise modeling and analysis (Ryan McMullan)

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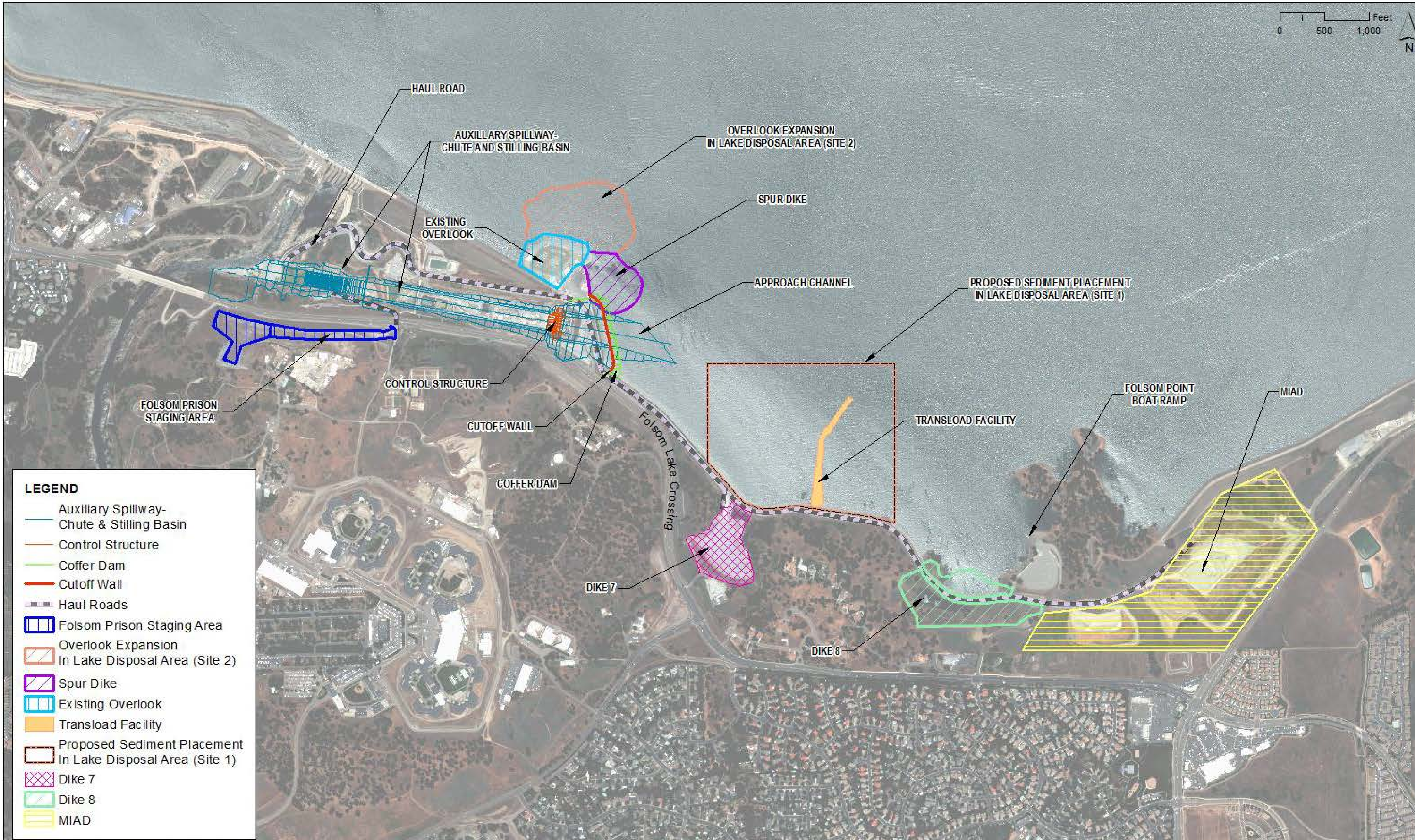
10.0 INDEX

PLATES



US Army Corps of Engineers
Sacramento District

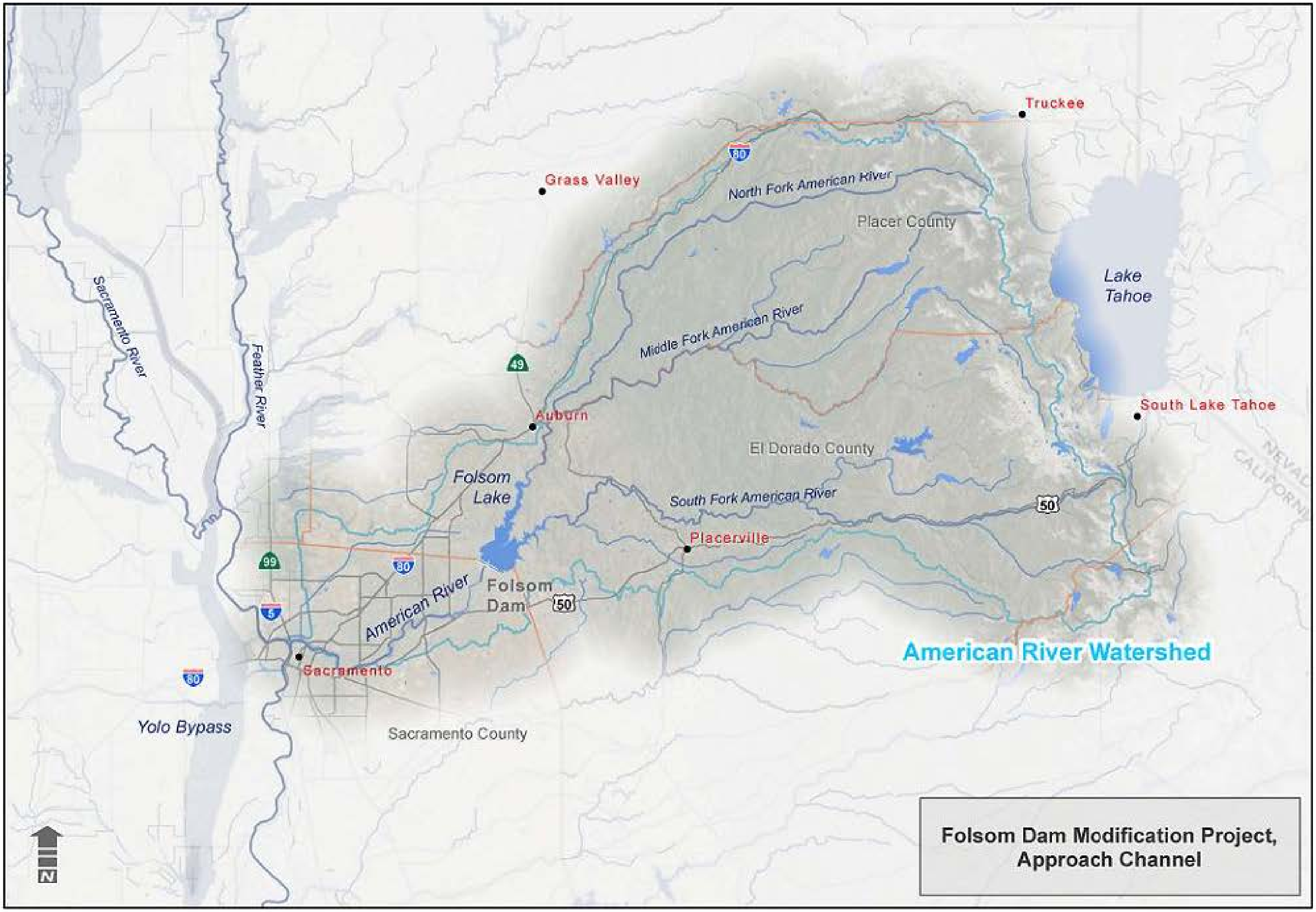
Plate 1 - Project Area Map

Folsom Dam Modification Project, Approach Channel SEIS/ EIR
December 2012

US Army Corps of Engineers
Sacramento District

Plate 2 - Future Project Rendering

Folsom Dam Modification Project,
Approach Channel SEIS/ EIR
December 2012



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Sacramento District

Plate 3 - American River Watershed Map

Folsom Dam Modification Project, Approach Channel SEIS/ EIR
December 2012

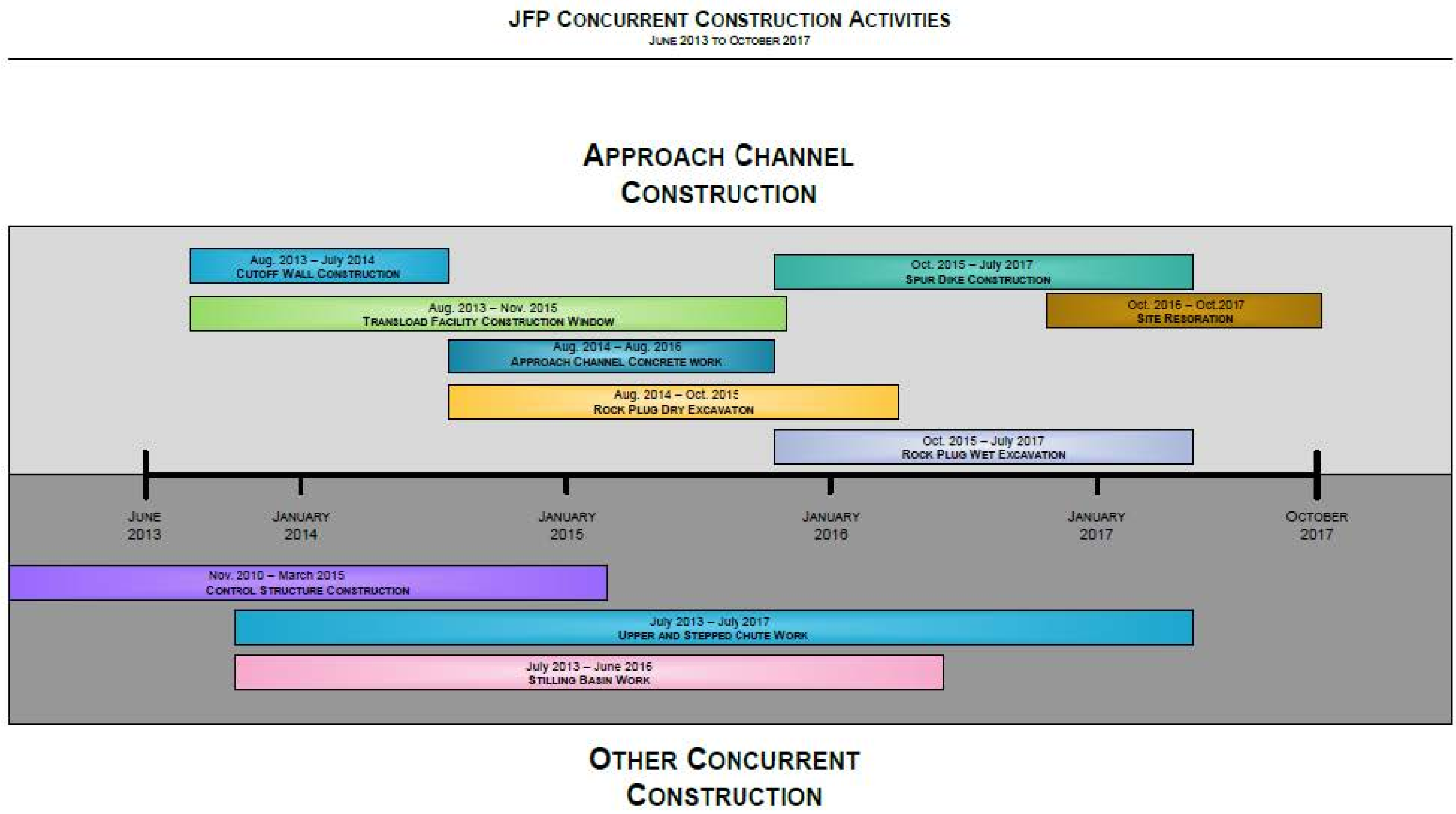

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Plate 4 - Timeline of JFP Construction Activities

Folsom Dam Modification Project,
Approach Channel SEIS/ EIR
December 2012

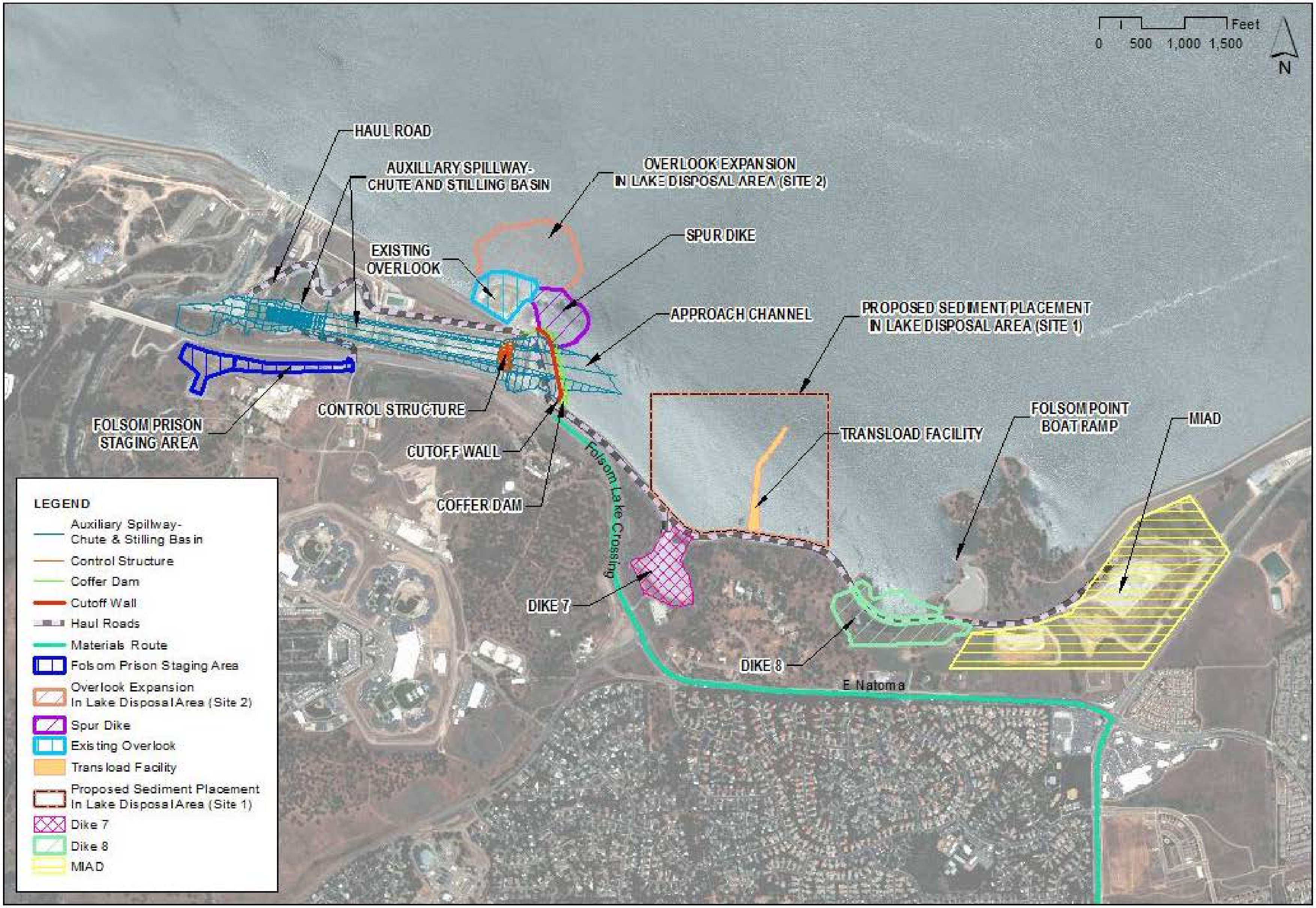

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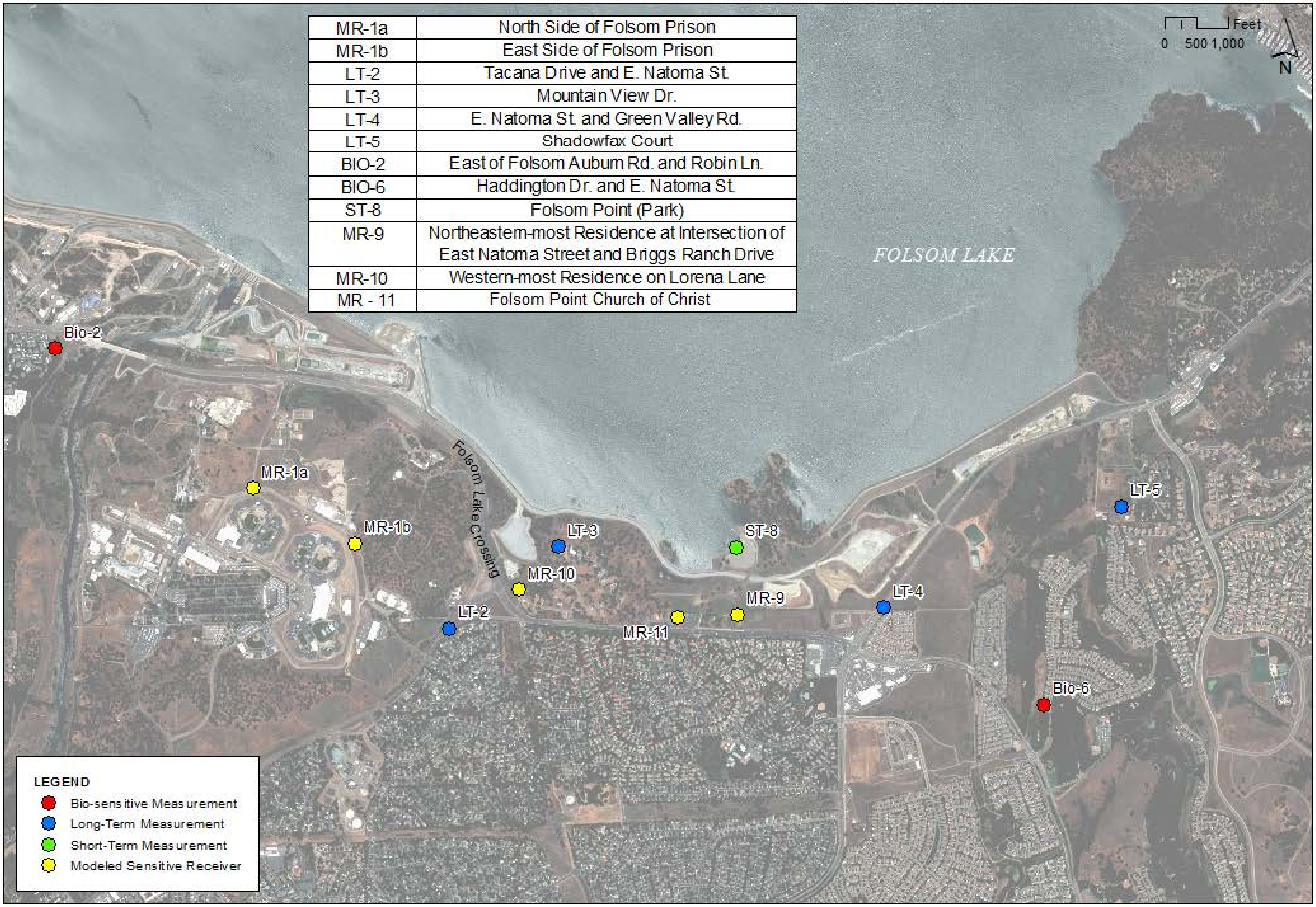
Plate 5 - Haul Routes & Staging Areas

**Folsom Dam Modification Project,
Approach Channel SEIS/ EIR
December 2012**



MR-1a	North Side of Folsom Prison
MR-1b	East Side of Folsom Prison
LT-2	Tacana Drive and E. Natoma St.
LT-3	Mountain View Dr.
LT-4	E. Natoma St. and Green Valley Rd.
LT-5	Shadowfax Court
BIO-2	East of Folsom Auburn Rd. and Robin Ln.
BIO-6	Haddington Dr. and E. Natoma St.
ST-8	Folsom Point (Park)
MR-9	Northeastern-most Residence at Intersection of East Natoma Street and Briggs Ranch Drive
MR-10	Western-most Residence on Lorena Lane
MR - 11	Folsom Point Church of Christ

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Plate 6 - Sensitive Noise Receptors

Folsom Dam Modification Project, Approach Channel SEIS/ EIR
December 2012