FOLSOM DAM RAISE PROJECT

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENAL IMPACT REPORT

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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 RAISE PROJECT:
DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT / ENVIRONMENTAL IMPACT REPORT

Type of Statement: Draft Supplemental Environmental Impact Statement/Environmental Impact Report (draft SEIS/EIR)

Lead NEPA Agency: U.S. Army Corps of Engineers, Sacramento District (Corps)

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

NEPA Cooperating Agencies: Sacramento Area Flood Control Agency (SAFCA); CVFPB

Summary: The Corps and its non-Federal partners, the CVFPB and SAFCA, propose to provide enhanced flood risk protection to the Sacramento Metropolitan Area by constructing the Folsom Dam Raise project. The project is located in Sacramento, Placer, and El Dorado Counties, California. Alternative 2 (Spillway Tainter Gate Modifications and Combined Earthen Raise/Concrete Floodwall) is the preferred alternative. This alternative would involve: (1) raising the effective crest elevations of Dikes 1 through 8 and the Mormon Island Auxiliary Dam (MIAD) by approximately 3.5 feet through the addition of earthen and rock materials to the top and upper sides of the dikes and MIAD; (2) raising the effective crest elevation of the Left Wing Dam and Right Wing Dam by building a concrete floodwall along the existing dam crests, and; (3) making refinements to the main dam's (Folsom Dam) spillway Tainter gates along with other structural modifications. This draft SEIS/EIR was prepared in accordance with the National Environmental Policy Act of 1969, as amended, and provides an evaluation of the potential effects on environmental resources that could occur if the proposed project (Alternative 2) is constructed, and those that could occur if the project is not constructed (Alternative 1, No Action). It also identifies measures to avoid, minimize, or compensate any potentially significant adverse impacts, where feasible.

Public Review: This revised draft SEIS/EIR on the Folsom Dam Raise project is being made available for public comment. Comments may be submitted by email or by standard mail to the contact listed below. To ensure comments will be considered, all comments must be received prior to the close of the 45-day public comment period that extends through July 31, 2017. A copy of this draft SEIS/EIR can be viewed by visiting the Corps' website at http://www.spk.usace.army.mil/Media/USACE-Project-Public-Notices/

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ERRATA SHEET
FOLSOM DAM RAISE PROJECT: DRAFT SEIS/EIR

This is the second draft of the Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR) for the Folsom Dam Raise project. A draft SEIS/EIR for the project was previously released for public review and comment in July of 2016. After the close of that original public comment period, it was determined a number of revisions to the SEIS/EIR were necessary to correct erroneous data and information, and to help clarify various aspects of the proposed project and its potential environmental effects. The revised draft SEIS/EIR is being released for a second public review period due to the changes made.

Before the decision was made to recirculate the draft document for a second public review period, it was being prepared as the final SEIS/EIR. The heading on certain pages of the current SEIS/EIR indicate that the document is the “Final SEIS”. Text within the document and/or in the title of appendices CD found at the end of the document may also indicate it is the final SEIS. Be advised that this current version of the SEIS/EIR for the Folsom Dam Raise project is really a draft SEIS/EIR.

EXECUTIVE SUMMARY

ES.1 PURPOSE OF THE SEIS/EIR

This Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR) for the Folsom Dam Raise project has been prepared by the U.S. Army Corps of Engineers (Corps), Sacramento District, as the Federal Lead Agency under the National Environmental Policy Act (NEPA) and the State of California Central Valley Flood Protection Board (CVFPB) as the State Lead Agency under the California Environmental Quality Act (CEQA), for the Folsom Dam Raise Project. The Folsom Dam Raise proposed action is a cooperative effort between the Corps, the U.S. Bureau of Reclamation (USBR), the Sacramento Area Flood Control Agency (SAFCA), and the CVFPB, through the California Department of Water Resources (DWR).

The Folsom Dam Raise project was reevaluated jointly with the Folsom Modification Project in the American River Watershed Project Post Authorization Change Report (PACR) for the American River Watershed Project dated March 2007. The PACR resulted in the recommendation of an auxiliary spillway at the Folsom Dam – to be constructed jointly with the USBR – known as the Folsom Joint Federal Project (JFP). In addition to the JFP, the PACR resulted in the authorization of the Folsom Dam Raise project, which includes a 3.5-foot combination earthen raise of the reservoir dikes and Mormon Island Auxiliary Dam (MIAD), a 3.5-foot raise of the Left Wing Dam (LWD) and Right Wing Dam (RWD) via installation of concrete floodwalls, and refinements to existing emergency and service spillway Tainter gates and related structural modifications at the main dam (Folsom Dam). The authorized Folsom Dam Raise project also includes three ecosystem restoration projects, but the design of this phase of these projects would begin after construction of the dam raise features and these projects are not evaluated in this SEIS/EIR.

After the authorization of emergency spillway gate work in the 2007 PACR, USBR completed structural improvements to the existing service and emergency Tainter gates, as well as the spillway piers in 2011. Due to these improvements, emergency gate refinements have been developed in lieu of complete gate replacement. These refinements resulted in the development of an Engineering Documentation Report (EDR) in 2013 to support a variation to the emergency spillway gate replacement concept. In addition, a series of Design Documentation Reports (DDRs) are being developed to determine the final designs for increasing the height of Folsom dikes and dams by 3.5 feet. It is anticipated the DDRs for all of the engineering designs would be completed by the end of 2019.

This SEIS/EIR examines the impacts of proposed construction of Alternative 2: Spillway Gate Modification (Tainter Gate) and Combination Earthen Raise/Concrete Floodwall (e.g. the proposed project; Tainter gate refinements, earthen raise elements, and concrete floodwall elements). The Dam Raise project was not fully designed in the 2007 PACR, nor was a full environmental analysis completed in the associated 2007 Folsom Dam Safety/Flood Damage Reduction EIS/EIR (2007 EIS/EIR). Consequently, additional design documentation was determined to be necessary and this Folsom Dam Raise SEIS/EIR is being prepared to fully disclose design refinements and their associated environmental effects.

ES.2 PROJECT AREA

The project is located in the area surrounding Folsom Lake that falls within portions of Placer, El Dorado, and Sacramento Counties. Folsom Dam and its associated facilities are located 23 miles northeast of the City of Sacramento. The Folsom Dam and Reservoir (Folsom Lake) are located downstream from the north and south forks of the American River. The study area is contained around the Folsom Facility which consists of four dams, the Main Concrete Dam (Folsom Dam or main dam), the Left Wing Dam (LWD), the Right Wing Dam (RWD), and the Mormon Island Auxiliary Dam (MIAD), as well as eight Dikes (Dikes 1 through 8). The new auxiliary spillway should be functional by late 2017.

In this document, the project area consists of the main dam (including its spillways), Dikes 1 through 8, MIAD, the LWD and RWD (which tie into the main dam), and associated haul routes and construction staging areas. The project area is shown in Figures ES-1 and ES-2.

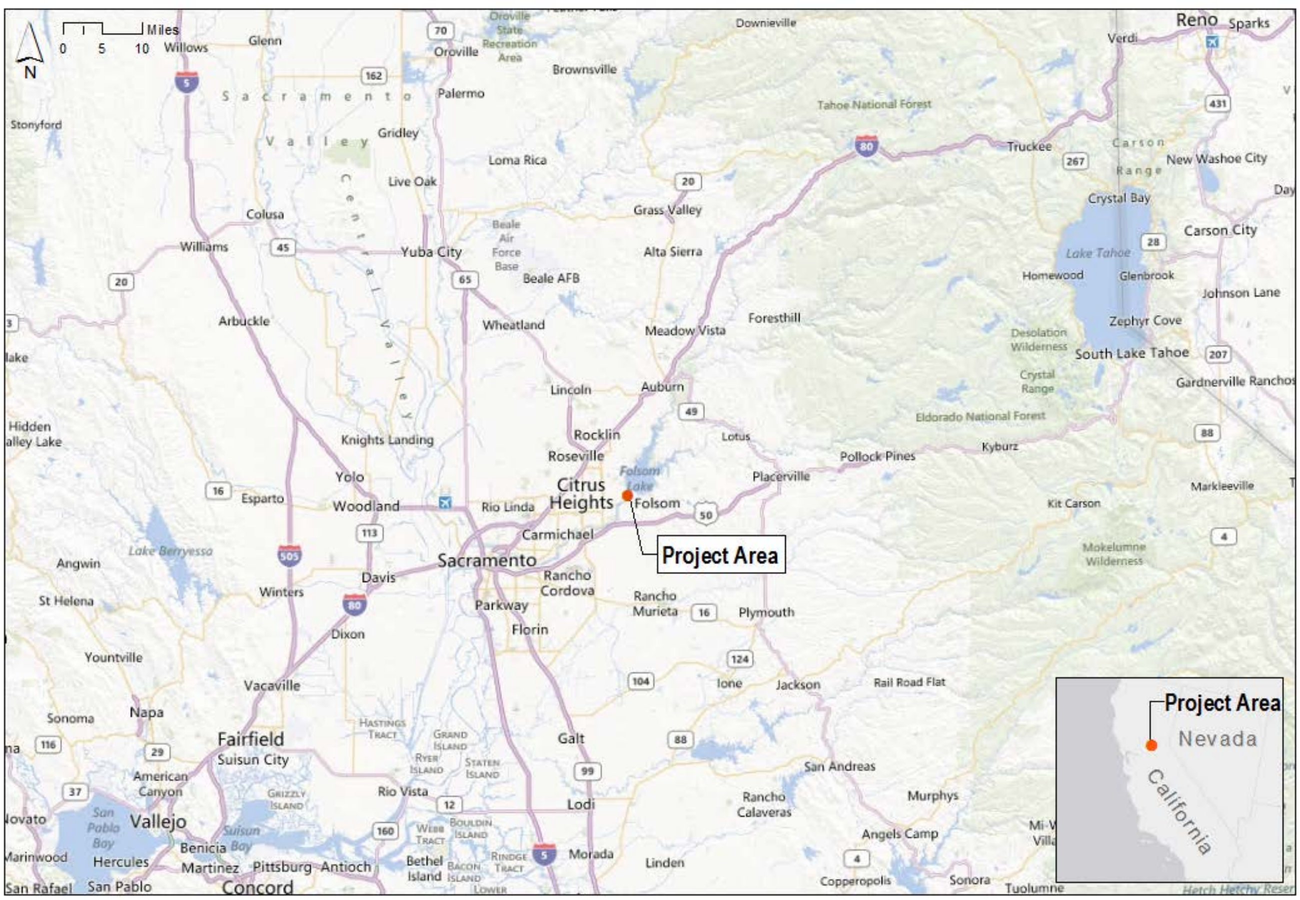

Figure ES-1 – Project Area Map.

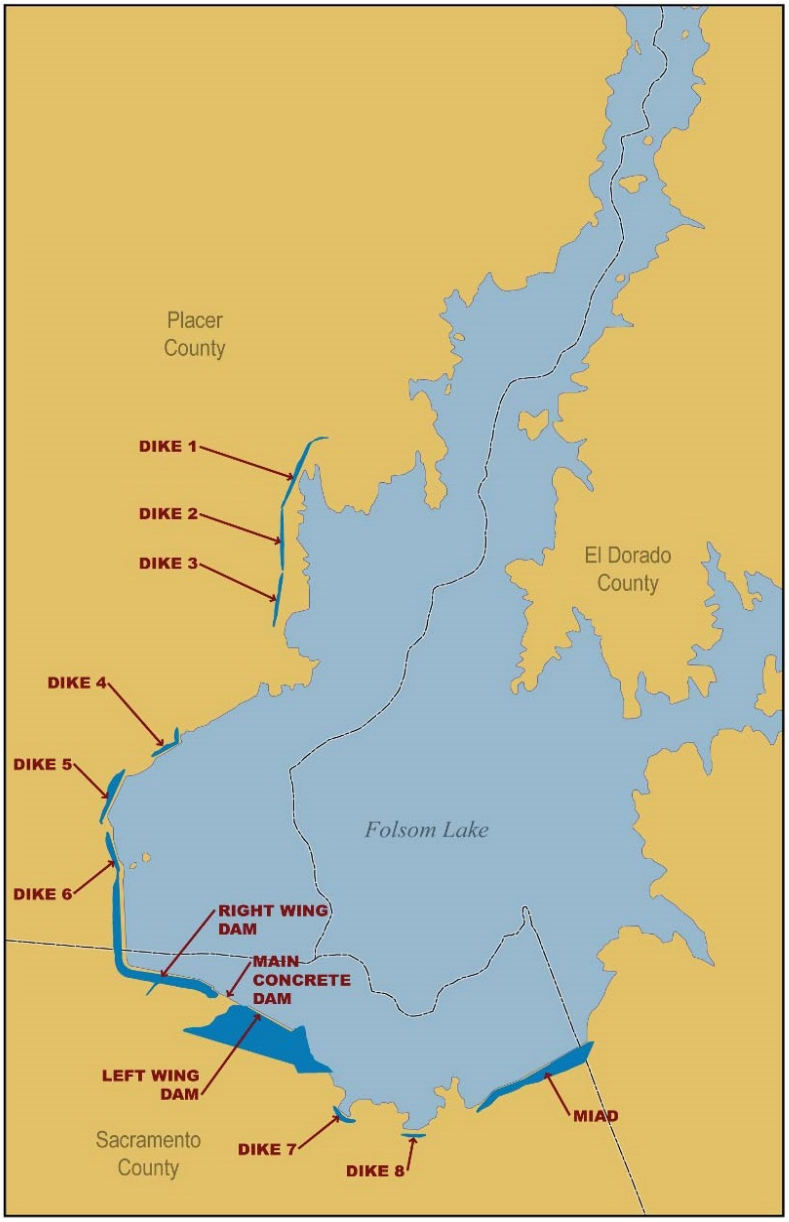

Figure ES-2. Folsom Lake and the Location of the Main Folsom Facilities.

ES.3 BACKGROUND AND NEED FOR ACTION

Sacramento is identified as one of the most at-risk communities in the nation for flooding, resulting in a need to reduce this risk through numerous flood damage reduction measures. The existing system leaves the highly urbanized Sacramento area at an unacceptably high level of flood risk.

The initial need for increased flood protection in Sacramento was realized when major storms in northern California in 1986, and again in 1997, caused record flood flows in the American River watershed. Outflows from Folsom Dam, together with high flows in the Sacramento River, caused the river stages to exceed the designed safety margin of levees protecting the City of Sacramento. If these storms had lasted much longer, major sections of the levee would likely have failed, causing probable loss of human life and billions of dollars in damages. The effects of the 1986 and 1997 storms raised concerns over the adequacy of the existing flood risk management system. This led to a series of investigations on the need to provide additional protection for the Sacramento metropolitan area. The results of these investigations led to authorization of several flood risk management projects in the American River watershed, including the Folsom Dam Raise project.

With the construction of the Joint Federal Project (JFP), the current storage capacity of the reservoir does allow for passing the Probable Maximum Flood (PMF) event. However, the current crest elevation of the reservoir dikes and embankment dams would not provide sufficient freeboard to meet design criteria for resisting wave height and wave run-up. A large enough flood event could cause the current dikes and/or embankment dams to sustain enough damage as to cause failure or overtop.

The primary purpose of the Folsom Dam Raise project is to reduce flood risk to the Sacramento area. The authorized top of flood pool would remain at reservoir water surface elevation 468.34 feet NAVD88. Affixing top seal bulkheads over the emergency gates would allow higher flood pools across the spillway, adding flood damage reduction benefits while still safely passing the PMF without overtopping the Tainter gates. With added operational flexibility and enhanced management of the enlarged flood storage capacity (in the form of surcharge), flood damage benefits are realized with delayed operation for the emergency gates and prolonged outflows at or below the 160,000 cfs threshold for more infrequent events up to a 1/240 year storm event (the authorized objective).

National Environmental Policy Act (NEPA) evaluation is required when a major Federal may have significant impacts on natural and human environmental quality. The Corps has determined that the proposed project may have significant effects on the environment; therefore, an EIS is required. This SEIS/EIR provides supplemental documentation and evaluates the potential direct, indirect, and cumulative environmental effects of alternative plans for the Folsom Dam Raise. This SEIS/EIR also identifies mitigation measures to avoid, minimize, and compensate for impacts.

ES.4 ALTERNATIVES

The Folsom Dam Raise project plan formulation process was developed and discussed in the American River Watershed Long-Term Study Final Supplemental Plan Formulation Report EIS/EIR (LTS EIS/EIR). Chapter 4.0 of the 2002 Long Term Study discussed plan formulation and screening of flood damage reduction measures and Chapter 5.0 described the alternatives. The two alternatives discussed in this SEIS/EIR (Alternative 1: No Action, and Alternative 2: Tainter Gate Refinements, Earth Raise Elements, and Concrete Floodwall Elements) were included in the final array of alternatives considered in the LTS EIS/EIR. Additional alternatives were screened out for reasons described in Table ES-1 below.

Table ES-1. Measures and Alternatives Considered but Eliminated.

Alternative	Reason for Elimination
Reduce the Stop Log Fabrication and Installation from Two Sets to Zero New Sets; Utilize Existing Set	Two gates would need to be non-operational during the construction; USBR does not agree with that action.
Tainter Gate Refinement: Replacement of Emergency Tainter Gates	Alternative 2 was chosen based on achieving the same benefit as this alternative but with more flexibility in operations for less cost.
Refined Emergency Gate Replacement	Alternative 2 was chosen based on achieving the same benefit as this alternative but with more flexibility in operations for less cost.
Tainter Gate Refinement: Horizontal Top Seal	The geometry and location of the Horizontal Top Seal made this refinement option more complex and difficult to design.
Tainter Gate Refinement: Skin Plate Extension	Modifications necessary for this alternative were deemed excessive and, more significantly, transverse seal loading is not recommended or practiced in Tainter gate designs.
Dredging	Dredging would be expensive, and environmentally and culturally damaging process. Because of its very high cost, this measure was not considered further.
The 3.5-Foot Dam Raise: Concrete Floodwall	This alternative was not carried forward for Dikes 1-8 and MIAD because of the potential recreation and environmental effects based on feedback from the public and environmental team.
The 3.5-Foot Dam Raise: Earthen Raise	This alternative was rejected for the left and right wing dams due to space constraints associated with steeper embankment slopes compared to other reservoir dikes.
The 3.5-Foot Dam Raise: Concrete Masonry Unit (CMU)	This alternative was rejected because reinforced CMU tend to crack more readily during earthquakes and other heavy movements.
3.5-Foot Dam Raise: Mechanically-Stabilized Earthen (MSE) Cap	The primary concern is that the stress-strain differential between the anchors and soil material would cause a seepage path through the MSE wall.

ES.4.1 Alternative 1 – No Action

Under Alternative 1, the Corps would not implement the spillway gate modifications or the 3.5-foot combination earthen raise and floodwall construction. Since no other projects are currently planned that are similar or equivalent to the emergency spillway gate modifications or the 3.5-foot raise, it would be speculative to assume that any work would occur absent the Corps project.

Under the No Action Alternative, significant loss of life is expected with a great enough flood event or PMF, as well as injuries, illnesses, and the release of hazardous and toxic contaminants to the downstream floodplain. The urban areas downstream of Folsom Dam would continue to be at risk of flooding, and lives would continue to be threatened. The gates and dam would be at risk for failure, threatening the levee system downstream with a surge of flow beyond the current 160,000 cfs levee capacity. If a dam or gate failure were to occur, the chance of levee failure downstream would increase. If a levee failure were to occur, major government facilities and transportation corridors would be impacted until flood waters recede. A temporary shut down or slowing of State and Local government functions would occur, and workers would be unable to perform their duties until the buildings are restored and can once again be occupied.

ES.4.2 Alternative 2 – Tainter Gate Refinements, Earthen Raise Elements, and Concrete Floodwall Elements (Proposed Project/Proposed Action, Environmentally Preferable Alternative)

Alternative 2, the proposed project, would consist of various activities that can be grouped into three main categories: refinements to the main dam's Tainter gates and related structural alterations to the main dam (termed the "Tainter gate refinements" element of the project); raising the effective crest (embankment) elevation of the existing earthen embankment dikes (Dikes 1 through 8) and MIAD (termed the "earthen raise" elements of the project), and; raising the effective crest elevation of the LWD and RWD through the addition of concrete floodwalls (termed the "concrete floodwall" elements of the project). The overall proposed project would be constructed in four phases beginning in approximately the fall of 2018 and ending in roughly the fall of 2022.

In addition, there would be a total of 29 staging areas within the project area for this alternative (e.g. the overall Dam Raise project; proposed project). These staging areas would encompass a total of approximately 167.6 acres and all of the proposed staging areas have been previously disturbed, although to varying degrees. The vegetation and habitat within each of these staging areas are discussed in detail in Section 3.4. All the staging areas would not be used simultaneously. Instead, various individual staging areas would be used in association with a given project construction phase. The currently anticipated schedule for the various project phases are indicated in Table ES-1 below.

Table ES-1. Anticipated schedule for the proposed project (Alternative 2).

Project Phase	Project Activity	Starting Year	Ending Year	Phase Duration
1	Main Dam Tainter Gates – Tainter gate & related structural refinements	2018 (fall)	2022 (fall)	4 years
2 (WP1)	Dikes 4, 5, & 6 – earthen embankment raise	2018 (fall)	2020 (fall)	2 years
3 (WP3)	Dikes 1, 2, & 3 – earthen embankment raise	2019 (summer)	2021 (summer)	2 years

Project Phase	Project Activity	Starting Year	Ending Year	Phase Duration
4 (WP2)	Dikes 7 & 8 plus MIAD, LWD, & RWD – earthen embankment raise for dikes and MIAD, concrete floodwalls for LWD and RWD	2020 (fall)	2022 (fall)	2 years

WP# = Work Package Number (ex. Work Package 1, Work Package 2, Work Package 3)

Proposed construction elements for Alternative 2 are discussed below, beginning with the design elements of the Tainter gate refinements, followed by the design elements of the 3.5-foot dam raise (the earthen raise and concrete floodwall elements). The 3.5-foot dam raise elements are currently at a lesser level of general design development and analysis than are the Spillway Modification (Tainter gates) elements. Because of this, the descriptions of the dam raise elements are briefer than the descriptions of the Tainter gate elements. It is likely that supplemental design and environmental documentation would be required for certain components of the dam raise prior to construction.

Tainter Gate Refinements

The existing main dam has a total of 8 Tainter gates; 5 of the 8 Tainter gates are designated as “service gates” 1 through 5, while the remaining 3 Tainter gates are designated as “emergency gates” 6 through 8. Tainter gates are simply a type of flood gate. In the case of the main dam, the Tainter gates are located near the crest (top) of the dam. These Tainter gates are opened to release water stored in Folsom Lake in order to create adequate flood storage upstream of the main dam. The main dam also releases water via outlet tubes near the bottom of the main dam, but these tubes do not provide sufficient discharge capacity to restore flood storage. The five service gates are typically opened to drain water from Folsom Lake, while the three emergency gates are generally left closed as long as possible.

The proposed project would include basically replacing most of the components of the 3 emergency Tainter gates and reinforcing the 5 service Tainter gates. USBR’s seismic retrofit of the Tainter gates did not account for some of the loading conditions imposed by Probable Maximum Flood (PMF) design load case. Some additional retrofit elements are necessary to address loading conditions imposed by the PMF event (skin plate ribs, lower girder, and trunnion anchorages). Trunnions are large metal arms that connect to and support the Tainter gates, and function to open and close these gates.

The “Tainter gate refinements” element of the proposed project would also include a variety of other structural changes/refinements to the main dam. These would include, but not be limited to:

- Constructing new “top seal” bulkheads to prevent overtopping of the Tainter gates during a major flood event. These hydraulic steel structures would be positioned immediately above the Tainter gates at their closed position, and would run horizontally, connecting to the dam’s concrete piers. The top of the bulkheads would be at elevation 486.34 feet NAVD88. This is the elevation of the PMF (483.34 feet NAVD88) with an additional 3 feet of freeboard. The top seal bulkheads would also increase the height of the flood pool upstream of the dam that can be retained before the emergency Tainter gates must be opened.

- Constructing vertical concrete extensions to the 9 existing concrete piers in order to provide the necessary elevated platform for a new hoist system for the Tainter gates. The new top seal bulkheads would mount to and seal against the pier extensions.

- Installing a new hoist system to raise and lower the modified Tainter gates, replacing the existing hoist system. The new system would be installed to handle increased hydrostatic PMF loads, as well as the slightly heavier gates.

Earthen Raise Elements

The current crest elevation of Dikes 1 through 8 and MIAD would be raised by approximately 3.5 feet using engineered fill material similar to the existing composition of these features, thereby allowing seepage and pore pressure to be maintained through the interface between the existing embankment material and the new material. The side slopes and crest widths would conform to Corps standards while maintaining USBR's requirements for security and maintenance.

Concrete Floodwall Elements

In combination with the earthen dam raises on the dikes and MIAD, the proposed project would also include construction of a new reinforced concrete floodwall on the top of LWD and RWD. The floodwall for RWD would run the length of this earthen embankment dam, tying into the existing grade at RWD's northern end and terminating at the west end of the main concrete dam at RWD's eastern end. The floodwall for LWD would also run the length of this earthen embankment dam, beginning at the west end of the main concrete dam and continuing to the east end of RWD. Just beyond the east end of RWD, the new floodwall would turn southward and connect to the top of the existing auxiliary spillway control structure at its northern end. A separate segment of new floodwall would begin at the southern end of the auxiliary spillway control structure, then run in a southeastern direction for roughly 580 feet (parallel to Folsom Lake Crossing), before terminating at the existing roadway that leads to the main dam.

Operation and Maintenance

Operation and Maintenance (O&M) requirements of the proposed project would not initially change with Alternative 2. However, the raise would result in an ability to sustain an increased flow of 160,000 cfs for a longer period of time and would have possible inundations up to 486.34' (NAVD88). Any post-construction operational changes would be defined in a Water Control Manual (WCM) update and any O&M effects from the Dam Raise project would be covered in a subsequent environmental document specifically addressing the proposed changes to the WCM.

Generally speaking, until the WCM is updated after construction, the O&M requirements would be no different than existing O&M for both the 3.5-foot dam raise and the spillway Tainter gate modification, with the exception of some reduced maintenance in a couple of areas:

- The new cable hoist system would be stainless steel with greaseless bearings, so chain maintenance is significantly reduced to periodic inspection.

- The removal of hoist motor redundancy linkage would also remove associated maintenance of this element.
- There would be an added inspection element with the new top seal. The current design is that it would be concrete with embedded steel components for connection of rubber seals and connections to the piers. The top seal would be an extremely low maintenance element but would be an extra item to look at during periodic inspections.

ES.5 ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

The following subsections provide a brief summary of the anticipated effects of the proposed project (Alternative 2) on various resource categories. An array of measures would be implemented to help avoid, minimize, and mitigate the project's adverse environmental impacts. Table ES-2, provided at the end of this Executive Summary, lists these mitigation measures and related environmental commitments for Alternative 2.

Recreation

Construction of the Tainter gate refinements element (phase) would not adversely affect recreational resources since the construction areas involved are not accessible to the public and are not part of the Folsom Lake State Recreation Area (FLSRA). During the construction of the 3 other phases of the proposed project however (e.g. phases involving raising Dikes 1-8, LWD, RWD, and MIAD) there would be some substantial restrictions to recreational facilities and resources in the immediate vicinity of construction work as well as a reduction in the availability and quality of recreational facilities and opportunities.

While these adverse impacts would only be temporary, they are deemed significant since construction of each of the cited phases would last approximately 2 years. Proposed avoidance, minimization, and mitigation measures would help reduce the magnitude of these temporary impacts, but not to a level that is less than significant. Alternative 2's long-term impacts to recreational resources would be less than significant with mitigation.

Vegetation and Wildlife

Existing habitats would be adversely disturbed during project construction. These habitats and their acreages that could be directly affected include: developed/disturbed areas (223.6 ac), lake (98.3 ac), annual grassland (66.9 ac), oak woodland (9.5 ac), oak savanna (2.5 ac), and riparian woodland (2.2 ac). Adverse impacts would largely be temporary, although there may be permanent loss of limited acreages of oak woodlands, oak savannas, and annual grasslands. The single riparian woodland area would be preserved. Refer to this table's section on water quality and Waters of the United States (WOUS) for information regarding potential project impacts to jurisdictional WOUS.

Wildlife species would be temporarily displaced during the 4-year project construction period. A few terrestrial animals could be injured or killed by construction work. If any active bird nests must be removed, young occupying such nests could perish. During project construction there would be substantial degradation of wildlife habitats directly impacted by construction activities. Wildlife access to various habitats within and adjacent to the project work areas would be adversely affected during construction. After project construction, there would be no substantial fragmentation or degradation of habitats given the proposed mitigation measures. Natural habitats would not be affected to a point where wildlife presently utilizing the area could not live or successfully reproduce in or near affected areas.

Overall, the proposed project's impacts to vegetation, wildlife, and wildlife habitats would be less than significant with mitigation.

Special Status Species

Project construction would likely require removal of a few elderberry shrubs, thereby adversely affecting the valley elderberry longhorn beetle (VELB). Because of proposed mitigation measures and the level of take involved, such impacts are not likely to result in jeopardy to the VELB.

There is a remote chance that bald eagles could be disturbed during project construction. Through avoidance and minimization measures, the project would not affect any bald eagles to a degree that causes (or may cause) injury to an eagle or a decrease in eagle productivity or nest abandonment. Nesting Swainson's hawks, loggerhead shrikes, and white-tailed kites could also be temporarily disturbed during project construction. This is unlikely, however, and such impacts would be rendered less than significant by implementing avoidance, minimization, and mitigation measures recommended by the California Department of Fish and Wildlife (CDFW).

Other migratory birds may nest in trees or shrubs that are within or close to the proposed project's limits of construction. Removal of trees/shrubs and general construction noise and activity could threaten active migratory bird nests. Such impacts would be avoided and minimized to the extent practicable. It may, however, be necessary to obtain a Special Purpose Permit from USFWS in order to remove active migratory bird nests in cases where direct impacts cannot be avoided.

The proposed project may result in temporary adverse impacts to nesting Swainson's hawks and white-tailed kites, limited temporary disturbance of bald eagles, temporary adverse impacts to other migratory birds, and both permanent and temporary impacts to the VELB. However, all these impacts would be less than significant with mitigation.

Air Quality

Emissions from construction equipment and worker vehicles would temporarily degrade air quality over the course of the 4-year project construction period. Primary pollutants of concern that would be emitted include ROG, NOx, CO, PM10, PM2.5, and SOx. Estimated emissions indicate the Placer County Air Pollution Control District (PCAPCD) threshold for PM10 would be exceeded in years 2019, 2020, and 2021. Estimated emissions indicate local Air Quality Management District thresholds for the other cited pollutants would not be exceeded. Emissions would also not exceed the USEPA's General Conformity *de minimis* thresholds.

A few isolated areas slated for construction work may harbor naturally occurring asbestos (NOA). Dust generated in such areas could release NOA, however use of state-prescribed BMPs during construction would greatly minimize this potential problem.

All adverse air quality impacts would be temporary and would be less than significant with mitigation.

Climate Change

Emissions from construction equipment and worker vehicles would include CO2 and other "greenhouse gases" that can contribute to climate change. Estimated emissions of greenhouse gases, expressed as CO2e, would not exceed the PCAPCD threshold of 10,000 metric tons CO2e per year and would not exceed the federal CO2e reporting threshold of 20,000 metric tons CO2e per year. However, these emissions could exceed the SMAQMD threshold of 1,100 metric tons CO2e per year during 2019 through 2022.

This SEIS/EIR utilized models to estimate emissions of CO2 and CO2e that may be generated during project construction. Project construction contractors may take an approach to construction that differs from the approach that formed the basis of the models. This could result in CO2e emissions that not only exceed the SMAQMD threshold, but also the PCAPCD threshold and the federal reporting threshold. Compensatory mitigation would be provided for CO2e emissions that occur in Sacramento County and exceed the SMAQMD threshold. If CO2e emissions generated by the proposed project in Placer County exceed the PCAPCD threshold, then similar compensatory mitigation would be provided for this exceedance. Should CO2e emissions produced anywhere by the proposed project exceed the federal reporting threshold, compensatory mitigation would be provided for this exceedance. In this manner, the project's effects on climate change would be less than significant.

Aesthetics and Visual Resources

Access to a few relatively scenic vistas would be temporarily limited during project construction, but there would be no long-term adverse effect on scenic vistas. There would be substantial damage to a few scenic resources during construction, mainly as a result of alterations to proposed staging areas. The existing visual character and quality of the affected dams, dikes, and staging areas would be degraded during construction, as would be certain viewsheds. Public access to various recreational trails would be temporarily restricted during construction, thereby limiting access to some natural areas that have relatively high aesthetic qualities. Some off-site residences near project work areas would experience temporary degradation of views of the FLSRA due to the presence of construction equipment and the effects of earthwork activities. Following project completion, there would be no remaining adverse impacts to aesthetics and visual resources as a result of proposed mitigation measures and the temporary nature of project construction.

The proposed project's potential impacts to aesthetics and visual resources would be less than significant with mitigation.

Traffic and Circulation

Construction of the proposed project would have temporary direct effects on the traffic and circulation in the project area. Traffic would substantially increase in relation to existing traffic load and capacity of the roadway system and has the potential to substantially disrupt the flow and/or travel time of traffic. Transportation and circulation effects resulting from this action would be temporary in nature and would not result in permanent traffic increases to the surrounding area.

The proposed project's impacts to area traffic and traffic circulation are considered significant and unavoidable as the project would substantially increase traffic during project construction even with proposed avoidance, minimization, and mitigation measures.

Noise

Project construction activities would cause a substantial temporary increase in ambient noise levels. Nearby residents, wildlife, and recreationists could be adversely affected and experience noise from construction equipment and activities. Following project completion, the project would not have any noise effects.

Although adverse noise impacts would be temporary, the project's noise impacts would be significant and unavoidable, even with implementation of the measures proposed to avoid and minimize noise effects.

Water Quality and Waters of the United States

Project construction activities, such as drilling, excavation, hauling, earthwork, and fill placement may disturb or mobilize sediments, having the potential to adversely affect total suspended solids, pH, turbidity, and dissolved oxygen in stormwater runoff and waters receiving this runoff. Debris and inadvertent spills of fuels, oils, or concrete mix materials from construction equipment, work areas, or the staging areas could be a source of contamination to Folsom Lake, the American River, and nearby wetlands and drainage swales and ditches. Some of the work on the spillway Tainter gates would be done over water with potential for lead paint to enter surface water downstream of the dam (lead paint is assumed present in all underlying primer on the structure).

Through implementation of the mitigation measures proposed, water quality would not be affected following project completion.

The proposed project would not involve direct impacts to jurisdictional wetlands or watercourses (drainage swales, ditches, rivers, etc.) and such features would be protected. Project construction could require limited removal and subsequent placement of riprap within the jurisdictional limits of Folsom Lake when raising certain dikes and MIAD. This would result in temporary impacts to the lake, but there would be no appreciable loss of lake acreage or volume; hence such impacts would be *de minimis* and less than significant. A proposed temporary detour for Park Road near Dikes 1 and 2 would directly impact approximately 0.5 acre of Folsom Lake (a jurisdictional Waters of the United States). The affected area is not frequently inundated and has limited aquatic functions and values. The detour road would be removed when raising of Dikes 1-3 is completed. Disturbed topography would be restored to mimic pre-construction topography and the disturbed lake area would be planted with a mixture of native grasses and forbs. This temporary lake impact would be less than significant given the proposed mitigation measures.

Although Alternative 2 (proposed project) would have temporary adverse effects on water quality and may require limited excavation and fill impacts within Folsom Lake, these impacts would be less than significant with mitigation.

Cultural Resources

Alternative 2 would not result in adverse effects to historic properties. Existing historic properties would undergo physical changes (e.g. the proposed alterations to the dikes and dams), however these modifications constitute no adverse effect to the qualities that make the historic properties eligible for inclusion in the National Register of Historic Places (NRHP). No adverse effects to tribal cultural resources are anticipated

Other Resources

Alternative 2 would not result in significant effects to the following resources/issues: hydrology and hydraulics; hydropower; water supply; fisheries and aquatic resources; geology; mineral resources; seismicity; soils (including prime farmland soils); land use and land planning; agriculture and forestry resources; socioeconomics; population and housing; public utilities and services; hazardous, toxic, and radioactive wastes, and; public safety. While these resources/issues are addressed in this SEIS/EIR, they are not considered in detail.

ES.6 COMPLIANCE WITH APPLICABLE LAWS, POLICIES, AND PLANS

This document is a joint SEIS/EIR, which fully complies with National Environmental Policy Act and California Environmental Quality Act requirements. The project would comply with all applicable Federal environmental laws and regulations, as well as all applicable state, regional, and local laws, regulations, and ordinances.

ES.7 PUBLIC INVOLVEMENT

Two public scoping meetings for the Folsom Dam Raise project were held on February 19, 2014 at the Folsom Community Center and on February 24, 2014 at the Sacramento Library Galleria. Mail and e-mail announcements were also sent to stakeholders and other interested parties. The scoping meetings were also advertised in the Sacramento Bee and the Folsom Telegraph. In addition, a Notice of Intent was filed with the Federal Register on February 6, 2014.

The draft SEIS/EIR was circulated for a 64-day review period (July 19, 2016 through September 20, 2016) to: Federal, State, and local agencies; organizations; elected officials; Native American tribes, and; individuals known to have an interest in the project. A Notice of Availability (NOA) for the draft SEIS/EIR was published in the Federal Register on July 22, 2016. The draft SEIS/EIR was made available both on the Corps' Sacramento District website as well as the website for the CVFPB. Hard copies of the draft SEIS/EIR were provided to the Folsom Public Library, Orangevale Branch Library, Eldorado County Library, and Roseville Library. Letters were mailed to interested parties and local residents notifying them of the availability of the draft SEIS/EIR, the public comment period, the method for submitting comments, the date, time, and location for the public meetings mentioned below, and how to obtain copies of the draft SEIS/EIR. Hard copies and/or DVDs of the draft SEIS/EIR, along with the information stated above, were mailed to various resource agencies, interested parties, and elected officials. Public notices and news releases were published in local newspapers to advise readers of the availability of the draft SEIS/EIR, the public comment period, the method for submitting comments, and the date, time, and location for the public meetings.

Two public meetings were held during the review period to discuss the proposed project and receive public input. Written comments regarding the draft SEIS/EIR received during the public review period are included in Appendix H together with responses to substantive comments. Coordination with Native American Tribes concerning the proposed project and the draft SEIS/EIR is addressed in Appendix G, as are comments submitted by such tribes and responses to these comments. All comments received during the public review period were considered when preparing the final SEIS/EIR. The final SEIS/EIR will be published for a final 30-day period. Following this, the Corps will make a decision on the project and complete a Record of Decision (ROD). Subsequently, the CVFPB will also make a decision on the final SEIS/EIR at a regularly scheduled CVFPB meeting and will complete a Notice of Determination (NOD).

ES.8 ISSUES OF KNOWN CONTROVERSY

Some significant and controversial issues have been raised by agencies and the public relating to the construction of the 3.5-foot dam raise, spillway modifications, and related features. These issues were identified based on feedback gathered in preliminary studies from formal and informal agency meetings, workshops, public meetings, telephone discourse, letters, and emails.

- Construction is expected to temporarily increase noise levels, affecting local recreationists and adjacent residents, even under circumstances of compliance with the City of Folsom noise ordinances.

Potential project noise impacts are addressed in Section 3.10 of this SEIS/EIR. Various measures proposed to help mitigate noise impacts are listed in Table ES-2, under the "Noise" subsection. Despite implementation of these measures, noise generated during project construction would still constitute a significant impact. This impact would cease following completion of project construction.

- Degradation of public recreational experiences in and adjacent to the project – noise, visual aesthetics, and access would be compromised during construction from 2018 to 2022.

  Potential project impacts to recreation are addressed in Section 3.3 of this SEIS/EIR. Access to existing recreation areas and facilities is also discussed in Section 3.3 and, to a limited degree, in Section 3.9. The measures proposed to help mitigate adverse project impacts to recreation resources and "experiences" are listed in Table ES-2, under the "Recreation" subsection. During project construction however, there would still be significant adverse impacts to recreation resources. There would be no long-term impacts to recreation resources following the completion of project construction. Visual resources/aesthetics are discussed in Section 3.8 of this SEIS/EIR, and measures proposed to mitigate adverse impacts to such resources are listed in Table ES-2 under the "Aesthetics & Visual Resources" subsection. The anticipated adverse impacts to visual aesthetics would be temporary and would be less than significant with mitigation.

- Both the public and various agencies indicated a greater interest and concern about how Folsom Dam and the JFP auxiliary spillway would be operated following completion of the Folsom Dam Raise project, compared to their concerns regarding construction of the this project.

  This issue is addressed in Section ES.9 below, and is also addressed in several places within the main body of this SEIS/EIR. One of the environmental commitments listed in Table ES-2 indicates that a supplemental joint NEPA/CEQA document would be prepared to cover future changes that may be made to the Water Control Manual for the Folsom facilities once the Dam Raise project is completed or near completion.

ES.9 UNRESOLVED ISSUES

While there will be no changes in normal operations with the construction of the dam raise, the raise would result in the ability to sustain an increased flow of 160,000 cfs for a longer period of time, and would potentially allow Folsom Lake to stage as high as 486.34 feet NAVD88. Any new operations could result from the construction of the Dam Raise project would be dependent upon first updating the existing Water Control Manual (WCM) for Folsom Dam and its facilities. As it stands, the proposed 3.5-foot raise is only an increase in the surcharge zone of the reservoir (lake), not the operational space, and would only have an effect in the events that encroach in that surcharge zone.

This SEIS/EIR does not include any evaluation of how changes in operation of the main dam and auxiliary spillway allowed by completion of the proposed Dam Raise project could affect environmental, social, and cultural resources. Upon or near completion of construction of the overall Folsom Dam Raise project, a revised WCM would need to be prepared for the Folsom Facilities (main dam, auxiliary spillway, dikes, LWD, RWD, MIAD) in order to best realize the benefits provided by this project. The Corps, in coordination with DWR, SAFCA, and USBR, would prepare a supplemental joint NEPA/CEQA document to address and evaluate the potential effects of implementing the revised WCM. This document would be finalized and approved prior to implementation of the revised WCM.

ES.10 PREFERRED PLAN

Alternative 2, Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall (the proposed project/proposed action), has been identified as the preferred plan. This alternative would include additional modifications to the existing spillway Tainter gates with a new "top seal" bulkhead that would prevent overtopping of the these gates, other structural modifications to the main dam, a 3.5-foot earthen raise on the dikes and MIAD, as well as construction of a reinforced 3.5-foot tall concrete floodwall along the crests of the LWD and RWD. Alternative 1, the No Action Alternative, was not selected because it was not considered to be in the best interest of public safety since it did not provide for increased flood protection. Alternative 2 is expected to provide continuous flood-risk management benefits to the Sacramento metropolitan area and provide flood damage reduction while safely passing the PMF flow without overtopping the spillway gates.

Table ES-2. Summary of Environmental Commitments (Mitigation Measures, etc.) for the Proposed Project (Alternative 2).

ID #	DESCRIPTION
	RECREATION
R-1	Prior to construction that may affect recreational resources, public outreach would be conducted through mailings, posting signs, coordination with interested groups, and meetings (if necessary) in order to provide information regarding changes to recreational access within the FLSRA.
R-2	The construction contractor would be required to: (1) Utilize traffic control measures, security fencing and/or temporary alternate public access detours for pedestrian, equestrian, bicycle and vehicular traffic; (2) Post warning and restricted access signs before and during construction as necessary.
R-3	A temporary recreational detour trail would be established by the construction contractor to help mitigate the temporary loss of the existing trail/roadway that runs along the crests of Dikes 4 through 6 and along the roadway/trail connecting these dikes.
	VEGETATION AND WILDLIFE
VW-1	The construction contractor would be required to implement dust control measures consistent with SMAQMD fugitive dust control measures.
VW-2	The construction contractor would be required to clean vehicles and equipment before first entering the project site.
VW-3	For each phase of the project, the Corps would prepare final construction plans that would include drawings identifying habitat areas that must be protected and specifying the methods of protection. These plans would be accompanied by written project specifications further detailing the habitat protection requirements, as well as general requirements concerning the protection of vegetation and wildlife. The final construction plans would also illustrate and/or describe those areas/lands near the project features that are outside the limits of construction (and thus must be protected from direct construction impacts).
VW-4	Native trees and shrubs having a DBH of 2 inches or greater located within the limits of construction of a particular project phase would be preserved to the extent practicable. The construction contractor would establish protective buffers (ex. temporary fencing) around the driplines of those trees and shrubs to be preserved that are located within the limits of construction. Native trees located outside the limits of construction would be preserved. The construction contractor would also erect protective buffers along the limits of construction where these limits are in close proximity to the adjacent trees and shrubs to be preserved. Any required trimming of native trees or shrubs would be conducted by, or under the direct supervision of a certified arborist.

ID #	DESCRIPTION
VW-5	Near the end of each phase of the overall project, the Corps would determine the approximate acreage of oak woodland habitat and oak savanna habitat eliminated as a result of construction activities. Once the total acres of each of the two habitat types is known, the Corps would develop a mitigation plan to compensate for these losses. Compensatory mitigation would involve creation or restoration of the affected habitat types. The minimum ratio of the acres of each type to be restored or created per acre of each type lost would be 1.2:1. The mitigation goal would be to create or restore habitat where the density of canopy tree species and midstory woody species is approximately the same as the average density of canopy tree species and midstory woody species found in the impacted habitats. The ground cover stratum would be restored through the planting of various native grasses and forbs, while the species composition of the midstory and canopy strata would strive to mimic that of the affected habitats. The restored areas would be managed and monitored by the Corps (or the Corps' contractor) for 5 years, although this period could be reduced to 4 years if success criteria are achieved by that time. The mitigation site(s) would be selected in coordination with USFWS, DWR, and SAFCA. The overall mitigation plan would also be prepared in coordination with these agencies. If on-site mitigation (which is preferred) proves to be a viable option, such coordination would also include USBR.
VW-6	Project impacts to migratory birds, including bald eagles, Swainson's hawks, loggerhead shrikes, and white-tailed kites, would be avoided or minimized to the degree practicable by following the avoidance, minimization, and mitigation measures for such species that are identified in the Special Status Species (Listed Species) section of this table.
VW-7	The Corps would ensure that all construction personnel undergo environmental protection training to be aware of all required environmental protections per the final construction plans and specifications, as well as those required by applicable federal and state laws.
VW-8	The construction contractor would be required to place food related wastes in self-closing trash containers.
VW-9	After completing construction activities within a given project phase, disturbed portions of the staging areas used for the project phase would be restored by the construction contractor. One exception to this generalization would be in cases where a particular staging area is also going to be used for a subsequent project phase. In such cases, the shared staging area would not be restored until the final project phase to use the staging area is completed. Another exception would be for staging areas, or portions thereof, that encompass permanent man-made features. Such areas would not be restored. Restoration of staging areas would first involve restoring pre-construction topography to the degree practicable. Next, a mixture of native grass and forb seeds would be planted throughout disturbed portions of staging areas in order to establish a permanent vegetative groundcover. The planted areas would be periodically monitored until the average ground cover accounted for by native grasses and forbs reaches approximately 75 to 80 percent.
VW-10	Revegetated areas would be monitored for invasive plant species by Corps staff during the construction contract warranty period of a given project phase. The term invasive plant species refers to those plants listed in the California Invasive Plant Inventory database generated by the California Invasive Plant Council, and having an invasive rating of "high" or "moderate". If it is determined invasive plants are becoming established, such plants would be eradicated by the construction contractor through directed herbicide applications, physical removal, or both. The goal would be to control invasive plant species such that they account for 5 percent or less of the average total plant cover.

ID #	DESCRIPTION
VW-11	Prior to initiating construction of a given project phase, Corps staff would conduct an assessment of drainage depressions, channels, and ditches present at the project site to determine whether any such features provide water to wetlands. Corps staff would also delineate the approximate limits of jurisdictional wetlands located within or immediately adjacent to the project's limits of construction. The construction contractor would be required to maintain flows in those drainage features that are found to provide water to wetlands. Direct construction impacts to wetlands would be prohibited.
VW-12	Once the Park Road detour road segment (an element of the project phase that includes Dikes 1, 2, and 3) is no longer needed for the proposed project, this road segment would be removed. Topography altered by construction of the road would be restored to approximately match pre-construction topography and natural areas disturbed by road construction would be planted with native grasses and forbs.
	SPECIAL STATUS SPECIES (LISTED SPECIES)
LS-1	As project design plans are developed and refined, the Corps, to the degree practicable, would adjust the limits of construction to avoid removal of existing native trees, large shrubs, and elderberry shrubs having one or more stems measuring 1 inch or greater in diameter at ground.
LS-2	Prior to starting construction activities for a given phase of the project, Corps biologists would survey areas within approximately 1,000 feet of the areas slated for construction in the given phase to determine whether any bald eagle nests are present. If any nests are discovered and regardless of whether a nest is classified as active, inactive/alternate, or abandoned, the Corps would coordinate with USFWS staff and CDFW staff to determine measures necessary to avoid, minimize, or mitigate potential adverse construction impacts to bald eagles and then would implement appropriate measures. Such measures could include not conducting project construction work within 660 feet of an active bald eagle nest or monitoring behavior of eagles tending an active or alternate nest for signs of stress and potential nest abandonment during the nesting season.
LS-3	Prior to beginning construction of a particular project phase, Corps biologists would survey areas within the immediate project vicinity to determine whether any active loggerhead shrike nests are present. If any nests are discovered, the Corps would coordinate with CDFW staff to determine measures necessary to avoid, minimize, or mitigate potential adverse construction impacts to the nest. Corps biologists would also survey areas within 0.25 miles (1,320 feet) of construction areas to determine if Swainson's hawk nests or white-tailed kite nests are present. Swainson's hawk surveys would be completed in compliance with the CDFW survey guidance. Other migratory bird nest surveys can be conducted concurrent with the Swainson's hawk surveys, with at least one survey conducted no more than 48 hours from the initiation of project construction activities to confirm the absence of nesting. If these surveys find there are active Swainson's hawk nests or active white-tailed kite nests present within the defined areas, CDFW would be contacted to determine the proper course of action. If necessary, buffers would be established around active nests with no construction allowed within the buffer zones until fledglings have left the nests. An alternative approach might involve monitoring active nests in close proximity to project construction areas for signs of stress exhibited by the adult birds, which could lead to nest abandonment.

ID #	DESCRIPTION
LS-4	Prior to initiating construction activities for a particular phase of the overall project, Corps biologists would conduct surveys for migratory bird nests situated within the limits of construction as well as such nests located within approximately 150 feet of these limits. If the initial surveys do not take place during the migratory bird nesting season, then Corps biologists would again conduct surveys for migratory bird nests at the beginning of the nesting season in a similar manner. If inactive nests are found (e.g. nests that do not contain eggs or chicks), these would be removed to help prevent birds from re-using the nests. Such inactive nests would not be removed if they belong to a special status species (listed species). If active nests are found, the following would be followed: (1) If active migratory bird nests are discovered within the project limits of constructions, buffer areas would typically be established by the construction contractor around each nest and construction activities within the buffer(s) would be prohibited until the young occupying the nests have fledged. The Corps would coordinate with USFWS staff and CDFW staff to determine the appropriate size of such nest buffer zones. Similarly if active migratory bird nests are documented within approximately 150 feet of the project's limits of construction, buffer areas would also be established around these nests as well; (2) If it is not practicable for project construction activities to avoid direct impacts to active migratory bird nest, the Corps would obtain a Special Purpose Permit (Migratory Bird Permit) from USFWS prior to impacting the active nests. This permit would authorize live-trapping and relocation of the affected active nests and the eggs or chicks occupying the nests. Chicks and/or viable eggs collected by qualified Corps staff pursuant to the permit would be taken to a wildlife care/rehabilitation facility.
LS-5	The construction contractor would be required to report any active or inactive migratory bird nests to the Corps within 24 hours of discovery of such nests.
LS-6	Prior to construction of a particular project phase, Corps environmental staff would perform field surveys to locate elderberry shrubs having one or more stems measuring 1.0 inch or greater in diameter at ground level that are within or in close proximity to the project phase's limits of construction.
LS-7	Construction personnel would receive USFWS-approved worker environmental awareness training to ensure that workers recognize elderberry shrubs and the valley elderberry longhorn beetle (VELB). The training would include: the protected status of VELBs and their host plants, elderberry shrubs; the need to avoid adversely affecting elderberry shrubs; elderberry shrub avoidance areas (protective buffers/exclusion zones); measures to be taken by workers during construction to protect elderberry shrubs; possible penalties that could be imposed for not complying with requirements established for the protection of elderberry shrubs and the VELB.

ID #	DESCRIPTION
LS-8	Where practicable, a minimum setback (buffer) of 100 feet from the drip-line of all elderberry shrubs containing stems measuring 1.0 inch or greater in diameter at ground level would be established. There may be instances where a 100-foot buffer is not practicable due to various constraints. In such cases, a buffer of at least 20 feet from the dripline of such elderberry shrubs would be established if feasible. The Corps will consult with USFWS prior to establishing any elderberry shrub buffer zones (setbacks) that extend less than 100 feet from the drip-line of a particular shrub. Prior to project construction activities near elderberry shrubs to be preserved, temporary protective barriers would be installed along the limits (boundaries) of approved elderberry shrub buffer zones (exclusion areas). No construction activities or similar disturbances would be allowed within the elderberry shrub buffer zones unless authorized in advance by the Corps and USFWS. In situations where elderberry shrubs to be preserved are located more than 100 feet from the project's limits of construction, protective barriers may not be installed if existing landscape conditions are such that inadvertent damage to the shrubs during construction is unlikely. The contractor would install signs approximately every 50 feet along the edge of any protective structural barriers. The signs would include the text: "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 would be readable from a distance of 20 feet and would be maintained during project construction.
LS-9	Any damage done within elderberry shrub buffer zones during the course of project construction would be remediated by the construction contractor shortly following the discovery of such damage. Remediation work may include installing erosion control measures, seeding disturbed areas with appropriate native plant seeds, etc.
LS-10	No insecticides, herbicides, fertilizers, or other chemicals that might harm the VELB or its host plant would be used in elderberry shrub buffer zones, or within 100 feet of any elderberry shrub with one or more stems measuring 1.0 inch or greater in diameter at ground level.
LS-11	If mowing of vegetation is deemed necessary to reduce fire hazard, such mowing may be performed within elderberry shrub buffer zones but only during the period from July through April. No mowing would be allowed within 5 feet of elderberry shrub stems, and all mowing would be done in a manner that avoids damaging elderberry plants.
LS-12	If direct construction impacts to elderberry shrubs (limited to those having at least 1 stem with a diameter of at least 1 inch as measured at ground level) are unavoidable, the Corps would purchase an appropriate number of credits from a USFWS-approved conservation bank as compensatory mitigation for such impacts. The number of conservation credits required would be based on methodologies prescribed in the USFWS's 1999 conservation guidelines for VELB (the "VELB Guidelines") and direct coordination with USFWS staff. The Corps would also contract with the same conservation bank from which the conservation credits are purchased to transplant the affected elderberry shrub(s) from the project site to the conservation bank. The affected shrubs would be transplanted when the plants are dormant (roughly November through the first 2 weeks in February) if feasible. The contractor (the conservation bank) would be required to follow the transplanting procedure set forth in the VELB Guidelines and Corps staff would monitor the removal of the shrubs from the project site.

ID #	DESCRIPTION
L2-13	The process for evaluating the potential impacts to the VELB in a given project phase would be as follows: (1) Designate elderberry shrubs that would be preserved and the protective buffers associated with each of those shrubs; (2) Designate shrubs that would have to be removed/transplanted, and determine the number of conservation credits that would have to be purchased to compensate for those shrubs that must be transplanted; (3) Submit a request for reinitiation of Endangered Species Act Section 7 consultation to USFWS that contains seeks concurrence with the Corps' effects determination and the Corps' proposed avoidance, minimization, and compensatory mitigation measures, (4) Proceed with construction of a given phase following receipt of the USFWS's Biological Opinion (e.g. amendment to Service File 08ESMF00-2017-F-0043).
LS-14	During project construction and/or restoration activities that involve earthwork, measures would be employed to suppress generation of dust. Such measures would include frequent watering of project haul roads, earthen stockpile areas, and similar exposed soil surfaces.
	AIR QUALITY
AQ-1	Require construction contractor to: (1) Develop an Asbestos Dust Mitigation Plan (ADMP) that conforms to requirements set forth in the State of California's Asbestos Airborne Toxic Control Measures (Asbestos ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations; (2) Submit the ADMP to applicable local Air Quality Management Districts for approval, and; (3) Implement the approved ADMP in areas where project construction would involve disturbing lands that may harbor naturally occurring asbestos.
AQ-2	Require construction contractor to implement the following fugitive dust mitigation measures: (1) Limit vehicle speeds on unpaved roads to 15 mph; (2) Water at least every 2 hours of active construction or often enough to keep disturbed areas adequately wet; (3) Remove all visible track-out from a paved public road at any location where vehicles exit the work site; (4) Install track-out prevention measures approved by the Corps; (5) Pre-wet the ground to the depth of anticipated cuts; (6) Suspend any excavation operations when wind speeds are high enough to result in dust emissions across property lines.
AQ-3	Require construction contractor to implement the following enhanced fugitive particulate matter dust control measures: (1) Water exposed soil to keep moist but do not allow sediment flows off site; (2) Suspend excavation, grading and/or demolition activity when wind speeds exceed 20-mph; (3) Install wind breaks on windward sides of construction areas; (4) Plant vegetative ground cover in disturbed areas as soon as possible; (5) For unpaved construction roads – (a) Install wheel washers or wash off all and equipment leaving the site; (b) Treat site access to a distance of 100 feet from the paved road with a 6-12 inch layer of wood chips, mulch or gravel; (c) Post a publicly visible sign with, the telephone number and person to contact at the lead agency regarding dust complaints that would be corrected within 48 hours of receipt, and the numbers of the Air Quality Management District (AQMD) of Sacramento, Placer and El Dorado, depending on jurisdiction.
AQ-4	Require construction contractor to implement the following basic emissions control practices: (1) Minimize idling time of equipment not in use to 5 minutes and post clear signage of this requirement for workers at site entrances; (2) Maintain all construction equipment in proper working condition and have equipment checked before operation by a certified mechanic; (3) Water exposed surfaces twice per day; (4) Cover or maintain at least 2 feet of free board space on trucks transporting soil, sand or other loose material onsite and all haul trucks slated for travel along freeways or major roadways must be covered; (5) Limit vehicle speeds on unpaved roads to 15 mph.

ID #	DESCRIPTION
AQ-5	Require the construction contractor to implement the following enhanced exhaust control practices: (1) Provide a plan to the Corps and applicable AQMD demonstrating heavy-duty off road vehicles used in the construction project would achieve a project-wide fleet average 20% reduction in NOx, and 45% reduction in particulate compared to the most recent CARB fleet average. This plan would be submitted prior to construction and in conjunction with equipment inventory composed of off road construction equipment with a 50 hp or greater rating that would be used an aggregate of 40 hours or more during any portion of the construction project; (2) Update the construction equipment inventory monthly except for any 30-day period in which no construction activity occurs and submit this to the Corps and applicable AQMD; (3) Ensure emissions from all off road diesel-powered equipment used onsite do not exceed 40% opacity for more than 3 minutes in any 1 hour, with non-compliant equipment repaired immediately and documented with a summary provided to the Corps and the appropriate AQMD on a monthly basis.
AQ-6	Require the construction contractor to comply with the following additional air quality mitigation measures: (1) Model year 2010 or newer haul trucks must be used for the duration of the project. If an occasion arises where there is limited availability of MY 2010 or new haul trucks, the contractor would need to demonstrate that MY 2010 or newer trucks are not available and get authorization from the Corps; (2) All off road diesel-powered construction equipment of greater than 50 hp will meet Tier-4 off road emission standards, where available. If a certain tier engine is not available, that equipment would be equipped with the next lower tier engine or an engine equipped with retrofit controls to reduce emissions of NOx and diesel PM to no more than the next available tier, unless certified by engine manufacturers that the use of such devices is not practical for specific engine types, and any uses of heavy-duty off road diesel equipment that does not meet Tier 4 emissions standards would first require approval by the Corps; (3) All construction equipment would be equipped with best available technology devices certified by CARB. Any emission control device would achieve emissions reductions that are no less than what could be achieved by a Level 3 diesel emissions control strategy for a similarly sized engine as defined by CARB regulations; (4) Construction equipment would incorporate emissions-reducing technology and idling would be restricted to a maximum of 5 minutes except as provided in the CARB 13CCR, Section 2485 exceptions.
AQ-7	Require the construction contractor to comply with the following off-site compensatory mitigation measures: (1) Provide the Corps and the applicable local AQMDs with updated and revised air quality emissions estimates prior to beginning project construction activities on a given phase. If the estimates indicate the applicable PM10 threshold and/or the PM2.5 threshold would be exceeded, the contractor would coordinate with the AQMDs in which the excess emissions occurred to determine the level of mitigation and administrative fees, if any, that must be paid; (2) Provide monthly estimates of actual PM10 and PM2.5 emissions to the Corps and the applicable AQMDs once construction activities begin, indicating, if necessary, in which AQMD jurisdiction the emissions occurred. When a monthly report indicates PM emissions exceeded the applicable local AQMD threshold, the contractor would be required to pay the appropriate mitigation fee and associated administrative fee to the local AQMD in which the excess emissions occurred; (3) Provide monthly reports of estimated actual NOx emissions and if NOx thresholds are exceeded, the contractor would pay the appropriate mitigation fee and associated administrative fee to the local AQMD in which the excess emissions occurred.

ID #	DESCRIPTION
	CLIMATE CHANGE
CC-1	The contractor would be required to submit monthly estimates of actual construction emissions to the Corps and applicable local AQMDs. If these monthly reports show that emissions may eventually exceed 25,000 metric tons (MT) CO_2e per year (federal threshold), 10,000 MT CO_2e per year (Placer County Air Pollution Control District threshold), or 1,100 MT CO_2e per year (SMAQMD threshold), the contractor would be required to prepare a greenhouse gas (GHG) emissions reduction plan for approval by the Corps, then implement the approved plan. Elements of such a plan could include the following: (1) Minimize the idling time of construction equipment to no more than 3 minutes, or shut equipment off when not in use, (2) Encourage carpools, shuttle vans, and/or alternative modes of transportation for construction worker commutes, (3) Use of CARB approved low carbon fuel, (4) Use of equipment with new technologies.
CC-2	If actual CO_2e emissions during construction of a given project phase do exceed either the federal threshold (25,000 MT CO_2e per year), the PCAPCD threshold (10,000 MT CO_2e per year), or the SMAQMD threshold (1,100 MT CO_2e per year) then compensatory mitigation would be provided in the form of purchasing sufficient carbon credits to mitigate for the excess CO_2e. Carbon offset credits would be purchased from a carbon registry that is acceptable to the applicable local Air Quality Management District and the Corps. Note that the provision of compensatory mitigation would only be required under the following scenarios: (1) Project construction emissions that occur within Placer County exceed the PCAPCD threshold of 10,000 MT CO_2e per year; (2) Project construction emissions that occur within Sacramento County exceed the SMAQMD recommended threshold of 1,100 MT CO_2e per year, or; (3) Project construction emissions exceed the federal threshold of 25,000 MT CO_2e per year, regardless of the county in which the emissions are generated.
	AESTHETICS & VISUAL RESOURCES
AV-1	The Corps would make modification to the dikes and dams in phases, limiting the extent of construction affecting viewsheds at any one time.
AV-2	The construction contractor would: (1) Preserve existing native trees to the extent practicable; (2) Locate staging areas on previously disturbed lands where feasible; (3) Following construction, restore staging areas to pre-construction topography to the degree practicable and hydroseed the areas with native grasses and forbs. Exceptions to this measure would include: (a) Staging areas on the lake side of Dikes 4, 5, and 6; (b) Staging areas situated on existing urban/disturbed lands, with the exception of the Dike 7 Office Complex staging area, would not be restored, but would instead be returned to conditions present prior to the project.
	TRAFFIC & CIRCULATION
TC-1	Prior to starting construction, the contractor would be required to prepare a traffic management plan for approval by the Corps and would then implement the approved plan. This plan would outline proposed travel and haul routes along with proposed traffic management/maintenance/safety measures.
TC-2	High collision intersections would be identified by the Corps and avoided by project construction vehicles and equipment if possible.
TC-3	Construction vehicle and haul truck drivers would be informed and trained on the various types of access and haul routes, as well as areas that are more sensitive to traffic increases.

ID #	DESCRIPTION
TC-4	The construction contractor would develop and use signs to inform the public of the construction access routes and haul routes, route changes, detours, and planned road closures to minimize traffic congestion and help ensure public safety.
TC-5	Prior to beginning construction at Dike 1, the construction contractor would build a new temporary paved 2-lane roadway segment extending northward from a location south of Dike 1 to Park Road north of this dike. This temporary roadway segment would function as a public detour route around that portion of Park Road that would be directly impacted by project construction. The construction contractor would remove this detour road upon completion of raising Dikes 1 through 3.
NOISE	
N-1	Construction noise would be limited in accordance with timeframes and requirements in the City of Folsom, Sacramento County, and Placer County Noise Ordinance exemption for construction. If construction must occur outside of the exempted timeframe in the vicinity of sensitive receptors, the construction contractor would be required to meet the City of Folsom exterior noise thresholds.
N-2	To help minimize construction noise effects to campers utilizing the Beals Point campgrounds, construction activities at Dike 6 would be limited to the construction noise exemption times specified by the City of Folsom Noise Ordinance (e.g. 7am to 6pm on weekdays, and 8am to 5 pm on weekends). In addition, no construction activities would be allowed at Dike 6 on weekends (Saturdays and Sundays). There could be limited exceptions to these requirements. Examples of potential exceptions include things such as emergency actions, corrective actions to ensure safety, transporting special equipment, etc. The construction contractor would first have to obtain Corps approval before performing construction work outside of the timeframes specified above.
N-3	Construction equipment noise would be minimized during project construction by muffling and shielding intakes and exhaust on construction equipment (per the manufacturer's specifications), and by shrouding or shielding impact tools.
N-4	All equipment, haul trucks, and worker vehicles would be turned off when not in use for more than 30 minutes.
N-5	Equipment warm up areas, water tanks, and equipment storage areas would be located as far from existing residences as is feasible.
N-6	Written notice of impending construction work would be provided to potentially-affected residences (typically those located with approximately 2,000 feet of proposed construction activities) at least 2 weeks prior to mobilization of a give project phase. These notices would identify the type, duration, and frequency of construction activities. Notification materials would also identify a mechanism to register complaints if construction noise levels are overly intrusive.
N-7	The contractor would measure surface velocity waves caused by equipment and monitor vibration up to a threshold value established and approved in writing by the Corps. There would be no vibration exceeding 0.2 inch per second. Such measurements would only be taken near residences and occupied buildings that could be adversely affected by excessive ground vibrations.
N-8	A 24-hour telephone hotline for noise complaints would be established by the construction contractor. Any complaint calls not answered at the time of the call would be returned within approximately 24 hours of their receipt, as long as the message left includes a call-back phone number.
N-9	Public meetings would be scheduled prior to construction of a given project phase to help ensure residents that may be affected by construction noise are informed of the project schedule and its potential effects.

ID #	DESCRIPTION
	WATER QUALITY & WATERS OF THE UNITED STATES
WW-1	Prior to construction of a given project phase, the contractor would be required to obtain a Construction General Permit (CGP; basically a National Pollutant Discharge Elimination System (NPDES) permit) from the Central Valley Regional Water Quality Control Board (CVRWQCB). This includes preparing a Stormwater Pollution Prevention Plan (SWPPP) and a Spill Prevention and Control Plan (SPCP) for approval by the Corps and CVRWQCB prior to initiating construction activities.
WW-2	Appropriate erosion control measures would be incorporated into the SWPPP by the construction contractor in order to prevent sediment from entering wetlands, waterways, and waterbodies, and to minimize temporary turbidity impacts. Examples include, but are not limited to: straw bales/wattles, erosion blankets, silt fencing, silt curtains, mulching, revegetation, and temporary covers. Sediment and erosion control measures would be maintained by the contractor during construction at all times. Control measures would be inspected periodically by the construction contractor, particularly during and after significant rain events.
WW-3	The contractor would use a water truck or other appropriate measures to control fugitive dust on haul roads, construction areas, staging areas, and stockpiles.
WW-4	A fuels spill management plan would be developed and implemented for the project by the construction contractor.
WW-5	Construction equipment and vehicles would be fueled and maintained in specified staging areas only, which would be designed to capture potential spills. These areas cannot be near any ditch, stream, river, or other body of water or feature that may convey water to a nearby body of water or wetland.
WW-6	Fuels and hazardous materials would not be stored on site, unless otherwise approved by the Corps and such substances are stored in areas designed to contain leaks and spills. Any spills of hazardous material would be cleaned up immediately by the construction contractor.
WW-7	Construction vehicles and equipment would be inspected frequently and appropriately maintained by the construction contractor to help prevent dripping of oil, lubricants, or any other fluids.
WW-8	Construction activities involving removal (excavation) of material from the dikes, RWD, LWD, or MIAD as well as placement of material on these same features would be scheduled by the contractor to avoid as much of the wet season as practicable in cases where these activities may occur below the ordinary high water elevation of Folsom Lake.
WW-9	Construction personnel would be trained in stormwater pollution prevention practices by the construction contractor.
WW-10	In areas proposed for revegetation, initiation and completion of revegetation work would be done by the contractor in a timely manner to control erosion.
WW-11	If raising of the dikes or MIAD require removal or placement of riprap below the ordinary high water elevation in Folsom Lake, the Corps would obtain a Clean Water Act Section 401 Water Quality Certification (WQC) from CVRWQCB prior to starting such construction activities.
WW-12	The construction contractor would be required to implement and/or adhere to applicable conditions and requirements set forth in the CGP and, if applicable, the Section 401 WQC.
WW-13	The contractor would be required to properly dispose of oil and similar potential pollutants, including hazardous wastes, off-site in a duly licensed facility.

ID #	DESCRIPTION
WW-14	The construction contractor would be required to abide by the following restrictions pertaining to the use of construction staging areas that extend into Folsom Lake: (1) Use must first be approved in writing by the Corps; (2) Use is strictly prohibited when the area is inundated by standing water or the water table underlying the staging area is within 6 inches of the soil surface; (3) Topographic alterations, including grading, excavation, or deposition of fill materials, are prohibited; (4) Clearing or removal of existing vegetation is prohibited; (5) Stockpiling of construction materials or wastes is prohibited; (6) Fueling of construction equipment or vehicles is prohibited; (7) Storage of fuel, hazardous wastes, or other potential pollutants is prohibited.
WW-15	Corps environmental staff would conduct new jurisdictional determinations (e.g. field mapping and classification of jurisdictional Waters of the United States; WOUS) prior to finalizing design plans for a particular project phase. The design plans would then be refined, if necessary, to ensure construction of the project phase would not necessitate direct impacts (e.g. placement of fill, excavation, land clearing) to any jurisdictional wetlands or watercourses. The contractor would be required to protect all such features located within or immediately adjacent to the project limits of construction. Such protection would include the installation of temporary physical barriers, such as orange mesh fencing adjacent to the boundaries of the wetlands and/or watercourses.
WW-16	That portion of the temporary Park Road detour road that passes through Folsom Lake would be constructed when the affected lake area is not inundated, if feasible. All of the temporary Park Road detour road would be completely removed upon completion of the 3.5-foot raise of Dikes 1 through 3 and lands disturbed by construction of the road would be restored by the construction contractor to mimic pre-construction conditions. Disturbed topography would be restored to approximately match the topography present prior to detour construction. Once topographic restoration is completed, natural areas disturbed by detour construction would be planted with a mixture of native grasses and forbs.
WW-17	During construction of the Tainter gates refinements phase of the proposed project, the construction contractor would be required to abide by the following requirements in accordance with 29 CFR 1926.62 “Lead”, and 8 CCR 1532.1 “Lead”: (1) Lead dust on surfaces, especially in eating areas, must be controlled by HEPA vacuuming, wet cleanup, or other effective methods; (2) Workers must have washing facilities with soap and clean water; (3) Workers must receive training on lead hazards and how to protect themselves; (3) Develop a written compliance program, approved by the Corps, to assure control of hazardous lead exposures; (4) Assess the amounts of lead breathed by workers and provide workers with appropriate respirators (if warranted based on air sampling results and medical monitoring results).
	CULTURAL RESOURCES
CR-1	While there would be no adverse effects to historic properties, if any archeological deposits or other potential historic properties are found during project activities, work would be stopped pursuant to 36 CFR § 800.13(b) to determine the significance of the find and, if necessary, complete appropriate discovery procedures.
	MISCELLANEOUS
M-1	Upon or near completion of construction of the overall Folsom Dam Raise project, a revised Water Control Manual (WCM) would need to be prepared for the Folsom Dam facilities (main dam, auxiliary spillway, dikes, LWD, RWD, MIAD) in order to best realize the benefits provided by this project. The Corps, in coordination with DWR, SAFCA, and USBR), would prepare a supplemental joint NEPA/CEQA document to address and evaluate the potential effects of implementing the revised WCM. This document would be finalized and approved prior to implementation of the revised WCM.

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ACRONYMS & ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
APE	Area of Potential Effects
ARB	California Air Resources Board
BA	Biological Assessment
BMPs	Best Management Practices
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CCAO	Central California Area Office
CCTS	Central California Taxonomic System
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CMU	Concrete Masonry Unit
CNDDB	California Natural Diversity Database
Corps	U.S. Army Corps of Engineers
CSUS	California State University, Sacramento
CVFPB	State of California Central Valley Flood Protection Board
CVP	Central Valley Project
CWA	Clean Water Act
DDR	Design Documentation Reports
DPM	Diesel Particulate Matter
DPR	California Department of Parks and Recreation
DSEIS/EIR	Draft Supplemental Environmental Impact Statement/Environmental Impact Report
DWR	California Department of Water Resources
EDR	Engineering Documentation Report
ESTG	Emergency Spillway Tainter Gates
EWDAA	Energy and Water Development Appropriations Act
FHWA	Federal Highway Administration
FLSRA	Folsom Lake State Recreation Area
FRM	Flood Risk Management
GHG	Greenhouse Gas
GIS	Geographic Information System
HAP	Hazardous Air Pollutant
HCM	Highway Capacity Manual
HCP	Habitat Conservation Plans
HTRW	Hazardous, Toxic, and Radioactive Waste
ITE	Institute of Transportation Engineers

JFP	Joint Federal Project
kV	kilovolt
kW	kilowatts
LOS	Level of Service
LWD	Left Wing Dam
MBTA	Migratory Bird Treaty Act
MIAD	Mormon Island Auxiliary Dam
MPO	Metropolitan Planning Organization
MSE	Mechanically-Stabilized Earthen
NAAQS	National Ambient Air Quality Standards
NCCP	National Community Conservation Plans
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Naturally Occurring Asbestos
NOx	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
PACR	Post Authorization Change Report
PG&E	Pacific Gas and Electric Company
PMF	Probable Maximum Flood
ROD	Record of Decision
ROG	Reactive Organic Gases
RWD	Right Wing Dam
RWQCB	Central Valley Regional Water Quality Control Board
SACOG	Sacramento Area Council of Governments
SAFCA	Sacramento Area Flood Control Agency
SIP	State Implementation Plans
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMUD	Sacramento Metropolitan Utility District
SPCP	Spill Preventions and Countermeasure Plan
SVAB	Sacramento Valley Air Basin
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	Toxic Air Contaminants
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
USBR	U.S. Bureau of Reclamation
USEPA	U. S. Environmental Protection Agency
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VELB	Valley Elderberry Longhorn Beetle
WAPA	Western Area Power Administration
WCM	Water Control Manual

CHAPTER 1.0 - INTRODUCTION

This document is a joint supplemental environmental impact statement/environmental impact report (SEIS/EIR) prepared by the U.S. Army Corps of Engineers (Corps), Sacramento District as the Federal Lead Agency under the National Environmental Policy Act (NEPA) and the State of California Central Valley Flood Protection Board (CVFPB) as the State Lead Agency under the California Environmental Quality Act (CEQA). The Sacramento Area Flood Control Agency (SAFCA) and the CVFPB are the Non-Federal sponsors for the proposed Folsom Dam Raise project, and are also considered as being "cooperating agencies" under NEPA. The U.S. Bureau of Reclamation (USBR) owns and manages the land where the proposed project would be located and is considered as being a "participating agency" under NEPA.

This SEIS/EIR is a supplement to the 2007 Final EIS/EIR for the Folsom Dam Safety and Flood Damage Reduction Project (2007 EIS/EIR) prepared by the U.S. Bureau of Reclamation (USBR). This SEIS/EIR has been prepared to evaluate the potential environmental impacts of the alternatives proposed in the Folsom Dam Raise project. This document evaluates project alternatives and includes mitigation measures to reduce, minimize, or avoid, where feasible, any significant and potentially significant adverse impacts. All figures cited herein are provided in Chapter 9.

1.1 Authorization

There are several authorizations that have led to this SEIS/EIR. They include:

- Section 209 of the Flood Control Act of 1962 (Pub. L. No. 87-875, § 209, 76 Stat. 1180, 1196-98 (1962)), authorizes studies for flood control in northern California. This is the basic authority for the Corps to study water resource related issues for the American and Sacramento Rivers.

- 1996 Water Resources Development Act (WRDA) (Pub. L. No. 104-303, § 101(a)(1), 110 Stat. 3658, 3662-3663 (1996)): Congress authorizes levee improvement features common to all three plans in the *1996 American River Watershed Project, California, Supplemental Information Report* (1996 SIR). The 1996 SIR described multiple alternative plans, of which certain levee and other flood system improvements were "common" to all alternatives: "Common Features."

- 1999 WRDA, Section 101(a) (6) (Pub. L. 106-53, § 101, 113 Stat. 274 (1999)) authorizes the Folsom Modification Project (modified river outlets), as identified in the 1996 SIR.

- 2004 Energy and Water Development Appropriations Act (EWDAA), Section 128 ((Pub. L. No. 108-137, § 128, 117 Stat. 1838, (2003)) authorizes a 7-foot raise of Folsom Dam (including replacement of 8 spillway Tainter gates), based on the recommendations contained in the November 2002 Chief of Engineers Report in the Corp's 2002 Long Term Study Final Supplemental Plan Formulation Report.

- 2006 EWDAA, Section 128, (Pub. L. No. 109-103, §128, 119 Stat. 2259-2260 (2006)) 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. The Secretaries are authorized to expend funds for coordinated technical reviews, joint planning, and preliminary design activities.

- WRDA 2007, Section 3029 (b) (Pub. L. No. 110-114, §3029, 121 Stat. 1112 (2007)): Based on recommendations from the 2007 Post Authorization Change Report (PACR), the Folsom Dam Raise and Folsom Modification Projects were revised to include the Joint Federal Project (JFP) auxiliary spillway.

1.2 Project Location

The project is located in the area surrounding Folsom Lake that falls within Placer, El Dorado, and Sacramento Counties (Figure 1-1). The Folsom Dam and Reservoir (Folsom Lake) are located downstream from the confluence of the north and south forks of the American River. The area mainly consists of Federally-owned lands that are leased to and managed by the California Department of Parks and Recreation (State Parks). Key features addressed in this SEIS/EIR border the south and western sides of Folsom Lake and include Dikes 1 through 8, the Left Wing Dam (LWD), the Right Wing Dam (RWD), the Mormon Island Auxiliary Dam (MIAD), and the Main Dam, also referred to as Folsom Dam (Figure 1-2).

1.3 Background

Folsom Dam and Reservoir is located on the main stem of the American River approximately 29 miles upstream from the City of Sacramento. It is a multipurpose dam owned and operated by the Bureau of Reclamation (USBR) as part of the Central Valley Project (CVP). The Corps prescribes storage requirements for flood risk management purposes at the dam. Folsom Lake is a multiuse facility authorized for flood risk management, fish & wildlife, water quality, water supply, hydroelectricity, recreation, and navigation. However, it is primarily operated to maximize flood risk management and water supply benefits.

The Folsom Dam and Appurtenant Facilities (Folsom Facilities) consist of four dams (Main Concrete Dam, MIAD, RWD, LWD), and 8 dikes (Dikes 1 through 8), which impound flows on the American River, forming Folsom Lake (Figure 1-2). Folsom Lake has a capacity of 977,000 acre-feet with a surface area of 11,450 acres. The maximum sustained flood control release that can currently be safely conveyed by the downstream channel is 115,000 cubic feet per second (cfs), however, the proposed project is being designed with the assumption that, with the construction of the American River Watershed Common Features GRR, the downstream levees have been improved to safely convey as much as 160,000 cfs.

Folsom Dam was originally authorized in 1944 for flood control, but was reauthorized in 1949 as a multi-purpose facility. The Corps constructed Folsom Dam and transferred it to USBR for coordinated operation as an integral part of the Central Valley Project (CVP). Construction of the dam began in October 1948 and was completed in May 1956. Water was first stored in February 1955. In the Energy and Water Development Appropriations Act (EWDAA) of 2004, Congress authorized a plan to raise Folsom Dam; the Folsom Dam Raise Project, including raising Folsom Dam by 7 feet, modifying the spillway, constructing a bridge downstream from Folsom Dam, and modifying the emergency release operations to permit surcharge. This would provide flood benefits while also resolving certain dam safety issues associated with passing the probable maximum flood (PMF). The Folsom Dam Raise project and the Folsom Dam Modification Project were reevaluated together in the PACR for the American River Watershed Project, dated March 2007. This report resulted in the recommendation of a JFP auxiliary spillway at Folsom Dam (to be constructed jointly with USBR), a 3.5-foot dam raise (including emergency spillway gates, the reservoir dikes, and three ecosystem restoration projects). This automates/reconfigures the temperature control shutters at Folsom Dam and restores the Bushy and Woodlake sites downstream. Under the original authorized plan, the main concrete dam, the RWD and LWD, MIAD, and Dikes 1 through 8 would be raised 7 feet, adding approximately 93,000 acre-feet of flood storage capacity to the reservoir. In addition, the five main dam service Tainter gates and the three main dam emergency Tainter gates would be replaced.

Since the work authorization of emergency spillway gates in the 2007 PACR, USBR completed structural improvements to the existing service and emergency Tainter gates, as well as the spillway piers in 2011. In light of these improvements, emergency gate refinements have been developed in lieu of complete gate replacements. As a result, in 2013, an Engineering Documentation Report (EDR) was developed to support a variation to the emergency spillway gate replacement concept.

Additionally, a series of Design Documentation Reports (DDRs) are being developed to determine the designs for increasing the height of Folsom dikes, MIAD, LWD, and RWD by 3.5 feet. It is anticipated the DDRs for all of the engineering designs would be completed by 2018. The 3.5-foot raise was not fully designed in the 2007 PACR, nor was a full environmental analysis completed in the associated 2007 EIS/EIR. Therefore, additional design documentation was determined to be necessary and this SEIS/EIR is being prepared to fully disclose revised project alternatives and updated project-related effects of the proposed Folsom Dam Raise project.

The primary objectives of the overall Folsom Dam Raise project are; (1) flood risk management, (2) ecosystem restoration, and (3) construction of a permanent bridge downstream of Folsom Dam, which was completed in 2009. The Dam Raise project has been prioritized with the first phase on the main dam Tainter gates portion of the 3.5-foot raise. The beginning of construction is estimated to be in late 2018, which would be after the completion of the Joint Federal Project (JFP) in late 2017. The JFP includes construction of an auxiliary spillway consisting of an approach channel, a six Tainter gate control structure, and a chute and stilling basin. Design on the remaining phase of the overall Dam Raise project (e.g., the ecosystem restoration component) would begin after construction of the dam raise features. A supplemental NEPA/CEQA document would be prepared for the ecosystem restoration component.

1.4 Project Purpose and Need for Action

Purpose

The purpose of the Folsom Dam Raise project is to reduce flood risk to the Sacramento area. The authorized top of flood pool would remain at reservoir water surface elevation 468.34 feet NAVD 88. Affixing top seal bulkheads over the emergency gates would allow higher flood pools across the spillway, adding flood damage reduction benefits while still safely passing the PMF without overtopping the Tainter gates. With added operational flexibility and enhanced management of the enlarged flood storage capacity (in the form of surcharge), flood damage benefits are realized with delayed operation for the emergency gates and prolonged outflows at or below the 160,000 cfs threshold for more infrequent events up to a 1/240 year storm event (the authorized objective).

There would be no immediate changes in normal operations with the construction of the dam raise; however, the raise would result in the ability to sustain an increased flow of 160,000 cfs for an extended period (as defined by the Emergency Spillway Release Diagram in the Water Control Manual), and could have possible inundations up to 486.34' (NAVD88). The Dam Raise project could eventually offer increased operational flexibility given the greater surcharge zone and ability to delay operation for the emergency gates and prolonged outflows at or below the 160,000 cfs threshold; however any new operations that might occur as a result of the Dam Raise would be dependent upon an updated WCM that accounts for both the new auxiliary spillway (Folsom JFP) and the Dam Raise project.

Need

Sacramento is identified as one of the most at-risk communities in the nation for flooding. Therefore, there is a need to reduce this risk through numerous flood damage reduction measures. The existing system leaves the highly urbanized Sacramento area at an unacceptably high level of flood risk.

The initial need for increased flood protection in Sacramento was realized when major storms in northern California in 1986, and again in 1997, caused record flood flows in the American River watershed. Outflows from Folsom Dam, together with high flows in the Sacramento River, caused the river stages to exceed the designed safety margin of levees protecting the City of Sacramento. If these storms had lasted much longer, major sections of the levee would likely have failed, causing probable loss of human life and billions of dollars in damages.

The effects of the 1986 and 1997 storms raised concerns over the adequacy of the existing flood risk management system. This led to a series of investigations on the need to provide additional protection for the Sacramento metropolitan area. The results of these investigations led to authorization of several flood risk management projects in the American River watershed, including the Folsom Dam Raise project.

With the construction of the Joint Federal Project, the current storage capacity of the reservoir does allow for passing the PMF. However, the current crest elevation of the reservoir dikes and embankment dams would not provide sufficient freeboard to meet design criteria for resisting wave height and wave run-up[1]. A large enough flood event could cause the current dikes and/or embankment dams to sustain enough damage as to cause failure or overtop.

1.5 Purpose of the SEIS/EIR

Construction of the Folsom Dam Raise project is considered to be a major Federal and State project subject to compliance with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), respectively. Because the proposed action has the potential to significantly affect the quality of the human environment, the Corps and the Central Valley Flood Protection Board (CVFPB) through the California Department of Water Resources (DWR) have prepared this joint Supplemental Environmental Impact Statement/ Environmental Impact Report (SEIS/EIR) to satisfy the environmental evaluation and review requirements of these two laws.

This SEIS/EIR: (1) describes the development and features of the alternatives; (2) discusses the environmental resources in the local and regional project areas; (3) evaluates the direct, indirect, and cumulative effects and significance of the alternatives on these resources, and; (4) proposes best management practices and mitigation measures to avoid or reduce any effects to less than significant, when possible. The type and extent of any effects that cannot be reduced to less than significant are identified so that decision-makers can consider the trade-offs of implementing the proposed action.

1.5.1 National Environmental Policy Act

NEPA provides an interdisciplinary framework for Federal agencies to develop information that would help them to take environmental factors into account in their decision-making (42 U.S.C. § 4321 *et seq*. and 40 C.F.R. § 1500.1 *et seq.*) To comply with NEPA, an EIS is required whenever a proposed major Federal action may result in significant effects on the quality of the natural and human environment (42 U.S.C. § 4332[2] [C]; 40 C.F.R. § 1508.18[a]). Additionally, in accordance with 40 C.F.R. § 1502.9[i] [ii], the Federal agency must prepare a supplement to either draft or final EIS documents when relevant, substantial changes in the proposed action occur or significant new circumstances or information relevant to environmental concerns are realized.

It is noted that under NEPA, the term “mitigation” is very broad and includes: avoidance measures (avoiding an impact completely); minimization measures (reducing or limiting the degree or magnitude of an impact); measures to rectify an impact (by restoring, rehabilitating, or repairing the affected environment), and; measures to reduce or eliminate an impact over time (by preservation and maintenance operations during the life of a proposed project or action). As used in this SEIS/EIR, the term mitigation is sometimes used in a broad way in that it refers to measures to avoid impacts, minimize impacts, or compensate for unavoidable impacts that cannot be further minimized. However, it is also common to separately mention avoidance, minimization, and mitigation measures. In such cases, mitigation measures frequently refer to proposed activities that serve to compensate for

[1] Wave run-up is the maximum vertical extent of wave uprush on a beach or structure above the still water level.

unavoidable adverse impacts; for example, purchasing credits from a conservation bank or restoring oak woodland habitat. When addressing the proposed project (the preferred alternative) this SEIS/EIR attempts to set forth all practicable measures (activities) that would help avoid adverse impacts altogether, help minimize unavoidable adverse impacts, and, when necessary, compensate (mitigate) for unavoidable adverse impacts that cannot be further minimized.

1.5.2 California Environmental Quality Act

According to the State CEQA Guidelines (14 CCR Section 15064[f] [1]), preparation of an EIR is required whenever a project may result in a significant environmental impact. An EIR is an information document used to inform public agency decision makers and the general public of the significant environmental effects of a project; identify possible ways to mitigate, reduce, or avoid the significant effects; and describe a range of reasonable alternatives to the project that can feasibly attain most of the basic objectives of the project while substantially lessening or avoiding any of the significant environmental impacts. Public agencies are required to consider the information presented in the EIR when determining whether to approve a project. The Corps and the CVFPB intend to use this SEIS/EIR in their decision making (per 15124(d) (1)(A).

CEQA requires that state and local government agencies consider the environmental effects of projects of which they have discretionary authority before taking action on those projects (California Public Resources Code [PRC] Section 21000 et seq.) CEQA also requires that each public agency avoid or reduce to less-than-significant levels, whenever feasible, the significant environmental effects of the project it approves or implements. If a project would result in significant environmental impacts that cannot be feasibly mitigated to less-than-significant levels, the project can still be approved but the lead agency's decision makers must issue a "statement of overriding considerations" explaining, in writing, the specific economic, social, and/or other considerations that they believe, based upon substantial evidence, make significant and unavoidable effects acceptable.

Permits and approvals required to implement to project can be found in Chapter 5.0 of this document, along with consultation requirements mandated by federal, state, or local laws, regulations or policies.

1.6 Related Documents and Resources Relied on in Preparation of the SEIS/EIR

In 2002, the Corps, along with the CVFPB and SAFCA, completed the American River Watershed Long-Term Study Final Supplemental Plan Formulation Report EIS/EIR (LTS EIS/EIR), which analyzed the environmental impacts of a 7-foot dam raise. There was no Record of Decision (ROD) for this analysis. In 2007, the Folsom Dam Raise was reevaluated in the PACR and the associated Folsom Dam Safety/Flood Damage Reduction EIS/EIR (2007 EIS/EIR), which recommended the replacement of the three emergency spillway gates and a 3.5-foot raise, as well as various other Folsom projects.

Although the environmental analysis of the Folsom Dam Raise is generally covered in the 2007 EIS/EIR, it was not fully designed at that time and a complete environmental analysis was not completed. Additionally, the project was not covered by the 2007 ROD. The PACR states "It is important to note that the effects associated with the authorized Corps projects (Folsom Modification and Folsom Dam Raise projects) are the impacts identified in the original environmental documents for those projects, and impacts are not updated to a current assessment." Therefore, the majority of the Dam Raise analysis in the 2007 EIS/EIR is based on the 2002 LTS EIS/EIR and the description, evaluation, and analysis are outdated and incomplete. The current SEIS/EIR is being prepared to fully disclose revised project alternatives and updated project-related effects.

1.7 Significant Issues

Significant issues identified as areas of controversy by agencies and the public related to construction of the 3.5-foot dam raise, the spillway gate modifications, 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.

- Construction is expected to temporarily increase noise levels, affecting local recreationists and adjacent residents, even under circumstances of compliance with the City of Folsom noise ordinances.
- Construction is expected to result in temporary but significant degradation of recreational experiences in and adjacent to the project area. Noise, visual aesthetics, and access would be compromised during construction years 2018 to 2022.
- Both the public and various agencies indicated a greater interest and concern about how Folsom Dam and the JFP auxiliary spillway would be operated following completion of the Folsom Dam Raise project, compared to their concerns regarding construction of the Dam Raise project itself.

1.8 Application of NEPA and CEQA Principles and Terminology

NEPA and CEQA are similar in that both laws require the preparation of an environmental study to evaluate the environmental effects of proposed activities. However, there are several differences between the two regarding terminology, procedures, content of documents, and substantive mandates to protect the environment. NEPA language is primarily used in this document but can be interchanged with CEQA language. In some cases in this document, both NEPA and CEQA terminology are used, as in Chapter 1 where the project purpose, need, and project objectives are discussed. Table 1-1 below compares general terminology of NEPA and CEQA for common concepts.

Table 1-1. Comparison of general NEPA and CEQA terminology.

NEPA Term	Correlating CEQA Term
Lead agency	Lead agency
Cooperating agency	Responsible agency
Environmental Impact Statement	Environmental Impact Report
Record of Decision	Notice of Determination
Preferred alternative	Proposed project

NEPA Term	Correlating CEQA Term
Project purpose	Project objectives
No Action alternative	No Project alternative
Affected environment	Environmental setting
Effect/Impact	Impact

1.9 Organization of the SEIS/EIR

The content and format of this SEIS/EIR is designed to meet the requirements of NEPA as set forth by the CEQ and the Corps' NEPA policy and guidance, and by the CEQA and the State CEQA Guidelines. The SEIS/EIR is organized as follows:

- The Executive Summary abridges the purpose and intended uses of the SEIS/EIR, lead agencies, project location, project background and phasing, need for action, and project purpose/objectives. It presents an overview of the proposed alternatives under consideration, as well as the major conclusions of the environmental analysis while documenting the known areas of controversy and issues to be resolved. It includes a brief summary of the proposed project's potential environmental impacts, a significance determination concerning these impacts, and a table that identifies all proposed mitigation measures and related environmental commitments.

- Chapter 1 explains the NEPA and CEQA processes; lists the lead, cooperating, and responsible agencies that may have discretionary authority over the project, including non-Federal Sponsors; specifies the underlying project purpose/objectives and need for action that the lead agencies are responding to in considering the proposed project and project alternatives; and outlines the organization of the document.

- Chapter 2 presents the proposed alternatives under consideration. This chapter constitutes the project description and describes the components for each action alternative as well as the No Action Alternative. This chapter also describes alternatives considered but eliminated from further consideration and provides a summary matrix that compares the environmental consequences of the alternatives under consideration.

- Chapter 3 describes the baseline or existing environmental and regulatory conditions. It provides an analysis of the impacts of each alternative under consideration, and identifies mitigation measures that would avoid/reduce/eliminate significant impacts to less-than-significant levels, where feasible. In addition, compensation is discussed for significant, adverse effects that cannot be reduced to a less than significant level.

- Chapter 4 describes the cumulative impacts of the project when combined with other past, present, and reasonably foreseeable future projects within the study area. In addition, it analyzes the growth-inducing impacts of the proposed action. The remainder of the chapter includes the requirements of NEPA and CEQA that are not addressed elsewhere in this SEIS/EIR such as the relationship between short-term uses of the environment and long-term productivity, significant and unavoidable environmental impacts, and irreversible and irretrievable commitments of resources.

- Chapter 5 summarizes Federal and State laws and regulations that apply to the project and describes the project's compliance with them, and also summarizes required permits, approvals, and authorizations

- Chapter 6 summarizes public involvement activities under NEPA and CEQA; Native American consultation; and coordination with other Federal, state, regional, and local agencies. A list of elected officials and representatives as well as government departments and agencies receiving a copy and/or notice of this SEIS/EIR is also included.

- Chapter 7 lists the various people who were involved in preparing this document.

- Chapter 8 provides a bibliography of sources cited in this SEIS/EIR.

- Chapter 9 contains the various figures cited in the main body of this SEIS/EIR.

- Appendices contain background information that supports this SEIS/EIR, including comments received during the public review period for the SEIS/EIR and responses to substantive comments (see Appendix H).

CHAPTER 2.0 - ALTERNATIVES

2.1 Introduction

The Folsom Dam Raise project plan formulation process is discussed in Chapter 4.0 of the 2002 Long Term Study, Plan Formulation and Screening of the Flood Damage Reduction Measures, in Chapter 5.0 of the Flood Control Alternatives, and in Chapter 6.0 of the Ecosystem Restoration for Flood Plain and Fisheries Resources.

2.1.1 Alternative Formulation and Screening

American River Watershed Long-Term Study, 2002

The purpose of the Long-Term Study is to address the residual flood risk remaining once the Folsom Dam Modification project is completed. The Long-Term Study evaluated an array of flood risk management (FRM) alternatives that included dam raises ranging from 3.5 to 12 feet. The study determined that a 7.0-foot raise of Folsom Dam that provided both additional FRM and dam safety[2] would be the most optimal economic solution, exclusive of the Detention Dam alternative.

Congress, through the Energy and Water Development Appropriations Act for Fiscal Year 2004, authorized several project features which were recommended by the Long-Term Study; raising Folsom Dam by 7 feet, modifying the L.L. Anderson Dam spillway, constructing a permanent bridge

[2] Dam safety in this instance refers to enabling the dam facility to pass one-hundred probable percent of the maximum flood, or PMF.

downstream from Folsom Dam, and modifying the emergency release operations to permit surcharge. At the time, this project was estimated to reduce the risk of flooding to about a 1 in 175 chance. Two project components of the 2002 Long-Term Study, the 3.5-foot dam raise and the 7.0-foot dam raise, were also evaluated in the 2007 PACR, which is described below.

American River Watershed Post Authorization Change Report, 2007

The purpose of the 2007 PACR is to document changes to two authorized projects: the Folsom Dam Modification Project and the Folsom Dam Raise Project. Both projects share an objective of improving flood risk management on the Lower American River, primarily through structural modifications to the existing Folsom Dam. In the 2007 PACR, project elements from both the Folsom Dam Modification Project and the Long-Term Study were considered not only for the purpose of flood risk management but also for dam safety. During the design refinements for Folsom Dam Modification Project, it was believed that due to significant increases in the cost estimates, the authorized project may not be optimal or even economically feasible. During this preliminary analysis, it appeared that adding operational gates to the proposed USBR dam safety auxiliary spillway would provide a more efficient way to meet two project purposes. The Folsom Joint Federal Project (JFP) is intended to meet the goals of the Corps as well as the USBR; its analysis became one of the main focuses of the 2007 PACR which evaluated a final array of four action alternatives shown in Table 2-1 below. Alternative C was the recommended plan and included a six-submerged Tainter gate auxiliary spillway, a 3.5-foot dam raise, and three emergency spillway gate replacements.

Table 2-1. 2007 PACR Final Array of Action Alternatives.

Alternative	Features
A	Eight Main Dam Outlets, Fuse Plug Spillway
B	A Six-Submerged Tainter Gate Auxiliary Spillway
C	A Six-Submerged Tainter Gate Auxiliary Spillway, 3.5’ Dam Raise, 3 Emergency and Service Spillway Gate Replacements
D	A Six-Submerged Tainter Gate Auxiliary Spillway, 7’ Dam Raise, 8 Emergency and Service Spillway Gate Replacements

Future Without Project Conditions

The future without project condition would be the most likely condition expected to exist in the future without a proposed Federal water resources project. While all the alternatives considered in this SEIS/EIR must be compared to existing conditions, the future without project condition constitutes the benchmark against which these alternatives must be compared for Federal planning purposes. Other adopted plans in the planning area and local planning efforts with high potential for implementation or adoption are considered as part of the forecasted without project condition. Under the future without project condition, neither the modifications to the spillway gates nor the 3.5-foot dam raise would be implemented, nor would the associated improved flood risk management benefits be possible.

Under the future without project condition, construction activities necessary to complete the Folsom Dam Raise project would not occur. As discussed in Chapter 3, these construction activities would result in temporary adverse impacts to various elements of the human environment including recreation, vegetation, wildlife, listed animal species, air quality, aesthetics/visual resources, traffic, noise, water quality, and Waters of the United States. There would be no such impacts under the future without project condition since the Dam Raise project would not be built. Under this scenario, it is likely that future construction activities would be necessary to perform general maintenance of the existing Folsom Facilities (main dam, LWD, RWD, MIAD, dikes, auxiliary spillway) and such work would result in some temporary adverse impacts to the human environment. However, it is not possible to estimate the magnitude and intensity of these future effects or when they might occur.

Completion of the Dam Raise project is a prerequisite for modifying the WCM for Folsom Dam to take advantage of the additional reservoir (Folsom Lake) surcharge volume that would be provided by the Dam Raise project. There is no doubt that the WCM would be modified in the future to account for this new surcharge space in order to accomplish the stated goal of the Dam Raise project, i.e. flood risk reduction. If the Dam Raise project is not constructed (the future without project condition), then it would also not be possible to revise the WCM in a manner that further reduces downstream flood risks. Without this reduction in flood risk, significant loss of life is expected with a great enough flood event, or PMF, as well as injuries, illnesses, and the release of hazardous and toxic contaminants to the downstream floodplain. Post-flood debris clean-up, repairs, and recovery could be a major undertaking. Additionally, infrastructure, such as transportation corridors and power and water supplies, would be incapacitated. The economic impact of the restricted movement of people and goods across the region, the emergency costs associated with evacuation, and all the emergency services associated with such an event would be huge.

The following general assumptions have been made in regard to the future without project condition for this study:

- In 2017, the JFP auxiliary spillway at Folsom Dam would be completed. A new water control manual would be adopted following completion of the auxiliary spillway in order to account for the benefits provided by this new water control structure. This includes a 400,000 acre-feet to 600,000 acre-feet (400/600) variable flood space operation that takes incidental storage space in upstream reservoirs into consideration when determining flood storage requirements at Folsom Dam during the flood season. The JFP would allow dam operators to release larger quantities of water at lower reservoir stages and more efficiently utilize flood space in the reservoir. Operation of the JFP is to some degree dependent on the American River levees downstream of the dam being able to safely pass the objective release of 160,000 cfs. At the time of the 2007 PACR, assumptions were made based on the available information that the downstream improvements authorized by WRDA 1996 and 1999 would be in place and allow for the safe passage of the objective releases identified in the 2007 PACR. However, as noted in the 2007 PACR, an erosion study of the downstream channel was needed to provide more information on this subject. Results of this erosion study identified the need for additional erosion protection. Therefore, erosion protection to these levees would enable more optimal operation of the JFP.

- The levee modifications recommended in the 2010 Natomas Post Authorization Change Report (PACR) and authorized by WRRDA 2014 (Pub. L. No 113-121) are assumed to be in place, which improve the levees surrounding the Natomas Basin but do not include levee raises to address higher volume, low frequency flows.

- The elements of the American River Common Features project, as authorized by WRDA 1996 and WRDA 1999, are assumed to be in place. These features addressed the levee seepage and stability concerns along the American River but do not address the erosion risk.

2.1.2 Measures and Alternatives Considered but Eliminated

Some measures originally identified that could contribute to addressing the Folsom dam raise were reviewed and dropped from further consideration. These measures, which are described in the subsections below, include a skin plate extension, a horizontal top seal in order to refine the Tainter gates, an earthen raise of the dam and dikes, dredging to lower the reservoir bottom, a Concrete Masonry Unit (CMU), or a Mechanically-Stabilized Earthen (MSE) cap to raise the dam. Variants of Tainter gate refinement and the 3.5-foot dam raise alternative remains the common element between all alternatives and are the primary focus of the remaining alternatives detailed in Sections 2.1.2.1 through 2.1.2.10 below.

2.1.2.1 Reduce the Stop Log Fabrication and Installation from Two Sets to Zero New Sets; Utilize Existing Set

The Folsom Dam Tainter gate upgrade includes the fabrication of two new sets of stop logs in order to complete construction within one year, a relatively short construction window. There already exists a set of stop logs which meet the height requirements. However, with the JFP auxiliary spillway expecting completion in 2017, there is a 3-year window for the Folsom Dam Tainter gate upgrades to be constructed. The Corps would reduce the quantity of acquired stop log sets to zero and consequently extend the construction period to 3 years. This alternative essentially recommends the re-use of existing stop logs to meet upgrade requirements.

The advantages to this alternative are:

- Reduces risk of trying to complete all work within a one year construction window, the failure of which would result in cost overruns and potential reduction in release capacity during late calendar year conditions of rising pool elevation.
- Shifting costs from additional and unnecessary sets of stop logs to that of an additional two sets of mobilization and demobilization costs.
- Space constraints on the site make completing multiple gates at once difficult, and the proposed design would alleviate this issue by essentially extending the period of performance.
- “Re-using” the existing stop log sets eliminates arguably wasteful spending.

The disadvantages include:

- Loss of flexibility of having two new sets of stop logs.
- Increased mobilization costs.

The justification for this alternative is, although mobilization costs would approximately triple, the reduction in project costs of a single, full set of stop logs is $2,876,309.57 each compared to the complementary increase in mobilization/demobilization project costs of $289,383.91. Incrementally, this proposal decreases end performance by 1/3 (3 sets reduced to 2) for each set of stop logs, and decreases costs by approximately 45%. In terms of incremental performance, the third set of stop logs is not justified without additional inputs or performance requirements that would place a higher value on the third set of stop logs over the first and second ones.

Overall, this alternative was rejected as two gates would need to be non-operational during the raise of the gate hoists, gear assemblies, motors and gantry way. Construction would move more efficiently if more than two gates are taken offline at a time; however, USBR does not see this as an option and requires that no more than two gates be offline at a time. Therefore, as USBR already has one set of stop logs, one additional set of new stop logs would be needed for the project.

2.1.2.2 Tainter Gate Refinement: Replacement of Emergency Tainter Gates

As the current authorized alternative per the 2007 PACR, this alternative would include the complete replacement of the existing three emergency spillway Tainter gates (ESTGs) with newly fabricated, larger Tainter gates (64.16-ft high, 54.5-ft radius). Trunnions would be elevated and relocated further downstream, requiring vertical and horizontal extension of existing piers, supplemental rock-bolts, and trunnion anchorage requirements, as well as new, elevated mechanical hoisting features and associated pier modifications. This alternative allows for the emergency gates to remain closed until the pool elevation approaches the PMF pool. A 2-foot partial gate opening would provide one foot of freeboard above PMF pool (483.34-ft NAVD 88).

This alternative was not carried forward for analysis, as the Alternative 2 (Section 2.3 below) was chosen based on achieving the same benefit as this alternative but with more flexibility in operations for less cost. Additionally, the horizontal top seal portion of this alternative raised significant concerns on ability to install, and it requires double the amount of steel.

2.1.2.3 Refined Emergency Gate Replacement

This alternative would include the complete replacement of the existing three emergency gates, with newly fabricated, larger Tainter gates (58.84-ft high, 48.33-ft radius). This alternative was developed based on hydraulic criteria that have been updated since the 2007 PACR. With the top of gate at elevation 478.34, operational requirements would require the emergency gates to open at a pool elevation of 476.34’. The gate geometry for this concept would not require extensive pier modifications such as those required for the PACR replacement concept.

While maintaining the same gate sill location as the existing Tainter gates, the slightly longer gate radius moves the trunnion further downstream but within the footprint of the existing pier geometry. This alternative would provide one foot of freeboard on the gates when the gates are fully open with a PMF pool. This option would also require new mechanical hoisting equipment to be elevated in order to keep motors above PMF elevation.

Similar to the alternative described above (2.1.2.2 Tainter Gate Refinement: Replacement of Emergency Tainter Gates), this was not carried forward for analysis since the Alternative 2 (Section 2.3 below) was chosen based on achieving the same benefit with more flexibility in operations for less cost.

2.1.2.4 Tainter Gate Refinement: Horizontal Top Seal

The Horizontal Top Seal refinement option is characterized by the main bulkhead, which spans horizontally across the emergency spillway bays. With the upper bulkhead and lower bulkhead, the "Horizontal Top Seal" would hold back water when pool elevation exceeds the top of the emergency Tainter gate.

The upper bulkhead would be comprised of I-beams while hangers would bear on the spillway bridge parapet and would be welded to the top of the upper bulkhead. The upper bulkhead would also rest on the stop log guide extension. The upper bulkhead would have clearance with the stop log extension, and thus would not restrain cross canyon movement of the piers. The upper bulkheads would seal against the stop log guide extension and the main bulkhead with J-bulb plastic seals. An elliptical skin plate extension would be connected to the bottom of the upper bulkhead to promote better hydraulic flow characteristics. The bolted connection would allow the skin plate extension to be added after both the main bulkhead and the upper bulkhead are in place. The exact shape of the skin plate extension would be determined by physical modeling by hydraulic engineers.

The lower bulkhead would be comprised of seal-welded, wide-flange I-beams. It would span across the spillway bay and be supported on top of the piers. Steel angles anchored on the pier faces would also support this feature. At the pier support, a low friction bearing pad would be installed to allow the lower bulkhead to move freely in the cross canyon direction. The lower bulkhead would have two hoist openings to allow for passage of the gate hoist chains. At each opening, a rubber seal would be installed to minimize leakage.

The horizontal top seal would address the emergency gates' hydraulic deficiency by allowing the gates to remain closed with pool elevation above the top of gate leaf. As for modifications needed to address the structural deficiency, the same gate modification for the Vertical Top Seal design would apply since the existing emergency Tainter gates were reused for both design refinements.

This alternative was rejected for several reasons, including:

- With possible controlled leakage through the horizontal top seal bulkhead, the hoist motor may need to be elevated to maintain dry operation.

- The geometry and location of the Horizontal Top Seal made this refinement option more complex and difficult to design. All the bulkheads can be shop fabricated, but their large size can complicate installation.
- The larger main bulkhead in the Horizontal Top Seal concept would likely be more difficult to install than the vertical bulkhead of the Vertical Top Seal concept. The Horizontal Top Seal refinement would have the same constructability challenge at the downstream pier nose due to limited work space.

2.1.2.5 Tainter Gate Refinement: Skin Plate Extension

This concept considered extending the skin plate to a height that met the new freeboard elevation. To accomplish this, the skin plate would have to extend on a tangent path approximately 24-feet long. This would require at least one additional rib support girder, an additional gate strut arm, and a completely redesigned/replaced trunnion assembly.

The heightened skin plate and added members would increase the gate weight, requiring larger hoists. Further, Tainter gate side seals typically seal against an embedded seal plate, in which the seal rubs along the arc of the gate as it is opened. The tangent section would not follow this arc and introduce transverse friction loads which side seals would not easily resist. The excessive wear induced on seals from transverse friction would also increase maintenance requirements. Pier modifications would likely be necessary to add extensive side seal plate embedment. These modifications were deemed excessive and, more significantly, transverse seal loading is not recommended or practiced in Tainter gate designs.

2.1.2.6 Dredging

Dredging as a viable solution was initially analyzed and screened out in the LTS EIS/EIR. The geology of Folsom Reservoir is rocky hills with a very thin (3-4 foot) soil veneer. The only major quantities of removable soil are found in the American River streambed, which is underwater most of the time. Thus, the removal would require soil and rock dredging which is expensive, and an environmentally and culturally damaging process. Because of its very high cost, this measure was not considered further and was not be considered in the current SEIS/EIR. The environmental effect of disposal is also very high due to potential mercury content and would further increase the cost.

2.1.2.7 The 3.5-Foot Dam Raise: Concrete Floodwall

The 3.5-foot dam raise/concrete floodwall alternative would consist of a cast-in-place, reinforced concrete wall located near the reservoir side of the crest of each of the dikes, the left and right wing dams, and MIAD. The existing access ramps crossing the dikes would be raised 3.5 feet to match the new concrete crest wall height. The 2007 PACR, with supporting engineering documentation report (EDR), authorized this alternative to raise these features by means of a concrete “crest-wall” (otherwise referred to as floodwall or parapet wall). This floodwall would be installed on the lakeside edge of the crest.

This alternative was not carried forward because of the potential recreation and environmental effects based on feedback from the public and environmental team. Additionally, the main engineering rationale supporting the embankment design was the geotechnical preference for similar and consistent materials. The concrete wall also has more susceptibility to seepage paths at concrete-soil interfaces.

2.1.2.8 The 3.5-Foot Dam Raise: Earthen Raise

This concept would raise all of the dams and dikes 3.5 feet through placement of fill derived from the auxiliary spillway excavation and/or from other borrow sources. It was rejected for the left and right wing dams due to space constraints associated with steeper embankment slopes compared to other reservoir dikes. There is inadequate space, particularly at the wing dam toes, at which an earthen fill would widen and conflict with existing project features and access.

2.1.2.9 The 3.5-Foot Dam Raise: Concrete Masonry Unit (CMU)

This alternative was rejected because reinforced CMU tend to crack more readily during earthquakes and other heavy movements. Additionally, CMU is not as effective at preventing water from seeping through and entering the landside. Reinforced concrete walls and/or an earthen raise in general would last longer than reinforced a CMU wall.

2.1.2.10 3.5-Foot Dam Raise: Mechanically-Stabilized Earthen (MSE) Cap

This alternative was not deemed feasible for several reasons. The primary concern is that the stress-strain differential between the anchors and soil material would cause a seepage path through the MSE wall. Further, the use of MSE for such a small height is not common and may further pose constructability challenges on the steep sloped, wing dam embankments. Another concern with the MSE concept is the vertical drop off on both upstream and downstream sides, which creates a safety risk or else requires additional guardrail features. Vertical alignment transitions would also be challenging at each end of the wing dams due to footprint limitations. The transitions would likely need a partial, water-stopped concrete flood wall tie-in to the MSE.

2.2 Alternative 1: No Action Alternative

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 the No Action Alternative, the Federal government would not implement the spillway gate modifications or the 3.5-foot raise, and the associated improved flood risk management benefits would not occur as also described in the Future Without Project Conditions. Since no other projects are currently planned that are similar or equivalent to the spillway gate modifications or the 3.5-foot raise, it would be speculative to assume that any work would occur absent the Corps project.

Under the No Action Alternative, significant loss of life is expected with a great enough flood event or PMF, as well as injuries, illnesses, and the release of hazardous and toxic contaminants to the downstream floodplain. The urban areas downstream of Folsom Dam would continue to be at risk of flooding, and lives would continue to be threatened. The gates and dam would be at risk for failure, threatening the levee system downstream with a surge of flow beyond the current 160,000 cfs levee capacity. If a dam or gate failure were to occur, the chance of levee failure downstream would increase. If a levee failure were to occur, major government facilities and transportation corridors would be impacted until flood waters recede. A temporary shut down or slowing of State and Local government functions would occur, and workers would be unable to perform their duties until the buildings are restored and can once again be occupied.

2.3 Alternative 2: Tainter Gate Refinements, Earthen Raise Elements, and Concrete Floodwall Elements (Proposed Project/Proposed Action/Environmentally Preferable Alternative)

Alternative 2, the proposed project, would consist of various activities that can be grouped into three main categories: refinements to the main dam's Tainter gates and related structural alterations to the main dam (termed the "Tainter gate refinements" element of the project); raising the effective crest (embankment) elevation of the existing earthen embankment dikes (Dikes 1 through 8) and MIAD (termed the "earthen raise" elements of the project), and; raising the effective crest elevation of the LWD and RWD through the addition of concrete floodwalls (termed the "concrete floodwall" elements of the project).

Proposed construction elements for Alternative 2 are discussed below in detail, beginning with the design elements of the Tainter gates, followed by the design elements of the 3.5-foot dam raise. While modification of all 8 gates (3 ESTGs and 5 service spillway Tainter gates (SSTG)) are analyzed in this document, the modification of the gates would be phased. Currently, the top seal would only be constructed on the emergency gates, while the modifications to the service spillway Tainter gates would occur at a later date.

The 3.5-foot dam raise elements are currently at a lesser level of general design development and analysis than are the Tainter gate refinements elements. Because of this, the descriptions of the dam raise elements are briefer than the descriptions of the Tainter gate elements. It is likely that supplemental design and environmental documentation will be required for certain components of the dam raise prior to construction.

O&M requirements for the elements constructed as part of Alternative 2 would initially remain as described in the current O&M manual and WCM. This is the condition evaluated in this SEIS/EIR. However, the raise would increase the flood storage capacity of the dam and reservoir up to elevation 486.34' (NAVD88) and would increase the flexibility of the discharge mechanisms of the Folsom Dam and its associated facilities, including the ability to sustain increased flows of 160,000 cfs for a longer period of time. Operating to take advantage of these flood risk management opportunities would require development of an updated WCM, which would require additional environmental analyses, documentation, and coordination.

2.3.1 Tainter Gate Refinements

The 2013 Engineering Documentation Report (EDR) identified refinements to the existing Tainter gates in lieu of the complete gate replacement originally proposed in the 2007 PACR. Refinements include additional strengthening features to the existing Tainter gates and a new "top seal" bulkhead that would prevent overtopping of the spillway gates during a major flood event.

The existing main dam has a total of 8 Tainter gates; 5 of the 8 Tainter gates are designated as "service gates" 1 through 5, while the remaining 3 Tainter gates are designated as "emergency gates" 6 through 8 (see Figures 2-1 and 2-2). Tainter gates are simply a type of flood gate (see Figure 2-3). In the case of the main dam, the Tainter gates are located near the crest (top) of the dam. These Tainter gates are opened to release water stored in Folsom Lake in order to create adequate flood storage upstream of the main dam. The main dam also releases water via outlet tubes near the bottom of the main dam, but these tubes do not provide sufficient discharge capacity to restore flood storage. The five service gates are typically opened to drain water from Folsom Lake, while the three emergency gates are generally left closed as long as possible to help minimize the velocity of discharges and the possible destruction of some of the dam's downstream features.

The proposed project would include replacing most of the components of the 3 emergency Tainter gates and reinforcing the 5 service Tainter gates. USBR's seismic retrofit of the Tainter gates did not account for some of the loading conditions imposed by Probable Maximum Flood (PMF) design load case. As such, some additional retrofit elements are necessary to address this (skin plate ribs, lower girder, and trunnion anchorages). Trunnions are large metal arms that connect to and support the Tainter gates, and function to open and close these gates (see Figure 2-2).

The "Tainter gate refinements" element of the proposed project would also include a variety of other structural changes/refinements to the main dam. These would include, but not be limited to:

- Constructing new "top seal" bulkheads to prevent overtopping of the Tainter gates during a major flood event. These hydraulic steel structures would be positioned immediately above the Tainter gates at their closed position, and would run horizontally, connecting to the dam's concrete piers. The top of the bulkheads would be at elevation 486.34 feet NAVD88. This is the elevation of the PMF (483.34 feet NAVD88) with an additional 3 feet of freeboard. The top seal bulkheads would also increase the height of the flood pool upstream of the dam that can be retained before the emergency Tainter gates must be opened.

- Constructing vertical concrete extensions to the 9 existing concrete piers (see Figures 2-1 and 2-2) in order to provide the necessary elevated platform for a new hoist system for the Tainter gates. The new top seal bulkheads would mount to and seal against the pier extensions.

- Installing a new hoist system to raise and lower the modified Tainter gates, replacing the existing hoist system. The new system would be installed to handle increased hydrostatic PMF loads, as well as the slightly heavier gates.

2.3.2 Earthen Raise Elements

The current crest elevations of the reservoir dikes (Dikes 1 through 8) and embankment dams (LWD, RWD, and MIAD) do not provide sufficient freeboard to meet Corps design criteria for resisting wave height and run-up. Accordingly, increasing the height of all reservoir dikes and embankment dams would be required.

The current crest elevation of Dikes 1 through 8 and MIAD would be raised by approximately 3.5 feet using engineered fill material similar to the existing composition of these features, thereby allowing seepage and pore pressure to be maintained through the interface between the existing embankment material and the new material. The side slopes and crest widths would conform to Corps standards while maintaining USBR's requirements for security and maintenance. Preliminary typical cross-sections for the proposed modifications to Dikes 1 through 8 and MIAD are provided in the following figures; Figure 2-4 (Dike 1), Figure 2-5 (Dikes 2 and 3), Figure 2-6 (Dikes 4, 5, and 6), Figure 2-7 (Dikes 7 and 8), and Figure 2-8 (MIAD).

Modifications to Dike 1 would primarily affect the dike's existing crest and upstream side slope (e.g. side slope on landward side of dike) through the removal of existing materials (ex. riprap, earthen materials, roadway pavement) and the addition of new materials (ex. engineered fill, riprap, roadway). Modifications to certain segments of this dike not previously modified by USBR would affect the dike's crest and both the upstream side slope and downstream side slope (e.g. side slope on lake side of dike) in a similar manor. Park Road intersects Dike 1 near its southern end before it runs along the dike's crest. A portion of the western leg of this road would need to be raised to meet the new dike crest elevation. A park horse trail also extends eastward from the dike near the aforementioned Park Road intersection. A small segment of this trail would need to be raised to merge with the new dike crest.

Modifications to Dikes 2 and 3 would also primarily affect each dike's existing crest and upstream side slope in manner similar to the modifications to Dike 1. Limited extensions would be required to both Dikes 2 and 3 in order for the new crest elevation to merge with adjacent, existing topography that is higher than the new crest elevation.

As with Dikes 1, 2, and 3, the proposed modifications to Dikes 4, 5, and 6 would also primarily affect the existing crest and upstream side slopes of these dikes through the removal of existing materials (ex. riprap, earthen materials, roadway pavement, roadway gravel) and the addition of new materials (ex. engineered fill, riprap, pavement). An existing gravel road/trail currently extends from the south end of Dike 4 to the north end of Dike 5. Portions of this road would be raised to the same elevation as the proposed raised crest elevation of the adjacent dikes because the affected road segments are presently lower than the necessary dike elevation. An existing gravel road/trail also currently extends from the south end of Dike 5 to the north end of Dike 6. Portions of this road would also be raised to the same elevation as the proposed raised crest elevation of the adjacent dikes. Gravel maintenance roads currently run along the upstream (landward side) toe-of-slope of Dikes 4, 5, and 6. Portions of these maintenance roadways would be relocated in a manner that mimics their current alignments to accommodate changes in the side slopes of the cited dikes.

The proposed modifications to Dikes 7 and 8 would be very similar to one another, as shown in Figure 2-7. The existing dike crests would be degraded slightly, as would be the existing dike side slopes on the upstream (landward side) of the dikes. New engineered embankment fill would then be added to the top of the dikes and to the upstream side slopes of the dikes. Aggregate base maintenance roads would be established on the top (crest) of each dike to replace current gravel (aggregate) roads presently on these dikes. Work necessary to raise the elevation of MIAD would involve limited removal of existing materials (embankment fill, aggregate roadway) along the existing crest of this dam. Additional engineered fill would then be added to the crest of the dam along with aggregate base to replace the existing maintenance road/shared use pathway (trail) that runs the length of the dam and riprap along the upstream side (lake side) of the dam adjacent to the raised area.

2.3.3 Concrete Floodwall Elements

In combination with the earthen dam raises on the dikes and MIAD, the proposed project would also include construction of a new reinforced concrete floodwall on the top of LWD and RWD. The floodwall for RWD would run the length of this earthen embankment dam, tying into the existing grade at RWD's northern end and terminating at the west end of the main concrete dam at RWD's eastern end. The floodwall for LWD would also run the length of this earthen embankment dam, beginning at the west end of the main concrete dam and continuing to the east end of RWD. Just beyond the east end of RWD, the new floodwall would turn southward and connect to the top of the existing auxiliary spillway control structure at its northern end. A separate segment of new floodwall would begin at the southern end of the auxiliary spillway control structure, then run in a southeastern direction for roughly 580 feet (parallel to Folsom Lake Crossing), before terminating at the existing roadway that leads to the main dam.

Both the LWD and RWD floodwalls would be installed adjacent to the lake side of the existing access/maintenance road that runs along the crest of the two dams. Figure 2-9 provides a preliminary typical cross section for the proposed floodwalls. Floodwall construction would include degrading a portion of the existing crest of the two dams, as well as a portion of the upstream (lake side) side slopes of both dams. After construction of the floodwalls, the degraded areas adjacent to the floodwalls would be backfilled with compacted fill and, on the upstream side of the floodwalls, riprap. Portions of the access/maintenance road affected by construction would be restored.

The analysis and design of the floodwall on the left wing dam and the right wing dam would be in accordance with EM 1110-2-2100, EM 1110-2-2104 and EM 1110-2-2502. The floodwall would be constructed using cast-in-place reinforced concrete. The reinforced concrete design and detailing would be in accordance with EM 1110-2- 2100, EM 1110-2-2104 and ACI 318-11. The floodwall would be designed with joints at every 30 feet. A construction joint type J would be provided in the base slab, and expansion joints would be provided in the wall. Seepage through the wall would be controlled by providing a Type "Y" water stop in the stem. Joint filler thickness would be determined from the estimated contraction and expansion from maximum temperature variation.

At the LWD and RWD, filter zones would be required only in the upper portion of the dams. Processed material filter zones would be constructed from the crest to an elevation of approximately 20 to 40-ft below the dam crest. This filter zone would be constructed by excavating a 20 to 40-ft portion of the downstream shell and placing the filter material against the core. The filter zone would then be covered by a layer of excavated shell material. This filter zone would exit into the downstream shell material of the embankment.

2.3.4 Construction Details

Tainter Gate Refinements: Access, Staging Areas and Haul Roads

As shown in Figure 2-10, general construction access to the Tainter gates would follow a path beginning at the existing Gate 1 construction entry to the ongoing JFP off Folsom Lake Crossing, and terminating at the intersection of the southern leg of Folsom Dam Road and Folsom-Auburn Road. An alternate egress route for construction traffic may include the northern leg of Folsom Dam Road, which also terminates at Folsom-Auburn Road. The construction access route would follow existing roadways and thus not require construction of new roads.

The main construction staging area would be located near the east end of LWD in an area referred to as the Overlook Area (see Figure 2-10). The main staging area would occupy approximately 6.6 acres within the Overlook Area, which is heavily disturbed and has been used as a construction staging site for the JFP for many years. An optional staging area, located within USBR's work yard just north of USBR's Central California Area Office (CCAO) facilities, may also be used if necessary. As depicted in Figure 2-10, this optional staging area could encompass as much as 13 acres. However if this optional staging site is used at all, it is unlikely the entire 13 acres would be utilized. Land within the boundaries of the optional staging area has been previously cleared and is heavily disturbed by past and ongoing usage by USBR. Should the optional staging area be used for the Tainter gate refinements project, the few existing native trees and shrubs that remain would be preserved to the degree practicable.

Concrete Floodwall Elements: Access, Staging Areas and Haul Roads

There would be three construction access points for work on the RWD (see Figure 2-11). One would be off Auburn-Folsom Road at the Beals Point roadway (e.g. the same access point used to access the southern end of Dike 6). Another other access point would be off Folsom-Auburn Road at Folsom Dam Road. The construction access/haul route from this access point would follow established roads within USBR's CCAO facilities. The third access point would be off Folsom Lake Crossing at or near the existing Gate 1 construction access that has been used as an access point for the JFP. The main construction access point would also be at this same location (see Figure 2-11). The construction access/haul route from this access point would follow an existing haul road before passing over the control structure of the new auxiliary spillway. During construction work on LWD and RWD, one lane of the existing road that runs from the LWD to the main dam and then to RWD (e.g. Folsom Dam Road) would be open to other traffic.

Four construction staging areas would be utilized during the construction of the RWD floodwall (see Figure 2-11). One would be located at the north end of the dam on its lake side within an area that has been previously cleared and disturbed. This area would encompass approximately 2.6 acres. Another large staging area would be located along the southern leg of the RWD on its landward side (south side). This staging area would occupy various disturbed areas within USBR's CCAO facilities and would occupy roughly 24.1 acres. Two small staging areas, each encompassing approximately 0.3 acre, would be situated along a haul route segment within USBR's CCAO facilities.

Three construction staging areas would be used during the construction of the LWD floodwall (see Figure 2-12). The main staging area would be located in the Overlook Area; the same disturbed area that would be used for construction staging associated with the proposed refinements to the Tainter gates at the main concrete dam. This staging area would occupy roughly 6.8 acres. Another small staging area, covering approximately 1.3 acres) would be situated adjacent to the Gate 1 access point in an area previously disturbed by JFP construction activities. The third staging area would be located in a previously disturbed area near the north end of the RWD on its land side (south side). This staging area would occupy approximately 1.7 acres.

Earthen Raise Elements: Access, Haul roads, and Staging Areas

Construction access to Dikes 1 and 2 would be from the north at the east end of Twin Rocks Road (see Figure 2-13). From this point, the construction access/haul road would continue south along an existing maintenance road to the north end of Park Road. The western leg of Park Road would be used to access the top of Dike 1. A new haul road would continue south from Park Road, roughly parallel to the west side of Dike 1, and would connect to the north end of Dike 2. The haul road would then continue along the crest of Dike 2. Construction access to Dike 3 would be from Douglas Boulevard south of the southern end of Dike 3, and also via the haul road and access discussed for Dikes 1 and 2. The construction access/haul road on the southern end of Dike 3 would likely follow Park Road northward, then jog slightly east near the south end of Dike 3 before turning northward to run along the dike itself.

Various construction staging areas would be used while raising the elevation of Dikes 1, 2, and 3. These would largely be situated in disturbed uplands near the east side (lake side) of the dikes, although some staging areas would be at or near the ends of the dikes as shown in Figure 2-13. The 10 staging areas would range in size from approximately 0.2 acre to 3.9 acres, and would occupy a total area of approximately 11.9 acres.

The main construction access to Dikes 4, 5, and 6 would be from Auburn-Folsom Road near the north end of Dike 5 (see Figure 2-11). A secondary construction access to these three dikes may also be utilized. This access would be from Auburn-Folsom Road along the existing Beals Point roadway near the south end of Dike 6. Use of the Beals Point roadway access would be restricted to emergency access and to rare instances when construction equipment is too large to access the project site using the primary access route. Construction haul roads for the three dikes would mainly follow existing maintenance roads that run along the landward side of the dikes. Between Dikes 4 and 5 as well as between Dikes 5 and 6, the haul roads would follow existing maintenance roads that connect these dikes.

Approximate limits of the proposed staging areas for Dikes 4, 5, and 6 are depicted in Figure 2-11. It is anticipated there would be four staging areas ranging in size from approximately 0.7 acre to 25.2 acres, with the four staging areas together encompassing a total of approximately 52.0 acres. Most of the northern staging area on the lake side of Dike 4 and most of the staging area on the lake side of Dikes 5 and 6 were previously established and used by USBR when making dike repairs. Large portions of the two lake-side staging areas are below the ordinary high water (OHW) elevation of Folsom Lake, which is elevation 466 feet NAVD88. Use of those portions of the lake-side staging areas below the OHW elevation would be heavily restricted. The construction contractor would be required to comply with the following as regards use of these areas:

- Use must first be approved in writing by the Corps.
- Use is strictly prohibited when the area is inundated by standing water or the water underlying the staging area is within 6 inches of the soil surface.
- Topographic alterations, including grading, excavation, or deposition of fill materials, are prohibited.
- Clearing or removal of existing vegetation is prohibited.
- Stockpiling of construction materials or wastes is prohibited.
- Fueling of construction equipment or vehicles is prohibited.
- Storage of fuel, hazardous wastes, or other potential pollutants is prohibited.

The main construction access to Dike 7 would be at Folsom Lake Crossing, using the access point shown in Figure 2-12. From this point, the construction access/haul road would follow an existing road and haul road that have been used during the construction of the JFP. The construction access to Dike 8 may include the same construction access used for Dike 7. However, it may also include an access at Folsom Point Road where it intersects with East Natoma Street (see Figure 2-12). The construction haul road at this location would follow a segment of Folsom Point Road before turning northwest to follow an existing maintenance road that runs to the southeast corner of Dike 8. If the access route to Dike 7 is also used for construction access to Dike 8, the construction haul road would generally follow the O&M Bench road that will have been established as part of the final phase (Phase V, restoration phase) of the Folsom JFP. This future maintenance road runs through areas that were previously disturbed by the JFP.

There would be different ways for construction vehicles and equipment to access MIAD and its associated construction staging areas. One would be to use the same access to Dike 7 discussed above, then following the O&M Bench road to MIAD (see Figures 2-12 and 2-14). Another would be to use the Folsom Point Road access to Dike 8, then following the O&M Bench road extending from Dike 8 to MIAD. Yet another construction access route would begin at the intersection of Access Road and Sophia Parkway with Green Valley Road (see Figure 2-14). From this point, construction traffic would follow Access Road northward to the east end of MIAD and its southern construction staging area. The existing maintenance road/shared use pathway (trail) along the crest of MIAD would also be used as a construction access/haul road.

Construction staging areas for the proposed work on Dike 7 would include the existing “Dike 7 Office Complex” area immediately south of the dike (approximately 2.1 acres), plus approximately 2.6 acres of previously disturbed land along the north side of the dike (see Figure 2-12). Both of these areas have been previously used as staging areas during JFP construction phases and the Dike 7 Office Complex staging area is largely paved. The main construction staging area for Dike 8 would likely be a previously disturbed area immediately adjacent to the north side of this dike, which would occupy approximately 2.5 acres (see Figure 2-12). However, the Dike 7 Office Complex area may also be used as a construction staging area during the proposed raising of Dike 8.

The main construction staging area for the proposed work on MIAD would be an extensive area of previously disturbed land on the southeast (land side) of MIAD (see Figure 2-14). This area would encompass approximately 36.1 acres. Immediately west of MIAD proper, there is an area previously used for construction staging and disposal purposes during phases of the JFP. This area, referred to as the “MIAD West” area (see Figure 2-14) and occupying approximately 9.7 acres, may also be used as an ancillary construction staging area for the proposed work on MIAD. Since work necessary to raise Dikes 7, 8, and MIAD would be performed during the same phase of the overall Folsom Dam Raise project, it is also possible that the previously mentioned staging areas for Dikes 7 and 8 may also be used for staging equipment and materials necessary to perform the raising of MIAD.

There would be a total of 29 staging areas within the project area for this alternative (e.g. the overall Dam Raise project; proposed project). These staging areas would encompass a total of approximately 167.6 acres and all of the proposed staging areas have been previously disturbed. The vegetation and habitat within each of these staging areas are discussed in detail in Section 3.4. The staging areas would not be used simultaneously, but would be utilized in association with each project construction phase (see *Construction Schedule* below). For example, the 11.9 acres of staging areas associated with Dikes 1, 2, and 3 would only be utilized during the construction phase involving raising these three dikes, which is currently scheduled to start in the summer of 2018 and end in the summer of 2020.

Borrow and Disposal Sites

The majority of materials necessary to construct the proposed project would be obtained from commercial sources located within 30 miles of the proposed project site. All permanent disposal sites would be at permitted landfills or duly-licensed commercial disposal sites located within 30 miles of the proposed project site.

The final phase of the JFP included restoration of a large area between the LWD and MIAD. The restoration activities included the removal of a substantial quantity of riprap (boulders) from the restoration area. This riprap was temporarily stockpiled in a previously disturbed area, referred to as the “MIAD East Area”, situated near the west end of MIAD on its landward side. The approximate location and limits of the riprap stockpile are shown in Figure 2-15.

The majority of the stockpiled riprap would be used in one or more phases of the proposed project as riprap necessary to accomplish raising the dikes and MIAD. Any riprap remaining afterward would be removed and disposed off-site by the end of the final phase of the overall Dam Raise project. Transport of the riprap from its current location to those project features where the riprap would be used (e.g. Dikes 1 through 8) would be accomplished by following the haul routes previously described for use in raising MIAD to reach either Green Valley Road or East Natoma Street. Haul trucks would then travel to Folsom Lake Crossing, go west on this roadway until reaching Auburn-Folsom Road, then go north on Auburn-Folsom Road until reaching the applicable project site access points. Any riprap used to raise the crest elevation of MIAD would be hauled directly from the riprap stockpile to MIAD

Site Preparation and Post-Construction Restoration and Cleanup

Once construction of a given phase of the proposed project begins, the initial work activities would typically include preparation of the construction staging areas and the establishment of haul roads (if necessary). Preparation of staging areas could include actions such as clearing and grading, spreading gravel, installation of temporary structures and lighting, etc. If topographic alterations are necessary in a given staging area, topsoil would first be removed and temporarily stockpiled so that this topsoil can be replaced during post-construction restoration of the staging area. All native trees having a DBH of 2 inches or greater would be preserved within the staging areas to the extent practicable. As mentioned, no removal of trees would be allowed in lake-side staging areas below the OHW elevation of Folsom Lake. Any tree trimming necessary would be conducted by, or under the direct supervision of, a certified arborist. Any necessary tree removal or trimming activities would be conducted outside of the typical migratory bird nesting season if practicable.

After completing construction activities within a given phase of the proposed project, disturbed portions of the staging areas used for the project phase would be restored. One exception to this generalization would be in cases where a particular staging area is also going to be used for a subsequent project phase. In such cases, the shared staging area would not be restored until the final project phase to use the staging area is completed. Another exception would be for staging areas, or portions thereof, that encompass permanent man-made features. An example of such a feature is the main staging area for the Tainter gate refinements (see Figure 2-10). Such areas would not be restored.

Restoration of staging areas would first involve restoring pre-construction topography to the degree practicable. Any topsoil removed and stockpiled during the original establishment of a particular staging area would be replaced during the process of topographic restoration. Next, a mixture of native grass and forb seeds would be planted throughout disturbed portions of staging areas in order to establish a permanent vegetative groundcover. All seeds would be procured from California native seed growers. Table 2-2 below provides a preliminary list of the grass/forb seed mixture that would be planted. This list and/or the seeding rates (pounds per acre) may be revised somewhat to account factors such as specific site conditions, the planting method used, and the availability of seed stock.

Table 2-2. Preliminary list of grasses and forbs to be planted (seeded) in the proposed project area for restoration.

Common Name	Scientific Name	Pounds PLS per Acre
California brome	*Bromus carinatus*	8
Blue wildrye	*Elymus glaucus*	2
Squirrel tail	*Elymus elymoides*	2
California poppy	*Eschscholzia californica*	2
California fescue	*Festuca californica*	2
Meadow barley	*Hordeum brachyantherum*	5
Creeping wildrye	*Leymus triticoides*	15
Miniature lupine	*Lupinus bilcolor*	2
Nodding needlegrass	*Nasella cernua*	2
Purple needlegrass	*Stipa pulchra*	5
Pine bluegrass	*Poa secunda*	8
Tomcat clover	*Trifolium willdenovii*	5
Small fescue	*Festuca microstachys*	10
Total Seed Mixture		**68**

PLS = Pure Live Seed. Pounds indicated are based on broadcast seeding or hydroseeding.

Disking would be performed prior to seeding to prepare the soil for seed placement. In compacted areas, the soil would be ripped or scarified to help reduce compaction. The method of seeding would be left to the contractor to determine, using hydroseeding, broadcast seeding, drill seeding, or a combination of these methods. In addition, soil imprinting may be employed in some areas to minimize seed runoff and help with local rainwater infiltration. Imprinting is a technique of soil-rolling that leaves small depressions in the soil surface that help break runoff, improve water infiltration, and prevent seed washout. Additionally, after the construction is complete, all temporary construction items such as signage, temporary fencing, etc., would be removed.

One of the staging areas that would be restored is somewhat atypical. This is the staging area referred to as the Dike 7 Office Complex, which is the staging area shown on Figure 2-12 as being located on the south side (land side) of Dike 7. This area has been used for construction staging and storage purposes by prior phases of the Folsom JFP and mainly consists of two parking lots and adjacent paved areas along with temporary buildings, fencing, and lighting. Initial steps in restoring the Dike 7 Office Complex would include removing all temporary buildings, fencing, lighting, and equipment from the staging area, then removing the existing asphalt and underlying subgrade material. The staging area would then be restored in a similar manner as previously described for the other staging areas; e.g. pre-construction topography would be restored to the extent practicable, then the disturbed areas would be seeded with a mixture of native grasses and forbs. Since the original topsoil present in this staging area was not saved when the area was built, it is likely that new topsoil would have to be brought in to backfill the areas where pavement and subgrade materials (aggregate base) are removed during the restoration process.

Construction Works and Schedule

The number of private construction employees present onsite each day would vary with scheduled construction activities. Up to 60 workers can be expected onsite any one day for the Tainter gate refinements work. Up to 50 workers can be expected onsite any one day for the earthen raise and concrete floodwall elements of the alternative. The construction work schedule would consist of 10-hour days over 6 days per week throughout the entire year. Twenty-four hour shift schedules may be requested when the construction schedule cannot be met in any other way. However, the double-shift schedule would be temporary and short-term, and potential impacts resulting from a 24-hour work schedule would be analyzed in the event such would need to occur.

The overall proposed project would be constructed in phases over time. The table below indicates the estimated schedule for the four main phases comprising the overall project. The phases involving earthen embankment raise elements and concrete floodwall elements are also sometimes referred to as “work packages” rather than phases. Because of this, Table 2-3 also supplies the Work Package number designation for project phases 2, 3, and 4.

Table 2-3. Anticipated schedule for the proposed project (alternative 2).

Project Phase	Project Activity	Starting Year	Ending Year	Phase Duration
1	Main Dam Tainter Gates – Tainter gate & related structural refinements	2018 (fall)	2022 (fall)	4 years
2 (WP1)	Dikes 4, 5, & 6 – earthen embankment raise	2018 (fall)	2020 (fall)	2 years
3 (WP3)	Dikes 1, 2, & 3 – earthen embankment raise	2019 (summer)	2021 (summer)	2 years
4 (WP2)	Dikes 7 & 8 plus MIAD, LWD, & RWD – earthen embankment raise for dikes and MIAD, concrete floodwalls for LWD and RWD	2020 (fall)	2022 (fall)	2 years

WP# = Work Package Number (ex. Work Package 1, Work Package 2, Work Package 3)

2.3.5 Operation and Maintenance (O&M)

O&M requirements of the proposed project would not initially change with Alternative 2. However, the raise would result in an ability to sustain an increased flow of 160,000 cfs for a longer period of time, and would have possible inundations up to 486.34’ (NAVD88). Any post-construction operational changes would be defined in a WCM update and any O&M effects from the Dam Raise Project would be covered in a subsequent environmental document specifically addressing the proposed changes to the WCM.

Generally speaking, until the WCM is updated after construction, the O&M requirements would be no different than existing O&M for both the 3.5-foot dam raise and the spillway Tainter gate modification, with the exception of some reduced maintenance in a couple of areas:

- The new cable hoist system would be stainless steel with greaseless bearings, so chain maintenance is significantly reduced to periodic inspection.
- The removal of hoist motor redundancy linkage would also remove associated maintenance of this element.
- There would be an added inspection element with the new top seal. The current design is that it would be concrete with embedded steel components for connection of rubber seals and connections to the piers. The top seal would be an extremely low maintenance element but would be an extra item to look at during periodic inspections.

2.3.6 Environmental Commitments

Various best management practices and other measures/actions would employed during project construction to help avoid or minimize potential impacts to the environment. Where necessary, compensatory mitigation would be provided to help reduce the degree or significance of unavoidable adverse impacts. Such environmental commitments are primarily addressed in Chapter 3 of this document.

2.4 Comparison of Alternatives

Table 2-4 shows the overall level of significance for each issue area. It also provides a comparison of significance determinations among the No Action Alternative and Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall. These three alternatives are analyzed in this SEIS/EIR as the final array of alternatives considered. Other alternatives have been screened out due to various reasons described in Section 2.1.1.

Table 2-4. Comparative Summary of Environmental Effects, Levels of Significance, and Mitigation: No Action Alternative vs. Proposed Project (Alternative 2).

	Alternative 1 – No Action Alternative	**Alternative 2 — Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall**
Recreational Resources		
Effects	Existing recreational opportunities would not be disturbed. The public would have continued use of the FLSRA without any closures or access restrictions unless a flood event occurs.	Construction of the Tainter gate refinements element (phase) would not adversely affect recreational resources since the construction areas involved are not accessible to the public are not part of the FLSRA. During the construction of the 3 other phases of the proposed project however (e.g. phases involving raising Dikes 1-8, LWD, RWD, and MIAD) there would be some substantial restrictions to recreational facilities and resources in the immediate vicinity of construction work as well as a reduction in the availability and quality of recreational facilities and opportunities. While these adverse impacts would only be temporary, they are deemed significant since construction of each of the cited phases would last approximately 2 years. Proposed avoidance, minimization, and mitigation measures would help reduce the magnitude of these temporary impacts, but not to a level that is less than significant. This alternative's long-term impacts to recreational resources would be less than significant with mitigation.
Significance	Not applicable.	Temporary impacts would be significant.
Mitigation	Not applicable.	Proposed mitigation measures would include the following (see Table 2-5 for descriptions): R-1, R-2, and R-3 Related measures proposed: VW-9, AV-1, TC-1, TC-4, TC-5, N-1, N-2, WW-2

	Alternative 1 – No Action Alternative	**Alternative 2 — Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall**
Vegetation and Wildlife		
Effect	No construction related effects (direct or indirect) to vegetation or wildlife would occur—conditions in the project area would remain consistent with existing conditions.	Existing habitats would be severely disturbed during project construction. These habitats and their acreages that could be directly affected include: developed/disturbed areas (223.6 ac), lake (98.3 ac), annual grassland (66.9 ac), oak woodland (9.5 ac), oak savanna (2.5 ac), and riparian woodland (2.2 ac). Adverse impacts would largely be temporary, although there may be permanent loss of limited acreages of oak woodlands, oak savannas, and annual grasslands. The single riparian woodland area would be preserved. Refer to this table's section on water quality and Waters of the United States (WOUS) for information regarding potential project impacts to jurisdictional WOUS. Wildlife species would be temporarily displaced during the 4-year project construction period. A few terrestrial animals could be injured or killed by construction work. If any active bird nests must be removed, young occupying such nests could perish. During project construction there would be substantial degradation of wildlife habitats directly impacted by construction activities. Wildlife access to various habitats within and adjacent to the project work areas would be adversely affected during construction. After project construction, there would be no substantial fragmentation or degradation of habitats given the proposed mitigation measures. Natural habitats would likely not be affected to a point where wildlife presently utilizing the area could not live or successfully reproduce in or near affected areas.
Significance	Not applicable.	Less than significant with mitigation.
Mitigation	Not applicable.	Proposed mitigation measures would include the following (see Table 2-5 for descriptions): VW-1, VW-2, VW-3, VW-4, VW-5, VW-6, VW-7, VW-8, VW-9, VW-10, VW-11, and VW-12. Related measures proposed: LS-1, LS-2, LS-3, LS-4, LS-14, AV-2, WW-2, WW-3, WW-12, WW-14, WW-15, and WW-16

	Alternative 1 – No Action Alternative	Alternative 2 — Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall
Special Status Species		
Effects	There would be no construction-related effects to existing special status species or critical habitat; however, a PMF flood event may result in the loss of critical habitat and special status species could be adversely affected. The types of special status species and their associated habitats would remain the same.	Project construction would likely require removal of some elderberry shrubs, thereby adversely affecting the valley elderberry longhorn beetle (VELB). Because of proposed mitigation measures and the level of take involved, such impacts are not likely to result in jeopardy to the VELB. There is a remote chance that bald eagles could be disturbed during project construction. Through avoidance and minimization measures, the project would not affect any bald eagles to a degree that causes (or may cause) injury to an eagle or a decrease in eagle productivity or nest abandonment. Nesting, Swainson's hawks, loggerhead shrikes, and white-tailed kites could also be temporarily disturbed during project construction. This is unlikely, however, and such impacts would be rendered less than significant by implementing avoidance, minimization, and mitigation measures recommended by the California Department of Fish and Wildlife (CDFW). Other migratory birds may nest in trees or shrubs that are within or close to the proposed project's limits of construction. Removal of trees/shrubs and general construction noise and activity could threaten active migratory bird nests. Such impacts would be avoided and minimized to the extent practicable. It may, however, be necessary to obtain a Special Purpose Permit from USFWS in order to remove active migratory bird nests in cases where direct impacts cannot be avoided.
Significance	Not applicable.	Less than significant with mitigation.
Mitigation	None required.	Proposed mitigation measures would include the following (see Table 2-5 for descriptions): LS-1, LS-2, LS-3, LS-4, LS-5, LS-6, LS-7, LS-8, LS-9, LS-10, LS-11, LS-12, LS-13, and LS-14. Related measures proposed: VW-1, VW-3, VW-4, VW-6, VW-7, VW-9, and AV-2.

	Alternative 1 – No Action Alternative	**Alternative 2 — Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall**
Air Quality		
Effects	There would be no construction-related effects on air quality in the project area. Air quality would continue to be influenced by climatic and geographic conditions, local and regional emissions from vehicles and households, and local commercial and industrial land uses. A possible flood event may temporarily increase the amount of vehicle emissions during flood-fighting activities, as well as increase the amount of vehicle emissions resulting from clean-up activities.	Emissions from construction equipment and worker vehicles would temporarily degrade air quality over the course of the 4-year project construction period. Primary pollutants of concern that would be emitted include ROG, NOx, CO, PM10, PM2.5, and SOx. Estimated emissions indicate the Placer County Air Pollution Control District (PCAPCD) threshold for PM10 would be exceeded in years 2019, 2020, and 2021. Estimated emissions indicate local Air Quality Management District thresholds for the other cited pollutants would not be exceeded. Emissions would also not exceed the USEPA's General Conformity *de minimis* thresholds. A few isolated areas slated for construction work may harbor naturally occurring asbestos (NOA). Dust generated in such areas could release NOA, however use of state-prescribed BMPs during construction would greatly minimize this potential problem.
Significance	Not applicable.	Less than significant with mitigation.
Mitigation	None required.	Proposed mitigation measures would include the following (see Table 2-5 for descriptions): AQ-1, AQ-2, AQ-3, AQ-4, AQ-5, AQ-6, and AQ-7. Related measures proposed: VW-1, VW-9, and TC-1.
Climate Change		
Effects	There would be no construction-related effects on climate change. Locally generated emissions, including levee operations and maintenance, would continue.	Emissions from construction equipment and worker vehicles would include CO2 and other "greenhouse gases" that can contribute to climate change. Estimated emissions of greenhouse gases, expressed as CO2e, would not exceed the federal CO2e reporting threshold of 25,000 metric tons CO2e per year or the Placer County Air Pollution Control District (PCAPCD) threshold of 10,000 metric tons CO2e per year. Such emissions would likely exceed the Sacramento Metropolitan Air Quality Management District (SMAQMD) threshold of 1,100 metric tons CO23 per year during 2019 through 2022.
Significance	Not applicable.	Less than significant with mitigation.
Mitigation	None required.	Proposed mitigation measures, if any are needed at all, would include the following (see Table 2-5 for descriptions): CC-1 and CC-2. Related measures proposed: AQ-5 and AQ-6.

	Alternative 1 – No Action Alternative	**Alternative 2 — Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall**
Aesthetics and Visual Resources		
Effects	The visual resources around Folsom Reservoir would remain undisturbed. Construction work, outside of routine maintenance and projects that are already underway or planned, would not contribute to any change in visual quality within the study area.	Access to a few relatively scenic vistas would be temporarily limited during project construction, but there would be no long-term adverse effect on scenic vistas. There would be substantial damage to a few scenic resources during construction, mainly as a result of alterations to proposed staging areas. The existing visual character and quality of the affected dams, dikes, and staging areas would be degraded during construction, as would be certain viewsheds. Public access to various recreational trails would be temporarily restricted during construction, thereby limiting access to some natural areas that have relatively high aesthetic qualities. Some off-site residences near project work areas would experience temporary degradation of views of the FLSRA due to the presence of construction equipment and the effects of earthwork activities. Following project completion, there would be no remaining adverse impacts to aesthetics and visual resources as a result of proposed mitigation measures and the temporary nature of project construction.
Significance	Not applicable.	Less than significant with mitigation.
Mitigation	None required.	Proposed mitigation measures would include the following (see Table 2-5 for descriptions): AV-1 and AV-2. Related measures proposed: VW-3, VW-4, VW-9, VW-13, WW-2, WW-3, and WW-14.
Traffic and Circulation		
Effects	The project would not create additional traffic during construction around the proposed project area. The existing roadway network, types of traffic, and circulation patterns would be expected to increase traffic by 2% each year.	Construction of the proposed project would have temporary direct effects on the traffic and circulation in the project area. Traffic would substantially increase in relation to existing traffic load and capacity of the roadway system and has the potential to substantially disrupt the flow and/or travel time of traffic. Transportation and circulation effects resulting from this action would be temporary in nature and would not result in permanent traffic increases to the surrounding area.
Significance	Not applicable.	Impacts are considered significant and unavoidable as the project would substantially increase traffic during project construction even with proposed avoidance, minimization, and mitigation measures.
Mitigation	None required.	Proposed mitigation measures would include the following (see Table 2-5 for descriptions): TC-1, TC-2, TC-3, TC-4, and TC-5. Related measures proposed: R-1 and R-2.

	Alternative 1 – No Action Alternative	**Alternative 2 — Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall**
Noise		
Effects	There would be no construction-related effects to the acoustic environment, including the generation of ground-borne vibration. The noise levels in the study area would remain consistent with the existing ambient noise levels present under current conditions. Sources of noise and noise levels would continue to be determined by local activities, development, and natural sounds.	Project construction activities would cause a substantial temporary increase in ambient noise levels. Nearby residents, wildlife, and recreationists could be adversely affected and experience noise from construction equipment and activities. Following project completion, the project would not have any noise effects.
Significance	Not applicable.	Despite implementation of mitigation measures, temporary noise impacts would remain significant and unavoidable.
Mitigation	None required.	Proposed mitigation measures would include the following (see Table 2-5 for descriptions): N-1, N-2, N-3, N-4, N-5, N-6, N-7, N-8, and N-9. Related measures proposed: N/A.

	Alternative 1 – No Action Alternative	**Alternative 2 — Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall**
Water Quality and Waters of the United States		
Effects	Water resources and quality would not be affected by construction in the project area. The surface and groundwater conditions would continue to be affected by contaminants through runoff. Extreme flooding events could wash siltation and contaminants into the water system, and if emergency work became necessary to prevent dike failure, measures required for the protection of water quality might not be used.	Project construction activities, such as drilling, excavation, hauling, earthwork, and fill placement may disturb or mobilize sediments, having the potential to adversely affect total suspended solids, pH, turbidity, and dissolved oxygen in stormwater runoff and waters receiving this runoff. Debris and inadvertent spills of fuels, oils, or concrete mix materials from construction equipment, work areas, or the staging areas could be a source of contamination into Folsom Lake, the American River, and nearby wetlands and drainage swales and ditches. Some of the work on the spillway Tainter gates would be done over water with potential for lead paint to enter surface water downstream of the dam (lead paint is assumed present in all underlying primer on the structure). Through implementation of the mitigation measures proposed, water quality would not be affected following project completion. The proposed project would not involve direct impacts to jurisdictional wetlands or watercourses (drainage swales, ditches, rivers, etc.) and such features would be protected. Project construction could require limited removal and subsequent placement of riprap within the jurisdictional limits of Folsom Lake when raising certain dikes and MIAD. This would result in temporary impacts to the lake, but there would be no appreciable loss of lake acreage or volume; hence such impacts would be *de minimis* and less than significant. Construction of a temporary detour route for Park Road (near Dikes 1 and 2) would directly impact approximately 0.5 acre of Folsom Lake. The detour road would be removed during completion of this phase of the project (raising Dikes 1-3), disturbed topography would be restored to approximate pre-construction topography, and the disturbed portion of the lake would be planted with a mixture of native grasses and forbs. This lake impact would be less than significant since the impact would be temporary, the affected area would be restored, and there would be no loss of lake acreage or volume.
Significance	Not applicable.	Less than significant with mitigation.
Mitigation	None required.	Proposed mitigation measures would include the following (see Table 2-5 for descriptions): WW-1, WW-2, WW-3, WW-4, WW-5, WW-6, WW-7, WW-8, WW-9, WW-10, WW-11, WW-12, WW-13, WW-14, WW-15, WW-16, and WW-17. Related measures proposed: VW-3, VW-4, VW-9, VW-11, VW-12, LS-1, LS-14, AQ-2, AQ-3, and AV-2.

	Alternative 1 – No Action Alternative	**Alternative 2 — Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall**
Cultural Resources		
Effects	A potential adverse effect to historic properties (cultural resources eligible for listing in or listed in the National Register of Historic Places) or tribal cultural resources could result from a large storm event. The effects would depend on the location of the failure in the system and severity of the storm. As a result, a precise determination of adverse effect and the significance of the effect is not possible and cannot be made.	Alternative 2 would not result in adverse effects to historic properties. Existing historic properties would undergo physical changes, however these modifications constitute no adverse effect to the qualities that make the historic properties eligible for inclusion in the National Register of Historic Places (NRHP). No adverse effects to tribal cultural resources are anticipated.
Significance	Not applicable.	Not applicable (no effect).
Mitigation	None required.	None required.

Table 2-5. Summary of Environmental Commitments (Mitigation Measures, etc.) for the Proposed Project (Alternative 2).

ID #	DESCRIPTION
	RECREATION
R-1	Prior to construction that may affect recreational resources, public outreach would be conducted through mailings, posting signs, coordination with interested groups, and meetings (if necessary) in order to provide information regarding changes to recreational access within the FLSRA.
R-2	The construction contractor would be required to: (1) Utilize traffic control measures, security fencing and/or temporary alternate public access detours for pedestrian, equestrian, bicycle and vehicular traffic; (2) Post warning and restricted access signs before and during construction as necessary.
R-3	A temporary recreational detour trail would be established by the construction contractor to help mitigate the temporary loss of the existing trail/roadway that runs along the crests of Dikes 4 through 6 and along the roadway/trail connecting these dikes.
	VEGETATION AND WILDLIFE
VW-1	The construction contractor would be required to implement dust control measures consistent with SMAQMD fugitive dust control measures.
VW-2	The construction contractor would be required to clean vehicles and equipment before first entering the project site.
VW-3	For each phase of the project, the Corps would prepare final construction plans that would include drawings identifying habitat areas that must be protected and specifying the methods of protection. These plans would be accompanied by written project specifications further detailing the habitat protection requirements, as well as general requirements concerning the protection of vegetation and wildlife. The final construction plans would also illustrate and/or describe those areas/lands near the project features that are outside the limits of construction (and thus must be protected from direct construction impacts).
VW-4	Native trees and shrubs having a DBH of 2 inches or greater located within the limits of construction of a particular project phase would be preserved to the extent practicable. The construction contractor would establish protective buffers (ex. temporary fencing) around the driplines of those trees and shrubs to be preserved that are located within the limits of construction. Native trees located outside the limits of construction would be preserved. The construction contractor would also erect protective buffers along the limits of construction where these limits are in close proximity to the adjacent trees and shrubs to be preserved. Any required trimming of native trees or shrubs would be conducted by, or under the direct supervision of a certified arborist.

ID #	DESCRIPTION
VW-5	Near the end of each phase of the overall project, the Corps would determine the approximate acreage of oak woodland habitat and oak savanna habitat eliminated as a result of construction activities. Once the total acres of each of the two habitat types is known, the Corps would develop a mitigation plan to compensate for these losses. Compensatory mitigation would involve creation or restoration of the affected habitat types. The minimum ratio of the acres of each type to be restored or created per acre of each type lost would be 1.2:1. The mitigation goal would be to create or restore habitat where the density of canopy tree species and midstory woody species is approximately the same as the average density of canopy tree species and midstory woody species found in the impacted habitats. The ground cover stratum would be restored through the planting of various native grasses and forbs, while the species composition of the midstory and canopy strata would strive to mimic that of the affected habitats. The restored areas would be managed and monitored by the Corps (or the Corps' contractor) for 5 years, although this period could be reduced to 4 years if success criteria are achieved by that time. The mitigation site(s) would be selected in coordination with USFWS, DWR, and SAFCA. The overall mitigation plan would also be prepared in coordination with these agencies. If on-site mitigation (which is preferred) proves to be a viable option, such coordination would also include USBR.
VW-6	Project impacts to migratory birds, including bald eagles, Swainson's hawks, and white-tailed kites, would be avoided or minimized to the degree practicable by following the avoidance, minimization, and mitigation measures for such species that are identified in the Special Status Species (Listed Species) section of this table.
VW-7	The Corps would ensure that all construction personnel undergo environmental protection training to be aware of all required environmental protections per the final construction plans and specifications, as well as those required by applicable federal and state laws.
VW-8	The construction contractor would be required to place food related wastes in self-closing trash containers.
VW-9	After completing construction activities within a given project phase, disturbed portions of the staging areas used for the project phase would be restored by the construction contractor. One exception to this generalization would be in cases where a particular staging area is also going to be used for a subsequent project phase. In such cases, the shared staging area would not be restored until the final project phase to use the staging area is completed. Another exception would be for staging areas, or portions thereof, that encompass permanent man-made features. Such areas would not be restored. Restoration of staging areas would first involve restoring pre-construction topography to the degree practicable. Next, a mixture of native grass and forb seeds would be planted throughout disturbed portions of staging areas in order to establish a permanent vegetative groundcover. The planted areas would be periodically monitored until the average ground cover accounted for by native grasses and forbs reaches approximately 75 to 80 percent.
VW-10	Revegetated areas would be monitored for invasive plant species by Corps staff during the construction contract warranty period of a given project phase. The term invasive plant species refers to those plants listed in the California Invasive Plant Inventory database generated by the California Invasive Plant Council, and having an invasive rating of "high" or "moderate". If it is determined invasive plants are becoming established, such plants would be eradicated by the construction contractor through directed herbicide applications, physical removal, or both. The goal would be to control invasive plant species such that they account for 5 percent or less of the average total plant cover.

ID #	DESCRIPTION
VW-11	Prior to initiating construction of a given project phase, Corps staff would conduct an assessment of drainage depressions, channels, and ditches present at the project site to determine whether any such features provide water to wetlands. Corps staff would also delineate the approximate limits of jurisdictional wetlands located within or immediately adjacent to the project's limits of construction. The construction contractor would be required to maintain flows in those drainage features that are found to provide water to wetlands. Direct construction impacts to wetlands would be prohibited.
VW-12	Once the Park Road detour road segment (an element of the project phase that includes Dikes 1, 2, and 3) is no longer needed for the proposed project, this road segment would be removed. Topography altered by construction of the road would be restored to approximately match pre-construction topography and natural areas disturbed by road construction would be planted with native grasses and forbs.
SPECIAL STATUS SPECIES (LISTED SPECIES)	
LS-1	As project design plans are developed and refined, the Corps, to the degree practicable, would adjust the limits of construction to avoid removal of existing native trees, large shrubs, and elderberry shrubs having one or more stems measuring 1 inch or greater in diameter at ground.
LS-2	Prior to starting construction activities for a given phase of the project, Corps biologists would survey areas within approximately 1,000 feet of the areas slated for construction in the given phase to determine whether any bald eagle nests are present. If any nests are discovered and regardless of whether a nest is classified as active, inactive/alternate, or abandoned, the Corps would coordinate with USFWS staff and CDFW staff to determine measures necessary to avoid, minimize, or mitigate potential adverse construction impacts to bald eagles and then would implement appropriate measures. Such measures could include not conducting project construction work within 660 feet of an active bald eagle nest or monitoring behavior of eagles tending an active or alternate nest for signs of stress and potential nest abandonment during the nesting season.
LS-3	Prior to beginning construction of a particular project phase, Corps biologists would survey areas within the immediate project vicinity to determine whether any active loggerhead shrike nests are present. If any nests are discovered, the Corps would coordinate with CDFW staff to determine measures necessary to avoid, minimize, or mitigate potential adverse construction impacts to the nest. Corps biologists would also survey areas within 0.25 miles (1,320 feet) of construction areas to determine if Swainson's hawk nests or white-tailed kite nests are present. Swainson's hawk surveys would be completed in compliance with the CDFW survey guidance. Other migratory bird nest surveys can be conducted concurrent with the Swainson's hawk surveys, with at least one survey conducted no more than 48 hours from the initiation of project construction activities to confirm the absence of nesting. If these surveys find there are active Swainson's hawk nests or active white-tailed kite nests present within the defined areas, CDFW would be contacted to determine the proper course of action. If necessary, buffers would be established around active nests with no construction allowed within the buffer zones until fledglings have left the nests. An alternative approach might involve monitoring active nests in close proximity to project construction areas for signs of stress exhibited by the adult birds, which could lead to nest abandonment.

ID #	DESCRIPTION
LS-4	Prior to initiating construction activities for a particular phase of the overall project, Corps biologists would conduct surveys for migratory bird nests situated within the limits of construction as well as such nests located within approximately 150 feet of these limits. If the initial surveys do not take place during the migratory bird nesting season, then Corps biologists would again conduct surveys for migratory bird nests at the beginning of the nesting season in a similar manner. If inactive nests are found (e.g. nests that do not contain eggs or chicks), these would be removed to help prevent birds from re-using the nests. Such inactive nests would not be removed if they belong to a special status species (listed species). If active nests are found, the following would be followed: (1) If active migratory bird nests are discovered within the project limits of constructions, buffer areas would typically be established by the construction contractor around each nest and construction activities within the buffer(s) would be prohibited until the young occupying the nests have fledged. The Corps would coordinate with USFWS staff and CDFW staff to determine the appropriate size of such nest buffer zones. Similarly if active migratory bird nests are documented within approximately 150 feet of the project's limits of construction, buffer areas would also be established around these nests as well; (2) If it is not practicable for project construction activities to avoid direct impacts to active migratory bird nest, the Corps would obtain a Special Purpose Permit (Migratory Bird Permit) from USFWS prior to impacting the active nests. This permit would authorize live-trapping and relocation of the affected active nests and the eggs or chicks occupying the nests. Chicks and/or viable eggs collected by qualified Corps staff pursuant to the permit would be taken to a wildlife care/rehabilitation facility.
LS-5	The construction contractor would be required to report any active or inactive migratory bird nests to the Corps within 24 hours of discovery of such nests.
LS-6	Prior to construction of a particular project phase, Corps environmental staff would perform field surveys to locate elderberry shrubs having one or more stems measuring 1.0 inch or greater in diameter at ground level that are within or in close proximity to the project phase's limits of construction.
LS-7	Construction personnel would receive USFWS-approved worker environmental awareness training to ensure that workers recognize elderberry shrubs and the valley elderberry longhorn beetle (VELB). The training would include: the protected status of VELBs and their host plants, elderberry shrubs; the need to avoid adversely affecting elderberry shrubs; elderberry shrub avoidance areas (protective buffers/exclusion zones); measures to be taken by workers during construction to protect elderberry shrubs; possible penalties that could be imposed for not complying with requirements established for the protection of elderberry shrubs and the VELB.

ID #	DESCRIPTION
LS-8	Where practicable, a minimum setback (buffer) of 100 feet from the drip-line of all elderberry shrubs containing stems measuring 1.0 inch or greater in diameter at ground level would be established. There may be instances where a 100-foot buffer is not practicable due to various constraints. In such cases, a buffer of at least 20 feet from the dripline of such elderberry shrubs would be established if feasible. The Corps will consult with USFWS prior to establishing any elderberry shrub buffer zones (setbacks) that extend less than 100 feet from the drip-line of a particular shrub. Prior to project construction activities near elderberry shrubs to be preserved, temporary protective barriers would be installed along the limits (boundaries) of approved elderberry shrub buffer zones (exclusion areas). No construction activities or similar disturbances would be allowed within the elderberry shrub buffer zones unless authorized in advance by the Corps and USFWS. In situations where elderberry shrubs to be preserved are located more than 100 feet from the project's limits of construction, protective barriers may not be installed if existing landscape conditions are such that inadvertent damage to the shrubs during construction is unlikely. The contractor would install signs approximately every 50 feet along the edge of any protective structural barriers. The signs would include the text: "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 would be readable from a distance of 20 feet and would be maintained during project construction.
LS-9	Any damage done within elderberry shrub buffer zones during the course of project construction would be remediated by the construction contractor shortly following the discovery of such damage. Remediation work may include installing erosion control measures, seeding disturbed areas with appropriate native plant seeds, etc.
LS-10	No insecticides, herbicides, fertilizers, or other chemicals that might harm the VELB or its host plant would be used in elderberry shrub buffer zones, or within 100 feet of any elderberry shrub with one or more stems measuring 1.0 inch or greater in diameter at ground level.
LS-11	If mowing of vegetation is deemed necessary to reduce fire hazard, such mowing may be performed within elderberry shrub buffer zones but only during the period from July through April. No mowing would be allowed within 5 feet of elderberry shrub stems, and all mowing would be done in a manner that avoids damaging elderberry plants.
LS-12	If direct construction impacts to elderberry shrubs (limited to those having at least 1 stem with a diameter of at least 1 inch as measured at ground level) are unavoidable, the Corps would purchase an appropriate number of credits from a USFWS-approved conservation bank as compensatory mitigation for such impacts. The number of conservation credits required would be based on methodologies prescribed in the USFWS's 1999 conservation guidelines for VELB (the "VELB Guidelines") and direct coordination with USFWS staff. The Corps would also contract with the same conservation bank from which the conservation credits are purchased to transplant the affected elderberry shrub(s) from the project site to the conservation bank. The affected shrubs would be transplanted when the plants are dormant (roughly November through the first 2 weeks in February) if feasible. The contractor (the conservation bank) would be required to follow the transplanting procedure set forth in the VELB Guidelines and Corps staff would monitor the removal of the shrubs from the project site.

ID #	DESCRIPTION
L2-13	The process for evaluating the potential impacts to the VELB in a given project phase would be as follows: (1) Designate elderberry shrubs that would be preserved and the protective buffers associated with each of those shrubs; (2) Designate shrubs that would have to be removed/transplanted, and determine the number of conservation credits that would have to be purchased to compensate for those shrubs that must be transplanted; (3) Submit a request for reinitiation of Endangered Species Act Section 7 consultation to USFWS that contains seeks concurrence with the Corps' effects determination and the Corps' proposed avoidance, minimization, and compensatory mitigation measures, (4) Proceed with construction of a given phase following receipt of the USFWS's Biological Opinion (e.g. amendment to Service File 08ESMF00-2017-F-0043).
LS-14	During project construction and/or restoration activities that involve earthwork, measures would be employed to suppress generation of dust. Such measures would include frequent watering of project haul roads, earthen stockpile areas, and similar exposed soil surfaces.
AIR QUALITY	
AQ-1	Require construction contractor to: (1) Develop an Asbestos Dust Mitigation Plan (ADMP) that conforms to requirements set forth in the State of California's Asbestos Airborne Toxic Control Measures (Asbestos ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations; (2) Submit the ADMP to applicable local Air Quality Management Districts for approval, and; (3) Implement the approved ADMP in areas where project construction would involve disturbing lands that may harbor naturally occurring asbestos.
AQ-2	Require construction contractor to implement the following fugitive dust mitigation measures: (1) Limit vehicle speeds on unpaved roads to 15 mph; (2) Water at least every 2 hours of active construction or often enough to keep disturbed areas adequately wet; (3) Remove all visible track-out from a paved public road at any location where vehicles exit the work site; (4) Install track-out prevention measures approved by the Corps; (5) Pre-wet the ground to the depth of anticipated cuts; (6) Suspend any excavation operations when wind speeds are high enough to result in dust emissions across property lines.
AQ-3	Require construction contractor to implement the following enhanced fugitive particulate matter dust control measures: (1) Water exposed soil to keep moist but do not allow sediment flows off site; (2) Suspend excavation, grading and/or demolition activity when wind speeds exceed 20-mph; (3) Install wind breaks on windward sides of construction areas; (4) Plant vegetative ground cover in disturbed areas as soon as possible; (5) For unpaved construction roads – (a) Install wheel washers or wash off all and equipment leaving the site; (b) Treat site access to a distance of 100 feet from the paved road with a 6-12 inch layer of wood chips, mulch or gravel; (c) Post a publicly visible sign with, the telephone number and person to contact at the lead agency regarding dust complaints that would be corrected within 48 hours of receipt, and the numbers of the Air Quality Management District (AQMD) of Sacramento, Placer and El Dorado, depending on jurisdiction.
AQ-4	Require construction contractor to implement the following basic emissions control practices: (1) Minimize idling time of equipment not in use to 5 minutes and post clear signage of this requirement for workers at site entrances; (2) Maintain all construction equipment in proper working condition and have equipment checked before operation by a certified mechanic; (3) Water exposed surfaces twice per day; (4) Cover or maintain at least 2 feet of free board space on trucks transporting soil, sand or other loose material onsite and all haul trucks slated for travel along freeways or major roadways must be covered; (5) Limit vehicle speeds on unpaved roads to 15 mph.

ID #	DESCRIPTION
AQ-5	Require the construction contractor to implement the following enhanced exhaust control practices: (1) Provide a plan to the Corps and applicable AQMD demonstrating heavy-duty off road vehicles used in the construction project would achieve a project-wide fleet average 20% reduction in NOx, and 45% reduction in particulate compared to the most recent CARB fleet average. This plan would be submitted prior to construction and in conjunction with equipment inventory composed of off road construction equipment with a 50 hp or greater rating that would be used an aggregate of 40 hours or more during any portion of the construction project; (2) Update the construction equipment inventory monthly except for any 30-day period in which no construction activity occurs and submit this to the Corps and applicable AQMD; (3) Ensure emissions from all off road diesel-powered equipment used onsite do not exceed 40% opacity for more than 3 minutes in any 1 hour, with non-compliant equipment repaired immediately and documented with a summary provided to the Corps and the appropriate AQMD on a monthly basis.
AQ-6	Require the construction contractor to comply with the following additional air quality mitigation measures: (1) Model year 2010 or newer haul trucks must be used for the duration of the project. If an occasion arises where there is limited availability of MY 2010 or new haul trucks, the contractor would need to demonstrate that MY 2010 or newer trucks are not available and get authorization from the Corps; (2) All off road diesel-powered construction equipment of greater than 50 hp will meet Tier-4 off road emission standards, where available. If a certain tier engine is not available, that equipment would be equipped with the next lower tier engine or an engine equipped with retrofit controls to reduce emissions of NOx and diesel PM to no more than the next available tier, unless certified by engine manufacturers that the use of such devices is not practical for specific engine types, and any uses of heavy-duty off road diesel equipment that does not meet Tier 4 emissions standards would first require approval by the Corps; (3) All construction equipment would be equipped with best available technology devices certified by CARB. Any emission control device would achieve emissions reductions that are no less than what could be achieved by a Level 3 diesel emissions control strategy for a similarly sized engine as defined by CARB regulations; (4) Construction equipment would incorporate emissions-reducing technology and idling would be restricted to a maximum of 5 minutes except as provided in the CARB 13CCR, Section 2485 exceptions.
AQ-7	Require the construction contractor to comply with the following off-site compensatory mitigation measures: (1) Provide the Corps and the applicable local AQMDs with updated and revised air quality emissions estimates prior to beginning project construction activities on a given phase. If the estimates indicate the applicable PM10 threshold and/or the PM2.5 threshold would be exceeded, the contractor would coordinate with the AQMDs in which the excess emissions occurred to determine the level of mitigation and administrative fees, if any, that must be paid; (2) Provide monthly estimates of actual PM10 and PM2.5 emissions to the Corps and the applicable AQMDs once construction activities begin, indicating, if necessary, in which AQMD jurisdiction the emissions occurred. When a monthly report indicates PM emissions exceeded the applicable local AQMD threshold, the contractor would be required to pay the appropriate mitigation fee and associated administrative fee to the local AQMD in which the excess emissions occurred; (3) Provide monthly reports of estimated actual NOx emissions and if NOx thresholds are exceeded, the contractor would pay the appropriate mitigation fee and associated administrative fee to the local AQMD in which the excess emissions occurred.

ID #	DESCRIPTION
	CLIMATE CHANGE
CC-1	The contractor would be required to submit monthly estimates of actual construction emissions to the Corps and applicable local AQMDs. If these monthly reports show that emissions may eventually exceed 25,000 metric tons (MT) CO2e per year (federal threshold), 10,000 MT CO2e per year (Placer County Air Pollution Control District threshold), or 1,100 MT CO2e per year (Sacramento Metropolitan Air Quality Management District threshold, the contractor would be required to prepare a greenhouse gas (GHG) emissions reduction plan for approval by the Corps, then implement the approved plan. Elements of such a plan could include the following: (1) Minimize the idling time of construction equipment to no more than 3 minutes, or shut equipment off when not in use, (2) Encourage carpools, shuttle vans, and/or alternative modes of transportation for construction worker commutes, (3) Use of CARB approved low carbon fuel, (4) Use of equipment with new technologies.
CC-2	If actual CO2e emissions during construction of a given project phase do exceed the federal threshold (25,000 MT CO2e per year), the PCAPCD threshold (10,000 MT CO2e per year), or the SMAQMD threshold (1,100 MT CO2e per year) then compensatory mitigation would be provided in the form of purchasing sufficient carbon credits to mitigate for the excess CO2e. Carbon offset credits would be purchased from a carbon registry that is acceptable to the applicable local Air Quality Management District and the Corps. Note that the provision of compensatory mitigation would only be required under the following scenarios: (1) Project construction emissions that occur within Placer County exceed the PCAPCD threshold of 10,000 MT CO2e per year; (2) Project construction emissions that occur within Sacramento County exceed the SMAQMD recommended threshold of 1,100 MT CO2e per year, or; (3) Project construction emissions exceed the federal threshold of 25,000 MT CO2e per year, regardless of the county in which the emissions are generated.
	AESTHETICS & VISUAL RESOURCES
AV-1	The Corps would make modification to the dikes and dams in phases, limiting the extent of construction affecting viewsheds at any one time.
AV-2	The construction contractor would: (1) Preserve existing native trees to the extent practicable; (2) Locate staging areas on previously disturbed lands where feasible; (3) Following construction, restore staging areas to pre-construction topography to the degree practicable and hydroseed the areas with native grasses and forbs. Exceptions to this measure would include: (a) Staging areas on the lake side of Dikes 4, 5, and 6; (b) Staging areas situated on existing urban/disturbed lands, with the exception of the Dike 7 Office Complex staging area, would not be restored, but would instead be returned to conditions present prior to the project.
	TRAFFIC & CIRCULATION
TC-1	Prior to starting construction, the contractor would be required to prepare a traffic management plan for approval by the Corps and would then implement the approved plan. This plan would outline proposed travel and haul routes along with proposed traffic management/maintenance/safety measures.
TC-2	High collision intersections would be identified by the Corps and avoided by project construction vehicles and equipment if possible.
TC-3	Construction vehicle and haul truck drivers would be informed and trained on the various types of access and haul routes, as well as areas that are more sensitive to traffic increases.

ID #	DESCRIPTION
TC-4	The construction contractor would develop and use signs to inform the public of the construction access routes and haul routes, route changes, detours, and planned road closures to minimize traffic congestion and help ensure public safety.
TC-5	Prior to beginning construction at Dike 1, the construction contractor would build a new temporary paved 2-lane roadway segment extending northward from a location south of Dike 1 to Park Road north of this dike. This temporary roadway segment would function as a public detour route around that portion of Park Road that would be directly impacted by project construction. The construction contractor would remove this detour road upon completion of raising Dikes 1 through 3.
	NOISE
N-1	Construction noise would be limited in accordance with timeframes and requirements in the City of Folsom, Sacramento County, and Placer County Noise Ordinance exemption for construction. If construction must occur outside of the exempted timeframe in the vicinity of sensitive receptors, the construction contractor would be required to meet the City of Folsom exterior noise thresholds.
N-2	To help minimize construction noise effects to campers utilizing the Beals Point campgrounds, construction activities at Dike 6 would be limited to the construction noise exemption times specified by the City of Folsom Noise Ordinance (e.g. 7am to 6pm on weekdays, and 8am to 5 pm on weekends). In addition, no construction activities would be allowed at Dike 6 on weekends (Saturdays and Sundays). There could be limited exceptions to these requirements. Examples of potential exceptions include things such as emergency actions, corrective actions to ensure safety, transporting special equipment, etc. The construction contractor would first have to obtain Corps approval before performing construction work outside of the timeframes specified above.
N-3	Construction equipment noise would be minimized during project construction by muffling and shielding intakes and exhaust on construction equipment (per the manufacturer's specifications), and by shrouding or shielding impact tools.
N-4	All equipment, haul trucks, and worker vehicles would be turned off when not in use for more than 30 minutes.
N-5	Equipment warm up areas, water tanks, and equipment storage areas would be located as far from existing residences as is feasible.
N-6	Written notice of impending construction work would be provided to potentially-affected residences (typically those located with approximately 2,000 feet of proposed construction activities) at least 2 weeks prior to mobilization of a give project phase. These notices would identify the type, duration, and frequency of construction activities. Notification materials would also identify a mechanism to register complaints if construction noise levels are overly intrusive.
N-7	The contractor would measure surface velocity waves caused by equipment and monitor vibration up to a threshold value established and approved in writing by the Corps. There would be no vibration exceeding 0.2 inch per second. Such measurements would only be taken near residences and occupied buildings that could be adversely affected by excessive ground vibrations.
N-8	A 24-hour telephone hotline for noise complaints would be established by the construction contractor. Any complaint calls not answered at the time of the call would be returned within approximately 24 hours of their receipt, as long as the message left includes a call-back phone number.
N-9	Public meetings would be scheduled prior to construction of a given project phase to help ensure residents that may be affected by construction noise are informed of the project schedule and its potential effects.

ID #	DESCRIPTION
	WATER QUALITY & WATERS OF THE UNITED STATES
WW-1	Prior to construction of a given project phase, the contractor would be required to obtain a Construction General Permit (CGP; basically a National Pollutant Discharge Elimination System (NPDES) permit) from the Central Valley Regional Water Quality Control Board (CVRWQCB). This includes preparing a Stormwater Pollution Prevention Plan (SWPPP) and a Spill Prevention and Control Plan (SPCP) for approval by the Corps and CVRWQCB prior to initiating construction activities.
WW-2	Appropriate erosion control measures would be incorporated into the SWPPP by the construction contractor in order to prevent sediment from entering wetlands, waterways, and waterbodies, and to minimize temporary turbidity impacts. Examples include, but are not limited to: straw bales/wattles, erosion blankets, silt fencing, silt curtains, mulching, revegetation, and temporary covers. Sediment and erosion control measures would be maintained by the contractor during construction at all times. Control measures would be inspected periodically by the construction contractor, particularly during and after significant rain events.
WW-3	The contractor would use a water truck or other appropriate measures to control fugitive dust on haul roads, construction areas, staging areas, and stockpiles.
WW-4	A fuels spill management plan would be developed and implemented for the project by the construction contractor.
WW-5	Construction equipment and vehicles would be fueled and maintained in specified staging areas only, which would be designed to capture potential spills. These areas cannot be near any ditch, stream, river, or other body of water or feature that may convey water to a nearby body of water or wetland.
WW-6	Fuels and hazardous materials would not be stored on site, unless otherwise approved by the Corps and such substances are stored in areas designed to contain leaks and spills. Any spills of hazardous material would be cleaned up immediately by the construction contractor.
WW-7	Construction vehicles and equipment would be inspected frequently and appropriately maintained by the construction contractor to help prevent dripping of oil, lubricants, or any other fluids.
WW-8	Construction activities involving removal (excavation) of material from the dikes, RWD, LWD, or MIAD as well as placement of material on these same features would be scheduled by the contractor to avoid as much of the wet season as practicable in cases where these activities may occur below the ordinary high water elevation of Folsom Lake.
WW-9	Construction personnel would be trained in stormwater pollution prevention practices by the construction contractor.
WW-10	In areas proposed for revegetation, initiation and completion of revegetation work would be done by the contractor in a timely manner to control erosion.
WW-11	The Corps would obtain a Clean Water Act Section 401 Permit (a Water Quality Certification; Section 401 WQC) from CVRWQCB prior to construction of the project phase that includes raising Dikes 1, 2, and 3. If the final design plans for the project phase that involves raising Dikes 4, 5, and 6 reveal that excavation and backfill (i.e. removal and replacement of riprap along the side slopes of the dikes) below the OHW elevation of Folsom Lake is necessary, the Corps would also obtain a Section 401 WQC from the CVRWQCB prior to construction of this phase.
WW-12	The construction contractor would be required to implement and/or adhere to applicable conditions and requirements set forth in the CGP and the Section 401 WQC.

ID #	DESCRIPTION
WW-13	The contractor would be required to properly dispose of oil and similar potential pollutants, including hazardous wastes, off-site in a duly licensed facility.
WW-14	The construction contractor would be required to abide by the following restrictions pertaining to the use of construction staging areas that extend into Folsom Lake: (1) Use must first be approved in writing by the Corps; (2) Use is strictly prohibited when the area is inundated by standing water or the water table underlying the staging area is within 6 inches of the soil surface; (3) Topographic alterations, including grading, excavation, or deposition of fill materials, are prohibited; (4) Clearing or removal of existing vegetation is prohibited; (5) Stockpiling of construction materials or wastes is prohibited; (6) Fueling of construction equipment or vehicles is prohibited; (7) Storage of fuel, hazardous wastes, or other potential pollutants is prohibited.
WW-15	Corps environmental staff would conduct new jurisdictional determinations (e.g. field mapping and classification of jurisdictional Waters of the United States; WOUS) prior to finalizing design plans for a particular project phase. The design plans would then be refined, if necessary, to ensure construction of the project phase would not necessitate direct impacts (e.g. placement of fill, excavation, land clearing) to any jurisdictional wetlands or watercourses. The contractor would be required to protect all such features located within or immediately adjacent to the project limits of construction. Such protection would include the installation of temporary physical barriers, such as orange mesh fencing adjacent to the boundaries of the wetlands and/or watercourses.
WW-16	That portion of the temporary Park Road detour road that passes through Folsom Lake would be constructed when the affected lake area is not inundated, if feasible. All of the temporary Park Road detour road would be completely removed upon completion of the 3.5-foot raise of Dikes 1 through 3 and lands disturbed by construction of the road would be restored by the construction contractor to mimic pre-construction conditions. Disturbed topography would be restored to approximately match the topography present prior to detour construction. Once topographic restoration is completed, natural areas disturbed by detour construction would be planted with a mixture of native grasses and forbs.
WW-17	During construction of the Tainter gates refinements phase of the proposed project, the construction contractor would be required to abide by the following requirements in accordance with 29 CFR 1926.62 "Lead", and 8 CCR 1532.1 "Lead": (1) Lead dust on surfaces, especially in eating areas, must be controlled by HEPA vacuuming, wet cleanup, or other effective methods; (2) Workers must have washing facilities with soap and clean water; (3) Workers must receive training on lead hazards and how to protect themselves; (3) Develop a written compliance program, approved by the Corps, to assure control of hazardous lead exposures; (4) Assess the amounts of lead breathed by workers and provide workers with appropriate respirators (if warranted based on air sampling results and medical monitoring results).
	CULTRUAL RESOURCES
CR-1	While there would be no adverse effects to historic properties, if any archeological deposits or other potential historic properties are found during project activities, work would be stopped pursuant to 36 CFR § 800.13(b) to determine the significance of the find and, if necessary, complete appropriate discovery procedures.

ID #	DESCRIPTION
	MISCELLANEOUS
M-1	Upon or near completion of construction of the overall Folsom Dam Raise project, a revised Water Control Manual (WCM) would need to be prepared for the Folsom Dam facilities (main dam, auxiliary spillway, dikes, LWD, RWD, MIAD) in order to best realize the benefits provided by this project. The Corps, in coordination with DWR, SAFCA, and USBR), would prepare a supplemental joint NEPA/CEQA document to address and evaluate the potential effects of implementing the revised WCM. This document would be finalized and approved prior to implementation of the revised WCM.

CHAPTER 3.0 - AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION

3.1 INTRODUCTION

Two alternatives are analyzed in detail in this SEIS/EIR; the No Action Alternative and Alternative 2, Spillway Tainter Gate Modification and Combination Earthen Raise and Concrete Floodwalls. Alternative 2 is the preferred alternative and the proposed project. This chapter describes the existing environmental resources that would be affected if either of the alternatives were implemented (see the Affected Environment section for each resource). It also describes the environmental consequences of implementing either alternative (see the Environmental Consequences section for each resource). Mitigation measures identified to avoid, minimize, or compensate for adverse project effects are discussed in the Mitigation Measures section.

This chapter describes existing conditions and future without project conditions (i.e., the No Action Alternative under NEPA and the No Project Alternative under CEQA) in the study area. The future without project conditions are the expected physical, environmental, and social conditions in the study area if no dam raise or gate modifications are constructed. Existing conditions are those that exist at a point in time prior to implementing the project. For this SEIS/EIR, it is the year the NOI and NOP were published (2014). Describing existing conditions helps to understand the environmental consequences that would occur under the No Action Alternative. The existing conditions and conditions under the No Action Alternative description may be the same for all, some, or none of the resources. Under NEPA, the environmental effects of the action alternatives (Alternative 2 in this case) are compared to conditions under the No Action Alternative.

Under CEQA, the baseline for assessing significance of impacts is normally the environmental setting, or existing conditions, at the time an NOP is issued (CEQA Guidelines Section 15125[a]). The environmental baseline for CEQA is assumed to be the existing conditions. The CEQA No Project Alternative is the future without project condition. It is included to allow comparison of the impacts of the proposed project and the future conditions of not approving the project.

The baseline environmental conditions assumed in this SEIS/EIR for analyzing the effects of the Folsom Dam Raise Project consist of the existing physical environment as of 2014, the year when the Notice of Preparation (NOP) was published to prepare a SEIS/EIR with the State Clearinghouse. The 2014 existing physical environment is fairly consistent with the current conditions in the project area because no major changes to resources have occurred within the last several years in the majority of the areas that could be directly affected by the proposed project. The Corps published the Notice of Intent (NOI) in the Federal Register for this SEIS/EIR concurrent with issuance of the State's NOP.

3.1.1 Affected Environment

For each resource, this section describes the existing pre-project conditions of the environmental resource in the project area. Resources not evaluated in detail are described first, followed by the resources that may be significantly affected by the alternatives.

Although all conditions are subject to some change over time, most of these resources are not expected to change significantly over the 50-year period of analysis for this study. However, any changes expected in the future without project condition are described as part of the No Action Alternative in the Environmental Consequences section. The Analysis of Effects described in the Environmental Consequences sections uses the pre-project condition as its baseline to identify changes to the resource under future with and without project conditions. The baseline environmental conditions assumed in the SEIS/EIR for analyzing the effects of the Folsom Dam Raise project consist of the existing physical environment as of 2014.

3.1.2 Environmental Consequences and Mitigation

This SEIS/EIR assumes that the future without project environmental conditions are similar to the existing conditions. Therefore, the description of the No Action Alternative for each resource is the same as the description of the existing condition for that resource, except where explicitly highlighted. For each resource, the environmental effects of implementing Alternative 2 (the proposed project) are compared to the No Action Alternative which, in this case, is the same as the existing conditions. This satisfies both the requirements of NEPA and the requirements of CEQA.

Both adverse and beneficial effects are considered including direct and indirect effects that could occur during or following construction. Cumulative effects are addressed in Chapter 4. Each section, where appropriate, contains a discussion of the methods used to analyze effects. In addition, significance criteria for each resource are used to evaluate the level of significance of any adverse effects. Finally, mitigation measures are proposed to avoid, minimize, or mitigate (compensate) any significant adverse effects on each resource.

Significance criteria (or "thresholds of significance") are used to define the level at which an impact would be considered significant. The significance thresholds used in this SEIS/EIR are those identified in Appendix G of the State CEQA Guidelines, as amended. Although NEPA does not prescribe specific thresholds of significance, it is common practice to identify thresholds by which to measure the environmental effects of each alternative. The significance determination under NEPA is then made considering the context and intensity of the environmental effects. Because this SEIS/EIR is a joint NEPA/CEQA document, and because CEQA thresholds are stringent, the CEQA Guidelines Appendix G have been used in this environment analysis. Thresholds may be quantitative and qualitative; they may be based on agency or professional standards, or on legislative or regulatory requirements that are relevant to the impact analysis.

Significance criteria used in this SEIS/EIR are based on the checklist presented in Appendix G of the State CEQA Guidelines; factual or scientific information and data; and regulatory standards of Federal, State, regional, and local agencies. These thresholds also include the factors taken into account under NEPA to determine the significance of the action in terms of the context and the intensity of its effects.

An environmental document prepared to comply with CEQA must identify the significance of the environmental effects of a proposed project. Therefore, for each effect (impact), a conclusion is provided regarding its significance. A "significant effect on the environment means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affects by the project" (State CEQA Guidelines, 11 Section 15382).

This SEIS/EIR uses the following terminology based on CEQA to denote the significance of each environmental effect (impact), and includes consideration of the "context" of the action and the "intensity" (severity) of its effects in accordance with NEPA guidance (40 CFR 1508.27):

No Impact indicates that the construction, operation, and maintenance of the Proposed Action and Action Alternatives would not have any direct or indirect impacts on the environment. It means that no change from existing conditions would result. This impact level does not require mitigation.

Beneficial Impact would result in a beneficial change in the physical environment. This impact does not require mitigation.

Adverse Impact would result in a negative change to a resource or physical environment. Significance is important.

Less Than Significant Impact would not result in a substantial or potentially substantial adverse change in the physical environment. This impact level does not require mitigation, even if applicable measures are available under CEQA.

Significant Impact is defined by CEQA Section 21068 as one that would cause "a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the project." Levels of Significance can vary by alternative based on the setting and the nature of the change in the existing physical condition. Under CEQA, mitigation measures or alternatives to the Proposed Action must be provided, where applicable, to avoid or reduce the magnitude of significant impact.

Potentially Significant Impact is one that if it were to occur, would be considered a significant impact as describe above. However, the occurrence of the impact cannot be immediately determined with certainty. For CEQA purposes, a potentially significant impact is treated as if it were a significant impact. Therefore, under CEQA, mitigation measures or alternatives to the Proposed Action must be provided, where necessary and applicable, to avoid or reduce the magnitude of significant impacts.

An impact may have a level of significance that is **too uncertain to be reasonably determined**, which would be designated too speculative for meaningful consideration, in accordance with State CEQA Guidelines Section 15145. Where some degree of evidence points to the reasonable potential for a significant effect, the SEIS/EIR may explain that a determination of significance is uncertain but is still assumed to be "potentially significant" as described above. In other circumstances, after thorough investigation, the determination of significance may still be too speculative to be meaningful. This is an effect for which the degree of significance cannot be determined for specific reasons, such as because aspects of the impact itself are either unpredictable or the severity of consequences cannot be known at this time.

3.2 RESOURCES NOT CONSIDERED IN DETAIL

Initial evaluation of the effects of construction of the selected alternative indicated that there would likely be little to no direct, indirect, or cumulative effects on several resources. These resources are described in Sections 3.2.1 through 3.2.12 to add to the overall understanding of the environmental setting.

3.2.1 Hydrology and Hydraulics

Hydrology

Surface Water

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 Lake (Figure 3-1).

At an elevation of 466 feet above mean sea level (NGVD 29), Folsom Lake is the principal reservoir on the American River, impounding runoff from a drainage area of approximately 1,875 square miles. Folsom Lake has a normal full-pool storage capacity of approximately 975,000 acre-feet.

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

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

Water levels would not be impacted during construction on the gates, dams or dikes. Therefore, the construction of the proposed project would not alter the hydrology of the American River or current reservoir operations. Water would continue to flow through the Basin in the same manner as under existing conditions. The project would not substantially alter the existing drainage pattern of the site or area in a manner that would result in substantial erosion, siltation, or flooding on or off site. Therefore, Alternative 2 would not affect hydrology. A separate action, the WCM update will evaluate effects on hydrology that could result from revised operation of the Folsom Dam and reservoir. At that time an appropriate NEPA/CEQA document would be prepared.

Groundwater

Folsom Lake 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 Lake consists primarily of bedrock formations of the Sierra Nevada foothill complex.

Ground water is found primarily in fractured geologic formations, and water can be present within the fractured formations. Fractured aquifer systems are typically low yielding; therefore, surface water sources are primarily used for drinking water or irrigation sources rather than wells. Although groundwater is not a major resource in the vicinity of the Folsom 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.

The Dam Raise Project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. Therefore, there would be no effects to groundwater hydrology with implementation of the project.

Hydraulics

Folsom Dam's current configuration has three general types of outlet structures including: 1) three power penstocks, 2) eight gated outlets (four upper and four lower), and 3) eight spillway gates (five operational service gates and three emergency gates). Reservoir releases are restricted by both the capacity of the discharge structures and by regulatory limits on the increases in release rates. The maximum capacity of the low-level outlets is 34,000 cfs (8,000 cfs total capacity through the three power penstocks and 26,000 cfs maximum total capacity through the eight gated river outlets).

During a flood event, releases are made through the low-level outlets until water levels in the reservoir reach the spillway crest and releases can be made from the main spillway gates. Once water is above the spillway crest, releases can then be raised incrementally to 115,000 cfs (design release), which represents the maximum safe carrying capacity of the lower American River. The maximum rate of increase in flows is limited to 15,000 cfs per hour until outflow reaches 115,000 cfs. As inflows continue to increase, more water is released from the spillways to protect the dam. A maximum of 160,000 cfs can be released on a limited emergency basis without causing a downstream levee failure and flooding in the Sacramento area. The three emergency spillway gates may not be used unless the total outflow from the dam exceeds 300,000 cfs. This restriction makes the emergency gates unusable for normal flood management purposes and limits the use of the gates to dam safety outflows.

The JFP auxiliary spillway, under construction until mid to late 2017, would provide additional flood risk management benefits for Folsom Lake (the maximum discharge capacity of the newly constructed auxiliary spillway is approximately 312,000 cfs). The WCM is currently being updated to take advantage of the additional release capabilities that the JFP would provide in 2017, the effects of which would be analyzed in a subsequent NEPA/CEQA document.

This SEIS/EIR focuses on effects associated with construction of the selected alternative. Because there would be no initial changes to the operation of Folsom Lake in this initial construction effort, impacts to hydraulics during the construction of the Dam Raise would be negligible. A subsequent WCM update would occur to take into account changes in operations due to additional capabilities of the Dam Raise; this would include appropriate NEPA/CEQA documentation.

3.2.2 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 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 Folsom Dam Raise would have no effect on the ability of Folsom Dam to generate hydropower. The project would not change any water diversions that can affect power generation.

3.2.3 Water Supply

Folsom Lake is operated as part of the CVP for many purposes, including water supply. 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 Lake (USBR, 2005).

Folsom Lake 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.

The Dam Raise project would have no effect on groundwater supplies or interfere substantially with groundwater recharge. The project design, such as having concrete floodwalls on the Left and Right Wing Dams, was designed to avoid any impact to the Natoma Water Line. Thus, water allocations and the timing of deliveries would not be impacted by the construction of the proposed alternative. However, while it is expected that operation of the dam raise features would have no effect on water supply, effects related to a change in reservoir operations as a result of the dam raise would be investigated in a subsequent analysis.

3.2.4 Fisheries and Aquatic Resources

Native and introduced fishes are present in the Folsom Lake area. Native fishes occur primarily as a result of their continued existence in the tributaries of Folsom Lake and Lake Natoma. Two native species are planted in Folsom Lake for fishing, rainbow trout and Chinook salmon. The populations of most other species are currently self-supporting. Introduced fishes are more commonly found in the reservoirs than are native fishes. Most of these fishes were introduced into the State as game fish or as forage fish to support game fish populations.

Construction of the proposed project (Alternative 2) could require limited removal of existing riprap and subsequent placement of new riprap below the ordinary high water level of Folsom Lake (e.g. within the jurisdictional boundaries of the lake). Should this be necessary, riprap removal and replacement could temporarily degrade lake water quality in the immediate proximity of this work. It is anticipated that the effects on fish in the lake would be *de minimis*. As part of raising Dikes 1, 2, and 3, construction of a temporary detour route for a segment of Park Road would be necessary. This detour road would directly impact approximately 0.5 acre of Folsom Lake. This impact would affect the edge of the lake near Dike 1 in the fluctuation zone that provides little habitat for fish or other aquatic organisms. The affected area would be restored to pre-construction conditions once the detour road is no longer needed.

There would be no interference with the movement of migratory fish and the impacts (or potential impacts) to Folsom Lake described above would be temporary and negligible. Therefore, the proposed action is not expected to adversely affect fishery or aquatic resources. As part of standard construction practices, the contractor would be required to develop and submit a Storm Water Pollution Prevention Plan (SWPPP) and a Spill Preventions and Countermeasure Plan (SPCP) prior to initiating construction activities to minimize the potential for soil or other contaminants to enter Folsom Lake. The SWPPP and SPCP must be approved by the Corps.

Other than the fill needed to construct the Park Road detour mentioned above, no materials would be discharged into Folsom Lake or the American River. Water trucks would be used for dust suppression along all areas of disturbed soil and along the haul routes; trucks would be monitored so over-watering does not occur. If equipment is to be refueled onsite, BMPs would be used to avoid and contain any possible spills. The use of BMPs, including implementation of the SWPPP and SPCP, during construction combined with the removal of the Park Road detour at the end of construction would help ensure that this project would have little to no effects on fisheries or aquatic resources.

3.2.5 Geology, Mineral Resources, Seismicity, and Soils

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

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

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.

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 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 (Knudsen, et al. 2008).

The dikes throughout the project site were constructed in the mid-1950s. Each dike was constructed as a zoned embankment with a silty sand (SM) core of approximately 30% fines, and a silty sand (SM) embankment shell with a fines content of <30%, or less than that of the core material. This construction also included a coarse gravel blanket drain at the downstream toe. The foundation is hard, moderate to highly weathered granite. The slope protection materials consist of rock riprap underlain by a coarse filter primarily consisting of 3-inch minus dredge tailings, and a fine filter material of 2-inch minus sands and gravels placed in 1 foot layers. Additionally, USBR has recently

(2007 through 2015) conducted dam safety improvements on Dikes 4, 5, 6, the Wing Dams, and MIAD. These include modification to the sand filters, toe drains, and the berms to mitigate against seismic and seepage concerns.

To ensure public safety, proposed new levees, other flood control facilities, and proposed modifications to existing flood control facilities would be designed to withstand the maximum earthquake and associated ground failures (EM 1110-2-2104, 2105, ER 1110-2-1806). Therefore, there would be no project-related effects to geology and or seismicity-related effects because flood control improvements would be designed to withstand ground shaking and associated ground failures. The project would not result in the loss of availability of a known mineral resource of value to the region. Therefore, there would be no effects to mineral resources due to the project. The project is not located on expansive soil that can cause significant damage to or disruption of engineered utilities or structures, and would not result in soil erosion or the loss of topsoil. Although the dikes would be disturbed during construction of the 3.5-foot raise, the soil and road would be restored upon completion of the project.

3.2.6 Land Use and Planning

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, residences on the southwestern perimeter of the reservoir near Granite Bay are located between 600 and 1,200 feet of Dikes 1 through 6. There are a few residences within 1,000 feet of the RWD, but none within the same distance of the LWD. On the southeastern perimeter of the reservoir, some residences are located within 400 feet of Dikes 7 and 8. The closest residences to MIAD are located approximately 1,200 feet away off Green Valley Road.

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. 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 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 (USBR, 2006). The designated land zones within and adjacent to project area would remain unchanged after implementation of the selected alternative.

To access Dikes 1 through 3, construction vehicles would possibly use the park entrance at the concurrence of Douglas Blvd and Park Road (Folsom Lake Park/Granite Bay). This impact to residential areas is temporary and less than significant. 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 Dam Raise project. The project would not physically divide an established community or conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project area. There would be no conflict with any applicable conservation plans or natural community conservation plans. Therefore, there would be no effect to land use as a result of the project.

3.2.7 Agriculture and Forestry Resources

There is no farmland or forestry land within the project area. Therefore, there would be no adverse effects on agricultural and forestry resources.

3.2.8 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 76,375 in 2015, which was a population growth of approximately 5.8% since the 2010 Census. The population of Folsom is approximately 74% white, 12% Asian, 6% African American, 0.6% Native American, and 0.2% Pacific Islander, with the remaining percentages classified as other or more than one race (Census 2015). People of Hispanic origin make up approximately 11% of the city's population. It is important to note that these estimates may not be accurate because the U.S. Census Bureau only updates population data every ten years, and the next update will not be until the year 2020.

The labor force in the City of Folsom was 35,487 people in May 2016, with an unemployment rate of 3.10%. The city's unemployment rate is well below the unemployment rate for the Sacramento – Roseville – Arden-Arcade Metropolitan area at 4.7% during the same time period (EDD 2016). The median family income in the City of Folsom from the years 2010 through 2014 was $100,163, and the per capita income is $38,472 (Census 2015). Employment opportunities near the project area include technology, food manufacturers, retail, health care, and education (City of Folsom 2011).

No actions associated with the project 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 a substantial population of minorities. No populations would be displaced as a result of project construction, and no local industry would be disrupted by project activities. There would be little to no effects to minorities or low-income populations. Therefore, socioeconomics is not evaluated further in this SEIS/EIR.

3.2.9 Population and Housing

Although there are no homes located directly within the project footprint, there are several residences near the construction areas. Residences on the southwestern perimeter of the reservoir near Granite Bay are located between 600 and 1,200 feet of Dikes 1 through 6. There are a few residences within 1,000 feet of the RWD, but none within the same distance of the LWD. On the southeastern perimeter of the reservoir, some residences are located within 400 feet of Dikes 7 and 8. The closest residences to MIAD are located approximately 1,200 feet away off Green Valley Road.

Because no existing housing is within the project footprint, the Dam Raise project would not displace any existing housing or people, necessitating the construction of replacement housing elsewhere. The Dam Raise would not cause population growth in the nearby area, either directly or indirectly. Therefore, there would be no effects to population and/or housing.

3.2.10 Public Utilities and Services

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 Folsom Transmission Line, and then to the 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. No natural gas infrastructure or facilities exist within the project area.

Modifications to the wing dams and dikes could disrupt buried and aerial utilities including sewage, water, gas, electric, telephone, and cable lines. Severing any of these lines can result in substantial disruption to services provided by the utilities. Prior to initiating ground disturbing activities, the contractor would coordinate with Underground Service Alert to insure that all underground utilities are identified and marked. All utilities would be protected in place and no disruption of service is expected. If for any reason utilities would require a disruption in service, residents and businesses within the potentially affected area would be given notice of the anticipated time and duration of the disruption before the start of construction.

Wastewater services would not be disrupted as a result of the construction of this project, and no additional wastewater facilities would need to be constructed to deal with any project water discharges. No additional water supply or landfill resources are needed to support the project. The Dam Raise Project complies with federal, state, and local statutes and regulations related to solid waste.

At the current level of design, construction would not access or realign the existing potable water supply, sanitary sewerage, or storm sewer systems. Existing haul routes would be used by construction vehicles to avoid overloading public roadways and causing delays to public services. Therefore, there would be no effects on public utilities or services as a result of project construction.

3.2.11 Hazardous, Toxic, and Radioactive Waste

A Phase I Environmental Site Assessment (Phase I) was conducted in accordance with ASTM E1527-13 guidance. The Phase I did not identify any HTRW sites located at the project area; however, due to historical mining activities, the project has the potential to contact contaminated groundwater and soil. Elevated levels of arsenic have been detected in the groundwater adjacent to MIAD.

Dredge tailings from placer mining in the area were used in the construction of the dikes, a slope protection, and riprap bedding. Placer mine tailings do not typically contain elevated levels of HTRW, and do not represent an environmental impact if disturbed.

During construction, there is potential for 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 to result in any adverse effects due to HTRW. If any HTRW sites are identified during construction, appropriate response activities would be conducted to prevent potential adverse effects. Lead is assumed present in all underlying primer on the dam structure and is further addressed in Section 3.11, Water Quality and Waters of the United States.

The construction of the Dam Raise project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or release of hazardous materials into the environment. It would not interfere with any emergency response or evacuation plans. The project would not expose nearby schools or other sensitive receptors to hazardous emissions or materials. It is not located on a hazardous materials site that would create a significant hazard to the public or the environment. Therefore, the Dam Raise project would not result in adverse effects to HTRW resources or to the public.

3.2.12 Public Safety

The construction of the Dam Raise project would not create a significant hazard to the public or the environment through interference with any emergency response or evacuation plans. The project would not expose nearby schools or other sensitive receptors to hazardous emissions or materials. The Dam Raise project would not increase the risk of wildland fires that would expose people or structures to a significant risk of loss, injury, or death. Therefore, the construction of the Dam Raise Project would have little to no effect on public safety.

3.3 RECREATION

3.3.1 Environmental Setting

The Folsom Lake State Recreation Area (FLSRA) is an important local, regional, and state recreation resource. Figure 3-2 shows recreation area features in conjunction with the Dam Raise Project dikes and wing dams. With an average of 1.5 million average annual visitors, the FLSRA is one of the most popular sites within California for recreation in the State Parks system (State Parks and USBR 2007). 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 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) and include 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.

There are three campgrounds in the FLSRA providing a total of 176 campsites that accommodate tent, trailer, RV, and group camping. Peninsula campground includes 104 family campsites. Negro Bar campground is comprised of three reservation-only group campsites, two of which are designed to accommodate 50 people with the third site designed to accommodate 25 people. Beals Point campground includes 49 family campsites and 20 RV sites with full hookups, sanitary dump station, three restrooms, and two shower buildings. 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 Beals Point, including trails, the beach, picnic area, and snack bar. Full capacity is often reached at all three campgrounds during the peak season.

There are 94 miles of existing trails within the FLSRA (see Figure 3-3). Currently, there are 46 miles of pedestrian/equestrian trails, 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. Granite Bay and Beals Point are the primary visitor areas on the western shoreline of Folsom Lake. On the eastern shoreline, Brown's Ravine and Folsom Point are the primary visitor areas.

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) accessible trail, a pedestrian only trail; parking; two reservable group picnic sites; and fishing and boating. There are also restrooms and bicycle/pedestrian trails. The boat launch area capacity varies with water levels. Dependent upon water levels, a maximum of 20 lanes of boat launch are available. Concessions in the area include a snack bar and beach equipment rentals, boat and personal watercraft rentals, equestrian trail rides, fitness training, and vessel repair and tow services.

The North Granite area is popular for fishing, horseback riding, and mountain biking and hiking. This area includes an informal beach area at Oak Point, an equestrian staging area, Doton's Point, and Beeks Bight. An activity center just north of the launch ramps is available by reservation for group use and includes a 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 ADA assessable, pedestrian only trail in the Beeks Bight area.

As with Beals 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 areas at the launch ramps 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. 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 launch areas range from about 360 feet to 470 feet. When the reservoir surface level is at 466 feet, a 16-lane ramp and a 4-lane ramp are usable. Elevations of the structures (other than the boat launch ramps), parking lot, and roads at Granite Bay range from approximately 465 feet to 475 feet.

Beals Point. Beals 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, 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 Beals Point and connects to Lake Natoma and the American River Parkway. The unpaved multi-use Granite Bay Trail connects Beals Point to other facilities along Folsom Lake.

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 Beals 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.

Brown's Ravine. Brown's Ravine is home to the Folsom Lake Marina which provides 675 wet slips, 175 dry storage spaces, boat launch facilities, marine provisions, pump-a-head station, a fueling station, a small picnic area, and restrooms. The Brown's Ravine Trail is an unpaved multi-use trail that 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. The equestrian/pedestrian Browns Ravine/Old Salmon Falls Trail begins at Browns Ravine and extends twelve miles to Old Salmon Falls.

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 121 vehicles with trailers. The maximum usable boat ramp elevation at Folsom Point is 468 feet with a minimum of approximately 405 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 Lake for their youth wake board and water ski camp.

3.3.2 Environmental Consequences

Methodology

The FLSRA supports a diverse range of outdoor recreation activities and opportunities. Impacts to recreational opportunities within the project area are evaluated based on temporary and permanent changes to those resources that would occur during 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;
- Requirements for the construction or expansion of recreational facilities; and
- Potential receptors in the area including staff, day use recreationists, campers, boaters and other water based recreationists. All recreational groups were taken into account during analysis of impacts.

Basis of Significance

Effects to recreational resources are considered significant if construction would:

- Substantially restrict or reduce the availability or quality of existing recreational facilities and opportunities in the project vicinity; or
- Displaced recreation from sites affected by construction would substantially contribute to overcrowding or exceed the facility capacity at other recreational sites (including sites within the FLSRA).

3.3.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Dam Raise would not be constructed. 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.

3.3.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise and Concrete Floodwall

Under this alternative, there would be no effects to recreational opportunities due to the modification of the spillway gates, as this portion of the project area is not open to public access. Staging areas are on USBR's work yard just south of the RWD and at the existing Overlook area adjacent to the LWD, and site access is off Folsom-Auburn Road through USBR's Central California Area Office (CCAO) and off Folsom Lake Crossing. The construction access routes, the staging areas, and the areas that will be within the limits of construction are all closed to public access.

The implementation of Tainter gate refinements element of the proposed project would not eliminate or severely restrict access to recreational facilities or resources, or result in substantial disruption to the use of an existing recreation facility. It would not have any significant effect on any nearby parks or require construction or expansion of recreational facilities. Therefore, the construction of the Tainter gates and the modification of the spillway gates would not have an impact on these recreation resources.

Access to the northern half of the Granite Bay Recreation Area is via Park Road, a paved, two-lane road that runs parallel to Dikes 2 and 3 but runs along the crest of Dike 1. That portion of Park Road that runs along the crest of Dike 1 would be closed for up to 2 years during construction of the project phase that raises the elevation of Dikes 1 through 3. A detour for vehicles and pedestrian traffic would be established near Dike 1. At the conclusion of construction, the detour would be removed and the area restored to pre-project conditions. The approximate alignment for the proposed Park Road detour is shown in Figure 3-4.

The trail that runs along the top of Dikes 4, 5, and 6 is heavily utilized by pedestrians, bicyclists, and equestrians. This trail would be closed to the public for up to 2 years for the duration of construction of the earthen embankment raise of the three dikes. A complex network of dirt trails is present on the landward side of Dikes 4, 5, and 6 (see Figure 3-5). Due to the location of proposed staging areas and construction access routes associated with this phase of the proposed project, several of these dirt trails or segments thereof would also be closed to the public during construction of this project phase. To help minimize the effects of trail closures, a dirt detour trail would be kept open to public use during project construction. The approximate location and alignment of this detour trail is shown in Figure 3-5.

Dikes 7 and 8, and MIAD, would be closed for up to 2 years during construction of this project phase, which also includes the construction of floodwalls along the crest of the LWD and RWD. A trail detour currently exists at MIAD, and this trail would remain accessible during construction (Figure 3-6) given that the access would provide reasonable pedestrian and equestrian access to Folsom Point. This detour area would not be impacted by other, concurrent projects such as the widening of the Green Valley Road. If there are such issues, another detour would be proposed and assessed prior to construction. As there presently is no access public access along the crests of at Dikes 7 and 8, a detour would not need to be established. A concrete floodwall on the top of the LWD and RWD would have no impact to recreation because these areas are not publically accessible.

A small segment of Folsom Point Road may be used for construction access to MIAD and Dikes 7 and 8, but it would remain publically accessible during construction with the use of proper signage, traffic control measures, and public education. The Brown's Ravine recreational area and trails are adjacent to a potential access point for MIAD at Sophia Parkway. If this potential access point is used, trail detours would be established. Use of these access points would be temporary.

Because trail detours would be maintained or established as necessary, it is unlikely that the project would increase the use of other nearby recreational facilities to the point that substantial physical deteriorations of the facilities would occur or accelerate. It is also unlikely that trail detours would have a significant adverse effect on the surrounding environment.

With the exception of the tops of the dikes and dams, as well as the staging areas, all existing recreational areas near the construction area would remain accessible to the public. Because of the trail detours and other recreational opportunities in the area, it is assumed that the majority of the recreation activity would not change and that most recreation users would continue to visit the FLSRA and use the trails. Once construction has been completed, the tops of the dikes would again become publically accessible.

The direct effects to recreation as a result of the implementation of this alternative are considered significant because it would result in a severe restriction to recreational facilities and resources due to a substantial, long-term disruption of existing recreation facility usage. All trails in the FLSRA, including those on Dikes 1 through 6 and MIAD, are used extensively throughout the seasons. Existing trails on Dikes 1 through 6 and MIAD accommodate pedestrian, bicycle, and equestrian users. Additionally, these trails are approximately 20 feet wide and allow for a large number of people to use them at once. Although trail detours would be accessible, these detours would not offer the same level of service as the paved roads and aggregate roads on the tops of the dikes and MIAD, and are not suitable for all types of recreation users. This would lead to both direct and indirect effects to those users who might choose to no longer recreate on the trails. Additionally, the creation of new trails would have the potential to cause adverse physical effects on the environment. Some trail users may decide to make their own trails or use trails not designated for their type of recreation. This can lead to both direct and indirect effects due to environmental impacts and may cause conflicts on existing trails leading to a potential increase of calls for service by the State Park Rangers, or the increased chance of accidents on unsanctioned trails.

Although recreational impacts of the proposed project would be significant, these impacts would be restricted to the duration of construction for project phases WP1, WP2, and WP3. Following completion of these phases, the proposed project would no longer have any effect on recreational resources given the implementation of the mitigation measures addressed below and the other mitigation measures described in Chapter 3.

3.3.5 Avoidance, Minimization, and Mitigation Measures

Although contractor staging would emphasize use of areas with no or limited current public access and away from residential areas, there may be temporary impacts to recreation access. In an attempt to maintain as much public access to recreation areas and trails throughout the construction period as possible, traffic control measures, security fencing, and/or temporary alternate public access detours for pedestrian, equestrian, bicycle, and vehicular traffic would be used.

To ensure public safety, warning signs and signs restricting access would be posted before and during construction as necessary. Public outreach would 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. The detours, traffic control measures, access restrictions, increased signage, increased education, and public outreach would help mitigate effects to recreational users of the FLSRA. The adverse effects of the proposed project on recreational resources would be temporary. Implementing mitigation measures, including avoidance and minimization, would reduce impacts but not to less than significant; therefore, implementing Alternative 2 would result in significant and unavoidable impacts on recreation. However, these adverse impacts would cease following completion of construction of project phases WP1, WP2, and WP3. Thus, Alternative 2 would not result in any long-term adverse impacts to recreational resources following completion of the project. Note that once the final trail detour routes needed during project construction are identified, another analysis of potential impacts would be completed and, if needed, included in a supplemental environmental document.

3.4 VEGETATION AND WILDLIFE

3.4.1 Environmental Setting

Regulatory Setting

The following Federal, State and local laws and regulations apply to the resources covered in this section. Descriptions of laws and regulations can be found in Chapter 5.0.

<u>Federal</u>

- Executive Order 13112, Invasive Species

- Fish and Wildlife Coordination Act (FWCA) (16 USA §§661 – 667e)
- Migratory Bird Treaty Act (16 USC §§703-712)

Local

- Sacramento County Tree Preservation and Protection 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.

Existing Conditions

Vegetation

Assessment of existing vegetation associations and habitats was made through limited field observations, interpretation of recent aerial photography, and review of past vegetation/land use mapping generated by others that covers the majority of the area encompassing the proposed project. The past vegetation/land use mapping reviewed consisted of: vegetative delineations conducted by the Northern Sierra Nevada Foothills Project (NSNFP; Klein et. al, 2007); habitat/land use mapping prepared by State Parks staff (State Parks, 2010), and; vegetation/land use/wetlands mapping contained in the 2007 EIS/EIR.

The immediate project area currently supports the following main vegetation associations/habitat types; oak woodland, oak savanna, riparian woodland, lake (lacustrine), developed/disturbed areas, and annual grassland.

Oak Woodland

Oak woodland is the largest woodland acreage that could potentially be affected by the proposed project. The canopy stratum of this vegetation association is typically dominated by either blue oak (*Quercus douglasii*), interior live oak (*Quercus wislizeni*), or a mixture of these plant species. Other trees present in the canopy can include grey pine (*Pinus sabiniana*), California buckeye (*Aesculus californica*), valley oak (*Quercus lobata*), black oak (*Quercus kelloggii*), and other oaks. Tree canopy cover is continuous or intermittent.

The midstory stratum is usually sparse to intermittent, and can include species such as blue elderberry (*Sambucus mexicana*), California buckeye (*Aesculus californicus*), poison oak (*Toxicodendron diversilobum*), wedgeleaf ceanothus (*Ceanothus cuneatus*), and various oaks. The ground cover stratum is often characterized by relatively bare ground or leaf litter in areas of dense tree cover. In areas with less tree cover, the ground cover can include non-native grass species such as cheat grass (*Bromus diandrus*), slender oat (*Avena barbata*), soft chess (*Bromus hordeaceus*), and Italian thistle (*Carduus pycnocephalus*). Other ruderal species include shortpod mustard

(*Hirschfeldia* incana), telegraph weed (*Heterotheca grandiflora*), and yellow starthistle (*Centaurea solstitialis*).

Oak woodlands are particularly prevalent in the immediate vicinity of Dikes 1, 2, and 3, and, to a lesser degree, near Dikes 4, 5, and 6. A few scattered patches of oak woodlands can also be found in the general vicinity of Dikes 7 and 8 as well as to the west of MIAD.

Oak Savanna

Oak savannas are similar to oak woodlands in that the dominant species in the canopy stratum of these savannas typically include blue oak and interior live oak. However, large oak trees tend to be widely scattered in oak savannas and the canopy cover occupied by oaks and other tree species is less than 30 percent. Various saplings and shrubs common to oak woodlands can also be found in scattered patches, but their density is insufficient to classify savannas as scrub-shrub habitat. The ground cover stratum is dominant owing to the limited cover accounted for by large woody species. This ground cover can be relatively dense and consists of a variety of grasses and forbs found in both the oak woodland vegetation association and the annual grassland association discussed below.

Only a minimal extent of oak savanna could potentially be affected by the proposed project. Limited acreages of oak savanna are present in the general vicinity of Dikes 1 through 3 and are much more prevalent in the general vicinity of Dikes 4 through 6. There are also relatively large areas of oak savanna in the general vicinity of Dikes 7 and 8.

Annual Grassland

Annual grassland is the largest acreage of vegetated habitat that could be affected within the Dam Raise Project footprint. Annual grassland lacks a vegetative overstory and consists of a heterogeneous mix of non-native grasses, annual forbs, and wildflowers. The general grouping of California annual grassland includes a large variety of plant species, the majority of which are non-native and considered to be dominant species (J.O. Sawyer and T. Keeler-Wolf, 2011). Introduced annual grasses include wild oat (*Avena fatua*), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), purple false brome (*Brachypodium distachyon*), and rattail fescue (*Festuca myuros*) (CNPS, 2015). Examples of native grasses include deergrass (*Muhlenberia rigens*) and purple needlegrass (*Stipa pulchra*). Herbaceous forbs and wildflowers within this group include both native species such as fiddle neck (*Amsinckia spp*.), western ragweed (*Ambrosia psilostachya*), popcorn flower (*Plagiobothrys spp*.), and California poppy (*Eschscholzia californica*), and non-native species such as shortpod mustard (*Hirschfeldia incana*), yellow starthistle (*Centaurea solstitialis*), and dove weed (*Eremocarpus setigerus*).

Scattered areas of annual grasslands are present in the immediate vicinity of Dikes 1 through 3 and in the general vicinity of Dikes 4 through 6. More extensive areas of annual grasslands are located in the general vicinity of Dike 7, Dike 8, and MIAD. Portions of the grassland areas in this latter region were once oak woodlands, oak savannas, and even seasonal wetlands and lake habitats but were disturbed by past JFP construction activities and other past clearing activities. Some of these disturbed areas have only recently been restored through the planting of native grasses and forbs like California brome (*Bromus carinatus*), creeping wildrye (*Leymus triticoides*), meadow barley (*Hordeum brachyantherum*), miniature lupine (*Lupinus bicolor*), and tomcat clover (*Trifolium willdenovii*).

Riparian Woodland

There is only one small area of riparian woodland that could potentially be affected by the proposed project. In the case of this particular area, located immediately south of MIAD, the vegetation is dominated by an admixture of trees and shrubs scattered within open grassland. The dominant woody species include Freemont cottonwood (*Populus fremontii*), black willow (*Salix nigra*), narrowleaf willow (*Salix exigua*), and California sycamore (*Platanus racemosa*). The ground cover stratum includes various invasive and native graminoids and forbs. This riparian habitat appears to have originally been associated with small, ephemeral streams or drainageways. These were eliminated by past construction of MIAD, with present hydrology supporting the remnant riparian woodland likely supported by seepage discharge from MIAD.

There are no other riparian woodland areas in close proximity to other elements of the proposed project. There are, however, a few riparian woodlands in the general region. The dominant tree species in the upper canopy layer in such woodlands include Fremont cottonwood, California sycamore, and valley oak (*Quercus lobata*). A subcanopy is also present and consists of less dominant trees like the white alder (*Alnus rhombifolia*), and Oregon ash (*Fraxinus latifolia*) (CDFW 2015). There is a typical midstory shrub layer consisting of California wild grape (*Vitis californica*), California wild rose (*Rosa californica*), California blackberry (*Rubus ursinus*), blue elderberry (*Sambucus cerulea*), and poison oak (*Toxicodendron diversilobum*); however, in shallower soils or frequently inundated banks, the shrub layer is primarily composed of willows and young trees. Additionally, there is an herbaceous layer consisting of sedges, rushes, and grasses including miner's lettuce (*Claytonia perfoliata*), Douglas sagewort (*Artemisia douglasiana*), poison-hemlock (*Conium maculatum*), and hoary nettle (*Urtica dioica*) (CDFW 2015).

Developed/Disturbed Areas

The proposed project could potentially affect a substantial acreage of areas classified as "developed/disturbed". The developed/disturbed areas category is really not a vegetation mapping unit so much as it is a land use designation. Such areas have been previously cleared of much of the original vegetation and developed for various uses and purposes. Examples of developed/disturbed areas that could be directly affected by the proposed project include: Dikes 1 through 8; MIAD; the LWD, RWD, and Main Dam; permanent roads, including permanent maintenance/access roads; permanent trails linking dikes; the overlook area developed at the east end of the LWD; facilities and features comprising the CCAO; the Dike 7 Office Complex; portions of parking areas.

Some developed/disturbed areas are completely devoid of vegetation. Other areas can have scattered sparse ground cover comprised of various ruderal plant species. A limited number of trees and shrubs can also be present within certain areas, such as the CCAO facilities, as can be various horticultural plants (e.g. landscaping plants). The existing dikes and dams are generally devoid of significant vegetation, with a few exceptions such as Dikes 1, 2, and 3, which have a fairly dense ground cover (various invasive and native grasses and forbs) on dike side slopes.

There are numerous areas that classify as developed/disturbed within the general vicinity of all the elements of the proposed project. Examples of such areas in close proximity to project elements include facilities of the Granite Bay, Beals Point, and Folsom Point recreation areas as well as the JFP Auxiliary Spillway. Various residential, commercial, and industrial areas (land uses) are prevalent outside the overall boundaries of the FLSRA.

Lacustrine (Lake)

The proposed project has the potential to affect significant acreage of lacustrine habitat. In this case, the lacustrine open water habitat is Folsom Lake. The project footprint borders or is in relatively close proximity to roughly 5.9 miles of lacustrine shoreline. Extreme seasonal water level fluctuations can occur in Folsom Lake, ranging from elevations of approximately 357 feet to the lake's ordinary high water (OHW) elevation of 466 feet NAVD. The lake shoreline fluctuation zone supports a mix of plant species adapted to wet environments and to much drier conditions. Common broadleaf forbs, such as miniature lupine (*Lupinus bicolor*), mustard, pearly everlasting (*Anaphalis margaritacea*), butter and eggs (*Linaria vulgaris*), Ludwigia (*Ludwigia* spp.), and common cocklebur (*Xanthium strumarium*), can rapidly colonize newly-exposed soils following the annual drop in lake levels. As the dry season progresses, sparse non-native annual grasses tend to dominate. Examples include ripgut brome, wild oat, and Italian ryegrass (*Lolium multiflorum*). Despite these generalizations, significant portions of the lake shoreline fluctuation zone are devoid of vegetation owing to the frequent cycles of inundation or lack thereof and to poor substrate.

There are a few scattered areas slightly landward of the lake's OHW elevation and within the higher portions of the lake shoreline fluctuation zone where trees and shrubs have become established. Such species include California cottonwood, Freemont sycamore, common buttonbush (*Cephalanthus occidentalis*), mulefat (*Baccharis salicifolia*), and a variety of willows (*Salix* spp.)

Waters of the United States

Jurisdictional Waters of the United States (WOUS) include waterbodies and watercourses such as lakes, ponds, rivers, and streams. WOUS also include wetlands. For regulatory purposes, wetlands are a subgroup of WOUS defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support hydrophytic vegetation, and that under normal circumstances, support a prevalence of vegetation typically adapted for life in saturated conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR Section 328.3; 40 CFR Section 230.3). Folsom Lake is a jurisdictional WOUS, with its jurisdictional boundary corresponding to the lake's OHW elevation of 466 feet NAVD 88. Those portions of the proposed project that could potentially affect lacustrine habitats (i.e. Folsom Lake) could therefore also potentially affect WOUS.

The USFWS performed a wetland delineation encompassing Dike 1 and limited areas on either side of this dike. The report documenting this delineation is contained in Appendix A. While this delineation identified 10 separate "wetlands" near Dike 1, 9 of these wetlands (those coded as SW001 through SW007, SW009, and SW008) should not have been classified as wetlands since they all are located within the jurisdictional boundary of Folsom Lake and thus are merely vegetated areas within the lake itself. One small vegetated wetland designated as SW010 and occupying 0.04 acre was delineated just east of the northern end of Dike 2. Besides Folsom Lake itself, the report identified another jurisdictional WOUS just west of the central portion of Dike 1. This feature, designated as SW008 and occupying 0.01 acre, is a drainage swale dominated by hydrophytic vegetation.

The USFWS also performed a wetland delineation encompassing Dikes 4, 5, and 6 along with additional lands on the west (landward) side of the dikes and on the east (water/lake) side of the dikes. The report documenting this delineation is also contained in Appendix A. This delineation identified 2 seasonal wetlands located near the center of Dike 5 on its west side; wetland WM012 (approximately 0.07 acre) and wetland WM013 (approximately 0.02 acre).

A jurisdictional WOUS delineation that encompassed essentially all of the features of the proposed project plus additional areas near these features was performed in 2006, as documented in Appendix C of the 2007 SEIS/EIR. This delineation did not locate any jurisdictional wetlands that could be directly affected by the proposed project, with the exception of a relatively small wetland located on the landward side of MIAD near its western end. The current remnant of this wetland coincides with the riparian woodland area previously discussed. It has yet to be determined whether this riparian woodland feature still retains a hydroperiod sufficient to still classify the feature as a wetland. It is noted that the subject delineation also mapped a jurisdictional drainage ditch, small open water area, a small freshwater marsh wetland, and another small "riparian" wetland on the landward side of MIAD close to Green Valley Road. However, all these areas were reportedly eliminated during the course of making various improvements to MIAD (USBR, 2010).

Wildlife and Habitat

Vegetative diversity and proximity to a large water body within the project vicinity provides a productive mosaic of habitat edge, cover, water, food resources and functional structure for wildlife, which have likely been a salient element in retaining existing wildlife use of the area. Vegetative transitions or ecotones, such as from oak woodland to grassland and from lake to upland, tend to support a greater diversity and population of wildlife species.

Oak woodland habitat provides a highly productive mast food (acorns) utilized by species found in the project area such as mule deer (*Odocoileus hemionus*), wild turkeys (*Meleagris gallopavo*), western grey squirrels (*Sciurus griseus*), western scrubjays (*Aphelocoma californica),* and acorn woodpeckers (*Melanerpes formicivorus*). Verner (1980) reported that thirty bird species are known to include acorns in their diet. Tree cavities in oaks, pines, and particularly cottonwood trees found in the project area's riparian woodland are used for nesting by American kestrels (*Falco sparverius*), several species of woodpeckers, northern flickers (*Colaptes auratus*), white-breasted nuthatches (*Sitta carolinensis*), oak titmice (*Baeolophus inornatus*), western gray squirrels, raccoons (*Procyon lotor*), hoary bats (*Lasiurus cinereus*), wrens, western bluebird (*Sialia mexicana*), and several species of owls. Two dozen breeding bird species have been documented to breed in oak woodlands (Gaines 1977). Large trees in oak woodlands provide potential nesting sites for the golden eagle, bald eagle, and red-tailed hawk (*Buteo jamaicensis*), which utilize the height of tall trees to protect their nests.

The woodland habitats also provides hiding cover, thermal regulation, nesting cavities, and structure for birds and mammals. Proximity to water increases this habitat value and increases food diversity. Dense, contiguous cover can provide connectivity (wildlife corridors), particularly used by larger ranging mammals. Cover forage and nest habitat is of high value in riparian woodland for birds such as ruby-crowned kinglets (*Regulus calendula*), bushtits (*Psaltriparus minimus*), warbling vireos (*Vireo gilvus*), Hutton's vireos (*Vireo huttoni*), Wilson's warblers (*Wilsonia pusilla*), American robins (*Turdus migratorius*), and Bullock's orioles (*Icterus bullockii*). The dense vegetation in oak woodlands can also provide a means of concealment for large predators like bobcats (*Lynx rufus*) and mountain lions (*Puma concolor*).

Most species found in oak and riparian woodlands also utilize annual grasslands. California quail (*Callipepla californica*), wild turkey, black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyl*), and deer are the most common mammalian species observed within the project area grasslands. The relatively large number of herbivores and insectivores foraging in grasslands also provide a significant prey base for many predatory species such as red-tailed hawks, red-shouldered hawks (*Buteo lineatus*), turkey vultures (*Cathartes aura*), great horned owls (*Bubo virginianus*), and white-tailed kites (*Elanus leucurus*). Also found within the grasslands and lake interface are Canada geese (*Branta canadensis*), great egret (*Ardea alba*), house finches (*Carpodacus mexicanus*), spotted towhees (*Piplio maculates*), gopher snakes (*Pituophis catenifer*), rattlesnakes (*Crotalus viridis*), common king snakes (*Lampropeltis getula*), coyotes (*Canis latrans*), Virginia opossum (*Didelphis virginiana*), and striped skunks (*Mephitis mephitis*).

Oak savanna habitats in the project area tend to support an admixture of wildlife species that frequent both oak woodlands and annual grasslands.

Inundated portions of the lake (lacustrine/lake habitat) provide habitat for a variety of fish species such as largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), bludegill (*Leopomis macrochirus*), rainbow trout (*Oncorhynchus mykiss*), and Wakasagi smelt (*Hypomesus nipponensis*). Habitat value within the lake shoreline fluctuation zone can be poor in many places due to the lack of vegetation and the effects of variable levels and timing of inundation. However, the habitat value is much higher in the scattered patches where vegetation is present, particularly in areas where this vegetation includes trees and shrubs. Wildlife associated with open habitats (ex. grasslands, oak savannas) sometimes frequent the lake shoreline fluctuation zone. Wading birds and shorebirds such as spotted sandpiper (*Actitis macularius*), killdeer (*Charadrius vociferous*), and Western sandpiper (*Calidris mauri*) forage in and near this zone. A wide variety of bird species use and some nest in the trees and shrubs, while common reptiles and amphibians like turtles, frogs, and snakes can be present in almost any portion of the shoreline fluctuation zone. More importantly, the shoreline zone of Folsom Lake forms a critical wildlife corridor. Many upland habitat types (e.g. oak woodland, annual grassland, riparian woodland) and some seasonal wetlands bordering the lake are effectively isolated until lake water levels recede, allowing wildlife to resume movement from one area to another.

Areas classified as developed/disturbed offer little in the way of wildlife habitat. Some animal species have adapted to conditions in these developed lands and often forage such areas. Examples include striped skunk, raccoon, mourning dove (*Zenaida macroura*), and rock pigeon (*Columba livia*). Some species use built structures (bridges, buildings, dam and auxiliary spillway, etc.) and temporary manmade objects (ex. large storage bins, scaffolding) as refuge and even nesting sites. Examples include cliff swallows (*Petrochelidon pyrrhonota*), Anna's hummingbird (*Calypte anna*), mourning doves), house finches (*Carpodacus mexicanus*), barn owls (*Tyto alba*), Say's phoebe (*Sayornis saya*), deer mice (*Peromyscus maniculatus*), and myotis bat (*Myotis californicus*). It is feasible that predator avoidance overrides human disturbance as an attractant to these sites. However, many species have low tolerances for disturbance and likely would not utilize habitat near sites actively used by humans.

Anthropogenic (human-caused) disturbances and loss of habitat can decrease the amount of food and availability of food resources for wildlife, compromise breeding and increasing mortality so that a species cannot maintain a population within a given area. Incremental loss of oak and riparian woodlands, oak savannas, and wetlands is a real concern for maintaining wildlife populations in the project vicinity. Many species also have a low tolerance for disturbance and will not utilize habitat near active anthropogenic sites. Disturbance factors such as roads, urban noise, construction sites, night lights, and toxic substances are additional contributions of developed areas which have reduced wildlife diversity and numbers. Mortality factors are high for suburban wildlife due to collisions with vehicles and power lines, toxic substances, depredation, noise, disturbance of nests and burrows, predation by dogs and humans, and other factors. Small acreages of remaining habitat can function as mortality sinks where species are attracted by useable habitat attributes but incur mortality due to unexpected anthropogenic factors.

The general region has incurred substantial residential, recreational, and dam/dike development in the last 50 years, fragmenting habitat and connectivity. Urban development has reduced habitat significantly in the Folsom vicinity, and many former native habitats are no longer suitable for supporting wildlife populations or constitute marginal habitat. Continuity and connectivity of woodland habitat around the lakefront is currently a primary limiting factor for maintaining wildlife populations as development continues to fragment or degrade remaining acreages. Existing woodlands in the immediate project vicinity still serve an important function for the lake ecosystem as a wildlife corridor. Loss of additional habitat in the project vicinity would jeopardize this habitat continuity around the lake circumference. Remaining woodlands are also heightened in importance since this productive habitat is a limited resource within the project vicinity, and is critical to maintaining current wildlife populations. Sufficient habitat acreage to support bioenergetics for larger land-based mammals such as gray foxes, bobcats, mountain lions, and coyotes is much reduced or no longer present. These species may still depend on woodlands near the southern part of Folsom Lake for lakeshore connectivity, cover, travel and for access to food sources. Wildlife species that do not seem to mind urban noise and activity, commonly referred to as urban wildlife (e.g. raccoons, opossums, cowbirds), are more likely to increase proportionally as woodlands are fragmented.

The components of the proposed project are largely situated adjacent to urbanized areas located west and south of these components. Recent residential and other development have contributed to reductions in wildlife habitat and habitat continuity. Remaining wildlife habitat exits primarily in a linear strip between the urbanized areas and dam/dike structures and in strips and patches located on the water side of the dam/dike structures. These remnant habitats support avian species and resident wildlife of lower trophic levels that are able to co-exist with urban disturbances. Past dam and dike construction/modification activities along with construction of the JFP auxiliary spillway have also contributed to substantial habitat disturbance and removal of various habitats including open water (lacustrine), riparian, wetland, oak savanna, oak woodland, and annual grassland.

3.4.2 Environmental Effects

Basis of Significance

Direct and indirect effects on vegetation and wildlife would be considered significant if the alternatives result in any of the following:

1. Substantial loss, degradation, or fragmentation of any natural communities or wildlife habitat.

2. Substantial reduction in the quality or quantity of important habitat with the result that native wildlife could not live or successfully reproduce in the project area.

3. Interfere substantially with the movement of any native wildlife species (habitat connectivity) or with established native resident or migratory wildlife corridors.

4. Conflict with any local, state or federal policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

5. Substantial effects on a sensitive natural community, including Federally-protected wetlands and other jurisdictional Waters of the U.S. as defined by Section 404 of the CWA.

Alternative 1: No Action Alternative

Under Alternative 1, No Action, the proposed construction would not occur. No construction related effects (direct or indirect) to vegetation and wildlife would occur, and conditions in the project area would generally remain consistent with existing conditions assessed in Section 3.4.2. However, USBR previously committed to restoring many of the native habitats (vegetation associations) that were severely disturbed during the construction of the new auxiliary spillway and during construction of MIAD safety improvements. Most of these areas are situated in the region extending from the auxiliary spillway eastward to the east end of MIAD. Details of the restoration plan are presently unknown, but it is assumed that some of the annual grasslands that have been restored in this region could be converted to woodlands or oak savannas in the future should a restoration program be implemented.

Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

The "footprint" (e.g. the limits of construction or direct impact) of each of the elements of the proposed project were superimposed on vegetation/habitat mapping to determine the extent of potential direct project impacts to the various vegetation associations and habitats previously discussed. Table 3-1 contains the results of this evaluation.

Table 3-1. Approximate extent (acres) of existing vegetation associations/habitats located within the potential direct impact "footprint" of the proposed project.

Vegetation Associations (Habitats)	Acres Within Proposed Project "Footprint"		
	Dams & Dikes	Staging Areas	Total
Developed/Disturbed Areas	157.2	66.4	**223.6**
Lake (Lacustrine)	57.4	40.9	**98.3**
Annual Grassland	14.8	52.1	**66.9**
Oak Woodland	4.7	4.8	**9.5**
Oak Savanna	1.3	1.2	**2.5**
Riparian Woodland	0	2.2	**2.2**
Totals	**235.4**	**167.6**	**403.0**

Acreages indicated for "dams & dikes" are those within the footprints of the existing dams and dikes themselves, plus a buffer of roughly 50 feet around the limits of these features.
Acreages indicated for "staging areas" are those within the limits of the proposed construction staging areas.
The habitats (vegetation associations) listed were based on those present in late 2016.

It is important to understand that the potential impact acreages indicated for the project's dams and dikes are typically much greater than what the actual acreages would likely be. This is because, to be conservative, the impact footprint of a given dam or dike commonly included the full extent of the feature, plus an additional 50-foot buffer extending beyond the limits of the feature. In actuality, the proposed improvements to the dikes and dams would directly affect roughly 30 percent of the full extent of a particular dike or dam, if not less in some cases. In contrast, the potential direct impact acreages indicated for the project's staging areas were based on the actual proposed boundaries of these areas without any buffers.

Over 55 percent of the total area that could be directly impacted by proposed construction would consist of existing developed/disturbed areas. Direct impacts to such areas would not significantly or adversely affect wildlife habitat or native plant communities since these areas are already heavily disturbed with highly limited habitat values and the remaining vegetation, where present, is widely scattered and not representative of natural conditions. There would be no substantial change to existing conditions in these developed/disturbed areas, as regards wildlife/habitat qualities, following completion of the proposed project.

Roughly 24 percent of the total potential impact area would consist of portions of Folsom Lake (e.g. lacustrine habitat). Although Table 3-1 indicates 40.9 acres could be directly impacted by staging areas, this acreage is limited to large portions of only 3 staging areas; the one situated on the lake side of Dike 4, the one situated on the lake side of Dikes 5 and 6, and the one located at the north end of the RWD and on its lake side (see Figure 2-11). As mentioned, use of these staging areas would be prohibited if the area is inundated or the soil is saturated with water. Topographic alterations, including placement of fill material or excavation/grading, and removal or clearing of trees and shrubs would also be prohibited in these lake staging areas. Thus, use of these particular staging areas would not result in appreciable alterations to existing conditions.

While roughly 57.4 acres of lake habitat falls within the conservative construction footprints of the proposed dike and dam alterations, this acreage is overestimated and the proposed construction work would not result in a truly measurable loss of lake acreage or volume. The impacts would primarily involve excavation of existing riprap and embankment material below the lake's ordinary high water elevation, followed by replacement of these same types of materials largely within the limits of where the existing riprap and embankment material are removed. Another impact would be construction of the temporary Park Road detour, which would directly impact less than 0.5 acre of the lake adjacent to Dike 1. Since this detour road would be removed once it is no longer needed and the affected lake area restored to pre-detour conditions, there would be no long-term loss of lake acreage or volume. Thus, while there would be temporary impacts to lake habitat during construction of dike and dam improvements (including the Park Road detour), the affected lake areas would essentially be the same as existing conditions following construction completion and there would be no appreciable loss of lake acreage or volume.

Project construction could directly affect up to 66.9 acres of annual grassland, or approximately 17 percent of the total area within the project footprint. The majority of existing vegetation, excluding any native trees present, would be removed, destroyed, or damaged in these grasslands during construction, thereby severely degrading the affected habitat. It is highly likely that very little of the 14.8 acres of annual grassland indicated in Table 3-1 as being within the "footprint" of dams and dikes would actually be directly impacted by the proposed project. Those limited areas that are actually disturbed during the raising of dikes (no annual grasslands would be directly impacted by proposed improvements to the main dam, LWD, RWD, and MIAD) would likely be permanently lost. However, direct impacts to annual grassland habitats within the proposed staging areas (total of approximately 52.1 acres) would only be temporary. As previously discussed, heavily disturbed portions of the staging areas would be restored to mimic pre-construction conditions as the final stage of construction in a given project phase. This restoration would include hydroseeding the affected areas with a mixture of native grasses and forbs.

Revegetated areas would be monitored for invasive plant species by Corps staff during the construction contract warranty period of a given project phase. The term invasive plant species refers to those plants listed in the California Invasive Plant Inventory database generated by the California Invasive Plant Council, and having an invasive rating of "high" or "moderate". If it is determined invasive plants are becoming established, such plants would be eradicated by the construction contractor through directed herbicide applications, physical removal, or both. The goal would be to control invasive plant species such that they account for 5 percent or less of the average total plant cover.

The proposed project could directly affect up to 9.5 acres of oak woodland habitats, with approximately 4.7 acres of this total attributable to the dam and dike improvements and the remaining 4.8 acres attributable to work in the staging areas. Since the impact footprints used to determine potential dike construction impacts were much larger than the anticipated actual footprints, dike construction impacts to oak woodlands would be substantially lower than the 4.7 acres indicated. Most native trees located within the proposed staging areas would be preserved, thereby reducing the actual staging area impacts to oak woodlands to less than the 4.8 acres indicated. Regardless, the proposed project would result in the permanent loss of some oak woodland habitats.

A total of approximately 2.5 acres of oak savanna habitat could be directly affected by the proposed project. Of this total, about 1.3 acres could be impacted by improvements to the dikes and roughly 1.2 acres could be impacted by work in the staging areas. Similar to the above discussion on oak woodlands, dike improvements would likely result in a loss of oak savanna that is much less than 1.2 acres and preservation of most native trees located in the staging areas would also reduce the staging area impacts to oak savanna. Despite these reductions, there would still be some relatively minimal permanent loss of oak savanna habitats.

Near the close of each phase of the overall project, the Corps would determine the approximate acreage of oak woodland habitat and oak savanna habitat eliminated (destroyed) as a result of construction activities. Once the total acres of each of the two habitat types is known, the Corps would develop a mitigation plan to compensate for these losses. Compensatory mitigation would involve creation or restoration of the affected habitat types (vegetation associations). The minimum ratio of the acres of each type to be restored or created per acre of each type lost would be 1.2:1. The mitigation goal would be to create or restore habitat where the density of canopy tree species and midstory woody species is approximately the same as the average density of canopy tree species and midstory woody species found in the impacted habitats. The ground cover stratum would be restored through the planting of various native grasses and forbs, while the species composition of the midstory and canopy strata would strive to mimic that of the affected habitats. The mitigation site(s) would be selected in coordination with USFWS, DWR, and SAFCA. The overall mitigation plan would also be prepared in coordination with these agencies. If on-site mitigation proves a viable option, such coordination would also include USBR

Table 3-1 indicates that use of the proposed staging areas could directly affect approximately 2.2 acres of riparian woodland. The single riparian woodland within the project footprint is located in the staging area just south of MIAD. This habitat would be completely protected and preserved during project construction; hence, there would be no loss of riparian woodland habitats.

It is anticipated that most animals that frequent areas that may be directly impacted by construction of a given project phase would move elsewhere at the onset of construction of that phase. However, it is possible that a few animals that use burrows in these areas and some slow-moving animals that do not flee the areas at the start of construction could be injured or killed by earthwork activities and perhaps construction traffic. Similarly, any animals using the many areas existing riprap along the side slopes of the dikes and MIAD could be harmed or killed during the course of removing riprap (removal of limited riprap areas is necessary before building the raised portions of dikes and MIAD). If any active bird nests must be removed, the young occupying removed nests (whether eggs or chicks) could perish in some cases. The potential for this would be minimized by taking chicks and viable eggs to a wildlife care facility where the facility would attempt to nurse the young until they can be safely released.

Disturbance caused by staging and construction activity, noise, traffic, and possibly night lighting are expected to displace wildlife species through the four-year project construction period from 2018 to 2022. Interference with lake access by terrestrial mammals would occur for intermittent periods during this same period. Loss of remaining woodland habitats would reduce habitat cover and connectivity used to access summer and fall water sources by terrestrial wildlife populations. The duration of construction-created disturbances would be overlapping and continuous. However, the disturbance areas would be separated sufficiently from a geographic standpoint that the overlapping periods of disturbance would have little meaning as regards potential adverse impacts to wildlife. For example, the anticipated 2-year construction schedule for Dikes 4, 5, and 6 would overlap the 2-year construction schedule for Dikes 1, 2, and 3 for approximately 15 months, but these two construction areas are separated by roughly 1 mile. The 2-year construction schedule for improvements to LWD, RWD, Dikes 7 and 8, and MIAD would not overlap with the construction schedule for Dikes 4-6 but would overlap the construction schedule for Dikes 1-3 by approximately 9 months. Yet the Dikes 1-3 construction area is separated by a minimum of 2.3 miles from the LWD/RWD/Dikes 7&8/MIAD construction area (Phase 4) and this separation distance is over 5 miles for some of the Phase 4 construction features.

Due to the fragmented nature of remaining oak woodland habitats, Alternative 2 (the proposed project) has a disproportionate potential to significantly impact remaining habitat connectivity by the removal of additional woodland. Permanent loss of even relatively small acreages could be significant to local wildlife populations for access, connectivity, breeding, and foraging. In the vicinity of the proposed project, the remaining natural terrestrial habitats exist only as a relatively narrow band adjacent to Folsom Lake, with the width of this band varying from as little as 150 feet to as much as roughly 2,400 feet. Because of this, these habitats are substantially more vulnerable to anthropogenic impacts than a configuration supporting greater interior habitat area and wildlife cover. The magnitude of project-caused disturbance would be proportionally higher as a result of the linear configuration of natural terrestrial habitats and due to lack of habitat continuity outside the project boundaries for cover, escape, or alternate use. As a result, because the habitat configuration is constrained and remaining acres are low, habitat can be highly impacted by incremental acreage losses.

During project construction, there would be a substantial reduction in the quality of important habitat, substantial degradation of certain natural vegetation associations and wildlife habitat, and some interference with the movement of terrestrial wildlife species. These effects would be minimized somewhat through some of the mitigation measures outlined in Section 3.4.5. The majority of these effects would also be temporary, being limited to the period of construction. There would be no long-term loss of annual grasslands, since disturbance to these grasslands would be mitigated by seeding with native grasses and forbs, but there would likely be a permanent loss of limited acreages of oak woodland and oak savanna habitats. These losses would be mitigated through compensatory mitigation involving creation or restoration of similar habitats, as described in Section 3.4.5. Following completion of project construction, there would be no substantial fragmentation or long-term degradation of habitats. The proposed project would not affect natural habitats to the point that native wildlife presently utilizing such habitats could not live or successfully reproduce in the project area. Following completion of construction of a given project phase, the improved dikes and dams would not interfere with the movement of wildlife species any more than these man-made features presently interfere with such movement, and wildlife corridors/habitat connectivity would not be appreciably degraded.

The proposed project would not conflict with any local, state, or federal policies or ordinances protecting biological resources (also refer to the section on special status species). Note that Sacramento County's tree protection ordinance is not applicable to the project since this ordinance only applies to unincorporated portions of the county and work to be completed within the county limits are within the boundaries of the City of Folsom. The proposed project would also not substantially affect sensitive natural communities. The only "sensitive natural communities" present within or immediately adjacent to the project footprint are wetlands and riparian woodlands (which would be protected and preserved) and, since it classifies as a jurisdictional WOUS, Folsom Lake. While the project could have temporary direct impacts to Folsom Lake, such impacts would be de minimis and BMPs (mitigation measures) discussed in Section 3.11.5 (Water Quality) would help avoid and minimize temporary impacts.

Given the considerations above, the proposed project's impacts to vegetation and wildlife resources would be less-than-significant through the implementation of the mitigation measures described below in Section 3.4.5, as well as those discussed in Section 3.11.5 (Water Quality), those discussed in Section 3.5.5 (Special Status Species), and those discussed in Section 3.6.5 (Air Quality) pertaining to the reduction and control of dust during project construction.

3.4.5 Avoidance, Minimization, and Mitigation Measures

The following avoidance, minimization, and mitigation measures would be employed to help ensure the project's long-term impacts to vegetation and wildlife resources are less than significant.

1. To minimize dust impacts to vegetation, wetlands, and wildlife, dust control measures consistent with SMAQMD fugitive dust control measures would be implemented by the construction contractor.

2. To help prevent importation of invasive plants and animals, the construction contractor would be required to thoroughly clean vehicles and equipment before first entering the project site.

3. For each phase of the project, the Corps would prepare final construction plans that would include drawings identifying habitat areas, including wetlands, that must be protected and specifying the methods of protection (e.g. installation of fencing or similar physical barriers, posting of signs, etc.). These plans would also illustrate and/or describe those areas/lands near the project features that are outside the limits of construction (and thus are protected

from direct construction impacts). The final construction plans would be accompanied by written project specifications further detailing the habitat protection requirements, as well as general requirements concerning the protection of vegetation and wildlife.

4. Native trees and shrubs having a DBH of 2 inches or greater located within the limits of construction of a particular project phase would be preserved to the extent practicable. The construction contractor would establish protective buffers (e.g. temporary fencing) around the driplines of those trees and shrubs to be preserved that are located within the limits of construction. Native trees and shrubs located outside the limits of construction would be preserved. The construction contractor would also erect protective buffers along the limits of construction where these limits are in close proximity to the adjacent trees and shrubs to be preserved. Any required trimming of native trees or shrubs would be conducted by, or under the direct supervision of a certified arborist.

5. Near the end of each phase of the overall project, the Corps would determine the approximate acreage of oak woodland habitat and oak savanna habitat eliminated (destroyed) as a result of construction activities. Once this is known, the Corps would develop a mitigation plan to compensate for these losses. Compensatory mitigation would involve creation or restoration of the affected habitat types (vegetation associations). The minimum ratio of the acres of each type to be restored or created per acre of each type lost would be 1.2:1, or in other words, for every acre impacted 1.2 acres would be restored or created. The mitigation goal would be to create or restore habitat where the density of canopy tree species and midstory woody species is approximately the same as the average density of canopy tree species and midstory woody species originally found in the impacted habitats. The ground cover stratum would be restored through the planting of various native grasses and forbs, while the species composition of the midstory and canopy strata would strive to mimic that of the affected habitats. The restored areas would be managed and monitored by the Corps (or the Corps' contractor) for 5 years, although this period could be reduced to 4 years if success criteria are achieved by that time. The mitigation site(s) would be selected in coordination with USFWS, DWR, and SAFCA. The overall mitigation plan would also be prepared in coordination with these agencies. If on-site mitigation proves a viable option, such coordination would also include USBR.

6. Project impacts to migratory birds, including bald eagles, Swainson's hawks, and white-tailed kites, would be avoided or minimized to the degree practicable by following the avoidance, minimization, and mitigation measures set forth in Section 3.5.5 for such species.

7. The Corps would ensure that all construction personnel undergo environmental protection training to be aware of all required environmental protections (bird, wildlife, and vegetation/habitat protection) per the final construction plans and specifications, as well as those required by applicable federal and state laws.

8. The construction contractor would be required to place food-related wastes in self-closing trash containers, in an effort to keep wildlife away from construction areas where they might be harmed.

9. After completing construction activities within a given phase of the proposed project, disturbed portions of the staging areas used for the project phase would be restored by the construction contractor. One exception to this generalization would be in cases where a particular staging area is also going to be used for a subsequent project phase. In such cases, the shared staging area would not be restored until the final project phase to use the staging area is completed. Another exception would be for staging areas, or portions thereof, that encompass permanent man-made features. Such areas would not be restored.

   Restoration of staging areas would first involve restoring pre-construction topography to the degree practicable. Next, a mixture of native grass and forb seeds would be planted throughout disturbed portions of staging areas in order to establish a permanent vegetative groundcover. The planted areas would be periodically monitored until the average ground cover accounted for by native grasses and forbs reaches approximately 75 to 80 percent.

10. Revegetated areas would be monitored for invasive plant species by Corps staff during the construction contract warranty period of a given project phase. The term invasive plant species refers to those plants listed in the California Invasive Plant Inventory database generated by the California Invasive Plant Council, and having an invasive rating of “high” or “moderate”. If it is determined invasive plants are becoming established, such plants would be eradicated by the construction contractor through directed herbicide applications, physical removal, or both. The goal would be to control invasive plant species such that they account for 5 percent or less of the average total plant cover.

11. Prior to initiating construction of a given project phase, Corps staff would conduct an assessment of drainage depressions, channels, and ditches present at the project site to determine whether any such features provide water to wetlands. Corps staff would also delineate the approximate limits of jurisdictional wetlands located within or immediately adjacent to the project’s limits of construction. The construction contractor would be required to maintain flows in those drainage features that are found to provide water to wetlands. Direct construction impacts to wetlands would be prohibited.

12. All BMPs would be strictly followed to prevent spills of toxic substances. Appropriate materials for spill containment and cleanup would be maintained onsite.

13. The following restrictions would be placed upon the use of any construction staging areas located within the jurisdictional limits of Folsom Lake: (1) Use would first need to be approved in writing by the Corps; (2) Use would be strictly prohibited when the area is inundated by standing water or the water underlying the staging area is within 6 inches of the soil surface; (3) Topographic alterations, including grading, excavation, or deposition of fill materials, would be prohibited; (4) Clearing or removal of existing vegetation would be prohibited; (5) Stockpiling of construction materials or wastes would be prohibited; (6) Fueling of construction equipment or vehicles would be prohibited; (7) Storage of fuel, hazardous wastes, or other potential pollutants would be prohibited.

14. Once the Park Road detour road segment (an element of the project phase that includes Dikes 1, 2, and 3) is no longer needed for the proposed project, this road segment would be removed. Topography altered by construction of the road would be restored to approximately match pre-construction topography and natural areas disturbed by road construction would be planted with native grasses and forbs.

3.5 SPECIAL STATUS SPECIES

3.5.1 Environmental Setting

Regulatory Setting

The following Federal, State, and local laws and regulations apply to the resources covered in this section. Descriptions of the laws and regulations can be found in Chapter 5.0.

Federal

- Endangered Species Act (16 U.S.C. 1531 et seq.)
- Migratory Bird Treaty Act (16 USC §703-712)
- Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d)

State

- California Endangered Species Act (Fish and Game Code 2050 et seq.)
- California Fish and Game Code (Sections 3511, 4700, 5050, and 5515), Fully Protected Species
- California Fish and Game Code (Section 3503), Protection of Bird Nests and Raptors

Existing Conditions

Special-status species are defined as:

- Species that are listed or proposed for listing as threatened or endangered under the ESA (50 CFR 17.12 for listed plants, 50 CFR 17.11 for listed animals, and various notices in the *Federal Register* for proposed species);

- Species that are candidates for future listing as threatened or endangered under the ESA (72 FR 69034, December 6, 2007);

- Species listed or proposed for listing by the State of California as threatened or endangered under the CESA (14 CCR 670.5);

- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380);

- Animals that are California species of special concern (California Department of Fish and Game 2008);

- Animals fully protected in California (CFGC 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians].

Federally-listed proposed, candidate, threatened, or endangered species (listed species) and their associated critical habitat were obtained for the Folsom, Rocklin, and Clarksville 7.5 Minute USGS Quadrangles via the USFWS website and the California Natural Diversity Database (CNDDB) (USFWS, CNDDB 2015). The USFWS and CNDDB lists are included in Appendix C. Excluding listed fish species, a total of 20 special status species are identified as having the potential to occur within the Folsom, Clarksville, and Rocklin quadrangles. Federally listed fish species that occur in the general region (Central valley steelhead, Central Valley spring run Chinook salmon, and Central Valley winter run Chinook salmon) cannot access potentially suitable habitat in Folsom Lake because passage to such habitat is blocked by Folsom Dam and by Nimbus dam, which is located downstream of Folsom Dam.. Because of this, special status fish species are not addressed in this document. Table 3-2 lists the special status species and provides their listing status, basic habitat requirements, and potential to occur in the project area.

Table 3-2. Special Status Species with Potential to Occur in the Project Area.

Species	Status	Habitat	Potential for Occurrence
Invertebrates			
Conservancy fairy shrimp *(Branchinecta conservatio)*	FE	Inhabits vernal pools	Unlikely. No known populations in the project area and suitable habitats are not present in the project area. Need to conduct survey prior to construction.
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 known populations in the project area and suitable habitats are not present in the project area. Need to conduct survey prior to construction.
vernal pool tadpole shrimp (*Lepiduras packardi*)	FE	Endemic to vernal pools in the Central Valley, coast ranges, and a limited number of sites in the Transverse Range and Santa Rosa Plateau of California. Pools are typically in grass bottomed swales of grasslands in old alluvial soils underlain by hardpan or in mud-bottomed pools with very turbid water.	Unlikely. Suitable habitat (vernal pools) is not present in the project area. Need to conduct survey prior to construction.

Species	Status	Habitat	Potential for Occurrence
valley elderberry longhorn beetle (VELB) *(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.	Elderberry shrubs occur in the primary action area, providing suitable habitat for VELB. 34 existing elderberry shrubs have been documented within the limits of, or in close proximity to, the proposed project.
Amphibians and Reptiles			
California tiger salamander, central population *(Ambystoma californiense)*	FT, ST	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).	Unlikely to occur. Proposed project is outside the spawning range for the species
California red-legged frog *(Rana draytonii)*	FT	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 due to presence of predator bull frog species and low quality habitat.
Giant garter snake *(Thamnophis gigas)*	FT, ST	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			
Bald eagle *(Haliaeetus leucocephalus)*	SE	Typically found in coniferous forest habitats with large, old growth trees near permanent water sources such as lakes, rivers, or ocean shorelines.	Known to occur in the project area.
Burrowing owl *(Athene cunicularia)*	SSC	Typically reside in burrows created in gently-sloping and treeless areas characterized by low, sparse vegetation. Endemic to open grassland, steppe and desert regions in North and South America. Breeding occurs in mid-March to August in the central and western U.S.	Unlikely to occur. Although some suitable habitat is present in project area, no burrowing owls have ever been documented in project lands and closest documented occurrences are over 4 miles south of Folsom Lake.

Species	Status	Habitat	Potential for Occurrence
California black rail *(Laterallus jamaicensis coturniculus)*	ST	Inhabits tidal marshes and freshwater marshes in the western United States and Mexico. Tend to inhabit the drier portions of wetlands.	Unlikely to occur; no suitable habitat in project area.
California spotted owl *(Strix occidentalis occidentalis)*	SSC	California endemic, with some birds in the Sierra Nevada region descending to lower elevations in winter. Breeds and roosts in forests and woodlands with large, old trees.	Unlikely to occur; old-growth forests preferred by this species are not present in project area.
Cooper's hawk *(Accipiter cooperii)*	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 foraging habitat is present within project area. Could be observed during migration in California.
Loggerhead shrike *(Lanius ludovicianus)*	SSC	Requires open country with short vegetation and shrubs or low trees, particularly those with spines or thorns which offer protection. Often seen along mowed roadsides, agricultural fields, pastures, old orchards, riparian areas, desert scrublands, prairies, and golf courses. Commonly present year round throughout most of the California range.	Moderate probability of occurrence in project area, particularly near annual grasslands.
Mountain plover *(Charadrius montanus)*	SSC	Reside in open, flat, dry tablelands with low, sparse vegetation and nests on bare ground. Most birds winter from north-central California to the Mexico border, with some birds west of the Coast Range in southern countries. They depart California wintering grounds in early and mid-March for breeding in high plains regions.	Unlikely to occur. Suitable foraging and nesting habitat is lacking in the project area, with a few isolated exceptions. Thus far, not documented in close proximity to the project site.
Short-eared owl *(Asio flammeus)*	SSC	One of the most widespread owl species; can found throughout the Americas. Inhabits large areas of open grassland and nest on the ground in prairies or hayfields. Partially migratory species with northern birds moving south for wintering (non-breeding) and southern birds staying primarily year round residents.	Unlikely to occur. Although potentially suitable habitat is present in the project area, no short-eared owls have been documented in the immediate project area and project site is outside historic or current breeding ranges.

Species	Status	Habitat	Potential for Occurrence
Swainson's hawk *(Buteo swainsoni)*	ST	Restricted to portions of the Central Valley and Great Basin regions where suitable nesting and foraging habitat is still available. Requires large, open grasslands with abundant prey in association with suitable nest trees.	Potential to occur in the project area.
tricolored blackbird *(Agelaius tricolor)*	SSC	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.
White-tailed kite (*Elanus leucurus*)	FP	Typically reside in coastal and valley lowlands within or near agricultural areas. Also inhabits herbaceous and open stages of most habitats, primarily in cismontane California. Nests typically near top of dense oak, willow, or other tree stands near open foraging areas.	Potential to occur in the project area, since this bird was previously observed in the project vicinity.
Plants			
Boggs Lake hedge-hyssop *(Gratiola heterosepala)*	SE	Can be found in marshes, swamps (lake margins), and vernal pool habitats on clay soils ranging from 10 to 2,375 meters in elevation. Known to occur in Fresno, Lake, Lassen, Madera, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano and Tehama Counties as well as parts of Oregon.	Unlikely to occur; small areas of seasonal wetlands and marshy habitat present within the project area, but not on clay soils.
El Dorado bedstraw *(Galium californicum ssp. sierrae)*	FE, SR	Only found within El Dorado County. Exists within chaparral, cismontane woodland, lower montane and coniferous forest habitats and gabbroic soils within an elevation range from 100 to 585 meters.	Unlikely to occur in the project area based on the lack of chaparral and coniferous forest.
Layne's ragwort *(Packera layneae)*	FT, SR	Can be found in Butte, El Dorado, Placer, Tuolumne, and Yuba Counties. Habitat is chaparral or cismontane woodland, located in serpentinite, gabbroic, or rocky soils.	Unlikely to occur in the project area; plant is endemic to the western slopes of the northern Sierra Nevada foothills, but not within the project footprint.
Pine Hill ceanothus *(Ceanothus roderickii)*	FE, SR	This species grows only on gabbro soils in western El Dorado County, scattered throughout areas of chaparral.	Unlikely to occur; no suitable habitat is in project area.

Species	Status	Habitat	Potential for Occurrence
Pine Hill flannelbush *(Fremontodendron decumbens)*	FE, SR	Only known from the central portion of western Eldorado County in the vicinity of Pine Hill itself. Habitat includes live oak woodland with a significant shrub component.	Unlikely to occur; no suitable habitat is in project area.
Sacramento Orcutt grass *(Orcuttia viscida)*	FE, SE	Endemic to Sacramento County. Grows only in vernal pools	Unlikely; no suitable habitat in the project area. Need to conduct survey prior to construction
Stebbin's Morning-glory *(Calystegia stebbinsii)*	FE, SE	Historically, only found in 2 areas of northern California foothills in El Dorado and Nevada Counties. Grows in openings in chaparral habitats.	Unlikely; no suitable habitat is present in project 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
(SR) State Rare Species

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 federally and state listed species are identified as having the potential to occur in the vicinity of the project areas and could be affected by construction activities:

- Valley elderberry longhorn beetle (Federal Threatened)
- Bald eagle (State Endangered)
- Loggerhead shrike (State Species of Special Concern)
- Swainson's hawk (State Threatened)
- White-tailed kite (State Fully Protected)

Valley Elderberry Longhorn Beetle.

The valley elderberry longhorn beetle (VELB) is federally-listed as threatened under the ESA. In October of 2012, the USFWS recommended in the Federal Register (78 FR 4812) that the beetle be delisted. After review of updated species information, the recommendation was withdrawn in September of 2014 (79 FR 55879 55917). The range of the beetle extends throughout the Central Valley and associated foothills, from the 3,000-foot-high contour in the east foothills, through the valley floor, to the watershed of the Central Valley in the west foothills. Elderberry shrubs are found in the remaining riparian forests and grasslands of the Central Valley and adjacent foothills. This beetle is often associated with various plant species, such as Freemont's cottonwood, California sycamore, willow, and oak (USFWS 1999a).

Elderberry shrubs (*Sambucus* sp.) are the host plant for VELB and are a common component of the remaining riparian forests of the Central Valley. Elderberry shrubs are also common in upland habitats. Field surveys have found that adult VELB feed on elderberry foliage, and perhaps flowers, and may be present from March through early June, which is the adult's lifespan. It is during this time that the adults mate. The females lay their eggs, either singularly or in small clusters, in bark crevices or at the junction of stem and trunk or leaf petiole and stem. After hatching, a larva burrows into the stem of the elderberry where it creates a gallery, which it fills with grass and shredded wood. After the larva transforms into an adult beetle, it chews an exit hole and emerges from the elderberry. The life span of VELB ranges from 1 to 2 years. Studies of the spatial distribution of occupied shrubs suggest that the beetle is a poor disperser (USFWS 1999a). Although critical habitat has been identified for the VELB, such critical habitat does not extend into the immediate vicinity of the proposed project.

The VELB has the potential to occur within and near the proposed project due to the presence of the VELB's host plant, elderberry. Thus far, a total of 34 existing elderberry shrubs having at least one stem with a diameter of 1 inch or greater, as measured at ground level, have been documented within or near the proposed project. Table 3-3 lists each of these shrubs while their approximate locations are shown in Figures 3-7 and 3-8. The biological surveys performed to reach this determination included the following:

- One survey conducted by Corps staff on July 1, 2013 documented shrubs 26 through 29.
- One survey conducted by Corps staff on April 3, 2014 documented shrubs 23, 24, and 25.
- Two surveys were conducted by staff of the Corps, USFWS, DWR, and USBR on April 9 and April 19, 2014, during which they documented shrubs 1 through 22.
- Various surveys were performed by biologists from the consulting firm Cardno. Shrubs 30, 31, 32, 33, and 34 were located by Cardno staff and documented in a 2016 report submitted to the Corps (Evans, 2016).

Table 3-3. Data for existing elderberry shrubs within or near the limits of the proposed project.

<table>
<tr><th>Shrub ID</th><th>General Location</th><th>Stems ≥1 to ≤3 Inches</th><th>Stems >3 to <5 Inches</th><th>Stems ≥5 Inches</th><th>VELB Exit Holes</th><th>Project Impact Anticipated</th></tr>
<tr><td>1</td><td>Dike 1</td><td>1</td><td>0</td><td>0</td><td>None</td><td>Indirect</td></tr>
<tr><td>2</td><td>Dike 1</td><td>1</td><td>0</td><td>0</td><td>None</td><td>Indirect</td></tr>
<tr><td>3</td><td>Dike 1</td><td rowspan="3">5</td><td>0</td><td>0</td><td>None</td><td>Indirect</td></tr>
<tr><td>4</td><td>Dike 1</td><td>0</td><td>0</td><td>None</td><td>Indirect</td></tr>
<tr><td>5</td><td>Dike 1</td><td>0</td><td>0</td><td>None</td><td>Indirect</td></tr>
<tr><td>6</td><td>Between Dikes 5 & 6</td><td>0</td><td>1</td><td>0</td><td>None</td><td>Direct</td></tr>
<tr><td>7</td><td>Between Dikes 5 & 6</td><td>0</td><td>1</td><td>0</td><td>None</td><td>Direct</td></tr>
<tr><td>8</td><td>Dike 6</td><td>3</td><td>0</td><td>0</td><td>None</td><td>Direct</td></tr>
<tr><td>9</td><td>Dike 6</td><td>1</td><td>0</td><td>0</td><td>None</td><td>Indirect</td></tr>
<tr><td>10</td><td>Dike 6</td><td>1</td><td>0</td><td>1</td><td>None</td><td>Indirect</td></tr>
</table>

Shrub ID	General Location	Stems ≥1 to ≤3 Inches	Stems >3 to <5 Inches	Stems ≥5 Inches	VELB Exit Holes	Project Impact Anticipated
11	Right Wing Dam	1	0	0	None	Indirect
12	Right Wing Dam	1	0	0	None	Indirect
13	Right Wing Dam	-	-	-	Unknown	Indirect
14	Right Wing Dam	1	0	0	None	Indirect
15	Right Wing Dam	1	0	0	None	Indirect
16	Right Wing Dam	0	0	1	None	Indirect
17	Right Wing Dam	1	0	0	None	Indirect
18	Right Wing Dam	1	0	0	Unknown	Indirect
19	Right Wing Dam	1	0	0	None	Indirect
20	Right Wing Dam	1	0	0	None	Indirect
21	Right Wing Dam	0	1	0	None	Indirect
22	Right Wing Dam	1	0	0	None	Indirect
23	Right Bank of American River	-	-	-	Unknown	None
24	Right Bank of American River	-	-	-	Unknown	None
25	Right Bank of American River	0	0	1	None	None
26	Right Bank of American River	0	0	1	None	None
27	Right Bank of American River	0	1	0	None	None
28	Right Bank of American River	0	1	0	None	None
29	Right Bank of American River	1	0	0	None	None
30	Main Dam	-	-	-	Unknown	None
31	Main Dam	-	-	-	Unknown	None
32	Auxiliary Spillway	-	-	-	Unknown	None
33	Auxiliary Spillway	1	0	0	No	None
34	Between Dikes 7 & 8	2	0	1	None	Indirect

Notes:

1. Shrub stem measurements are stem diameters at ground level. The numbers indicated in the "stems" columns are the number of stems falling within the stem diameter range indicated in the column headings.

2. The "project impact anticipated" column lists three types of potential impacts. "Direct" impacts indicate the elderberry shrub may need to be removed from the project site. "Indirect" impacts indicate the elderberry shrub may be preserved at its current location, but the shrub (including any VELB present) could potentially be affected by things like dust and vibration generated during project construction activities. Impacts shown as "None" indicate that it is currently known that the shrub can be preserved

at its existing location and that a buffer zone extending at least 100 feet beyond the drip line of the shrub can be provided during project construction work. It is emphasized that the anticipated impacts listed as "Direct" and "Indirect" are very preliminary. The assessment of potential impacts to elderberry shrubs coded as having a project impact of "Direct" or "Indirect" will be refined as project construction plans are more fully developed.

3. The shrubs designated ID #3, #4, and #5 are clustered tightly together in a single large clump. It was not possible to determine exactly which stems were associated with each individual shrub. For all three shrubs combined, there were a total of 5 stems having a diameter ranging from 1 to 3 inches. No stems larger than 3 inches diameter were present.

4. Shrub ID #13 was not accessible; hence shrub stem diameters could not be measured or examined for the presence of VELB exit holes.

5. Shrub ID #18 is located beyond a security fence and could not be readily accessed. The stem diameter indicated was estimated by visual observation but stems could not be examined closely enough to determine whether VELB exit holes were present.

6. The shrubs designated ID #23 and #24 are both located on a steep bluff and could not be accessed without a safety harness. Both shrubs have many stems and it was assumed each shrub had at least one stem with a diameter >1 inch. Due to lack of access, stem measurements could not be collected and it was not possible to determine whether VELB exit holes are present.

7. Shrub ID #30 is located above the stilling basin access road where there is no viable access. The shrub has many stems and it was assumed one of these had a diameter >1 inch. Due to lack of access, stem measurements could not be collected and it was not possible to determine whether VELB exit holes are present.

8. Shrub ID #31 is located at the toe of slope before a large drop off and could not be accessed without a safety harness. The shrub has many stems and it was assumed one of these had a diameter >1 inch. Due to lack of access, stem measurements could not be collected and it was not possible to determine whether VELB exit holes are present.

9. Shrub ID #32 is adjacent to the step chute outer wall at the toe of slope where there is no viable access. The shrub has many stems and it was assumed two of these had a diameter >1 inch. Due to lack of access, stem measurements could not be collected and it was not possible to determine whether VELB exit holes are present.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is fully protected under the Bald and Golden Eagle Protection Act, is listed as endangered by the State, and is projected under the MBTA. This species is a permanent resident and uncommon winter migrant in California. Breeding is mostly restricted to Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity Counties. About half of the wintering population is in the Klamath Basin. The bald eagle is fairly common as a local winter migrant in a few favored inland waters in Southern California. The largest numbers of bald eagles occur at Big Bear Lake, Cachuma Lake, Lake Matthews, Nacimiento Reservoir, San Antonio Reservoir, and along the Colorado River. Bald eagles are typically found in coniferous forest habitats with large, old growth trees near permanent water sources such as lakes, rivers, or ocean shorelines. This eagle requires large bodies of water with abundant fish and adjacent snags, or other perches for foraging. Bald eagles prey mainly on fish, and occasionally on small mammals or birds, by swooping from a perch or during mid-flight. This eagle also scavenges dead fish and other dead animals. Nests are found in large, old growth or dominant trees, especially ponderosa pine with an open branch-work, usually 50 feet to 200 feet above the ground. It breeds February through July, with peak activity from March to June. Clutch size is usually two. Incubation usually lasts 34 to 36 days (Zeiner et al. 1990a).

The bald eagle is known to occur within the general project area and, based on the availability of adequate nesting sites and foraging habitat, would continue to utilize habitat within the project area. Bald eagles have over-wintered in the area but there are no reports of successful nest building activities. No critical habitat has been designated for this species.

Loggerhead shrike

The loggerhead shrike (*Lanius ludovicianus*) is a CDFW species of special concern and is also protected under the MBTA. Historically, they have been described as "abundant" in the San Joaquin Valley and in the San Francisco Bay region, with lower population numbers toward the coast (Shuford 2008). Breeding populations have the highest abundance in parts of the Central Valley, coast ranges, and the southeastern deserts (Sauer et al. 2005). Open habitat is preferred primarily in shrublands or open woodland with decent grass coverage. They require perches of tall shrubs, trees, fences, or power lines for hunting and impaling prey. Impaling sites, which are typically sharp and thorny multi-stemmed plants, are used as a tool to feed or store prey for later consumption. Foraging is the same during both breeding and nonbreeding seasons. Their diet consists mostly of arthropods (grasshoppers, crickets, beetles, and caterpillars); however, they may also consume reptiles, amphibians, small rodents, and birds, depending on the season. Nesting occurs in dense foliage, about 1 to 2 meters above the ground, although it is does not consistently fall within this range (Shuford 2008). The loggerhead shrike breeds year round across California from as early as January to July (Unitt 2004).

Although the primary threat to the loggerhead shrike is habitat loss, they are also affected by exotic grasses and forbs. Habitat loss of breeding grounds, wintering grounds, and migratory routes is due to increasing agriculture production and urbanization. Exotic grasses and forbs introduced by livestock such as cheat grass (*Bromus tectorum*), alters fire regimes, which then causes a frequency of fires, then sagebrush loss, ultimately causing the conversion from shrub to grassland dominant habitat (Shuford 2008). Both threats cause a large decrease in habitat for the loggerhead shrike.

The loggerhead shrike has the potential to occur in the project area, particularly in the annual grassland and oak savanna habitats.

Swainson's hawk

Swainson's hawks (*Buteo swainsoni*) are protected under the MBTA and are State-listed as threatened. During the breeding season this species is associated with habitat consisting of large, flat, open, undeveloped landscapes that include suitable grassland and or agricultural for foraging, as well as adjacent tall trees for nesting throughout regions of western North America. During our winter season they inhabit grasslands and agricultural regions from central Mexico to southern South America (England et al. 1997). In California, the nesting distribution includes the Sacramento and San Joaquin Valleys, the Great Basin sage-steppe communities and associated agricultural valleys in extreme northeastern California, isolated valleys in the Sierra Nevada in Mono and Inyo Counties, and limited areas of the Mojave Desert region (CDFG 1994).

Since 1980, based on nesting records alone, populations in California appear relatively stable. However, continued agricultural conversion and practices, urban development, and water development have reduced available habitat for Swainson’s hawks throughout their range in California; this habitat reduction could potentially result in a long-term declining trend. The status of populations, particularly with respect to juvenile survivorship, remains unclear.

In California, Swainson’s hawk habitat generally consists of large, flat, open, undeveloped landscapes that include suitable grassland or agricultural foraging habitat and sparsely distributed trees for nesting. Foraging habitat includes open fields and pastures. Preferred foraging habitats for Swainson’s hawk include alfalfa fields, fallow fields, low-growing row or field crops, rice fields during the non-flooded period, and cereal grain crops. Prey species include ground squirrels, California voles, pocket gophers, deer mice, reptiles, and insects (CDFG 2000; England et al. 1997).

Swainson's hawk often nests peripherally to riparian systems, and are known to utilize lone trees or groves of trees in agricultural fields. Valley oak (*Quercus lobata*), Fremont’s cottonwood (*Populus fremontii*), walnut (*Juglans nigra*), and large willow (*Salix* spp.) with an average height of about 60 feet are the most commonly used nest trees in the Central Valley. Breeding occurs from late March to late August, with peak activity from late May through July. Clutch size is two to four eggs (Zeiner et al. 1990a). This species may use the riparian trees in the project area as nest sites, and they may forage in the uplands.

White-tailed Kite

White-tailed kite (*Elanus leucurus*) are a fully protected by the State and are also protected under the MBTA. This species is a common to uncommon, yearlong resident in coastal and valley lowlands of California and is rarely found away from agricultural areas. However, it does inhabit herbaceous and open stages of most habitats, mostly in cismontane California. The main prey of white-tailed kite is voles and other small, diurnal mammals, but it occasionally preys on birds, insects, reptiles, and amphibians. White-tailed kite forages in undisturbed, open grasslands, meadows, farmlands and emergent wetlands. Nests are made of loosely piled sticks and twigs and lined with grass, straw, or rootlets and placed near the top of a dense oak, willow, or other tree stand; usually 6-20 m (20-100 ft) above ground. Nests are located near open foraging areas in lowland grasslands, agricultural areas, wetlands, oak-woodland and savanna habitats, and riparian areas associated with open areas. Breeding occurs from February to August during which time two clutches of 3 to 6 eggs may be produced.

White-tailed kite are known to occur and nest at several locations along the American River. White-tailed kites have also been observed flying and foraging in the immediate vicinity of the proposed project.

3.5.2 Environmental Consequences

Methodology

Based on the USFWS list for the quadrangles within the study area (Clarksville, Folsom, and Rocklin), a review of CNDDB occurrences within a 10-mile radius of the study area, and biologist's observations during reconnaissance-level surveys, five special-status wildlife species (discussed above) were identified as having potential to occur within the study area and surrounding region.

Basis of Significance

For this analysis, based on professional practice and NEPA and CEQA Guidelines for special status species, a direct or indirect effect, was considered significant if it met one or more of the following significance criteria:

- Have a substantial adverse effect, either directly or indirectly, on species growth, survival, or reproductive success through habitat modification, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by CDFW or the USFWS;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Contribute to a substantial reduction or elimination of species diversity or abundance; or
- Have an adverse effect on a species' designated critical habitat, if applicable.

3.5.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Corps would not participate in the construction of the proposed project. There would be no construction-related effects from the project to existing special status species or critical habitat. The types of special status species and their associated habitats would remain the same. Current dam and dike maintenance, recreation, and public activity would not change. The effects of these activities on special status species and their associated habitat would be the same; however, a PMF flood event may result in the loss of critical habitat, and special status species could be adversely affected. This scenario assumes USBR would utilize the additional surcharge volume provided by the Dam Raise project on an emergency basis during such a flood event, even in the absence of a modified WCM.

3.5.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise and Concrete Floodwall

Effects to Valley Elderberry Longhorn Beetle (VELB)

The proposed project would include situations where elderberry shrubs would be preserved at their existing locations and a protective buffer that extends at least 100 feet beyond the shrubs would be provided and maintained during project construction. In such cases, the Corps has determined there would be no adverse effects to the VELB. This conclusion is in keeping with the *Programmatic Formal Consultation Permitting Projects with Relatively Small Effects on the Valley Elderberry Longhorn Beetle Within the Jurisdiction of the Sacramento Field Office, California* (Service File 1-1-96-F-66), as first appended to add the Folsom Dam Safety/Flood Damage Reduction Project on November 1, 2012 (Service File 08ESMF00-2013-F-0044).

The proposed project would also include instances where elderberry shrubs would be preserved at their existing locations and a protective buffer would be provided and maintained during project construction, but the buffer would extend less than 100 feet beyond the shrubs. In such cases, there could be indirect or direct impacts to the VELB such as:

- Short-term adverse effects such as vibration and dust generated by nearby construction equipment, which could disturb the VELB.
- Potential adverse effects if construction contractors inadvertently damage a particular elderberry shrub during project construction, despite the presence of the protective buffers/barriers.
- Potential reduction in the long-term viability of elderberry shrubs due to the placement of materials during project construction.

Such effects are considered less than significant with the implementation of the avoidance and minimization measures discussed in Section 3.5.5. Given these considerations, the Corps has determined that in the scenario described (e.g. elderberry shrubs preserved with protective buffers less than 100 feet) the proposed project may affect but is not likely to adversely affect the VELB.

Finally, the proposed project could include cases where direct impacts to one or more elderberry shrubs cannot be avoided. In such cases, the Corps would purchase credits from a USFWS-authorized conservation bank whose service area encompasses the project site and the affected shrubs would be transplanted to the conservation bank (refer to Section 3.5.5). Potential adverse impacts to the VELB under this scenario include:

- Any beetle larvae occupying the elderberry shrubs being transplanted could be killed during the transplantation process or the larvae's life cycle could be interrupted.
- The transplanted shrubs could die as a result of transplantation, or these shrubs could experience stress due to changes in hydrology, soil, micro climate, or associated vegetation.
- Shrub branches containing larvae might be cut, broken, or crushed during the transplantation process.
- The removal of shrubs may further fragment remaining habitats, thereby making VELB dispersal more difficult.

Given the above, the Corps has determined that in cases where elderberry shrubs must be transplanted from the project site, the project may affect, and is likely to adversely affect, the VELB or its habitat even though compensatory mitigation would be provided. Despite the potential adverse effects to VELB, the transplanting of elderberry shrubs is deemed to be a less than significant impact to this species owing to the limited number of shrubs that would likely be involved and the fact that compensatory mitigation would be provided.

There is no critical habitat designation under Section 4(b)(2) of the ESA for the VELB within the Folsom Dam Raise Project area, although such critical habitat occurs elsewhere. Therefore, critical habitat for the VELB would not be affected by the proposed project.

As discussed previously, the proposed project would be constructed in various phases over time. Construction plans for the "Tainter Gate Refinements" component (phase) of the project are presently at the 95 percent design level. No elderberry shrubs would be removed or transplanted from the project site during construction of this phase. Those existing elderberry shrubs in the immediate vicinity of this phase and their proximity to project construction activities, including haul routes and staging areas, are as follows (refer to Figure 2-10 and Figure 3-8):

- Shrub 12 – Minimum distance from haul route is approximately 92 feet. Minimum distance from optional staging area is approximately 50 feet.
- Shrubs 13 & 14 – Minimum distance from haul route is approximately 40 feet. Minimum distance from optional staging area is approximately 77 feet.
- Shrubs 23 through 33 – Distance from project limits of construction, haul routes, and staging areas ranges from approximately 340 feet to over 1,400 feet.

Protective buffers would be established around elderberry shrubs 12, 13, and 14. The buffer around shrub 12 would extend approximately 50 feet from this shrub. The buffer around shrubs 13 and 14 would extend approximately 40 feet from these shrubs. No physical protective buffers (ex. orange mesh fencing, etc.) would be established around shrubs 23 through 33. This is because these shrubs are far away from the proposed construction activities and these shrubs are separated from the construction areas (including haul routes and staging areas) by existing physical features (ex. other roads, steep slopes, waterways, auxiliary spillway, etc.) that make it practically impossible for construction equipment and activities to inadvertently damage these shrubs. In consideration of the preceding information, the Corps has concluded that construction of the Tainter Gate Refinements phase of the Folsom Dam Raise project may affect, but is not likely to adversely affect the VELB.

Construction plans for the other three phases of the Folsom Dam Raise project (Dikes 4, 5, and 6; Dikes 1, 2, and 3; Dikes 7 and 8, LWD and RWD, MIAD) have not yet progressed to the stage that accurate determinations can be made regarding potential impacts that construction of these phases may have on the VELB. However, preliminary assessments of the potential impacts to existing elderberry shrubs within or near these phases are provided in Table 3-3. Given these assessments, the potential effects to the VELB for a given phase could range from no effect (all shrubs preserved with buffers of 100 feet or more provided around each shrub), to "may affect, but is not likely to adversely affect" (all shrubs preserved with buffers of less than 100 feet provided around each shrub), to "may affect, and is likely to adversely affect" (some shrubs must be transplanted and conservation credits purchased). Under any of these scenarios, the Corps maintains that the net effect to the VELB would be less than significant by following the avoidance and minimization measures described in Section 3.5.5 and, where necessary, the compensatory mitigation measures described in Section 3.5.5.

The proposed process for evaluating the potential impacts of these 3 project phases to the VELB is as follows:

- As construction plans are further developed for a given phase, conduct additional field surveys for elderberry shrubs situated within or near the limits of that phase (limits of construction, staging areas, haul routes).
- Once construction plans have reached a sufficient level of design (65% to 95% design) for a given phase, determine the phase's likely impacts to elderberry shrubs/VELB through:
  - Designating those shrubs that would be preserved and the protective buffers associated with each of those shrubs.
  - Designating those shrubs that would have to be removed/transplanted, and determining the number of conservation credits that would have to be purchased to compensate for those shrubs that must be transplanted.
- Upon completion of the above for a given phase, submit a request for reinitiation of Section 7 consultation to USFWS that contains appropriate information and seeks concurrence with the Corps' effects determination and the Corps' proposed avoidance, minimization, and compensatory mitigation measures.
- Proceed with construction of a given phase following receipt of the USFWS's Biological Opinion (e.g. amendment to Service File 08ESMF00-2017-F-0043).

Regardless of the uncertainties associated with the 3 project phases mentioned above, the Corps has determined that the level of anticipated take resulting from the overall Folsom Dam Raise project is not likely to result in jeopardy to the VELB or destruction or adverse modification of critical habitat. The Corps further maintains that addition of the overall Folsom Dam Raise project to the original USFWS programmatic consultation (Medlin, 1996; Service File 1-1-06-F-66) would not result in unacceptable effects on the VELB or its ecosystem.

On October 13, 2016, the USFWS issued a Biological Opinion that addressed the proposed project's potential impacts to the VELB (see Appendix D). This agency concluded that the overall project would not likely jeopardize the continued existence of the VELB. Based on the information contained in Table 3-3 above, USFWS concluded that project construction could directly impact three elderberry shrubs; shrubs 6 and 7 (situated between Dikes 5 and 6) and shrub 8 (situated near Dike 6). USFWS also determined that the Corps would need to purchase 2.4 conservation credits from an authorized conservation bank and transplant the affected shrubs from the project site to the conservation bank to fully compensate for the loss of the 3 shrubs.

As previously discussed, design plans for the project phase involving Dikes 4, 5, and 6 have not yet advanced to the stage where it can be certain whether one or more of the three shrubs would actually need to be removed. If any removal is necessary, the Corps would comply with compensatory mitigation requirements set forth by USFWS.

Effects to Bald Eagle

Bald eagles have been observed flying and foraging in the general vicinity of the proposed project, primarily in Folsom Lake. However, bald eagle nests have yet to be documented in close proximity to any areas that would be disturbed by project construction activities. Bald eagles typically nest near lakes, rivers, or streams that support an adequate food supply. They commonly nest in mature or old-growth trees or in dead trees, selecting the tallest trees with limbs strong enough to support their large, heavy nests. They can also nest in man-made structures like power poles and communication towers. Nest sites typically have at least one perch with a clear view of the water where the birds usually forage, and shoreline trees or snags are preferred in cases where nesting occurs within or near reservoirs and lakes. Preferred nesting sites are not common within or in the immediate vicinity of the project features, making it somewhat unlikely that bald eagle nests are present and the potential for future nest establishment seems limited.

Prior to starting construction activities for a given phase of the project, Corps biologists would survey areas within approximately 1,000 feet of the areas slated for construction in the given phase to determine whether any bald eagle nests are present. The typical maximum buffer distance between a bald eagle nest and construction activities is 660 feet (USFWS, 2007). If any bald eagle nests are discovered during the field surveys, regardless of whether a nest is classified as active, inactive/alternate, or abandoned, the Corps would coordinate with USFWS staff and CDFW staff to determine measures necessary to avoid, minimize, or mitigate potential adverse construction impacts to bald eagles. Any such measures necessary would be implemented. Such measures could include not conducting project construction work within 660 feet of an active bald eagle nest or monitoring behavior of eagles tending an active or alternate nest for signs of stress and potential nest abandonment during the nesting season. By following guidance provided by USFWS and CDFW, the project would not agitate or bother any bald eagles to a degree that causes, or is likely to cause, injury to an eagle or a decrease in eagle productivity or nest abandonment by interfering with normal breeding, feeding, or sheltering behavior. Thus, the overall project impacts to bald eagles would be less than significant.

Effects to Swainson's Hawk, Loggerhead Shrike, and White-tailed Kite

Both the Swainson's hawk and white-tailed kite have been observed flying in the immediate vicinity of the proposed project, and both of these species are known to occur in the general project area. The loggerhead shrike has not been documented in the immediate project area, however there is potential for it to occur. Project construction activities could potentially result in direct and indirect effects to these species if they begin nesting adjacent to construction areas. Construction activities in the vicinity of a nest have the potential to result in forced fledging or nest abandonment by adult birds.

Prior to beginning construction of a particular project phase, Corps biologists would survey areas within approximately 0.25 mile (1,320 feet) to determine if Swainson's hawk nests or white-tailed kite nests are present. Surveys for loggerhead shrikes would take place within the immediate project vicinity. If these surveys find there are active nests present within the defined areas, CDFW would be contacted to determine the proper course of action. If necessary, buffers would be established around active nests with no construction allowed within the buffer zones until fledglings have left the nests. An alternative approach might involve monitoring active nests in close proximity to project construction areas for signs of stress exhibited by the adult birds, which could lead to nest abandonment. Through coordination with CDFW and implementing recommended avoidance, minimization, and mitigation measures, it is anticipated that project construction effects to Swainson's hawk, loggerhead shrike, and white-tailed kite would be less than significant.

3.5.5 Avoidance, Minimization, and Mitigation Measures

The following measures are proposed by the Corps to avoid, minimize, or mitigate significant effects to special status species that are associated with the Dam Raise Project to less than significant.

Valley Elderberry Longhorn Beetle

When developing designs for each of the various project phases, the Corps would strive to avoid designs that necessitate direct impacts to elderberry shrubs (e.g. shrub removal) to the degree practicable. To minimize the potential take of the VELB, the following measures would be incorporated into the project:

- Prior to construction of a particular project phase, Corps environmental staff would perform field surveys to locate elderberry shrubs having one or more stems measuring 1.0 inch or greater in diameter at ground level that are within or in close proximity to the project phase's limits of construction.

- Construction personnel would receive USFWS-approved worker environmental awareness training to ensure that workers recognize elderberry shrubs and the VELB. The training would include: the protected status of VELBs and their host plants, elderberry shrubs; the need to avoid adversely affecting elderberry shrubs; elderberry shrub avoidance areas (protective buffers/exclusion zones); measures to be taken by workers during construction to protect elderberry shrubs; possible penalties that could be imposed for not complying with requirements established for the protection of elderberry shrubs and the VELB; and key Corps contacts and key contacts with the construction contractor pertaining to environmental issues.

- Where practicable, a minimum setback (buffer) of 100 feet from the drip-line of all elderberry shrubs containing stems measuring 1.0 inch or greater in diameter at ground level would be established. There may be instances where a 100-foot buffer is not practicable due to various constraints. In such cases, a buffer of at least 20 feet from the dripline of such elderberry shrubs would be established if feasible. The Corps would consult with USFWS prior to establishing any elderberry shrub buffer zones (setbacks) that extend less than 100 feet from the drip-line of a particular shrub. Such buffer zones would not be established without first obtaining approval from USFWS.

- Prior to project construction activities near elderberry shrubs to be preserved as part of the project, protective barriers would be installed along the limits (boundaries) of approved elderberry shrub buffer zones (exclusion areas). These barriers would typically be orange-mesh fencing, but could also include other barriers such as wooden fencing, staked ropes with flagging, or K-rails (Jersey barriers). The protective barriers would be maintained throughout the duration of project construction and/or restoration activities. No construction activities or similar disturbances would be allowed within the elderberry shrub buffer zones unless authorized in advance by the Corps and USFWS.

Regardless of the preceding, there could be situations where elderberry shrubs to be preserved are located in areas near a proposed project phase where no construction work would occur within 100 feet of the shrubs and existing landscape conditions (ex. steep terrain, intervening roadways, etc.) are such that it would be highly improbable that construction work could inadvertently damage such shrubs. In such cases, protective barriers would not be installed if approved in advance by USFWS.

- Signs would be placed approximately every 50 feet along the edge of the elderberry shrub buffer zones (i.e. along the protective barriers discussed above). The signs would include the text: "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 would be readable from a distance of 20 feet and would be maintained during project construction. If protective barriers are not required to be installed along limits of elderberry shrub buffer zones, no signs would be provided along these buffer zones.

- Any damage done within elderberry shrub buffer zones during the course of project construction would be remediated shortly following the discovery of such damage. Remediation work may include installing erosion control measures, seeding disturbed areas with appropriate native plant seeds, etc.

- No insecticides, herbicides, fertilizers, or other chemicals that might harm the VELB or its host plant would be used in elderberry shrub buffer zones, or within 100 feet of any elderberry shrub with one or more stems measuring 1.0 inch or greater in diameter at ground level.

- If mowing of vegetation is deemed necessary to reduce fire hazard, such mowing may be performed within elderberry shrub buffer zones but only during the period from July through April. No mowing would be allowed within 5 feet of elderberry shrub stems, and all mowing would be done in a manner that avoids damaging elderberry plants.

- During project construction and/or restoration activities that involve earthwork, measures would be employed to suppress generation of dust. Such measures would include frequent watering of project haul roads, earthen stockpile areas, and similar exposed soil surfaces.

Designs for the various phases of the Folsom Dam Raise project are in the process of development. While generating these plans, the Corps will attempt to avoid designs that necessitate direct construction impacts to existing elderberry shrubs having one or more stems that have a diameter of one inch or greater as measured at ground level (e.g. avoid the need to remove such elderberry shrubs).

There may be cases where it is not practicable to avoid direct construction impacts to elderberry shrubs meeting the stem diameter requirements stated above. In such cases, the Corps would purchase an appropriate number of credits from a USFWS-approved conservation bank. There are currently two approved conservation banks whose service areas encompass the proposed project and have conservation credits (mitigation credits) available for compensating VELB impacts in the form of impacts to elderberry shrubs; the French Camp Conservation Bank and the River Reach Conservation Bank. The determination of the number of conservation credits required would be based on methodologies prescribed in the USFWS conservation guidelines for VELB (the "VELB Guidelines"; USFWS, 1999) and direct coordination with USFWS staff. The Corps would also contract with the same conservation bank from which the conservation credits are purchased to transplant the affected elderberry shrub(s) from the project site to the conservation bank. The affected shrubs would be transplanted when the plants are dormant (roughly November through the first 2 weeks in February) if feasible. The contractor (the conservation bank) would be required to follow the transplanting procedure set forth in the VELB Guidelines and Corps staff would monitor the removal of the shrubs from the project site.

Through employing the avoidance, minimization, and compensatory mitigation measures described above, the proposed project's effects to the VELB would be less than significant.

Bald Eagle, Loggerhead Shrike, Swainson's Hawk, and White-Tailed Kite

Prior to beginning construction for a given phase of the project, Corps biologists would survey within the immediate project area for loggerhead shrikes to determine if the species is present. If any active nests are discovered during the field surveys the Corps would coordinate with CDFW staff to determine measures necessary to avoid, minimize, or mitigate potential adverse construction impacts.

Prior to starting construction activities for a given phase of the project, Corps biologists would survey areas within approximately 1,000 feet of the areas slated for construction in the given phase to determine whether any bald eagle nests are present. If any bald eagle nests are discovered during the field surveys, regardless of whether a nest is classified as active, inactive/alternate, or abandoned, the Corps would coordinate with USFWS staff and CDFW staff to determine measures necessary to avoid, minimize, or mitigate potential adverse construction impacts to bald eagles. Any such measures necessary would be implemented. Such measures could include not conducting project construction work within 660 feet of an active bald eagle nest or monitoring behavior of eagles tending an active or alternate nest for signs of stress and potential nest abandonment during the nesting season. By following guidance provided by USFWS and CDFW, the project would not agitate or bother any bald eagles to a degree that causes, or is likely to cause, injury to an eagle or a decrease in eagle productivity or nest abandonment by interfering with normal breeding, feeding, or sheltering behavior. Thus, the overall project impacts to bald eagles would be less than significant.

Prior to beginning construction of a particular project phase, Corps biologists would survey areas within approximately 0.25 mile (1,320 feet) of construction areas to determine if Swainson's hawk nests or white-tailed kite nests are present. Swainson's hawk surveys would be completed in compliance with the CDFW survey guidance (Swainson's hawk Technical Advisory Committee, 2000). Other migratory bird nest surveys can be conducted concurrent with the Swainson's hawk surveys, with at least one survey conducted no more than 48 hours from the initiation of project construction activities to confirm the absence of nesting. If the area surveyed does not contain any active nests, construction activities would commence without any further mitigation. If these surveys find there are active nests present within the defined areas, CDFW would be contacted to determine the proper course of action. If necessary, buffers would be established around active nests with no construction allowed within the buffer zones until fledglings have left the nests. An alternative approach might involve monitoring active nests in close proximity to project construction areas for signs of stress exhibited by the adult birds, which could lead to nest abandonment. Through coordination with CDFW and implementing recommended avoidance, minimization, and mitigation measures, it is anticipated that project construction effects to Swainson's hawk and white-tailed kite would be less than significant.

Other Migratory Birds

Various migratory bird species, besides Swainson's hawk, loggerhead shrike, and white-tailed kite discussed above, may nest in trees and shrubs that are situated within areas that will be directly disturbed by project construction activities or are in close proximity to such areas. The following measures would be taken to help avoid, minimize, and mitigate for potential adverse impacts to active migratory bird nests.

- As project design plans are developed and refined, the Corps would adjust the limits of construction to avoid removal of existing native trees and large shrubs to the degree practicable.

- Prior to initiating construction activities for a particular phase of the overall project, Corps biologists would conduct surveys for migratory bird nests situated within the limits of construction as well as such nests located within approximately 150 feet of these limits. If inactive nests are found (e.g. nests that do not contain eggs or chicks), these would be removed to help prevent birds from re-using the nests. If active nests are found, the protocol described below would be followed.

- If the surveys performed above do not take place during the migratory bird nesting season (typically February 1 through August 31), then Corps biologists would again conduct surveys for migratory bird nests at the beginning of the nesting season in a manner similar to that discussed above.

- If active migratory bird nests are discovered within the project limits of constructions, buffer areas would typically be established by the construction contractor around each nest and construction activities within the buffer(s) would be prohibited until the young occupying the nests have fledged. The Corps would coordinate with USFWS staff and CDFW staff to determine the appropriate size of such nest buffer zones. Similarly if active migratory bird nests are documented within approximately 150 feet of the project's limits of construction, buffer areas would also be established around these nests as well. It is emphasized that there may be exceptions to this procedures, as described below.

- There may be instances where it is not practicable for project construction activities to avoid direct impacts to active migratory bird nests. The Corps would obtain a Special Purpose Permit (Migratory Bird Permit) from USFWS in such cases prior to impacting the active nests. This permit would authorize live-trapping and relocation of the affected active nests and the eggs or chicks occupying the nests. Chicks and/or viable eggs collected by qualified Corps staff pursuant to the permit would typically be taken to the Wildlife Care Association located in McClellan, California; however, the chicks and/or eggs might be taken to a different care facility if warranted.

- The construction contractor would be required to report any active or inactive migratory bird nests to the Corps within 24 hours of discovery of such nests.

The project's temporary impacts to migratory bird species would be rendered less than significant by following the avoidance, minimization, and mitigation measures discussed above.

3.6 AIR QUALITY

3.6.1 Environmental Setting

Regulatory Setting

This section provides regulatory background and the current environmental setting for air pollutants. Air quality pollutants that are assessed include criteria pollutants, which are pollutants with established national standards, and toxic air contaminants (TACs) which often lack established standards. Federal and local regulatory agencies have different threshold criteria for each area of analysis.

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

The CAA sets emission limits for certain air pollutants from specific sources, set new source performance standards based on best demonstrated technologies, and established national emissions standards for hazardous air pollutants. The USEPA has established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants, which are known to be harmful to human health and the environment under the provisions of the CAA. These pollutants are: 1) carbon monoxide (CO), 2) lead (Pb), 3) nitrogen dioxide (NO2), 4) ozone (O3), 5) particulate matter (this is broken down into particulate matter less than 10 microns in diameter (PM10) and particulate matter less than 2.5

microns in diameter (PM2.5)) and 6) sulfur dioxide (SO_2). For each of these six criteria pollutants there are Federal and State Standards. For several of these pollutants, California has set standards which are more protective.

Air quality within a control region is classified by the USEPA according to whether the region meets or exceeds Federal primary and secondary NAAQS established by the CAA. Primary standards define levels of air quality necessary to protect public health with an adequate margin of safety. Secondary standards define levels of air quality necessary to protect public welfare (i.e., soils, vegetation, and wildlife) from any known or anticipated adverse effects of a pollutant.
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 criteria pollutants that do not meet standards, and as a result are in nonattainment status.

USEPA promulgated the General Conformity Rule, which applies to most federal actions, including the Folsom Dam Raise project. The General Conformity Rule is used to determine if federal actions meet the requirements of the CAA and the applicable State Implementation Plan by ensuring that pollutant emission 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 NAAQA or interim emission reduction

A conformity determination is required if the federal agency determines that the action is to occur in a nonattainment area or maintenance area; the action is not included in the federal agency's "presumed to conform list"; the emission from the proposed action are not within the approved emissions budget; and the total direct and indirect emissions of a pollutant area are at or above the *de minimis* levels established in the General Conformity regulations.

State

Responsibility for attaining and maintaining air quality in California is divided between the California Air Resources Board (CARB) and Regional Air Quality Districts. Areas of control for the regional districts are set by CARB, which divides the State into air basins. These air basins are defined by topography that limits air flow access, or by county boundaries. Air quality attainment plans requirements are established by the California Clean Air Act (CCAA) based on the severity of air pollution problems cause by locally generated emissions. CARB and the local air districts have also been delegated authority by the USEPA to enforce the Federal National Emission Standards for Hazardous Air Pollutants. TACs are 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". Controlling toxic air emissions became a National priority with the passage of the Clean Air Act Amendments, whereby Congress mandated that USEPA regulate 188 air toxicants. TACs can be emitted from stationary and mobile sources. TACs do not have ambient air quality standards because often safe levels of TACs have not been determined and instead are evaluated by calculating health risks associated with exposure.

Local

The local air quality management districts (AQMD), also called air pollution control districts (APCD), implement federal and state regulations at the local level, permit stationary sources of emission and develop the local elements of the SIP. Air quality management at the local level is also accomplished by requested incorporation of mitigation measures on project environmental impact assessment under CEQA and mitigated negative declarations developed by project proponents under CEQA. CEQA requires mitigation of air quality impacts that exceed certain significance thresholds established by the local air quality management district.

The following Federal, State, and local laws, regulations, and policies apply to the resources covered in this Section. Descriptions of the laws and regulations can be found in Section 5.0, Compliance with Environmental Laws and Regulations.

- Federal:
  - Clean Air Act, 42 U.S.C §7401, *et seq.*
  - Federal Tailpipe Emission Standards, 40 CFR Part 88
  - General Conformity Regulation, 40 CFR Parts 5, 51 and 93
  - National Ambient Air Quality Standards, 40 CFR Part 50

- State:
  - Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations
  - California Ambient Air Quality Standards
  - California Clean Air Act, Health and Safety Code, Division 26
  - Idling Limit Regulation, Title 13, California Code of Regulations
  - Fugitive Dust Rule 403

- Local:
  - El Dorado County Air Quality Management District (EDCAQMD) Standards
  - Placer County Air Pollution Control District (PCAPCD) Standards
  - Sacramento Metropolitan Air Quality Management District (SMAQMD) Standards

Existing Conditions

The study area for the Dam Raise is located in the Sacramento Valley Air Basin (SVAB), which includes Sacramento County, and Placer County. El Dorado County is located in the Mountain County Air Basin (MCAB) directly adjacent to the SVAB. Corresponding AQMDs for these air basins are SMAQMD, PCAPCD, and EDCAQMD. Dikes 1 through 6 are situated within the PCAPCD, and this air district boundaries include two additional air basins besides the SVAB. The remainder of the project area lies within the jurisdictional area of the SMAQMD, with the exception of a small western projection of MIAD into the EDCAQMD (Figure 1-2).

Climate

Located at the southern end of the Sacramento Valley, the project area is characterized by hot, dry summers and mild, rainy winters. The surrounding mountains create a barrier to airflow that can trap air pollutants in the valley when meteorological conditions are right and a temperature inversion exists.

Air Quality

Within Sacramento County, on-road motor vehicles are the major source of ROG, CO, and NOx emissions. Other equipment and off-road vehicles contribute substantially to ROG, CO, and NOx 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.

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, as well as school teachers and students.

There are numerous sensitive receptors within 1,000 feet of the project area. Several residences to the west of Vogel Valley Road, Haley Drive, and East Hidden Lakes Drive are within 600 feet of Dikes 1, 2, and 3. Residences on Lake Court, Lakeshore Drive, and Sierra Drive are within 200 feet of Dike 4. Residences to the west of Auburn-Folsom Road are within 1,000 feet of Dike 5, parts of the Right Wing Dam, and just over 1,000 feet from Dike 6. Many residences just off of East Natoma Street are within 1,000 feet of Dikes 7 and 8.

Air Pollutants

NAAQS and CAAQS were established to protect public welfare from the following criteria air pollutants; CO, NO2, O3, PM10, PM2.5, and SO2. Criteria air pollutants relevant to the project were based on the existing pollutant conditions in the SVAB. Air pollutants relevant to the project and their health effects are discussed below and summarized in Table 3-4. In addition, sensitive receptors are defined and receptors near the project area are identified.

Ozone is a secondary pollutant that is not emitted directly into 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. Ozone (O3) is a gas which is not emitted directly into the air, but is created by a chemical reaction between two precursors — oxides of nitrogen (NOx) and volatile organic compounds (VOC) — in the presence of sunlight. Ozone concentrations are expressed in parts per million (ppm) or parts per billion (ppb). High ground-level ozone concentrations can reduce lung function and increase respiratory symptoms, thereby aggravating asthma, bronchitis, or other respiratory conditions including chest pains and wheezing. NO_x is used as a measurable pollutant in the evaluation of O3 for the purpose of conformity determinations and local and state thresholds.

Inhalable particulates refer to particulate matter less than 10 microns in diameter (PM10). Particulates are classified as primary or secondary depending on their origin. Primary particles are unchanged after being directly emitted (e.g., road dust) and are the most commonly analyzed and modeled form of PM10. Because it is emitted directly and has limited dispersion characteristics, this type of PM10 is considered a localized pollutant. In addition, secondary PM10 can be formed in the atmosphere through chemical reactions involving emissions of ROG, NOx, and sulfur oxides (SOx). Much of the PM10 and fine particulates (PM2.5) that can be breathed into the lungs is comprised of secondary particulate matter.

Toxic Air Contaminants

Toxic Air Contaminants (TACs) relevant to the project were determined based on AQMD guidance and the project site conditions. 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 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 (naturally-occurring asbestos).

Use of off-road duty diesel equipment for site grading and excavation, paving, hauling and construction activities can release DPM emissions. DPM is the most complex of diesel emissions. Diesel particulates, as defined by most emission standards, are sampled from diluted and cooled exhaust gases. This definition includes both solids, as well as liquid material which condenses during the dilution process. The basic fractions of DPM are elemental carbon, heavy hydrocarbons derived from the fuel and lubricating oil, and hydrated sulfuric acid derived from the fuel sulfur. The air districts have not established a quantitative threshold for significance for construction-related TAC emissions, and it is recommended that project applicants address this issue on a case-by-case basis, taking into consideration the specific characteristics of each project's proximity.

The Folsom Dam Raise project area has been identified as within an area where local geology supports the formation of NOA. SMAQMD's Air Pollution Control Officer (APCO) has determined the Copper Hills Volcanics Area in eastern Sacramento County, including the eastern portion of the City of Folsom, contains NOA at levels greater that the jurisdictional threshold in the State's Asbestos Airborne Toxic Control Measure (ATCM). NOA has been positively identified in rock formations along the Sacramento County-El Dorado County border in units that demonstrate the same geologic factors present in Cooper Hills Volcanics Area. NOA in the quantity of less than one percent has been documented in the proximity of Folsom Dam (USBR 2005) from samples taken in December 2005. Properties located entirely or partially within the area identified in the Copper Hills

Volcanic unit must comply with the ATCM, unless a geologic evaluation by a registered geologist demonstrated the individual site does not contain NOA.

CARB has adopted two airborne toxic control measures for controlling NOA: the 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. CARB's Fugitive Dust rule 403 also provides synchronous mitigation measures that restrict airborne dust.

Attainment Status

Placer, El Dorado, and Sacramento Counties are in attainment for all criteria pollutants with the exception of the following:

- Placer County: Nonattainment for O3 and PM10 CAAQS, Nonattainment for O3 NAAQS;
- El Dorado County: Nonattainment for O3 and PM10 CAAQS, Nonattainment for O3 NAAQS;
- Sacramento County: Nonattainment for O3 and PM10 CAAQS, Nonattainment for O3 and PM2.5 NAAQS.

Reducing ozone to levels below state and federal standards is one of the primary goals of the local air quality control districts. As a nonattainment area, air quality data and emission trends must be evaluated to determine how much ozone concentrations will need to be reduced to attain the standard in the future. Control measures and strategies are included as commitments in these plans to achieve the reductions in emissions of NOx and ROC necessary for the region to attain the standard. General Conformity *de minimis* levels establish a prescribed threshold for ozone precursors based on the non-attainment and maintenance classification of the air basin. A request for reclassification of the 8-hour ozone non-attainment area from "serious" to "severe" was granted by USEPA for the SVAB in June 2010, and the GRC *de minimis* thresholds for ozone, VOC, and NOX were reduced from 50 tons per year to 25 tons per year

Table 3-4. 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	PM10, PM2.5, CO, and ozone precursor (ROG and NOx) emissions are the primary criteria pollutants of concern associated with the project. Sacramento, Placer and El Dorado Counties have NAAQS and/or CAAQS non-attainment designations for PM10, PM2.5, and O3. Consequently, PM10, PM2.5, CO, and ozone precursor (ROG and NOx) emissions are the primary criteria pollutants of concern associated with the project.
TACs	Diesel Particulate Matter (DPM) and Naturally Occurring Asbestos (NOA)	Local geology supports the formation of NOA, and NOA has been documented in proximity to Folsom Dam.

State Implementation Plans

Due to the nonattainment or maintenance area designations for SVAB discussed above, a SIP is required of the SVAB for O_3, PM10, and PM2.5, and a maintenance plan for CO and PM10. The status of these SIPs is summarized below (SMAQMD 2015).

- O_3: SMAQMD has been designated non-attainment for O3 with a severe-15 classification and an attainment deadline of July 20, 2027.
- PM10: SMAQMD prepared a maintenance plan approved by the USEPA in 2015.
- PM2.5: SMAQMD prepared a PM2.5 attainment plan for submission in 2012. A final rule for Determination of Attainment was submitted July 2013 and the rule became final in August 2013.
- CO: A maintenance plan was approved by the USEPA in 2005 for the SMAQMD and is still applicable.

Air Emission Thresholds for Federal and Local Criteria Pollutants

The Federal standards and local thresholds for short-term construction projects in Sacramento, El Dorado, and Placer Counties are shown in Table 3-5 below. Local emissions are calculated per county and compared to their thresholds by pounds per day, whereas Federal standards look at the project emissions in total by tons on an annual basis.

Table 3-5. Air Emission Construction Thresholds for Federal and Local Criteria Pollutants.

Criteria Pollutant	Federal Standard (tons/year)	Sacramento Metropolitan AQMD Threshold	El Dorado County AQMD Threshold	Placer County APCD Threshold
NO_x	25***	85 lbs/day	82 lbs/day	82 lbs/day
CO	100	*AAQS	*AAQS	*AAQS
SO_x	100	N/A		
PM_{10}	100	80 lbs/day (with BMPs)** 14.6 tons/year	*AAQS	82 lbs/day
$PM_{2.5}$	100	82 lbs/day (with BMPs)** 15 tons/year**	*AAQS	82 lbs/day
ROG	25***	None	82 lbs/day	82 lbs/day

NO_x = nitrogen oxides
CO = carbon monoxide
SOx = sulfur oxides
PM_{10} = particulate matter 10 micrometers or less
$PM_{2.5}$ = particulate matter 2.5 micrometers or less
ROG = reactive organic gases
* = default to State standard
** = 0lbs/day threshold, with BMPs standard is 80 lbs/day PM10 and 82 PM2.5
*** = rates for "severe" Federal nonattainment areas [*Federal Register* (40 CFR), 1993]

3.6.2 Environmental Consequences

Methodology

The methods for evaluating impacts are intended to satisfy the Federal and State air quality requirements, including the Federal General Conformity Rule, and to disclose effects for NEPA and CEQA. Assessment focuses on short-term construction emissions because once constructed, the project would not result in operational (indirect) emissions. Combustion emissions from heavy equipment and construction worker commute trips can contribute incrementally to regional ozone concentrations over the construction period.

In coordination with SMAQMD, the Roadway Construction Emissions Model, Version 8.1.0 (SMAQMD 2016), was used to estimate construction emissions for the proposed project. The Roadway Construction Model assesses construction exhaust emissions for quantities of ROG, CO, $CO_{2,}$ NOx, SOx, $CO2_{e,}$ PM2.5 and PM10. Outputs from the model calculations can be found in Appendix E. The Roadway construction model provided an annual breakdown of the project phases for each year from 2018 to 2022. Maximum construction parameters were entered into the model to account for a worst case scenario of emission quantities. The following construction sources and activities are examples of proposed project work that were analyzed for emissions:

- Onsite construction off-road equipment emissions (all criteria pollutants)
- Onsite pickup trucks, onsite haul trucks, and off site haul trucks emissions (all criteria pollutants). Haul truck emissions to transport borrow and disposal material were included within a 30 mile radius.
- Offsite worker vehicle emissions (all criteria pollutants)
- Entrained fugitive dust emissions for paved and unpaved road entrained dust (PM10 and PM2.5)
- Onsite material storage piles handling and wind erosion (PM10 and PM2.5)
- Onsite excavation (cut/fill) fugitive dust (PM10 and PM2.5)

The results from the Roadway model were used to assess the projects emissions against General Conformity de minimis thresholds and state and local air district CAAQ thresholds. Emission results of CO_2 and CO_{e2} are addressed under Climate Change in Section 3.7.

Basis of Significance

A project would significantly affect air quality if it would:

- Exceed ambient air quality thresholds;
- Contribute on a long-term basis to any existing or projected air quality violation;
- Expose sensitive receptors (such as schools, residences, or hospitals) to substantial pollutant concentrations; or

- Not conform to applicable Federal and State standards or local thresholds on a long-term basis.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard.

3.6.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the project would not be constructed and there would be no construction-related effects on air quality in the project area. Air quality would continue to be influenced by climatic and geographic conditions, local and regional emissions from vehicles and households, and local commercial and industrial land uses. Air quality is expected to improve in the future based on the stricter standards implemented by CARB and SMAQMD.

3.6.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

Average daily emissions (lbs/day), total construction emissions (tons/year), and maximum daily emissions (lbs/day) were calculated from the Roadway Construction Emissions Model for ROG, NOx, PM10, and PM2.5 and SO_x to evaluate emissions against AQMD and federal thresholds. All criteria pollutant emissions from activities associated with the implementation of Alternative 2 are summarized in Tables 3-6 through 3-11 below. Unmitigated and mitigated emissions in pounds per day are provided in Tables 3-6 and 3-7. Unmitigated and mitigated emissions in tons/year for assessment are provided in Tables 3-8 and 3-9. Unmitigated and mitigated maximum emissions in pounds per day are provided in Tables 3-10 and 3-11. Unmitigated emission calculations do not include AQMD Best Management Practices (BMPs) and basic construction emission control practices, or use of emission reducing Tier 4 off-road equipment and other proposed mitigation measures discussed herein. In contrast, mitigated emissions calculations are based on employing all these mitigation measures and thus constitute the best estimate of the proposed project's construction emissions.

Results of the Roadway Construction Emission Model calculations for unmitigated emissions (pounds per day) of criteria pollutants are listed in Table 3-6. Unmitigated emissions would exceed local air quality district management thresholds as follows: NOx in 2020, 2021, and 2022; PM10 in 2020, 2021, and 2022; PM2.5 in 2021. As indicated in Table 3-7, proposed mitigation measures would eliminate exceedance of local AQMD thresholds in the case of NOx and PM2.5; however, PM10 thresholds would still be exceeded in 2019, 2020, and 2021.

Table 3-6. Unmitigated project construction emissions: average pounds per day for each year of construction work.

Year	Pollutant (lbs/day)					
	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	SO_x
2018	4	55	28	47	11	<1
2019	5	65	32	63	15	<1

Year	Pollutant (lbs/day)					
	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	SO_x
2020	8	94	49	105	24	<1
2021	44	514	248	352	88	<1
2022	13	137	137	155	36	<1
SMAQMD Thresholds (lbs/day)	N/A	85	N/A	80	82	N/A
PCADPCD Thresholds (lbs/day	82	82	N/A	82	N/A	N/A
EDCAQMD Thresholds (lbs/day)	82	82	N/A	N/A	N/A	N/A

Table 3-7. Mitigated project construction emissions: average pounds per day for each year of construction work.

Year	Pollutant (lbs/day)					
	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	SO_x
2018	2	7	34	46	10	<1
2019	2	8	40	61	13	<1
2020	4	13	68	102	22	<1
2021	19	60	333	334	71	<1
2022	7	19	123	151	32	<1
SMAQMD Thresholds (lbs/day)	N/A	85	N/A	80	82	N/A
PCAPCD Thresholds (lbs/day)	82	82	N/A	82	N/A	N/A
EDCAQMD Thresholds (lbs/day)	82	82	N/A	N/A	N/A	N/A

Table 3-8 provides the estimated unmitigated project construction emissions in units of total tons per year, with data provided for each year of construction. Table 3-9 provides the same emissions estimates but based on implementing the mitigation measures proposed (e.g. mitigated emissions). Unmitigated emissions would not exceed applicable Federal General Conformity de minimis thresholds in any year. However, unmitigated NOx emissions would exceed local AQMD thresholds in 2021 while unmitigated PM10 emissions would exceed such thresholds in 2020, 2021, and 2022. The proposed mitigation measures would typically reduce most types of emissions and these would not exceed Federal General Conformity de minimis thresholds. Even with mitigation, however, PM10 emissions would exceed local AQMD thresholds in 2020, 2021, and 2022. Note that the local AQMDs really do not have defined thresholds for maximum emissions on a yearly basis. The local AQMD thresholds indicated in the cite tables were determined as follows: (AQMD lbs/day threshold X 365 days/year)/2,000 lbs/ton = yearly threshold in tons per year.

Table 3-8. Unmitigated project construction emissions: total tons per year for each year of construction work.

Year	Pollutant (tons/year)					
	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	SO_x
2018	<1	2	1	2	<1	<1
2019	<1	10	5	10	2	0
2020	1	15	8	16	4	<1
2021	2.	23	13	27	6	<1
2022	1	12	7	16	4	<1
SMAQMD Thresholds (tons/year)	N/A	15	N/A	14.6	15	N/A
PCAPCD Thresholds (lbs/day)	14.9	14.9	N/A	14.9	N/A	N/A
EDCAQMD Thresholds (lbs/day)	14.9	14.9	N/A	N/A	N/A	N/A
Federal Thresholds (tons/year)	25	25	100	100	100	100

Table 3-9. Mitigated project construction emissions: total tons per year for each year of construction work.

Year	Pollutant (tons/year)					
	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	SO_x
2018	<1	<1	1	2	<1	<1
2019	<1	1	6	9	2	<1
2020	<1	2	11	16	3	<1
2021	1	3	20	26	6	<1
2022	<1	2	12	16	3	<1
SMAQMD Thresholds (tons/year)	N/A	N/A	N/A	14.6	15	N/A
PCAPCD Thresholds (lbs/day)	14.9	14.9	N/A	14.9	N/A	N/A
EDCAQMD Thresholds (lbs/day)	14.9	14.9	N/A	N/A	N/A	N/A
Federal Thresholds (tons/year)	25	25	100	100	100	0

Table 3-10 presents the estimated maximum daily emissions (in pounds per day) anticipated during each year of project construction, assuming none of the proposed emissions mitigation measures were to be implemented. Table 3-11 provides similar data, but these data do assume the proposed mitigation measures would be implemented. The data in these two tables are comparable to the data presented in Tables 3-6 and 3-7 except that they indicate the maximum emissions that could be generated during a particular day of the year while Tables 3-6 and 3-7 indicate the average daily emissions that would be generated throughout the year.

Table 3-10. Unmitigated project construction emissions: maximum daily emissions, expressed in pounds per day, for each year of construction work.

Year	Pollutant (lbs/day)					
	ROG	**NOx**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**SO_x**
2018	4	55	28	47	11	<1
2019	6	74	37	78	18	<1
2020	16	177	98	217	50	<1
2021	14	156	85	186	43	<1
2022	13	137	76	155	36	<1
SMAQMD Thresholds (tons/year)	N/A	85	N/A	80	82	N/A
PCAPCD Thresholds (lbs/day)	82	82	N/A	82	N/A	N/A
EDCAQMD Thresholds (lbs/day)	82	82	N/A	N/A	N/A	N/A

Table 3-11. Mitigated project construction emissions: maximum daily emissions, expressed in pounds per day, for each year of construction work.

Year	Pollutant (lbs/day)					
	ROG	**NOx**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**SO_x**
2018	2	7	34	46	10	<1
2019	3	10	45	76	16	<1
2020	9	25	150	212	45	<1
2021	8	22	135	182	38	<1
2022	7	19	123	151	32	<1
SMAQMD Thresholds (tons/year)	N/A	85	N/A	80	82	N/A
PCAPCD Thresholds (lbs/day)	82	82	N/A	82	N/A	N/A
EDCAQMD Thresholds (lbs/day)	82	82	N/A	N/A	N/A	N/A

Unmitigated maximum daily emissions would exceed local AQMD thresholds as follows: NOx in 2020, 2021, and 2022; PM10 in 2020, 2021, and 2022. Mitigated maximum daily emissions (e.g. maximum daily emissions during construction of the proposed project) would not exceed local AQMD thresholds except for PM10, which would exceed such thresholds in 2020, 2021, and 2022.

The models used to estimate equipment emissions during construction of the proposed project all indicate that federal air quality thresholds for ROG, NOx, CO, PM10, PM2.5 and SOx would not be exceeded as long as the best management practices (e.g. mitigation measures) addressed in Section

3.6.5 are employed. Since these mitigation measures would be utilized, project construction emissions should not violate federal de minimis air quality thresholds and are therefore deemed less than significant using the federal thresholds as the basis of assessment.

These models also indicate that local AQMD thresholds for ROG, NOx, and PM2.5 would not be exceeded during any year of project construction if the mitigation measures cited are used. However, project construction emissions could exceed local AQMD thresholds for PM10 during the years 2019, 2020, and 2021 despite utilizing these mitigation measures. If PM10 emissions do indeed exceed local AQMD thresholds, this exceedance would ultimately be mitigated through payment of an appropriate mitigation fee (e.g. via "off-site" mitigation) to the applicable local AQMDs as addressed in Section 3.6.5. This would fully compensate for the excess PM10 emissions. Given this, the temporary nature of construction emissions, and the strong likelihood that construction emissions would not exceed local AQMD thresholds for ROG, NOx, and PM2.5, the proposed project's construction emissions would be less than significant using the local AQMD thresholds as the basis of assessment. Overall, the proposed project's temporary impacts to air quality would also be less-than-significant with mitigation.

Construction Emissions of TACs

TACs of interest to this alternative are DPM and NOA. Sensitive receptors are as close as 200 feet to the project boundary and sensitive receptors within 1,000 feet of the construction could be subjected on a short-term basis to DPMs and criteria pollutants from construction equipment and vehicles. However, health risks associated with exposure to carcinogenic substances are typically measured over 70-years of exposure. Because the proposed project is for a limited construction period of 4 years rather than a long-term installation, and many of the project phases would affect sensitive receptors on an interim basis for a maximum of two years, the potential human exposure to DPM is considered short-term. The majority of traffic near sensitive receptors would consist of exposure to on-site pickup trucks and on-site haul trucks rather than heavy equipment operations. Implementation of required basic construction emission control practices, the construction PM, fugitive dust and exhaust emission mitigation measures would substantially reduce DPM emissions to less than one lb/hr. Consequently, the project's health risks associated with DPM would be less-than-significant by incorporating-mitigation as specified below in Section 3.6.5.

Construction workers and adjacent sensitive receptors could potentially be exposed to NOA from fugitive dust sources resulting from activities such as excavation, staging areas, stockpiling or blasting. Granitic material would not be expected to contain NOA material. The MIAD area overlies metamorphic rock and NOA could be located in this area though none has been documented at this site. Presence of NOA could also expose sensitive receptors through exposure to airborne NOA. NOA could be tracked-out on roadways by construction vehicles or become airborne on days of high wind velocity. However, required incorporation of CARB Asbestos ATCM measures and fugitive dust control measures detailed in Section 3.6.5 is expected to reduce this exposure to less-than-significant with mitigation.

Geologic testing per the ATCM regulations would be necessary to document that NOA is not present in areas which are within the vicinity of metamorphic rock (ultramafic rock) or the Copper

Hills vicinity, in order to avoid ATCM regulations. Otherwise to comply with ATCM measures, the contractor must provide an Asbestos Dust Mitigation Plan to the AQMDs fees before the start of any construction or grading activity. The provisions of the dust mitigation plan would be implemented at the beginning and maintained throughout the duration of the construction or grading activity. Many of the asbestos control measures parallel the Fugitive Dust Control Plan. In compliance with asbestos regulations and Fugitive Dust Control Plans, actions would be implemented for street sweeping, speed limits, watering of soils, covering haul trucks or allowing free board space, and creating paved surfaces where specified. As a result, Alternative 2 NOA construction emissions would be less-than-significant with mitigation.

Construction Related Odor Emissions

SO_2 emissions associated with diesel fuel could emit offensive odors during construction. However, because ultra-low diesel fuel is now required in California, and less than one ton/yr of sulphur emissions would be generated by the project, the potential for diesel-related odor is minimal. Odor impacts resulting from construction activities would be less-than significant.

3.6.5 Avoidance, Minimization, and Mitigation Measures

The following mitigation measures are required to reduce air quality impacts to less-than-significant with mitigation.

Asbestos Dust Mitigation

The following measures are required by the CARB ATCM for construction projects where the area to be disturbed is greater than one acre and naturally occurring asbestos (NOA) may be present. The project construction contractor would be required to adhere to these requirements when a given project phase would involve the disturbance of lands that may harbor NOA.

- Submit an Asbestos Dust Mitigation Plan to the AQMD of Sacramento, Placer and El Dorado Counties with required fees. The Plan would specify dust mitigation practices sufficient to ensure that no equipment or operation emits dust that is visible crossing the project boundary line. Construction would not commence until the Asbestos Dust Mitigation Plan is approved.

- The contractor would conduct cleanup of carryout and track out by the following methods:

    - Remove any visible track-out from a paved public road wherever vehicles exit the work site with a wet sweeper or a HEPA filter equipped vacuum device at least one time per day; or flush with water, if curbs or gutters are not present, and where the use of water will not result in a source of trackout material or result in adverse impacts on storm water drainage systems or violate any NPDES permit program. Use of blower devices, or dry rotary brushes or brooms for removal of carryout and track out on public roads would be prohibited.

  - 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 fifty consecutive feet from the intersection with the paved public road; or any other measure as effective as the measures listed above.

- Keep active storage piles adequately wetted or covered with tarps.

- Control for disturbed surface areas and storage piles that will remain inactive for more than seven days, which would include one or more of the following:
  - Keep the surface adequately wetted;
  - Establish and maintain surface crusting;
  - Apply non-toxic, biodegradable dust suppressants or stabilizers according to the manufacturer's recommendations;
  - Cover with tarp or vegetative cover;
  - Install wind barriers of fifty percent porosity around three sides of a storage pile;
  - Install wind barriers across open areas; or
  - Take other measures as effective as the measures listed above.

- Control for traffic on on-site roads, parking lots, and staging areas which would include:
  - A maximum vehicle speed limit of 15 miles per hour or less; and
  - One or more of the following:
    - Watering every two hours of active operations or sufficiently often to keep the area adequately wetted;
    - Apply non-toxic, biodegradable dust suppressants consistent with manufacturer's directions;
    - Maintain a gravel cover with a silt content that is less than 5 percent and asbestos content that is less than 0.25 percent, as determined using an approved asbestos bulk test method, to a depth of 3 inches on the surface being used for travel; or
    - Any other measure as effective as the measures listed above.

- Control for earthmoving activities that would include one or more of the following:
  - Pre-wetting the ground to the depth of anticipated cuts;
  - Suspension of grading operation when wind speeds are high enough to result in dust emissions crossing the property lines, despite the application of dust mitigation measures;
  - Application of water prior to any lands clearing; or
  - Any other measure as effective as the measures listed above.

- Control for off-site transport. No truck would be allowed to transport excavated material off-site unless:
  - o Trucks are maintained such that no spillage would occur from holes or other opening sin cargo compartments; and
  - o Loads are adequately wetted and either
  - o Covered with tarps; or
  - o Loaded such that the material does not touch the front, back, or sides of the cargo compartment at any point less than six inches from the top and that no point of the load extends above the top of the cargo compartment.

- Post construction stabilization of disturbed areas. Upon completion of the project, disturbed surfaces would be stabilized using one or more of the following methods;
  - o Establishment of a vegetative cover;
  - o Placement of at least three inches of non-asbestos-containing material;
  - o Paving;
  - o Any other measure deemed sufficient to prevent wind speeds of ten miles per hour or greater from causing visible dust emissions.

Fugitive Dust Emission (PM) Mitigation Measures

The construction contractor would be required to implement the fugitive dust mitigation measures listed below (in addition to the asbestos mitigation measures previously mentioned):

- Limit vehicle speeds on unpaved roads to 15 miles per hour.
- Water at least every 2 hours of active construction activities or sufficiently often to keep disturbed areas adequately wet.
- Remove all visible track-out from a paved public road at any location where vehicles exit the work site. This would typically be accomplished using wet sweeping by a HEPA filter-equipped vacuum device on a daily basis.
- Install one or more of the following track-out prevention measures:
  - o A gravel pad to clean the tires of exiting vehicles.
  - o A tire shaker.
  - o A wheel wash system
  - o Pavement extending at least 50 feet from the intersection with the paved public road, or
  - o Any other measure(s) as effect as the measures listed above.
- Pre-wet the ground to the depth of anticipated cuts.
- Suspend any excavation operations when wind speeds are high enough to result in dust emissions across the property line, despite the application of other dust mitigation measures.

Enhanced Fugitive Particulate Matter (PM) Dust Control Practices

The construction contractor would be required to implement the following enhanced fugitive PM dust control practices:

- For Soil Disturbance Areas:
    - Water exposed soil with adequate frequency for continued moist soil, but do not overwater to the extent that sediment flows off the project site.
    - Suspend excavation, grading, and/or demolition activity when wind speeds exceed 20 mph.
    - Install wind breaks (ex. solid fencing) on the windward side(s) of construction areas.
    - Plant vegetative ground cover in disturbed areas as soon as possible.

- For Unpaved Roads:
    - Install wheel washers for all exiting trucks, or wash off all trucks and equipment leaving the site.
    - Treat site access to a distance of 100 feet from the paved road with a 6 to 12-inch layer of wood chips, mulch, or gravel to reduce generation of road dust and road dust carryout onto public roads.
    - Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person would respond and take corrective action within 48 hours of receiving a complaint. The phone number of the AQMDs of Sacramento, Placer and El Dorado would also be provided on the sign depending on jurisdiction to help ensure compliance.

Basic Construction Emission Control Practices

The construction contractor would be required to implement the additional basic construction emission control practices:

- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to five minutes (as required by the state airborne toxics control measure [Title 13, Sections 249(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.
- 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.
- Water all exposed surfaces 2 times daily. Exposed surfaces include, but are not limited to soil piles, graded areas, unpaved parking areas, staging areas, and access/haul roads.
- Cover or maintain at least 2 feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks slated for travel along freeways or major roadways must be covered.
- Limit vehicle speeds on unpaved roads to 15 miles per hour.

Enhanced Exhaust Control Practices

The construction contractor would be required to implement the following enhanced exhaust control practices:

- Provide a plan for approval by the Corps and the applicable AQMD(s) demonstrating that the heavy-duty (50 horsepower or more) off-road vehicles to be used in the construction project, including owned, leased, and subcontractor vehicles, would achieve a project-wide fleet-average 20 percent NO_x reduction and 45 percent particulate reduction compared to the most recent California Air Resources Board (ARB) fleet average. Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available. The SMAQMD's Construction Mitigation Calculator can be used to identify an equipment fleet that achieves this reduction. The subject plan would be submitted in conjunction with the equipment inventory discussed below.

- Submit to the Corps and appropriate AQMD(s) a comprehensive inventory of all off-road construction equipment, equal to or greater than 50 hp, that would be used an aggregate of 40 or more hours during any portion of the construction project. The inventory would include the horsepower rating, engine model year, and projected hours of use for each piece of equipment. The inventory would be updated and submitted monthly throughout the duration of the project, except that an inventory would not be required for any 30-day period in which no construction activity occurs. At least 4 business days prior to the use of subject heavy-duty off-road equipment, the contractor would provide the jurisdictional AQMD(s) with the anticipated construction timeline including start date, and name and phone number of the project manager and on-site foreman. The SMAQMD's Model Equipment List can be used to submit this information.

- Ensure that emissions from all off-road diesel-powered equipment used on the project site do not exceed 40 percent opacity for more than 3 minutes in any 1 hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) would be repaired immediately. Non-compliant equipment would be documented and a summary provided to the Corps and the appropriate AQMD(s) on a monthly basis. A visual survey of all in-operation equipment would be made at least weekly, and a monthly summary of the visual survey results would be submitted throughout the duration of the project, except that the monthly summary would not be required for any 30-day period in which no construction activity occurs. The monthly summary would include the quantity and type of vehicles surveyed as well as the dates of each survey.

- If at the time of construction, applicable AQMDs have adopted a regulation applicable to construction emissions, compliance with the regulation may completely or partially replace this mitigation. Consultation with the appropriate AQMD prior to construction would be necessary to make this determination.

Additional Air Quality Mitigation Measures

The construction contractor would be required to comply with the following:

- Model year 2010 (MY2010) or newer haul trucks would typically be used for the duration of the project. Use of these trucks would provide the best available emission controls for NO_x

and PM emissions. Occasions could arise when the availability of MY2010 or newer haul trucks is limited, thereby forcing the need to use older trucks to meet construction schedule goals. In such a situation, the construction contractor would first be required to demonstrate that MY2010 or newer trucks are not available in the general project region before the use of older trucks is authorized by the Corps.

- All off-road diesel-powered construction equipment greater than 50 horsepower would meet Tier-4 off road emission standards (reference 40 CFR Part 1039), where available. In addition, if not already supplied with a factory-equipped diesel particulate filter, all construction equipment would be outfitted with Best Available Control Technology (BACT) devices certified by CARB. Any emissions control device used by the construction contractor would achieve emissions reductions that are no less than what could be achieved by a Level 3 diesel emissions control strategy for a similarly sized engine as defined by CARB regulations. In the event that a certain tier engine is not available for any off-road equipment larger than 50 hp, that equipment would be equipped with the next lower tier engine (e.g., if Tier 3 is not available use Tier 2), or an engine that is equipped with retrofit controls to reduce exhaust emissions of NO_x and diesel PM to no more than the next available tier, unless certified by engine manufacturers that the use of such devices is not practical for specific engine types. If the construction contractor proposes to use off-road diesel powered construction equipment greater than 50 hp that does not meet Tier-4 off road emissions standards, such usage would first have to be approved by the Corps.

- Construction equipment would incorporate emissions-reducing technology such as specific fuel economy standards. Idling would be restricted to a maximum of 5 minutes, except as provided in the CARB 13CCR, Section 2485 exceptions.

Off-Site Mitigation Measures

(1) Mitigation for Particulate Matter Emissions Exceeding SMAQMD and/or PCAPCD Thresholds:

The construction contractor would provide the Corps and the applicable local AQMDs (e.g. SMAQMD and/or PCAPCD) with updated and revised air quality emissions estimates prior to beginning project construction activities on a given project phase. If these estimates indicate the applicable PM10 threshold and/or the applicable PM2.5 threshold would be exceeded despite the use of the mitigation measures and BMPs addressed previously, the contractor would coordinate with AQMDs to determine the level of mitigation fees (including administrative fees), if any, that must be paid. For SMAQMD, the cost of reducing one ton of PM emissions starting July 1, 2016 is $18,250; however, this fee is typically adjusted every year.

The construction contractor would provide monthly estimates of actual PM10 and PM2.5 emissions to the Corps and the applicable AQMDs once construction activities begin. These emissions reports would, if necessary, indicate the emissions that occurred within Sacramento County and El Dorado County for SMAQD and the emissions that occurred within Placer County for PCAPCD. When a monthly report indicates PM emissions exceeded the applicable local AQMD threshold, the contractor would be required to pay the appropriate mitigation fee and any associated administrative fee. These compensatory mitigation fees would be paid to the applicable local AQMD. For example, if a particular project phase entailed work in both Sacramento County and Placer County and PM10 emissions in Sacramento County were 1 ton over the SMAQMD threshold while PM10 emissions in Placer County were 2 tons over the PCAPCD threshold, then the mitigation fee paid to SMAQMD would be for a 1 ton overage while the mitigation fee paid to PCAPCD would be for a 2 ton overage.

(2) Mitigation for NOx Emissions Exceeding SMAQMD and/or PCAPCD Thresholds:

As discussed, modeling performed by the Corps as part of this SEIS/EIR indicated that construction emissions of NOx would not exceed local AQMD thresholds for NOx. If, however, the construction contractor's monthly reports of estimated actual NOx emissions (see above) reveal that such NOx thresholds have been exceeded during construction of a particular project phase, then the construction contractor would be required to pay the appropriate mitigation fee an any associated administrative fee. These compensatory mitigation fees would be paid to the applicable local AQMD, similar to how compensatory mitigation fee payments would be made for exceeding PM thresholds. For SMAQMD, the cost of reducing one ton of NOx emissions starting July 1, 2016 is $18,250; however, this fee is typically adjusted every year.

3.7 CLIMATE CHANGE

3.7.1 Environmental Setting

Regulatory Setting

The following Federal, State, and local laws and regulations apply to the resources covered in this section. Descriptions of the laws and regulations can be found in Chapter 5.0.

Federal

- Mandatory Greenhouse Gas Reporting Rule

State

- Assembly Bill 32, Global Warming Solutions Act of 2006
- California Clean Air Act of 1998
- Executive Order B-30-15
- Executive Order S-3-05
- Executive Order S-13-08
- Senate Bill 97
- Air Resources Board AB 32 Scoping Plan
- State Regulations on Greenhouse Gases and Climate Change

Local

- El Dorado County Air Quality Management District

- Placer County Air Pollution Control District
- Sacramento Metropolitan Air Quality Management District

Federal

On February 18, 2010, Council of Environmental Quality (CEQ) released the "Draft Guidance for GHG emissions and Climate Change Impacts" regarding the consideration of GHGs in NEPA documents for Federal actions. The draft guidelines include a presumptive annual threshold of 25,000 metric tons of carbon dioxide equivalent (CO2e) emissions from a proposed action to trigger a quantitative analysis (CEQ, 2010). On August 1, 2016, CEQ issued the "Final Guidance for Federal Departments and Agencies on Consideration of GHGs and the Effects of Climate Change for NEPA Reviews (CEQ, 2016)". The 2016 Final Guidance explains the application of NEPA principles and practices that Federal agencies should consider when addressing the potential effects of a proposed action on climate change as indicated by assessing GHG emissions, and the effects of climate change on a proposed action and its environmental impacts. The 25,000 MT per year threshold for CO2e would be used to determine the significance criteria for climate change.

State

On June 1, 2005, Executive Order S-3-05 (E.O. S-3-05) was signed by Governor Arnold Schwarzenegger. "The order established greenhouse gas reduction targets, created the Climate action plan Team, and directed the Secretary of Cal/EPA to coordinate efforts with meeting the targets with the heads of other state agencies. The order also requires the Secretary to report back to the Governor and Legislature biannually on progress toward meeting the GHG targets, GHG impacts to California, and Mitigation and Adaptation Plans." (California Climate Change Portal, 2015)

The following year, the Global Warming Solutions Act of 2006, commonly referred to as Assembly Bill 32 (AB 32), required the California Air Resources Board (CARB) to develop regulations and policies to regulate sources of emissions of GHGs that cause global warming. CARB was directed to create a program that would reduce statewide emissions to 1990 levels by 2020, a reduction of approximately 21.7% below emissions expected under a "business as usual scenario." These reductions were to be met by adopting regulations that maximize feasible technology and are cost effective while improving efficiency in land use sectors (i.e. energy, transportation, waste).

In addition, AB 32 directed CARB to develop a scoping plan to help lay out California's strategy for meeting the goals. This scoping plan was to be updated every 5 years and would be funded through fees collected annually from large emitters of GHGs such as oil refineries, electricity power plants, cement plants, and food processors.

Senate Bill 97 (SB 97) approved by legislature in 2007, was an act relating to the California Environmental Quality Act (CEQA) that addressed GHGs. Specifically, SB 97 required Office of Planning and Research to prepare and develop proposed guidelines addressing the analysis and mitigation of greenhouse gases for the implementation of CEQA by public agencies. The Amendments to the CEQA Guidelines were adopted by the California Natural Resources Agency (formerly Natural Resources Agency) March 18, 2010.

Local

The local air quality districts within the project boundaries oversee air quality standards in their respective areas, and also provide guidance for addressing GHG emissions and mitigation in CEQA documents. While Placer and Eldorado air quality districts have not adopted thresholds of significance for GHGs, SMAQMD has. On October 23, 2014, SMAQMD adopted Resolution 2014-028 that established recommended thresholds for GHGs. Following in November 2014, SMAQMD updated Chapter 6 of SMAQMD's CEQA Guide to Air Quality Assessment to provide guidance for agencies to specifically deal with GHG emissions, and included SMAQMD's recommended thresholds. On October 13, 2016, PCAPCD adopted the Review of Land Use Projects under CEQA Policy that established a threshold of significance for criteria pollutants and greenhouse gases. This serves as guidelines for the PCAPCD to use when recommending mitigation measures for projects as well.

Potential Environmental Effects

Guidance released by CEQ regarding the consideration of GHG's in NEPA documents for Federal actions include a presumptive threshold of 25,000 metric tons of CO2e emissions from a proposed action to trigger a quantitative analysis (CEQ, 2010). CEQA requires that lead agencies consider the reasonably foreseeable adverse environmental effects of projects they are considering for approval. CEQA requires that the cumulative impacts of GHG, even impacts that are relatively small on a global basis, need to be considered and if significant, consider feasible alternatives and mitigation measures that would substantially reduce significant adverse environmental effects.

Existing Conditions

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 100 years, with the most severe warming occurring in the most recent decades. In the 12 years between 1995 and 2006, 11 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 100 years (IPCC 2007).

The causes of this warming have been identified as both natural processes and as the result of human actions. Increases in greenhouse gas (GHG) concentrations in the Earth's atmosphere are thought to be the main cause of human-induced climate change. GHGs naturally trap heat by impeding the exit of solar radiation that has hit the Earth and is reflected back into space. The six principal GHGs of concern are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

According to the US Global Change Research Program 3rd National Climate Assessment (USGCRP 2014), climate change is already affecting the American people in far-reaching ways. Certain types of extreme weather events with links to climate change have become more frequent and/or intense, including prolonged periods of heat, heavy downpours, and, in some regions, floods and droughts. In addition, warming is causing sea level to rise and glaciers and Arctic sea ice to melt, and oceans are becoming more acidic as they absorb carbon dioxide. These and other aspects of climate change are disrupting people's lives and damaging some sectors of our economy.

3.7.2 Environmental Consequences

Methodology

The proposed construction activities would use large, diesel-fueled construction vehicles during all phases of the project. The partial degrade of dike crowns would result in emissions from bulldozers and graders, as well as emissions from the haul trucks used to dispose of material. The construction of concrete floodwalls would result in emissions from haul trucks and other equipment, as well as the diesel-powered mixers required for the mixing of the cement. Diesel-powered cement mixers, pavers, and haul trucks for borrow materials would be used for the reconstruction of the dike crowns. Trucking material in from borrow sites for an earthen raise would increase the total GHG emissions for this project.

In addition to the construction vehicles, mixers, and haul trucks involved in the actual construction of the project, there would also be GHG emissions from the workforce vehicles. Workers would commute from their homes to the construction site and park in the staging area. Workers are assumed to commute no farther than 20 miles from the construction site based on the availability of housing and the urban setting of the project. During construction, there may be times when large construction vehicles on the roads slow regular traffic, increasing emissions from vehicles that use the roads on a regular basis.

All construction-related emissions for the proposed project were estimated using SMAQMD's most recent version of the Road Construction Emissions Model (version 8.1.0). The SMAQMD Road Construction Emissions Model 8.1.0 (RCEM) was based on a collaboration among SMAQMD, California Department of Transportation (Caltrans), CARB, and the USEPA.

The Dam Raise project includes four distinct project phases that would each be constructed during a 2 to 4 year duration and would occur during the period from late 2018 to late 2022. For each project phase, project parameters were directly input into the data section of the model which calculates emissions based on various factors such as the size of the project area(s), types and number of construction equipment, number of workers required, and the amount of fill (ex. soil, concrete, rock) and other materials to be transported. The RCEM creates default values based on the project parameters, and these values change to reflect the percentage, or amount of time each piece of equipment would be used during each construction phase. Outputs from the RCEM runs produced for each of the project phases are provided in Appendix E.

Basis of Significance

It is unlikely that any single project by itself would have a significant impact on climate change. However, the cumulative effect of human activities has been 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). The impacts of the proposed project related to climate change were evaluated using the criteria listed below. For this analysis, an effect pertaining to climate change was analyzed based on draft NEPA guidance published by CEQ and State CEQA Guidelines Appendix G (14 CCR 15000 et seq.) An effect was considered significant if it would:

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

The following significance criteria were specifically used to determine the significance of potential GHG emissions from the proposed 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, e.g. 25,000 metric tons CO_2e per year; or

- If, during a given project phase, project construction emissions within Placer County exceed the PAPCD threshold of 10,000 metric tons CO_2e per year; or

- If, during a given project phase, project construction emissions within Sacramento County exceed the SMAQMD threshold of 1,100 metric tons CO_2e per year; or

- If the proposed project has the potential to contribute to a substantially lower carbon future.

3.7.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the project would not be constructed and there would be no construction-related effects on climate change. Locally generated emissions, including levee operations and maintenance, would continue. However, a flood associated with a PMF event that also results in the overtopping or failure of one or more of the existing dikes may result in large amounts of GHG emissions during flood-fighting activities, as well as large amounts of emissions resulting from clean-up activities and the repair and/or replacement of flood damaged housing, commercial and industrial properties, and public infrastructure.

3.7.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

Construction emissions associated with Alternative 2 would be produced for up to 4 years. At the time of this analysis, this period would begin in 2018 and end in 2022. Table 3-12 contains estimated total CO_2 and CO_2e emissions by the proposed project during each of the construction years, assuming no emissions mitigation measures are employed. The mitigation measures referred to are those listed in Section 3.6 (Air Quality), excluding compensatory mitigation measures. Table 3-13 provides these same estimated emissions, but assuming the cited mitigation measures are employed. Since the project would incorporate these mitigation measures, Table 3-13 provides the best estimate of potential CO2 and CO2e emissions.

Table 3-12. Estimated CO2 and CO2e emissions by the proposed project during each year of project construction: emissions without mitigation.

YEAR	CO2 (tons per year)	CO2e (metric tons per year)
2018	364.7	334.1
2019	1,808.5	1,656.6
2020	2,883.8	2,642.2
2021	4,711.2	4,317.9
2022	2,667.7	2,445.7
Total Project	**12,435.9**	**11,396.4**
PCAPCD Threshold	N/A	10,000
SMAQMD Threshold	N/A	1,100
Federal Threshold	N/A	25,000

Table 3-13. Estimated CO2 and CO2e emissions by the proposed project during each year of project construction: emissions with mitigation.

YEAR	CO2 (tons per year)	CO2e (metric tons per year)
2018	358.7	328.5
2019	1,776.3	1,626.9
2020	2,841.1	2,602.9
2021	4,669.5	4,279.4
2022	2,651.0	2,430.2
Total Project	**12,296.6**	**11,267.9**
PCAPCD Threshold	N/A	10,000
SMAQMD Threshold	N/A	1,100
Federal Threshold	N/A	25,000

Notes:
All emissions were estimated using SMAQMD's Road Construction Emissions Model, Version 8.1.0.
EDCAMD has no thresholds established for CO2 or CO2e.

Although there is a slight discrepancy between mitigated and unmitigated emissions estimates, the reduction from unmitigated to mitigated emissions is not substantial. Based on the RCEM, the proposed project would not exceed PCAPCD's CO2e threshold of 10,000 MT (metric tons) CO2e per year and would also not exceed the federal threshold of 25,000 MT CO2e per year. However, emissions would exceed SMAQMD's threshold of 1,100 MT CO2e per year in 2019, 2020, 2021, and 2022. Using the PCAPCD and federal thresholds, the proposed project's effects on climate change related to GHG emissions would be less-than-significant. Compensatory mitigation would be provided for CO2e emissions generated by project construction activities that take place in

Sacramento County. Given this, the proposed project's effects on climate change based on SMAQMD's CO2e threshold would also be rendered less-than-significant.

There remains a limited chance that actual emissions of CO2e during project construction could exceed either the PCAPCD threshold for CO2e or, less likely, the federal CO2e threshold. As discussed in the preceding Air Quality section, the construction contractor would be required to submit monthly estimates of actual construction emissions to the Corps and applicable local AQMDs. If these monthly reports show that emissions may eventually exceed either of the two CO2e thresholds, the contractor would be required to implement various BMPs/mitigation measures mentioned in Section 3.7.5 to help avoid going over the thresholds. If actual CO2e emissions during construction of a given project phase do exceed either of the two thresholds, then compensatory mitigation would be provided in the form of purchasing sufficient carbon credits to mitigate for the excess CO2e. For example, if CO2e emissions generated during the raising of Dikes 4, 5, and 6 (one phase of the project) were 12,000 MT CO2e in one calendar year and these emissions occurred in Placer County (which would be the case since most project work would be in this county), then the contractor would have to purchase 2,000 metric tons of carbon credits. By following this protocol, the project's effects on climate change would remain less-than-significant due to the proposed compensatory mitigation.

The proposed project would not produce long-term GHG emissions but could address foreseeable future climate change impacts that would result in beneficial management related to flood risk reduction, dam safety, and public health. These benefits would not be inhibited by climate change itself, nor the purpose of the project given the greater surcharge zone and ability to delay operation for the main dam emergency gates and prolonged outflows at or below the 160,000 cfs threshold. Though the proposed project won't necessarily sequester GHG emissions, it would prevent extra carbon productions. Project emissions are short-term construction emissions, and the project is expected to have long-term benefits from the prevention of extra carbon production from the demolition, repair, and reconstruction of flood induced infrastructure losses associated with a catastrophic flood event. The short-term construction emissions are expected to be less than significant when averaged over the life span of the project and compared to the carbon production prevented from catastrophic flooding. Since the proposed project would not significantly affect climate change during project construction and since it would have no adverse effects on climate change following project completion, it would also have no cumulatively significant effect. Instead, the proposed project may ultimately help counteract future adverse climate change effects on the local and regional environment.

While the proposed project would limit extra carbon production, it could also provide additional benefits to foreseeable climatic impacts. Climate change could exacerbate natural process such as snowpack and streamflow which are expected to decline in some parts of the Southwest (e.g. California) and affect how Folsom Dam is operated. Other impacts could include longer periods of drought or more intense rains. Future climatic conditions are uncertain, but the proposed project would provide the future operations of Folsom Dam Reservoir with added capacity to adapt to long term foreseeable climate change impacts.

At this time, ongoing construction work for the JFP, and updates to the Folsom WCM are ongoing. The Dam Raise project is intended to offer increased operational flexibility given the greater surcharge zone and ability to delay operation for the main dam emergency gates and prolonged outflows at or below the 160,000 cfs threshold; however, any new operations that might occur as a result of the Dam Raise would be dependent upon a separate updated WCM, in addition to the updated WCM based on the Folsom JFP. The WCM update required to operate Folsom Reservoir with the JFP in place will include operations based on weather forecasts in addition to current operations (i.e. variable space storage, basin wetness parameters, etc.). The new operations would provide more flexibility for making water releases and could also take into account potential changes to operation due to climate change. A new WCM update would be required to incorporate the Dam raise. As a result of that Dam Raise WCM update, a separate supplemental analysis would cover NEPA/CEQA requirements for such an action, and evaluate significance of potential impacts on climate change.

3.7.5 Avoidance, Minimization, and Mitigation Measures

Section 3.6.5 of Air Quality discusses various BMPs and other mitigation measures that would be used during construction of the proposed project to help minimize potentially adverse air quality impacts. Many of these actions would also help reduce GHG emissions.

The construction contractor would be required to submit monthly estimates of actual construction emissions to the Corps and applicable local AQMDs. If these monthly reports show that emissions may eventually exceed any of the three CO2e thresholds (i.e. federal, PCAPCD, or SMAQMD thresholds), the contractor would be required to prepare a GHG emissions reduction plan for approval by the Corps, then implement the approved plan. Elements of such a plan could include one or more of the following:

- Minimize the idling time of construction equipment to no more than 3 minutes, or shut equipment off when not in use.
- Encourage carpools, shuttle vans, and/or alternative modes of transportation for construction worker commutes.
- Use of CARB-approved low carbon fuel.
- Use of equipment with new technologies (repowered engines, electric drive trains).

If actual CO2e emissions during construction of a given project phase do exceed any of the three thresholds, then compensatory mitigation would be provided in the form of purchasing sufficient carbon credits to mitigate for the excess CO2e. Carbon offset credits would be purchased by the construction contractor and potential sources for these credits include; CAPCOA GHG Reduction Exchange Program, the Climate Action Reserve, the American Carbon Registry, or a similar carbon credit registry that is acceptable to the applicable local AQMD and the Corps. Thus, if the actual CO2e emissions of a particular project phase exceed the PCAPCD significance threshold for CO2e, the federal significance threshold for CO2e, or the SMAQMD significance threshold for CO2e, the purchase of carbon credits would reduce the project's climate change effect to less-than-significant.

It is noted that the above compensatory mitigation measure would only be triggered under the following scenarios: (1) Project construction emissions that occur within Placer County exceed the PCAPCD threshold of 10,000 MT CO2e per year; (2) Project construction emissions that occur within Sacramento County exceed the SMAQMD recommended threshold of 1,100 MT CO2e per year, or; (3) Project construction emissions exceed the federal threshold of 25,000 MT CO2e per year, regardless of the county in which the emissions are generated.

3.8 AESTHETICS AND VISUAL RESOURCES

3.8.1 Environmental Setting

Regulatory Setting

There are no Federal or State laws regulating visual resources.

Existing Conditions

Folsom Lake is a significant visual feature in the regional landscape. The lake and shoreline contrast sharply with the nearby rolling, wooded foothills. Visual quality is highest in winter and spring when reservoir levels are high. As summer progresses, reservoir drawdown typically exposes a ring of bare soil along the shoreline, negatively affecting visual quality. Major viewer groups are the residents of nearby areas and recreationists using the reservoir and shoreline.

Downstream of Dikes 1 through 6 contains views of grasslands, oak woodlands, and wetlands. Several unimproved recreation trails are visible in the area. Auburn-Folsom Road is visible in some of these locations. The existing trail on top of Dikes 1 through 6 has views of Folsom Lake and the shoreline. The areas surrounding Dikes 7 and 8 are similar to that of Dikes 1 through 6, only with some visibility from Folsom Lake Crossing and E. Natoma Street.

The LWD and RWD have little viewshed from any residential areas. Construction is ongoing near the LWD and spillway, where equipment and vehicles are visible throughout the week. An existing trail follows the crest of MIAD, providing trail users with sweeping views of Folsom Lake and the general area surrounding MIAD. The land immediately south of MIAD and north of Green Valley Road was heavily disturbed by USBR’s recent safety improvements to MIAD, which were completed in 2016. Most of this land has since been restored to pre-construction topography and vegetated with native grasses and forbs. However, some access roads still remain along with other small disturbed patches and vegetation is rather sparse, thereby lowering the visual appeal of this area.

3.8.2 Methodology and Basis of Significance

Methodology

Evaluation of the project's potential impacts on visual resources was based on a review of scenic vistas and landscapes that could be affected by project-related activities. Visual contrasts were examined, which included evaluations of changes in form, size, colors, project dominance, view blockage, and duration of impacts. Other elements, such as natural screening by vegetation or landforms, placement of project components in relation to existing structures, and likely viewer groups, were also considered.

Basis of Significance

The thresholds of significance encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and intensity. The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines. A proposed alternative would result in a potentially significant impact to 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.
- Substantially degrade the existing visual character or quality of the site and its surroundings.
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

3.8.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Corps would not participate in construction of the proposed project and the visual resources around Folsom Reservoir would remain undisturbed. Dikes and dams would not be modified, and construction work, outside of routine maintenance and projects that are already underway or planned, would not contribute to any change in visual quality within the study area.

3.8.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

During the four year construction period of the Tainter gates, visual resources near the gates and dam structure itself may temporarily be impaired. However, at the time of this analysis, staging would be at the "overlook" area and possibly the CCAO area yard, which are not publically accessible or visible areas. Therefore, construction-related effects on aesthetics and visual resources are considered less than significant because construction is temporary and existing views would not be obstructed.

The 3.5-foot raise of the dikes and dams, and other construction activities, may temporarily impair visual resources during each 2-year construction period of the various work packages. Increased construction traffic on Auburn-Folsom Road would affect views of the area from several homes near the area and may be visible by recreation users on the trails. The flagmen and turning lanes, as well as construction vehicles, would be visible at certain times of the day.

The recreational trail that runs along the crest of Dikes 1 and 2 as well as a portion of Dike 3 provide only limited views of Folsom Lake. These views would be somewhat eliminated during project construction since the public would not have access to the dike trail. However, the public would have access to other areas east of the dikes that afford lake views. Recreational users of this part of the FLSRA (e.g. Granite Bay area) would be exposed to construction work and disturbance during project construction, thereby temporarily reducing aesthetic values of the immediate vicinity. A few residences on Vogel Valley Road, located immediately west of Dike 1, would be exposed to partial views of construction work but several residences on this road would not be able to see this due to oak woodlands between the dike and the subject road.

The existing trail on top of Dikes 4, 5, and 6 has views of Folsom Lake and various habitats. During construction, recreationists would not have access to the trail on top of the dikes and would need to utilize the trail detour, which would not have views of the reservoir because of its location on the downstream side of the dikes. The trail detour would instead provide views of natural areas such as grasslands, oak woodlands, and other habitats. Proposed staging areas on the land side (downstream side) of Dikes 4, 5, and 6 would be severely disturbed during construction, temporarily converting these areas from largely annual grasslands and thereby decreasing their “natural” beauty. People boating in Folsom Lake and using the recreation facilities near the Beals Point parking lot and the northern Beals Point campground would be exposed to construction activities that have a temporary adverse impact on visual resources. A few residences located immediately north of the northern end of Dike 4 have direct views of this dike and the proposed staging areas adjacent to the dike. Project construction work would temporarily degrade these views. However, the raising the crest elevation of Dike 4 would not eliminate or further obstruct existing views of Folsom Lake from these residences.

Construction of the floodwall on top of the RWD would be visible to users of the recreational facilities adjacent to the Beals Point parking lot and, to a lesser degree, from a few of the campsites in the southern Beals Point campground. Construction work necessary for improvements to the LWD, main dam, and the RWD would be visible to boaters on Folsom Lake and to drivers traveling nearby segments of Auburn-Folsom Road, Folsom-Auburn Road, and Folsom Lake Crossing. Since the LWD, RWD, and main dam are all heavily disturbed features to begin with, proposed construction activities would have only minimal adverse effects on visual resources while construction is ongoing.

Construction work at Dike 7 and Dike 8, including activities in the staging areas adjacent to these dikes, would be visible from a few residences situated between and south of these two dikes. Numerous residences immediately south of the proposed staging area located between Dike 8 and

MIAD (the MIAD West staging area) would be exposed to views of construction activities associated with the raising of Dikes 7 and 8 and MIAD. Vehicles on segments of Folsom Lake Crossing, East Natoma Street, and Green Valley Road would also be able to see construction work, as would people using portions of the FLSRA that remain open near the two dikes and MIAD. Construction work on the crest of MIAD would further be visible to boaters on Folsom Lake and to users of the eastern side of the Folsom Point day use area. With the exception of the Dike 7 Office Complex staging area, proposed staging areas associated with MIAD and Dikes 7 and 8 improvements would be temporarily converted from recently restored annual grasslands to disturbed staging facilities, thereby decreasing the visual qualities of these areas. Raising the two dikes and MIAD would not further limit views of Folsom Lake from nearby residences, few of which have views of the lake now. However, the temporary presence of construction work would lower the aesthetic appeal of the existing viewshed from nearby residences.

Raising the dams and dikes would adversely affect the visual character of nearby portions of the FLSRA during construction of the proposed project. Modifications to dikes and dams around Folsom Lake would occur in phases, limiting the extent of construction affecting viewsheds at any one time. The relatively small changes in the heights of these large linear features would not significantly alter the quality of views around the lake, nor would these changes obstruct existing views of the lake from nearby residences. The proposed staging areas severely disturbed during project construction would be restored to mimic pre-construction topography and would be planted with native grasses and forbs. In this manner, the existing visual qualities and aesthetic appeal of the staging areas would largely be restored upon construction completion. Restoration of the Dike 7 Office Complex staging area would actually improve the visual quality of this area since this staging area would also be returned to a condition very similar to that present prior to the construction of this existing staging area. Following completion of the proposed improvements to the dikes and dams, these features would look quite similar to their existing appearance.

The proposed project would temporarily limit access to a few relatively scenic vistas, such as views of Folsom Lake from Dikes 4 through 6 and MIAD. There would be no long term adverse effect on any scenic vistas, however. The project would not create permanent new sources of substantial light or glare. During project construction, there would be substantial damage to a few scenic resources primarily as a result of alterations to proposed staging areas. The existing visual character and quality of the affected dikes, dams, and staging areas would be degraded during project construction and certain viewsheds would be similarly degraded as a result of construction activities. However, all these adverse effects would be temporary and limited to the duration of construction in each of the four project phases. Most heavily disturbed staging areas would be restored to mimic pre-construction topography and would be planted to form annual grasslands, thereby mitigating the short-term adverse impacts. Given these points and the commitment to the avoidance, minimization, and mitigation measures listed below, the proposed project's impacts to aesthetic and visual resources would be less-than-significant.

3.8.5 Avoidance, Minimization, and Mitigation Measures

- Modifications to dikes and dams would occur in phases, limiting the extent of construction affecting viewsheds at any one time.

- Existing native trees would be preserved to the extent practicable.
- Staging areas would be located on previously disturbed lands where feasible.
- Staging areas would be restored following construction by restoring pre-construction topography to the degree practicable and hydroseeding the areas with native grasses and forbs. Exceptions to this mitigation measure would include: (1) Staging areas on the lake side of Dikes 4, 5, and 6 would not be subject to restoration since no topographic alterations or clearing of vegetation would be allowed in these staging areas; (2) Staging areas situated on existing urban/disturbed lands, with the exception of the Dike 7 Office Complex staging area, would not be restored, but instead returned to conditions present prior to the project (examples include staging areas for LWD improvements and for the main dam improvements).

3.9 TRAFFIC AND CIRCULATION

3.9.1 Environmental Setting

Regulatory Setting

The following Federal, State, and local laws and regulations apply to the resources covered in this section. Descriptions of the laws and regulations can be found in Chapter 5.0.

<u>Federal</u>

- Title 23 of the Code of Federal Regulations (CFR)
- Title 23 of the U.S. Code (USC)

<u>State</u>

- California Streets and Highways Code

<u>Regional and Local</u>

The Folsom Dam Raise Project study area includes roadways in the following jurisdictions:

- Counties – Sacramento, Placer and El Dorado (limited).
- Communities – Cities of Folsom, Roseville, and Community of Granite Bay.

The Sacramento Area Council of Governments (SACOG) serves as the area Metropolitan Planning Organization (MPO) for the region. Local municipalities determine their own criteria for streets and roads while the California Department of Transportation (Caltrans) oversees State highways.

Existing Conditions

This section describes the environmental setting as it pertains to transportation and circulation. Any incremental transportation impacts associated with implementation of the project are limited to the proposed construction years. The proposed project is expected to be under construction during calendar years 2018 through 2022. Therefore, the analysis years include all construction years from the project startup in 2018 to project completion in 2022, as well as the 2014 baseline conditions required by CEQA.

Folsom Dam is located in the City of Folsom (City) north of US Highway 50. Figure 1-1 shows the project vicinity map in context to the regional circulation system. The roadways within the study area of this SEIS/EIR are located within Sacramento County, Placer County, and to a limited extent, El Dorado County. Roadways under Caltrans' jurisdiction are also adjacent to the project area. Access points to the proposed work sites are restricted to the western and southern regions of Folsom Lake. Direct access to the project area is disseminated throughout the proposed project area, as shown in Figures 2-11 through 2-14. Onsite haul routes are not discussed since they are not considered part of the public roadway system.

The roadway network adjacent to the construction 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 construction activities. It is assumed daily workers would commute locally via the adjacent roadway network, or use Highway 80 and Highway 50 to gain access to the site.

The area is considered to be primarily a suburban, low-density development to the east of Sacramento. Transportation facilities and services include interstate and State highways, local roads and streets, and local transit including local bus service and a light rail line from the City of Folsom to downtown Sacramento. A number of bicycle paths/routes accompany major roads. In addition, commuter bus services are provided by counties and cities within the area.

Functional Classification

Sacramento, Placer, and El Dorado Counties use 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 importance to the land use pattern, travelers, and general welfare. The functional classification system recognizes differences in roadway function and standards between urban/suburban 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. In some cases, onramps and off-ramps are metered during peak-hours 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., freeways, arterials, and expressways).

- **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. 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, and comfort and convenience. Six LOS categories, from A (best) to F (worst), define each type of transportation facility (Table 3-14).

Table 3-14. 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.

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), the American Association of State Highway and Transportation Officials (AASHTO) and the Institute of Transportation Engineers (ITE) guidelines and nomenclature. Table 3-15 (Roadway Functional Classification Thresholds) shows the relationship of LOS threshold for various roadway functional classifications.

Table 3-15. 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.

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 on rural, urban, and suburban roadways except within one-half mile of state highways where the standard is LOS D. The El Dorado County General Plan establishes LOS F as the acceptable threshold for county roads. The Community of Granite Bay establishes an LOS C (except for intersections along Auburn-Folsom Road south of Douglas Boulevard, and along Douglas Boulevard west of Auburn-Folsom Road where the standard is LOS E). The standards generally apply to projects that would create a permanent increase in traffic.

<u>Freeways</u>

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 reflects the City's long dependence and appreciation for provided service since the 1800s.

- 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 serves as a 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 which endured long delays and congestion 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.

Arterials, Collectors, and Local Roads by Jurisdiction

Table 3-16 below 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, commercial, recreational, and residential uses in the vicinity of the project.

Table 3-16. Roadway Segments and their functional class, capacity, and level of service.

Roadway Segments	**Functional Class**	**Capacity (LOS C/D/E)**	**Year 2015 Traffic Volumes**	
			Traffic Volumes[2]	**LOS**
Folsom-Auburn Road – Folsom Lake Crossing to Greenback Lane	4AD	37,400	39,330	**F**
Folsom Boulevard – Greenback Lane to Iron Point Rd	4AD	37,400	45,603	**F**
Greenback Lane/Riley St – Natoma Street to Folsom Boulevard/Folsom Auburn Road	2A	18,700	56,590	**F**

Roadway Segments	Functional Class	Capacity (LOS C/D/E)	Year 2015 Traffic Volumes	
			Traffic Volumes[2]	LOS
Greenback Lane - Hazel Ave to Madison Ave	4AMD	36,000	29,075	D
East Natoma Street – Cimmaron Cir to Folsom Lake Crossing	4AU	28,900	20,027	D
East Natoma Street – Folsom Lake Crossing to Green Valley Rd	4AU	28,900	32,694	**F**
Oak Avenue Parkway – Blue Ravine Rd to East Bidwell St	6AD	56,000	26,783	C
East Bidwell Street – Clarksville Rod to Iron Point Rd	6AD	56,000	47,413	D
Blue Ravine Road – Oak Avenue Pkwy to Green Valley Rd	4AD	37,400	23,525	D
U.S. 50 – Hazel Ave to Folsom Blvd	4FA	89,800	140,914	**F**
U.S. 50 - Folsom Blvd to East Bidwell St[1]	4F	71,400	119,439	**F**
U.S. 50 – East Bidwell St to County line[1]	4F	71,400	98,808	**F**
Folsom Lake Crossing Bridge	4AHD	40,000	31,850	C
I-80 – Douglas Blvd to Greenback Ln	6F	107,100	197,630	**F**
I-80 – south of Greenback Ln	6F	107,100	205,662	**F**
Douglas Boulevard – Barton Rd to Auburn-Folsom Rd	4AD	37,400	48,499	**F**
Douglas Blvd – Folsom-Auburn to Folsom Lake Crossing (To account for use of Park Drive)	4AU	14.500	7,900	A
Auburn-Folsom Road – Douglas Blvd to Lake Crossing	4AD	34,860	48,620	**F**
I-80 – north of Douglas Blvd	6F	107,100	197,630	**F**
U.S. 50 - Sacramento - El Dorado County Line1	4F	71,400	93,636	**F**
Green Valley Road – East Natoma Street - Sophia Parkway	**4AU**	28,900	**38,609**	**F**

Source: Transportation Research Board 2000
Note: Year 2011 traffic volumes from the Folsom DS/FDR traffic analysis – calculated from 2010 ADT (Average Daily Traffic) with an annual 2% growth rate.
(1) Data obtained from Caltrans Traffic Data Branch – calculated from 2010 ADTs with an annual 2% growth rate.
(2) Data obtained from Folsom Dam Safety and Flood Damage Reduction Final EIS/EIR – calculated from 2007 ADTs with an annual 2% growth rate.

Bicycle and Pedestrian Facilities

Pedestrian facilities generally include sidewalks, crosswalks, curb ramps, pedestrian signals, and streetscape/landscape amenities (i.e., benches, tree-lined buffers, planters, bulb-outs, street lighting, etc.). There are existing bicycle lanes on several roadways in the vicinity of the proposed project. A Class II bicycle facility is an on-road, striped bicycle lane, and a Class III bicycle facility is an on-road, signed bicycle route.

Class II Bicycle Facilities

- *Douglas Boulevard* - Bicycle lanes are provided intermittently east of Eureka Road.
- *Auburn-Folsom Road/Folsom Boulevard* - Bicycle lanes are provided in the City of Folsom north of Greenback Lane/Riley Street and south of Sutter Street.
- *Natoma Street* - Bicycle lanes are provided from Folsom Boulevard to east of Mill Street, and between Prison Road and Ranch Drive. The City of Folsom Bikeway Master Plan proposes

to connect these two segments so the bicycle lanes would eventually run continuously between Folsom Boulevard and Green Valley Road.

- *Green Valley Road* - Bicycle lanes are provided from north of Natoma Street to the Sacramento County line. The Bikeway Master Plan proposes to connect these bicycle lanes with existing lanes on Blue Ravine Road south of Natoma Street.

Class III Bicycle Facilities

- *Auburn-Folsom Road* - There are bicycle lanes on each side of the road between the Sacramento County line and Joe Rodgers Road.

Transit Service

Public transportation within the proposed project vicinity is provided via bus and light rail service. Bus service within the City of Folsom, the City of Roseville, Sacramento County, and Placer County is primarily provided by Folsom Stage Line, Roseville Transit, Sacramento Regional Transit, and Placer County Transit, while light rail transit is provided by Sacramento Regional Transit.

3.9.2 Environmental Consequences

Methodology

Traffic effects associated with the project were evaluated in two ways: (1) regarding average daily traffic, and; (2) in terms of specific time periods during the day (*i.e.*, hourly basis, as needed). The analysis is based on the following criteria:

- The construction schedule would be up to 10 hrs a day, up to 6 days per week.
- Material hauling activity would occur within normal work hours, from 7am to 7pm.
- Equipment hauling activity would occur during normal work hours, from 7am to 7pm.

Borrow materials (soil, rock, riprap) necessary for each alternative would be obtained from commercial suppliers located within 30 miles of the proposed project site. Haul trucks would use existing county and city designed haul truck routes and approved and established haul routes described in this document to transport the borrow materials and other supplies necessary for project construction.

Haul trucks and staff vehicles are expected to access the site via one of two predetermined, approved haul routes, one from I-80 and one from Highway 50 (Figure 3-9). For Alternative 2, the proposed route is originating from I-80, proceeding south to Sierra College Boulevard, east on Douglas Boulevard following Douglas Blvd into the project site. The route originating from Highway 50 would be via East Bidwell Street, Oak Avenue, Blue Ravine Road, to East Natoma Street, to Folsom Lake Crossing and vice-versa (for Alternative 2). 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.

To account for the large percentage of heavy trucks associated with typical construction projects, the Institute of Transportation Engineers recommends a threshold level of 50 or more new peak-direction trips during the peak hours. Therefore, an alternative would cause an increase in traffic that is substantial in relation to the existing traffic load and capacity, and result in a significant impact related to traffic, if it would result in 50 or more new truck trips during the morning or evening peak hours.

Basis of Significance

Adverse effects on traffic and circulation are considered significant if an alternative would result in any of the following:

- 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;
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities;
- Result in inadequate emergency access;
- Reduce supply of parking spaces sufficiently to increase demand above supply;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in a safety risk; or
- Substantially increase hazards due to design feature (e.g. sharp curves or dangerous intersection) or incompatible uses.

3.9.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Corps would not participate in construction of the proposed alternatives; therefore, the project would not create additional traffic during construction around the proposed project area. The existing roadway network, types of traffic, and circulation patterns is expected to increase traffic by 2% each year.

3.9.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

The existing access into the construction site for the Tainter gate refinements portion of Alternative 2 is via the intersection along Folsom-Auburn Road and Folsom Dam Road, or from Folsom Lake Crossing. Access from the first point allows vehicular access to RWD; however, this access is restricted to limited use. Access from the second point, off Folsom Lake Crossing and across the LWD, would be the primary access to the dam for the Tainter gate refinements. Table 3-17 details direct access roads for this phase of the overall project.

Table 3-17. Tainter gate refinements access routes.

Access Points	Location
Ingress to Project Site	Intersection of Folsom Lake Crossing and Folsom Dam Road
Egress from Project Site	Intersection of Folsom-Auburn Road and Folsom Dam Road

One lane would be open to traffic across the main Folsom Dam structure at all times during the construction period; however, the traffic lane would not need to be continuous across the dam so long as a vehicle (auto/pickup) can navigate from one side to the other. Coordination with USBR on use of the Main Dam road is ongoing.

Truck trips would involve hauling materials through residential areas; however, proposed routes are on designated haul roads. Additionally, proposed haul routes occur in the vicinity of schools throughout the project area. When possible, construction schedules would avoid routes that impact schools during the school year.

Vehicle trips to Folsom Dam from the surrounding area would increase slightly as a result of labor force trips and haul truck trips. It is anticipated that 67 haul truck trips would be required over the duration of construction, beginning calendar year 2018 and lasting approximately four years. Approximately 54 workers are estimated to commute to and from the project six days a week, resulting in a total of 134,784 worker commuter trips over the duration of construction. Therefore, 134,851 total truck trips are associated with the Tainter gate refinements aspect of Alternative 2.

Transportation and circulation effects resulting from this action are temporary in nature and would not result in permanent traffic increases to the surrounding area. The action would not create 50 or more new truck trips during peak travel hours (7AM to 8AM and 5PM to 6PM), as workers would be arriving and leaving onsite between 7am and 7pm. Employee commuter trips and haul truck trips would not result in a deterioration of existing LOS values, nor substantially disrupt the flow and/or travel time of traffic on public roadways or on Highways 50 and 80. Labor force trips and haul truck trips would not conflict with adopted plans or policies that effect public transit, bicycle, or pedestrian facilities, nor would it conflict with emergency access. Therefore, this phase of Alternative 2 would result in less than significant impacts on transportation and circulation resources.

Direct access routes to the construction sites for the 3.5-foot raise of the dikes, wing dams, and MIAD are listed in Table 3-18.

Table 3-18. Construction access routes for raising Dikes 1 through 8, the Left Wing Dam, the Right Wing Dam, and the Mormon Island Auxiliary Dam

Project Elements	Construction Access Locations
Dikes 1, 2, and 3 (Work Package #1)	Ingress and Egress: Twin Rocks Road to Park Road and Douglas Boulevard to Park Road

Project Elements	Construction Access Locations
Dikes 4, 5, and 6 (Work Package #2)	Ingress and Egress: Auburn-Folsom Road to intersection with proposed new temporary on-site access road. Egress Only: Intersection of existing on-site access road with Auburn-Folsom Road (construction traffic only allowed to turn northbound upon egress). Restricted Ingress and Egress: Beals Point road. Access limited to emergency access and special circumstances.
Right Wing Dam (part of Work Package #3)	Ingress and Egress: Folsom-Auburn Road to intersection with Folsom Dam Road. Ingress only: Folsom Lake Crossing to intersection with Folsom Dam Road. Restricted Ingress and Egress: Beals Point road. Access limited to emergency access and special circumstances.
Left Wing Dam (part of Work Package #3)	Ingress and Egress: Folsom Lake Crossing to intersection with Folsom Dam Road.
Dikes 7 and 8, MIAD (part of Work Package #3)	Ingress and Egress: (1) Folsom Lake Crossing to intersection with existing on-site access road to Dike 7. (2) East Natoma Street to intersection with Folsom Point Road (near Dike 8). (3) Green Valley Road to intersection with existing on-site access road near western end of MIAD, and/or to intersection with existing on-site access road across from Sophia Parkway.

Construction of these three phases (work packages; WP 1 through 3) of the proposed project would have temporary direct effects on the traffic and circulation in the project area. Traffic generated by the proposed action would result in growth in two categories: (1) labor force accessing the project site on a daily basis, and (2) truck trips due to the import and export of materials and equipment. New trips have been 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. Construction labor force is estimated as round-trips per day, while haul truck trips are estimated as total trips over the construction duration of each phase/work package (approximately 2 years for each phase). Table 3-19 provides these values. The traffic numbers developed are maximum amounts of traffic volumes based on anticipated work schedules and activities.

Table 3-19. Estimated truck trips for Work Packages (WP) 1 through 3 of the proposed project.

Component	Total Hauling Truck Trips (20cy per truck)	Total Worker Commuting Truck Trips	Total Truck Trips
WP1: Earthen Embankment Raise, Dikes 4-6	3,121	33,696	**36,817**
WP2: Earthen Embankment Raise, Dikes 1-3	2,768	33,696	**36,464**
WP 3 Earthen Embankment Raise for Dikes 7, 8, and MIAD, Concrete Floodwall Raise for LWD and RWD	9,731	33,696	**43,427**
Total	**15,621**	**101,088**	**116,709**

Direct access to the proposed work sites would vary by project feature/Work Package and are detailed in Table 3-19 above. It is anticipated that these roads would be used by workers accessing LWD, RWD, MIAD and Dikes 1 through 8. Figures 2-11 through 2-14 illustrate the routes that are proposed to be used for providing equipment, workers, and materials for the alternatives. These figures also illustrate the approximate locations of proposed construction staging areas.

An existing paved public road (Park Road) on the crest of Dike 1 would need to be closed during construction of the earthen raise of Dikes 1 through 3 (approximately 2 years); therefore, a detour road would be constructed to maintain public access to the park roadway system. This detour road would be removed following completion of the dike raises, since the portion of Park Road affected would be restored as part of raising Dike 1. Public vehicle access is not permitted on the crests of Dikes 4 through 8, the crests of the RWD and LWD, the crest of MIAD, and the top of Folsom Dam (the main dam). A new temporary construction access road would be constructed during the course of raising Dikes 4, 5, and 6. This access road would be built off Auburn-Folsom Road near the intersection of Bell Drive and Auburn-Folsom Road. A new temporary northbound turn lane leading to this new construction access road would also be built along the east side of Auburn-Folsom Road. The temporary access road and the turn lane would be removed following completion of the dike raises. That portion of Auburn-Folsom Road affected by turn lane and access road construction would be restored to pre-construction conditions during the course of removing the temporary access road and its turn lane.

It is estimated that approximately 15,620 truck trips would be necessary for material and equipment hauling for this alternative during construction (2018-2022). Approximately 27 workers are estimated to commute to and from the project 6 days a week for a total of 624 days in the project lifetime, adding up to 101,088 worker commuter trips. Therefore, 116,709 total trips are associated with this alternative.

The increased traffic associated with construction will not eliminate any known emergency access routes and will not affect emergency access. Construction workers would park in designated locations and would not reduce the supply of parking spaces. Air traffic patterns would not be affected, design features do not include any changes to traffic design, and no increase in hazards would occur. However, the implementation of this portion of Alternative 2 would substantially increase traffic in relation to existing traffic load and capacity of the roadway system and has the potential to substantially disrupt the flow and/or travel time of traffic. Therefore, potential traffic effects resulting from this action would be significant and unavoidable during the period of project construction.

3.9.5 Avoidance, Minimization, and Mitigation Measures

The effects are identified as significant and unavoidable, 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 travel and haul routes as well as proposed traffic management/maintenance/safety measures to be approved by the Corps, and implement the plan prior to initiation of construction.

- High collision intersections would be identified and avoided if possible.

- Construction vehicle and haul drivers would be informed and trained on the various types of access and haul routes, as well as areas that are more sensitive to traffic (e.g., high density residential areas, education centers, narrow roadways, etc.).

- The construction contractor would develop and use signs to inform the public of the construction access routes and haul routes, route changes, detours, and planned road closures to minimize traffic congestion and ensure public safety.

- Prior to beginning construction at Dike 1, the construction contractor would build a new temporary paved 2-lane roadway segment extending northward from a location south of Dike 1 to Park Road north of this dike. This temporary roadway segment would function as a public detour route around that portion of Park Road that would be directly impacted by project construction. The construction contractor would remove this detour road upon completion of raising Dikes 1 through 3.

3.10 NOISE

3.10.1 Environmental Setting

Regulatory Setting

- City of Folsom Noise Ordinance
- El Dorado County Noise Ordinance
- Placer County Noise Ordinance
- Sacramento County Noise Ordinance
- Noise Control Act of 1972, as amended (42 U.S.C. 4901 et seq.)

Existing Conditions

Federal and state governments provide guidelines for construction noise in regards to worker protection and protection of the general public. The proposed project is located in the vicinity of four jurisdictions: 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 Leq 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 would be applied to this project because the City is the closest jurisdiction with the most restrictive noise ordinance. The local noise standards for Sacramento County, Placer County and El Dorado County can be found in Appendix F. Compliance with the City of Folsom standards would assure compliance with all other local noise standards. The noise ordinance standards for the City of Folsom are listed in Table 3-20, and are based on the L50 metric as the baseline criterion level.

Table 3-20. City of Folsom Noise Ordinance.*

		Noise Levels Not To Be Exceeded In Residential Zone**	
Maximum Time of Exposure	**Noise Metric**	**7 am to 10 pm (daytime)**	**10 pm to 7 am (nighttime)**
Exterior Noise Standards			
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. on 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, the construction contractor would be required to comply with the City of Folsom exterior noise standards. 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.

Background sound levels for residential areas are typically in the range of 40–60 dBA. This analysis assumed an average background noise level of 50 dBA. However, ongoing construction projects, such as the auxiliary spillway construction would have an impact on this ambient noise level for the Tainter gate work, Dikes 7 and 8, MIAD, and the LWD and RWD. For the most part, the ambient noise for Dikes 1 through 6 would typically be in the range of 40-60 dBA.

3.10.2 Environmental Consequences

Methodology

Noise effects were evaluated for each construction site by comparing the expected project-generated construction noise levels with existing noise levels while taking into account the locations of sensitive receptors, and the noise criteria and standards set forth in applicable laws and regulations. A reasonable worst-case assumption is that the three loudest pieces of equipment would operate simultaneously and continuously over at least a one-hour period. Because the average background noise level in residential areas is estimated to be 50 dBA, a construction-related increase in noise to levels above 60 dBA would represent a significant effect.

Construction noise may potentially impact five jurisdictions (City of Folsom, Granite Bay, and unincorporated areas of Sacramento, El Dorado, and Placer Counties). These jurisdictions either have non-transportation noise standards based on time of day and land use sensitivity, or provide exemptions for construction as long as those activities occur during the daytime. Residential areas are considered the most noise-sensitive land use and have the strictest noise standards.

Construction activity noise levels at and near the project areas would fluctuate depending on the particular type, number, and duration of uses of various pieces of construction equipment. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. In addition, certain types of construction equipment generate impulsive noises (such as pile driving or blasting), which can be particularly annoying. Table 3-21 shows typical noise levels during different construction stages. Table 3-22 shows typical noise levels produced by various types of construction equipment.

Table 3-21. Typical Construction Noise Levels.

Construction Phase	Noise Level (dBA, Leq)[a]
Ground Clearing	84
Excavation	89
Foundations	78
Erection	85
Finishing	89

[a] Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase of construction and 200 feet from the rest of the equipment associated with that phase.
Source: EPA, 1971.

Table 3-22. Noise Emission Levels Typical for Construction Equipment.

Equipment	Typical Noise Level (dBA) 50 feet from Source
Backhoe	80
Bulldozer	85
Compressor	81

Equipment	**Typical Noise Level (dBA) 50 feet from Source**
Generator	75
Grader	85
Jackhammer	90
Loader	85
Roller	75
Scraper	89
Truck	88

Source: Federal Highway Administration 1995 and Reagan and Grant 1977.

A reasonable worst-case assumption is that the three loudest pieces of equipment would operate simultaneously and continuously over at least a one-hour period. The combined sound level of three of the loudest pieces of equipment listed in Table 3-22 (jackhammer, scraper, and truck) is 94 dBA measured at 50 feet from the source. Table 3-23, which assumes this combined source level, summarizes predicted noise levels at various distances from an active construction site. The data shown in the table indicates that the 60 dBA threshold would be exceeded up to 2,000 feet from the point the noise is generated. These estimations of noise levels take into account distance attenuation, attenuation from molecular absorption, and anomalous excess attenuation (Hoover 1996).

Table 3-23. Estimated Construction Noise in the Project Area.

Distance Attenuation	
Distance to Receptor (feet)	**Sound Level at Receptor (dBA)**
50	94
100	88
200	82
400	73
600	72
800	69
1000	66
1500	62
2000	59
2500	56
3000	53
4000	49
5280	45
7500	38

*This calculation assumes simultaneous operation of one jackhammer, one truck, and one scraper.

The results in Table 3-23 above indicate the potential for residences within about 2,000 feet of active construction sites to be exposed to substantial increases in noise, assuming a background sound level of 50 dBA.

Basis of Significance

Adverse effects on noise and vibration are considered significant if an alternative would result in any of the following:

- Exposure to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Substantial (10 dB or greater) long-term increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; or,
- Exposure of sensitive receptors or structures to ground borne vibration that exceed California Depart of Transportation (Caltrans) recommended standards.

3.10.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Corps would not participate in the proposed project. As a result, there would be no construction-related effects to the acoustic environment, including the generation of ground borne vibration. The noise levels in the study area would remain consistent with the existing ambient noise levels present under current conditions. Sources of noise and noise levels would continue to be determined by local activities, development, and natural sounds.

3.10.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

Main Dam and Tainter Gates. The nearest noise receptors to Folsom Dam are the USBR offices on the south side of the dam. The closest USBR office is approximately 1,000 feet away from the main dam (Figure 1-2). The replacement of the Tainter gates is expected to result in an increase in ambient noise levels at the USBR's and DPR's offices because of the close proximity of the proposed roadway to these buildings. Additionally, a portion of the Folsom State Prison complex just across Folsom Lake Crossing road is within 2,000 feet of the main concrete dam. Because this area is immediately adjacent to a main road, the ambient noise level in the background would be higher than 60 dBA. Temporary noise effects associated with raising and modifying Folsom Dam would be considered less than significant because the distance between noise sources and potential receptors is large enough to attenuate noise.

There are several sites where sensitive noise receptors are located near the proposed construction areas for this portion of Alternative 2. Operation of heavy equipment over the maximum construction duration (2 years for each work package or phase, except for the Tainter gate refinements that would last 4 years), within 2,000 feet of sensitive receptors, would result in a substantial increase in the ambient noise level exceeding the estimated background level of 50 dBA.

Dike 1. Residences to the northwest of Vogel Valley Road are within 500 to 600 feet of Dike 1. Residences on Christian Lane are less than 900 feet away from Dike 1. Additionally, numerous residences near the confluence of Boulder Road and Twin Rocks Road are within 2,000 feet of Dike 1 (Figure 3-11).

Dike 2. The Granite Bay Activity Center is within approximately 600 feet of Dike 2. Numerous residences along Haley Drive are within 1,000 feet of Dike 2. Parts of the beach and the parking lot for the boat launch are within 2,000 feet of the dike as well (Figure 3-12).

Dike 3. The Granite Bay Activity Center is approximately 600 feet of the dike. Residences along East Hidden Lakes Drive and Haley Drive are within 1,000 feet of Dike 3. Residents on Kirk Court, Michael Court, and Jon Way are less than 2,000 feet from Dike 2. Parts of the boat launch and beach area are within 2,000 feet of Dike 3 (Figure 3-13).

Dike 4. Residences to the north of Dike 4 near the intersection of Lake Court and Sierra Drive are within 300 feet of Dike 4. Some residences on Lakeshore Drive are within 700 feet of Dike 4. Residences near the intersection of Bronson Drive and Hill Road are within 800 feet of Dike 4. Sections of multi-use trails are within 300 feet of the dike (Figure 3-14).

Dike 5. There are a number of residences to the west of Auburn-Folsom Road on the southwestern perimeter of the reservoir near Granite Bay, located within 600 to 1,200 feet of Dike 5. Multi-use trails are located within 200 feet of the dike. Various sections of beach are located 200 to 500 feet from Dike 5 (Figure 3-15).

Dike 6. Campsites are located within 300 feet of Dike 6 (Figure 3-16), and multiuse trails are within 500 feet.

Right Wing Dam and Left Wing Dam. The access to Beals Point parking lot is less than 100 feet north of the RWD. Portions of the American River Bike Trail run nearly parallel to the RWD. There are a few residences within 1,000 feet of the RWD, but none within the same distance of the LWD (Figures 3-17 and 3-18).

Dike 7, Dike 8, and MIAD. On the southeastern perimeter of the reservoir, some residences are located within 400 feet of Dikes 7 and 8 (Figure 3-19). The closest residences to MIAD are located approximately 1,200 feet away off Green Valley Road (Figure 3-20). Construction in these areas could cause a substantial, temporary increase in the ambient noise level and expose sensitive receptors to noise levels that exceed standards established by local noise ordinances.

Residences in other areas around the perimeter of Folsom Lake are located far enough away from construction areas to attenuate construction-related noise to an acceptable level. It is not anticipated that construction-related noise would create a significant adverse effect on recreation facilities located at Granite Bay. However, campers using the campgrounds at Beals Point would likely be disturbed by construction noise during the course of raising Dikes 5 and 6.

Vibration associated with construction activities would be short-term, due to the distance of structures and sensitive receptors, and would not be significant. Other sensitive receptors that could be affected by this increase include residents, wildlife, and recreationists. Sensitive receptors would experience noise from construction vehicle motors and construction activities. Because the increase in vibration would be short-term and intermittent, the impact would be less than significant.

Temporary noise effects associated with the construction of this alternative are considered significant because of the close proximity of portions of the dikes to some residential areas and to FLSRA campgrounds. Implementation of mitigation measures listed below would reduce this effect, but not to a less than significant level.

3.10.5 Avoidance, Minimization, and Mitigation Measures

The following measures would be implemented to reduce the effects of construction noise:

- Construction noise would be limited in accordance with timeframes and requirements in the City of Folsom, Sacramento County, and Placer County Noise Ordinance exemption for construction. If construction must occur outside of the exempted timeframe in the vicinity of sensitive receptors, the construction contractor would be required to meet the City of Folsom exterior noise thresholds.

- To help minimize construction noise effects to campers utilizing the Beals Point campgrounds, construction activities at Dike 6 would be limited to the construction noise exemption times specified by the City of Folsom Noise Ordinance (e.g. 7am to 6pm on weekdays, and 8am to 5 pm on weekends). In addition, no construction activities would be allowed at Dike 6 on weekends (Saturdays and Sundays). There could be limited exceptions to these requirements. Examples of potential exceptions include things such as emergency actions, corrective actions to ensure safety, transporting special equipment, etc. The construction contractor would first have to obtain Corps approval before performing construction work outside of the timeframes specified above.

- Construction equipment noise would be minimized during project construction by muffling and shielding intakes and exhaust on construction equipment (per the manufacturer's specifications), and by shrouding or shielding impact tools.

- All equipment, haul trucks, and worker vehicles would be turned off when not in use for more than 30 minutes.

- Equipment warm up areas, water tanks, and equipment storage areas would be located as far from existing residences as is feasible.

- Written notice of impending construction work would be provided to potentially-affected residences (typically those located with approximately 2,000 feet of proposed construction activities) at least 2 weeks prior to mobilization of a give project phase. These notices would identify the type, duration, and frequency of construction activities. Notification materials would also identify a mechanism to register complaints if construction noise levels are overly intrusive.

- The contractor would measure surface velocity waves caused by equipment and monitor vibration up to a threshold value established and approved in writing by the Corps. There would be no vibration exceeding 0.2 inch per second. Such measurements would only be taken near residences and occupied buildings that could be adversely affected by excessive ground vibrations.

- A 24-hour telephone hotline for noise complaints would be established by the construction contractor. Any complaint calls not answered at the time of the call would be returned within approximately 24 hours of their receipt, as long as the message left includes a call-back phone number.

- Public meetings would be scheduled prior to construction of a given project phase to help ensure residents that may be affected by construction noise are informed of the project schedule and its potential effects.

Although construction activities are temporary and avoidance, minimization, and mitigation measures would be implemented, impacts would remain significant and unavoidable because there would be a substantial temporary increase in ambient noise levels in the project vicinity above the levels existing without the project.

3.11 WATER QUALITY & WATERS OF THE UNITED STATES

Water quality analysis covers the conventional pollutants. For this analysis, conventional pollutants analyzed are:

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

Groundwater quality was not analyzed for this report because of the lack of hydraulic connectivity between the dikes, emergency spillway, and the Folsom Lake. Previous studies (Sherer 2006) indicate that the data collected throughout the downstream foundation areas indicate that there is no connection between the lake and local groundwater levels.

The area of analysis for this section is the aquatic body of Folsom Lake, particularly surface waters within the area of the lake along the dikes, the main dam, and the emergency spillway. This section further addresses potential project impacts to jurisdictional Waters of the United States

(WOUS), which include Folsom Lake and wetlands in the immediate vicinity of the proposed project's anticipated direct impact footprint.

3.11.1 Environmental Setting

Regulatory Setting

The following Federal, state, and local laws and regulations apply to the resources covered in this section. Descriptions of the laws and regulations are discussed in Chapter 5.0.

Federal

- Clean Water Act (CWA) (33 USC §1251 *et seq.*)
- National Pollutant Discharge Elimination System (33 USC §1342)

State

- California Water Code
- Local Water Quality Regulations
- Porter-Cologne Water Quality Control Act

Existing Conditions

Pursuant to the Porter-Cologne Act, the Central Valley Regional Water Quality Control Board (CVRWQCB) prepares and updates the Water Quality Control Plan for the Sacramento and San Joaquin River Basins every three years. The most recent update was completed in July 2016. The plan describes the officially designated beneficial uses for specific surface water and groundwater resources, and the enforceable water quality objectives necessary to protect those beneficial uses. The Folsom Dam Raise project is located within the CVRWQCB's jurisdiction and is subject to the Basin Plan.

Snowmelt and precipitation from the upper American River Watershed discharges water into Folsom Lake. In general, runoff from the relatively undeveloped watershed is of high quality and rarely exceeds the State of California's water quality objectives (USBR Dam Safety SEIS, 2008). The following beneficial uses have been defined by the CVRWQCB for Folsom Lake: municipal and domestic water supply; irrigation; industrial power; water contact and non-contact recreation; warm and cold freshwater habitat; warm freshwater spawning habitat; and wildlife habitat, along with potential beneficial uses for industrial service supply. Water quality within Folsom Lake and Lake Natoma is generally acceptable to meet the beneficial uses currently designated for these water bodies.

Although groundwater is not a major resource in the vicinity of Folsom Lake, small amounts of groundwater are typically found in granitic fissures and cracks. Because fractured aquifer systems are typically low yielding, surface water sources are primarily used for drinking water or irrigation water sources rather than wells.

The applicable CVRWQCB water quality standards are listed in Table 3-24. The water quality values measured within Folsom Lake from 1992 to 1998 are presented in Table 3-25. All the data were collected over a six-year period from 1992 to 1998; 104 samples were taken for both pH and turbidity; 47 samples were taken for TOC; 101 samples were taken for electric conductivity (Larry Walker Associates, 1999).

Table 3-24. Central Valley Regional Water Quality Control Board Water Quality Standards.

Water Quality Parameter	Objective
Bacteria	100 MPN/100 ml
Total Dissolved Solids	100 mg/l
Dissolved Oxygen	7.0 mg/l for cold water habitat
	5.0 mg/l for warm water habitat
Turbidity	10 NTU
pH	6.5 to 8.5

Note: MPN is the Most Probably Number

Table 3-25. Water Quality Parameters Sampled at Folsom Lake – 1992 to 1998.

Water Quality Parameter	Minimum	Maximum	Average
pH (standard units)	5.82	8.46	7.09
Turbidity (mg/L)	1	68	1.2
DO (mg/L)	6.1	13.6	10.3
TOC (mg/L)	2	3.5	N/A
Nitrogen (mg/L)	N/A	N/A	N/A
Phosphorus (mg/L)	N/A	N/A	N/A
Electric Conductivity (μS/cm)	18.5	123	52.2

Table 3-26 presents water quality values within Folsom Reservoir from 2001 to 2005. The nitrogen, phosphorus, and TDS data were collected over a 13-month period from February 2001 to February 2002; five (5) samples were taken for each of these parameters. The TOC data were collected on June 11, 2003; six (6) samples were taken. The pH, electric conductivity, DO, and turbidity data were collected on June 28, 2005; a total of 47 samples were taken (USBR 2005, MWH 2003, Wallace, Roberts and Todd et. al. 2003).

Table 3-26. Water Quality Parameters Sampled at Folsom Lake – 2001 to 2005.

Water Quality Parameter	Minimum	Maximum	Average
pH (standard units)	6.6	8.23	6.94
Turbidity (NTU)	1	126.9	8.4
DO (mg/L)	4.95	7.93	6.88
TOC (mg/L)	1.5	1.8	1.6
Nitrogen (mg/L)	<0.050	0.11	0.062
Total Phosphorus (mg/L)	<0.010	<0.050	0.0212
TDS (mg/L)	39	44	41.8
Electric Conductivity (μS/cm)	32.5	61.6	46.2

Fecal coliform bacteria levels within Folsom Lake are presented in Table 3-27. The values for Granite Bay and Beal's Point represent data collected over a five-month period (May 2003 to September 2003); 19 samples were taken at each location. The values for Folsom Dam represent data collected over a 13-month period from February 2001 to February 2002; 5 samples were taken (USBR 2003; Wallace, et al. 2003).

Table 3-27. Folsom Lake Fecal Coliform Sampling – 2001 to 2003, Fecal Coliform Concentrations (MPN/100mL).

Site	Minimum	Maximum	Geometric Mean
Granite Bay	2	300	9
Beals Point	2	900	18
Folsom Dam	2	30	12.2

Known jurisdictional WOUS within and close to the potential direct impact footprint of Alternative 2 (the proposed project) are discussed in Section 3.4 (Vegetation and Wildlife). Folsom Lake is a jurisdictional waterbody up to its Ordinary High Water (OHW) elevation of 466 feet NAVD88. The American River is located immediately adjacent to the south (downstream) of Folsom Dam and is a jurisdictional waterway. One small vegetated wetland, designated as SW010 and occupying approximately 0.04 acre, is located just east of the northern end of Dike 2. A jurisdictional drainage swale, designated as SW008 and occupying approximately 0.01 acre, is located just west of the central portion of Dike 1. Two jurisdictional seasonal wetlands, designated as WM012 (approximately 0.07 acre) and wetland WM013 (approximately 0.02 acre), are situated near the central portion of Dike 5 on its west side. A remnant fragment of riparian woodland habitat, encompassing roughly 2.2 acres) is located on the south side of MIAD near its western end. This feature likely classifies as a jurisdictional wetland; however, further examination of this feature is warranted to determine whether it still has a hydroperiod that is adequate to support wetland hydrology.

3.11.2 Environmental Consequences

Methodology

Effects on water quality that could result from construction activities were qualitatively evaluated based on the construction practices and materials to be used, the location and duration of the activities, and the potential for water-quality degradation of project waterways (Table 3-28). Standard pollution prevention measures, including erosion and sediment control measures, good housekeeping, proper control of non-stormwater discharges, and hazardous spill prevention and response measures, would be implemented as part of the project design.

Table 3-28. Summary of Potentially Significant Water Quality Effects.

Threshold	Rational for Evaluating Potential Effects
Fecal Coliform Bacteria	Effects not likely since potential bacteria sources are not associated with the project
pH	Any release of concrete wash water without treatment or approved BMPs could affect pH. Increased turbidity from construction activities could also affect pH to a limited degree.
DO	Discharges with chemical or biochemical oxygen demand, could lower DO concentrations in water
Oil and Grease	Discharges of oil, grease, or similar materials from construction equipment could pollute water
Turbidity	Stormwater runoff from areas disturbed during construction could increase turbidity levels in water
Nutrients	Stormwater runoff from areas disturbed during construction and from areas revegetated at the end of construction could increase nutrient concentrations in water and also decrease DO concentrations

Basis of Significance

For this analysis, an effect pertaining to surface and ground water quality was considered significant under CEQA and NEPA if it would result in any of the following environmental effects, which are based on professional practice, Federal guidelines, and State CEQA Guidelines Appendix G (14 CCR 1500 *et seq*.):

- Violate water quality standards or waste discharge requirements, create or contribute runoff water that would provide substantial additional sources of polluted runoff, or otherwise substantially degrade water quality;
- Substantially degrade water quality to the detriment of beneficial uses;
- Substantially alter regional or local flows resulting in substantial increases in erosion or sedimentation on or off the site, resulting in flooding on or off the site, or exceed the capacity of stormwater drainage systems.
- Have a substantial adverse effect on jurisdictional Waters of the United States through filling, dredging, or other means.

3.11.3 Alternative 1: No Action Alternative

Under this alternative, water resources or quality would not be affected by construction in the project area. The surface and groundwater conditions would continue to be affected by contaminants through runoff. Extreme flooding events could wash siltation and contaminants into the water system, and if emergency work became necessary to prevent dike failure, measures required for the protection of water quality might not be used. Water quality would continue to be influenced by urban and natural stormwater runoff. There would be no additional impacts to jurisdictional WOUS.

3.11.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

An assessment was conducted by USBR on the Folsom Dam temperature shutters (2001). It was concluded that lead paint should be assumed present in all underlying primer on the structure. Some of the work on the Tainter gates would be done over water and there is the potential for lead paint to enter surface water downstream of the dam. Stop logs would be installed on the waterside of the Tainter gates to hold back the water during the period when Tainter gates and associated structures are being modified. This measure, along with the implementation of best management practices and the mitigation measures listed below, would help ensure that direct adverse effects to water quality during the construction of the Tainter gates refinement element (phase) of the proposed project would be less than significant.

The proposed project would neither increase the occurrence of impervious surfaces such as parking lots or buildings, nor change the existing land uses such that adverse hydromodification would occur. Existing drainage infrastructure (function and capacity) would not be altered from the 3.5-foot raise of the dikes, wing dams, and MIAD. Overall, the existing drainage patterns would not be substantially altered; therefore the direct and indirect effects to local drainage would be less than significant. Implementation of an approved Stormwater Pollution Prevention Plan (SWPPP) would ensure that there is no exceedance of the capacity of stormwater drainage infrastructure, and therefore effects to the infrastructure (dikes, etc.) would be less than significant with mitigation.

Project construction activities, such as drilling, excavation, grading, hauling, and fill placement may disturb or mobilize sediments, which have the potential to affect total suspended solids, pH, turbidity, and dissolved oxygen. Installation of the dike raises and the concrete floodwalls, and use of the identified staging areas, would have short-term adverse impacts on water quality from ground-disturbing activities. Exposed soil on the dikes, MIAD, LWD, and RWD could potentially erode as a result of significant stormwater runoff events, causing increased turbidity in Folsom Lake and possibly nearby wetlands. Stormwater runoff from the proposed staging areas would carry suspended sediments that could also temporarily increase turbidity in the lake and nearby wetlands. In addition, debris and inadvertent spills of fuels, oils, or concrete mix materials from construction equipment, in work areas, or in the staging areas could be a source of contamination into Folsom Lake, the American River, and nearby wetlands and drainage swales and ditches.

The construction contractor would be required to obtain an NPDES Construction General Permit from the CVRWQCB prior to initiating any project construction activities. The construction contractor would be required to prepare a SWPPP and obtain approval of this plan from the Corps and CVRWQCB. The contractor would then be required to implement the approved SWPPP prior to initiating construction activities, and to implement and maintain standard BMPs throughout the period of construction. There is also a potential for fugitive dust to enter waterways, waterbodies, and wetlands during construction due to activities like grading and movement of trucks and equipment along haul roads. However, frequent watering of haul routes, proper coverage and control of material stock piles, and installation of BMPs would help to avoid and minimize such pollution impacts.

Raising the elevation of the dikes and MIAD would first require removal of some of existing dike and dam materials to establish a satisfactory base for new materials. This would include removing some of the existing riprap that is present on the side slopes of some of the dikes and MIAD before placing new riprap on these side slopes for the raised segments. The removal of existing riprap and its subsequent replacement could potentially extend below the OHW elevation of Folsom Lake, thereby resulting in temporary impacts to this jurisdictional WOUS. Should this occur, the end result would not adversely affect the aquatic functions and values of the lake. There would also be no appreciable loss in lake acreage (surface area) or volume. Short-term impacts to the lake would largely be confined to limited degradation of water quality adjacent to construction work.

As shown in Figure 3-4, the temporary Park Road detour segment proposed for the project phase involving the raising of Dikes 1 through 3 would cross through a portion of Folsom Lake. The detour road would be 24 feet wide, consisting of two 10'-wide travel lanes (thus 20' wide pavement) and a 2'-wide gravel shoulder on each side of the travel lanes. The road's crest would be at approximately elevation 467 feet NAVD88 where it crosses Folsom Lake and the road base would have 2H:1V side slopes (2 feet horizontal distance for each foot of vertical elevation change). Construction of the Park Road detour segment would directly impact approximately 0.5 acre of Folsom Lake. The detour road would be completely removed upon completion of the 3.5-foot raise of Dikes 1 through 3 and lands disturbed by construction of the road would be restored by the construction contractor to mimic pre-construction conditions. Disturbed topography would be restored to approximately match the topography present prior to detour construction. Once topographic restoration is completed, natural areas disturbed by detour construction would be planted with a mixture of native grasses and forbs. Thus, the direct impact to Folsom Lake would be temporary and there would be no loss of lake acreage or storage volume. This impact is further discussed in Appendix I.

The Corps would obtain a Clean Water Act Section 401 Permit (a Water Quality Certification; Section 401 WQC) from CVRWQCB prior to construction of the project phase that includes raising Dikes 1, 2, and 3. The construction contractor would be required to comply with all applicable conditions and requirements set forth in the issued Section 401 WQC, including any monitoring requirements. If the final design plans for the project phase that involves raising Dikes 4, 5, and 6 reveal that excavation and backfill (i.e. removal and replacement of riprap along the side slopes of the dikes) below the OHW elevation of Folsom Lake is necessary, the Corps would also obtain a Section 401 WQC from the CVRWQCB prior to construction of this phase. The construction contractor would be required to comply with all applicable conditions and requirements set forth in the issued Section 401 WQC.

A few of the project's staging areas would extend into the lake. Use of these staging areas would be very restricted, thereby helping ensure use of such areas would not result in long-term significant impacts to the lake. The restrictions would include, but not necessarily be limited to: (1) Use would first need to be approved in writing by the Corps; (2) Use would be strictly prohibited when the area is inundated by standing water or the water underlying the staging area is within 6 inches of the soil surface; (3) Topographic alterations, including grading, excavation, or deposition of fill materials, would be prohibited; (4) Clearing or removal of existing vegetation would be prohibited; (5) Stockpiling of construction materials or wastes would be prohibited; (6) Fueling of construction equipment or vehicles would be prohibited; (7) Storage of fuel, hazardous wastes, or other potential pollutants would be prohibited.

The proposed project would not directly impact any known jurisdictional wetland or watercourses (ex. drainage ditches and swales). Since this conclusion is based on limited recent jurisdictional determinations and the determination documented in the 2007 EIS/EIR however, Corps environmental staff would conduct new jurisdictional determinations (e.g. field mapping and classification of jurisdictional WOUS) prior to finalizing design plans for a particular project phase. The design plans would then be refined, if necessary, to ensure construction of the project phase would not necessitate direct impacts to any jurisdictional wetlands or watercourses. The construction contractor would be required to protect all such features located within or immediately adjacent to the project limits of construction. Such protection would include the installation of temporary physical barriers, such as orange mesh fencing (safety fencing), adjacent to the boundaries of the wetlands and/or watercourses.

Soil exposed during project construction could potentially erode during rain events, causing increased turbidity in Folsom Lake as well as wetlands and watercourses located within or near the project's limits of construction. Construction activities have the potential to temporarily impair water quality if disturbed and eroded soil, petroleum products, or construction-related wastes are discharged into receiving waters or onto the ground where they can be carried into receiving waters. Soil and associated contaminants that enter receiving waters through stormwater runoff and erosion can increase turbidity, stimulate algae growth, increase sedimentation of aquatic habitat, lower dissolved oxygen content, and introduce compounds that may be toxic to aquatic organisms.

As previously mentioned, to help maintain existing water quality conditions the construction contractor would be required to obtain a Construction General Permit (CGP), to develop a SWPPP that would become part of the CGP, to implement the SWPPP and standard BMPs prior to and during project construction activities. The contractor would be required to abide by applicable conditions/requirements set forth in the CGP and to abide by applicable technical certification conditions set forth in any Section 401 WQCs obtained by the Corps for the project. Examples of stormwater BMPs include installation and maintenance of silt fences, erosion control wattles, erosion control blankets, and, in the case of work near large waterbodies like Folsom Lake, floating turbidity curtains.

By applying the measures described above as well as those outlined in Section 3.11.5 below, the proposed project would not violate water quality standards or create or contribute stormwater runoff that would provide additional sources of water pollution or substantially degrade water quality. While some degradation of water quality would be unavoidable during project construction, such degradation would be temporary, relatively minor, and would not result in long-term degradation of water quality or adverse effects to beneficial uses of Folsom Lake or the American River. The proposed project would not alter regional or local flows to the point that such flows increase erosion or sedimentation, result in on-site or off-site flooding, or exceed the capacity of nearby stormwater drainage systems. Although there would be temporary adverse impacts to jurisdictional WOUS during project construction, the project would not result in substantial adverse impacts to jurisdictional WOUS. Thus, the proposed project's anticipated impacts to water quality and jurisdictional WOUS would be less than significant.

3.11.5 Avoidance, Minimization, and Mitigation Measures

The contractor would be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the Central Valley Regional Water Quality Control Board (CVRWQCB). As part of the permit (a Construction General Permit), the contractor would be required to prepare a SWPPP and a SPCP prior to initiating construction activities, identifying BMPs to be used for avoidance or minimization of any adverse effects during construction to surface waters.

Pollution prevention measures should be incorporated into all final design and construction plans. The pollution prevention measures would include erosion and sediment control measures, and measures for non-stormwater discharges (i.e., construction dewatering and appropriate spill prevention and containment measures). Measures would be implemented to avoid accidental spills and sediment dispersal during barging of borrow materials. Work under NPDES jurisdiction requires the preparation of a SWPPP. The SWPPP would describe the proposed construction activities and pollution prevention measures that should be implemented to prevent discharge of pollutants. The SWPPP would also include a description of inspection and monitoring activities that must be conducted. Construction and post-construction monitoring should be conducted to ensure that all pollution prevention efforts are performed as described in the SWPPP. The SWPPP should be amended in the event modifications to the pollution prevention measures become necessary.

The following BMPs would be incorporated into the project:

- Appropriate erosion control measures would be incorporated into the SWPPP by the construction contractor in order to prevent sediment from entering wetlands, waterways, and waterbodies, and to minimize temporary turbidity impacts. Examples include, but are not limited to: straw bales/wattles, erosion blankets, silt fencing, silt curtains, mulching, revegetation, and temporary covers. Sediment and erosion control measures would be maintained by the contractor during construction at all times. Control measures would be inspected periodically by the construction contractor, particularly during and after significant rain events.

- The contractor would use a water truck or other appropriate measures to control fugitive dust on haul roads, construction areas, staging areas, and stockpiles.

- A fuels spill management plan would be developed for the project by the construction contractor and would be implemented by the contractor.

- Construction equipment and vehicles would be fueled and maintained in specified staging areas only, which would be designed to capture potential spills. These areas cannot be near any ditch, stream, river, or other body of water or feature that may convey water to a nearby body of water or wetland.

- Fuels and hazardous materials would not be stored on site, unless otherwise approved by Corps and such substances are stored in areas designed to contain leaks and spills. Any spills of hazardous material would be cleaned up immediately by the construction contractor.

- Construction vehicles and equipment would be inspected frequently and appropriately maintained by the construction contractor to help prevent dripping of oil, lubricants, or any other fluids.

- Construction activities involving removal (excavation) of material from the dikes, RWD, LWD, or MIAD as well as placement of material on these same features would be scheduled by the contractor to avoid as much of the wet season as practicable in cases where these activities may occur below the ordinary high water elevation of Folsom Lake. Construction personnel would be trained in stormwater pollution prevention practices by the construction contractor.

- In areas proposed for revegetation, initiation and completion of revegetation work would be done by the contractor in a timely manner to control erosion.

- Implementation and adherence to any additional requirements as mandated by the CGP and the Section 401 WQC. The construction contractor would obtain the CGP while the Corps would obtain the Section 401 WQC. The contractor would be responsible for implementing requirements set forth in these two permits.

- The construction contractor would be required to properly dispose of oil and similar potential pollutants, including hazardous wastes, off-site in a duly licensed facility.

- The construction contractor would be required to abide by the following restrictions pertaining to the use of construction staging areas that extend into Folsom Lake: (1) Use must first be approved in writing by the Corps; (2) Use is strictly prohibited when the area is inundated by standing water or the water underlying the staging area is within 6 inches of the soil surface; (3) Topographic alterations, including grading, excavation, or deposition of fill materials, are prohibited; (4) Clearing or removal of existing vegetation is prohibited; (5) Stockpiling of construction materials or wastes is prohibited; (6) Fueling of construction equipment or vehicles is prohibited; (7) Storage of fuel, hazardous wastes, or other potential pollutants is prohibited.

- Corps environmental staff would conduct new jurisdictional determinations (e.g. field mapping and classification of jurisdictional WOUS) prior to finalizing design plans for a particular project phase. The design plans would then be refined, if necessary, to ensure construction of the project phase would not necessitate direct impacts (e.g. placement of fill, excavation, land clearing) to any jurisdictional wetlands or watercourses.

- That portion of the Park Road detour road segment (an element of the project phase that includes Dikes 1, 2, and 3) that passes through Folsom Lake would be constructed when the portion of the lake affected is dry, if feasible. Once the Park Road detour road segment is no longer needed for the proposed project, this road segment would be removed. Topography altered by construction of the road would be restored to approximately match pre-construction topography and natural areas disturbed by road construction would be planted with native grasses and forbs.

- During construction of the Tainter gates refinements phase of the proposed project, the construction contractor would be required to abide by the following requirements, in accordance with 29 CFR 1926.62 Lead and 8 CCR 1532.1 Lead:
  - Housekeeping. Lead dust on surfaces, especially in eating areas, must be controlled by HEPA vacuuming, wet cleanup, or other effective methods.
  - Hand and face washing. Workers must have washing facilities with soap and clean water.
  - Training. Workers must receive training on lead hazards and how to protect themselves.
  - Develop a written compliance program, approved by the Corps, to assure control of hazardous lead exposures.
  - Assess the amounts of lead breathed by workers. This is usually done by employee breathing-zone air sampling. Air sampling results are used to determine if clean areas for eating and clothing change, showers, full worker training, and medical monitoring with routine blood testing for lead and zinc protoporphyrin (ZPP) is necessary, as well as the type of respirator that must be worn for protection.

3.12 CULTURAL RESOURCES

The following section addresses cultural resources impacts that could result from implementation of one of the proposed alternatives for the Folsom Dam Raise Project. “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.

3.12.1 Environmental Setting

Regulatory Setting

- National Historic Preservation Act of 1966, as amended (NHPA)
- Assembly Bill 52 (AB52)

Existing Conditions

For purposes of complying with Section 106 of the NHPA, a Federal agency would make a determination of the Area of Potential Effects (APE) for the project or undertaking. The APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character of use of historic properties, if any such properties exist." Additionally, the APE "is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking."

The APE may extend beyond the physical impacts associated with a project. Depending on the scale and nature of the undertaking and the known and anticipated types of cultural resources, the direct or indirect effects may include, but are not limited to: physical modification, intrusion to the visual or aesthetic characteristics of landscapes or features, or even access to a historic property.

The APE for the Folsom Dam Raise Project includes all areas of ground disturbance, staging areas, and modifications to manmade structures (Folsom Dam, Dikes 1 through 8, MIAD, LWD, and RWD). The existing conditions, records and literature search, and inventory and evaluation of cultural resources cover the APE for the Folsom Dam Raise Project.

<u>Prehistoric Cultural Context</u>

Since the Folsom Dam Raise Project area lies within two specific cultural areas, both the Lower Sacramento Valley and the Northern Sierra slope regions, the context below summarizes the distinct cultural chronologies for each of these regions.

<u>Lower Sacramento Valley</u>

Prehistorically, the Lower Sacramento Valley has been subjected to archeological interest since the last decade of the nineteenth century, culminating with early avocational archeologists establishing a temporal schedule for this region, referred to as the Central California Taxonomic System (CCTS) (Nilsson and Smith 2006; Moratto 1984). The CCTS is organized into three very broad divisions, the Early, Middle, and Late Horizon. This broad classification has largely fallen out of use, mostly due to obscured gradual changes throughout time, ignored diversity in the archeological record, and ignored smaller spheres of culture within the Central Valley (Waechter and Mikesell 1994). For these reasons, the cultural history discussion would concentrate on the pattern-aspect theme, presented by Frederickson (1973), in an effort to take into account cultural variation between sub-regions as well as material culture and behavior.

Windmiller Pattern (4,500-3,000 B.P.)

This pattern exemplifies the earliest occupation in the Sacramento Valley and encompasses aspects ascribed to the Early Horizon of the CCTS. This pattern is characterized by the exploitation of both game and plant resources and acquisition of utility goods, as well as ornamental and ceremonial objects, many of which were apparently obtained as finished items as opposed to raw materials (Moratto 1984). In regards to settlement practices, the Windmiller pattern suggests that populations may have established winter villages in the valley, with summer exploitation of the foothill zones. Within the archeological record, the Windmiller pattern is characterized by extended burials with westerly orientation as well as the presence of grave goods, which has been utilized to identify social stratification within the Windmiller peoples.

Berkeley Pattern (3,500-1,500 B.P)

The Windmiller Pattern gives way to the Berkeley Pattern in the Sacramento Valley, marking a transitional shift as opposed to a sudden and total replacement of the culture that proceeded. This pattern corresponds with the Middle Horizon of the CCTS and is represented by an increased dependence on acorn milling, evidenced by an increase in mortars and pestles within the archeological record for the Berkeley people. Cultural material includes the occurrence of an extensive bone tool kit, unique flintworking techniques, and certain types of shell beads and pendants within Berkeley pattern sites. Burial practices of Berkeley peoples included interring their dead in flexed positions with variable burial orientation. There has also been evidence of cremation practices within the Berkeley Pattern as well as a decrease in the numbers and variation of grave goods.

Augustine Pattern (1,500 B.P. to Contact Period)

The Augustine Pattern, assigned to the Late Horizon, is distinguished by intensive fishing, hunting and gathering, and reflects local innovation in technology and the integration of new developments with traits from the previous Berkeley Pattern. Settlement patterns exhibit highly stratified populations, indicated by the increased variation in mortuary practices and types of grave furnishings (Bennyhoff and Fredrickson 1994). Exhibited within the archeological collection is evidence for extensive trade networks, connecting the interior to the coast (Nilsson and Smith 2006). Archeologically, the Augustine Pattern is characterized by baked clay items, the introduction of the bow and arrow which replaced the dart and atlatl as the favored hunting implement, and the presence of side-notched, serrated arrow points. In the archeological record, evidence of the Augustine Pattern is also displayed in the distinctive Olivella shell bead types, clamshell disc beads, stone tubular pipes, and flat bottomed mortars.

Northern Sierra

Many researchers working within the project area have chosen to refer to the Central Valley sequence, specifically as it relates to work performed adjacent to Folsom Reservoir, when discussing chronologies. In 1952, archeological investigations were performed by the University of California at Berkeley, and it was through this research that Heizer and Elsasser (1953) developed two archeological cultures separated in time and space; the Martis Complex and the Kings Beach Complex.

Martis Complex (4,000-1,500 B.P.)

The Martis Complex, centered in the Martis Valley, represents the earliest occupation of the north-central Sierra foothills and mountains. The dates of the complex is determined by both obsidian hydration measurements and radiocarbon dates (Elsasser and Gortner 1991). The Martis Complex is characterized by an artifact assemblage dominated by local lithic materials consisting of basalt as opposed to obsidian tool production. Other cultural material indicative of this complex includes large, roughly shaped projectile point, and "boatstones" or atlatl weights (use of atlatl and dart). Plant processing tools such as the mano and millingstones for seed milling, bowl mortar and cylindrical pestle, are displayed in the artifact assemblages. Based upon the large numbers of projectile points and milling equipment discovered in the archeological record, there was an apparent economic emphasis on hunting and seeding (Moratto 1984). Elsasser and Gortner also note the frequent association of Martis assemblages with petroglyphs of the "Central Sierra Abstract Style" and suggest that these locations may represent high-elevation summer hunting camps (Waechter and Mikesell 1994).

Kings Beach Complex (1,500 B.P. to Contact Period)

The Kings Beach Complex, named after a site on the north shore of Lake Tahoe, was distinguished by flaked obsidian and chert tool stones over basalt resources. The archeological assemblages of Kings Beach are characterized by sparse artifact scatters overlying deeper Martis settlements (Elston et al 1977). The Complex employed the use of small projectile points, hunting technology based upon the bow and arrow, bedrock mortars, and cobble pestles. Although hunting played a role in Kings Beach subsistence patterns, fishing and gathering strategies are thought to have constituted the main focus of site use. This is indicated by the site locations situated at the mouths and confluence of streams within the Lake Tahoe region. Researchers have ascribed this complex to the ethnographic Washoe after 1,000 B.P. (Heizer and Elsasser 1953). The results of the work originally performed by Heizer and Elsasser dated the Kings Beach Complex to no earlier than 1000 years B.P, leaving a substantial chronological gap between the two complexes. Due to the work by W. Davis and R. Elston in the Lake Tahoe region, their efforts proved successful in finding evidence for a transitional phase between both the Martis and Kings Beach Complexes (Elston 1977).

Ethnographic Background

Ethnographic Overview

The Folsom Dam Raise Project APE is located within the territorial boundaries of the ethnographic Nisenan. The Nisenan, often referred to as the Southern Maidu in anthropological literature, are classified as the southern linguistic group of the Maidu tribe, and together with Maidu and Konkow, form a subgroup of the California Penutian linguistic family (Wilson and Towne 1978). The Nisenan linguistic group is further subdivided based on dialect into Northern Hill Nisenan, inhabiting the Yuba River drainage; Southern Hill Nisenan, living along the American River; and Valley Nisenan, occupying a portion of the Sacramento River Valley between the American and Feather Rivers (Beal's 1933; Kroeber 1925, 1929).

Prior to Euroamerican contact, Nisenan territory extended west into the Sacramento Valley to encompass the lower Feather River drainage, north to include the Yuba River watershed, south comprising the whole of the Bear and American River drainages and the upper reaches of the Cosumnes River, and east to the crest of the Sierra Nevada (Wilson and Towne 1978).

The information in this section is derived from a variety of sources, including: Bennyhoff (1977); Beal's (1933); Gifford (1927); Kroeber (1925, 1929); Littlejohn (1928); and, Wilson and Towne (1978). Additional resources on Nisenan and Miwok ethnography include: Faye (1923); Levy (1978); Powers (1976); and, Schulz and Ritter (1972). The following is a brief synthesis focusing on selected traits of Valley Nisenan ethnography that may manifest archaeologically.

Habitation Patterns

The Nisenan were organized by tribelet, each tribelet being composed of several large, semi-autonomous villages that accepted the leadership of the headman of a specific village. Headmen acted as advisors for major decision making, communal hunts, and ceremonies. Wilson and Towne (1978) identify three Valley Nisenan tribelet centers in the Sacramento Valley: at the mouth of the American River (present-day Sacramento); at the mouth of the Bear River; and, at the confluence of the Yuba and Feather rivers near present-day Marysville.

Nisenan villages varied greatly in size, ranging from three to seven houses up to 40 to 50 houses, with the largest valley villages inhabited by more than 500 people (Littlejohn 1928). Villages in the lower valleys tended to be located along low rises and mounds adjacent to streams and rivers.

Nisenan built structures, including semi-permanent houses, which were generally conical, measuring 10 to 15 feet in diameter and covered with tule mats, grasses, or earth. Smaller, temporary wikiup-like shelters, made of upright poles and cloaked in brush, were used in the warm seasons while hunting and gathering (Curtis 1924; Kroeber 1925). Other structures commonly associated with village sites include semi-subterranean dance houses, acorn granaries, and sweathouses (Wilson and Towne 1978). Each Nisenan tribelet controlled the natural resources within a bounded tract of land (Littlejohn 1928). These boundaries were often indicated by piles of stones (Littlejohn 1928). Beal's (1933) estimated that Nisenan tribelet territory averaged approximately 100 square miles.

Subsistence

The basic subsistence strategy of the Nisenan was seasonally mobile hunting and gathering. Acorns from the California Black Oak, the primary staple, were gathered in the fall and stored in granaries for use during the rest of the year. Other plant resources included seeds, buckeye, wild onion, wild sweet potato, Indian potato, wild garlic, wild carrot, many varieties of berries and fruit, grasses, herbs, and rushes. During the warmer months, people moved to mountainous areas to hunt and collect food resources particular to higher elevations.

Communal hunting drives were undertaken to obtain deer, quail, rabbits, and grasshoppers. Game was prepared by roasting, baking, or drying. Mountain lions and bobcats were hunted for their skins as well as their meat, and bears were hunted ceremonially in the winter when their hides were at their best condition (Wilson and Towne 1978). Runs of salmon in the spring and fall provided a regular supply of fish, while other fish, such as suckers, pike, whitefish, and trout were caught with hooks, harpoons, nets, weirs, snares, fish traps, or by using fish poisons such as soaproot. Birds were trapped with nooses or large nets, or shot with bow and arrow (Wilson and Towne 1978).

Many wild plants may also have been "managed" by prescribed burning that removed underbrush and encouraged growth of edible grasses, seed-producing plants, and other useful plant resources such as basketry materials (Blackburn and Anderson 1993). The use of fire for environmental modification and as an aid in hunting is frequently mentioned in ethnographic literature relating to the Nisenan. Littlejohn (1928) noted that the lower foothills in the valley oak zone were thickly covered with vegetation that was annually burned by the Nisenan to remove and limit its growth while encouraging the growth of oaks and the harvest of acorns. The annual fires destroyed seedlings but did not harm established oak trees. Beal's (1933) also noted that the Nisenan regularly burned the land, primarily for the purpose of driving game.

Technology and Trade

Stone technology included flaked stone knives, projectile points, and other tools made from obsidian, basalt, and silicates. Ground stone tools included club heads, pipes, charms, and mortars and pestles made from local coarser-grained rocks (Beal's 1933; Wilson and Towne 1978). Shells and beads manufactured from bone, shell, and minerals, such as magnesite, were used for ornamentation. Wood and bone were used for a variety of tools and weapons, including bows, arrow shafts and points, fishhooks, looped stirring sticks, flat-bladed mush paddles, pipes, and hide preparation tools. Cordage was made from plant material and was used to construct fishing nets as well as braided and twined tumplines.

Baskets were used for a variety of tasks, including storing, cooking, serving, and processing foods. Basketry items consisted of burden baskets, traps, cradles, hats, cages, seed beaters, and winnowing trays. Basket manufacturing techniques included both twining and coiling, and baskets were decorated with a variety of designs and materials. Other woven artifacts included tule matting and netting made of milkweed, sage fibers, or wild hemp. In the Sacramento Valley, the Nisenan used tule balsa rafts and log canoes (Kroeber 1929) for fishing, and used the boats extensively for travel among the major river villages.

Trade and exchange networks were established with neighboring groups for food and other items, both practical and ornamental, which were not available within Nisenan territory. Clamshell disk beads, used as a mode of currency, were acquired from Patwin and other outside sources. Obsidian was highly valued and imported. Nisenan informants stated that obsidian only came from a place to the north, outside of Nisenan territory (Littlejohn 1928). Abundant archaeological evidence suggests that the vast majority of obsidian in southern Nisenan territory is derived from either Bodie Hills to the east, or Napa Valley to the west. Nisenan commodities traded to neighboring groups included salmon, deer, and acorns (Davis 1961).

Intergroup Relations

Nisenan and Miwok peoples frequently interacted as trading partners, at ceremonial gatherings, and in armed conflict primarily due to perceived territorial encroachment. The ethnographic literature, particularly in reference to the Nisenan, reports rather regular hostilities between Hill and Valley Nisenan, and Nisenan and Sierra Miwok (cf., Littlejohn 1928; Beal's 1933). Most interactions between the two ethnographic groups, however, appear to have been civil, friendly in nature, and characterized by considerable intermarriage.

Ethnohistory

Initial contact with Euroamericans in the eighteenth century had little effect on the Nisenan. The earliest contacts were Spanish exploratory expeditions in the Central Valley led by José Canizares and Gabriel Moraga, followed in the 1820s by American and Hudson's Bay Company trappers. Introduced diseases, against which they had no natural immunities, were the single greatest cause of death among California Native Americans after Euroamerican contact. The great epidemic of 1833 (probably malaria) devastated the Valley Nisenan population by as much as 75 percent, in some instances wiping out entire villages.

Captain John Sutter settled in Nisenan territory in 1839. Word of James Marshall's 1848 discovery of gold near the Nisenan settlement of Culloma (Coloma) soon triggered an influx of thousands of fortune seekers in Hill Nisenan territory (Wilson and Towne 1978). From the 1870s until the 1890s, the Nisenan experienced a cultural and religious resurgence with the Ghost Dance revival of 1870. Originating with the Paiute, the basic tenets included the end of the world and/or return of the dead, return of the world to Native Americans, and the destruction of White People (Bean and Vane 1978:670). Native American "rancherias" were established by the federal government in the Maidu area between 1906 and 1937. Today, the majority of the estimated 2,500 Maiduan peoples (including persons descended from Nisenan, Konkow, and Maidu groups) live within the traditional territory inhabited at historic contact by their ancestors.

Historic Context

The following Historic Context section is taken from the "Cultural Resources Literature Search, Inventory, and National Register Evaluations for the Folsom Dam Safety and Flood Damage Reduction EIS/EIR, El Dorado, Placer, and Sacramento Counties, California" report completed by Pacific Legacy, Inc. (Bartoy 2007).

Exploration into the interior of present day California began in 1808 with an expedition led by the Spanish explorer Gabriel Moraga, looking for potential sites for new missions (Thompson and West 1880). The British, working for the Hudson's Bay Company based out of Fort Vancouver on the Columbia River, entered the region from the north via the Siskiyou Trail in the late 1800s (Dillon 1975). The Americans, led by Jedidiah Strong Smith in 1826, followed an overland route (Hurtado 1888:39-42). Smith led a small band of men across the Sacramento Valley in 1827, searching for a pass across the Sierra Nevada and camping at a site that is now part of the City of Folsom.

Fur Trappers were followed by military expeditions in the 1840s, charged with exploring the region in advance of American westward expansion. A detachment of the Wilkes expedition, led by Lt. George Foster Emmons, traveled from the Columbia River to Sacramento in 1841. John Charles Frémont led the Army Corps of Topographical Engineers into present day California in two separate expeditions in the 1840s.

The area surrounding Folsom Lake was first settled by Euro Americans following the discovery of gold at Coloma in 1848. This discovery led to an influx of miners who sought rich placer deposits along the American River and its tributaries. As new deposits were discovered, towns and camps were established near the discoveries and these quickly developed into communities to provide for needs of the expanding population. These communities included Mormon Island, Goose Flat, Alabama Bar, Sailor's Bar, Negro Hill, Salmon Falls, McDowell Hill, Beal's Bar, Condemned Bar, Doton's Bar, Long Bar, Horseshoe Bar, and Rattlesnake Bar (Hoover et al. 1966:300; Peak and Associates 1990:5; Waechter and Mikesell 1994:11-12).

Mormon Island, site of California's second important gold discovery, was one of the most prominent of these early communities. The camp was originally established on a gravel bar at the confluence of the North and South Forks of the American River. The settlement was located on a branch of the Coloma Road, the first route into the region which connected Sutter's Fort in Sacramento to his sawmill in Coloma. "By 1853, the camp had some 2,500 inhabitants and had three dry goods stores, five general merchandise stores, two blacksmith's shops, a bakery, saloons, hotels, schools, a post office, and express offices for both Wells Fargo & Company and Adams & Company" (Waechter and Mikesell 1994:12). As with the majority of the communities formed by miners, Mormon Island went into decline as nearby gold deposits were exhausted. By the 1880s, the population had dwindled to 20 and no residents were present when the town site was inundated by the Folsom Reservoir (Waechter and Mikesell 1994).

As hard rock and hydraulic mining replaced placer mining in the 1850s, the need for large amounts of water led to the construction of numerous dams, ditches, and flumes throughout the region. The largest and most prominent of these endeavors were undertaken by two joint stock companies: the Natomas Water and Mining Company, and the American River Ditch Company. Although several smaller companies were involved in the creation of water conveyance systems in the region, such as the Salmon Falls Water and Mining Company who constructed the Clark-Eastman Ditch, and the Negro Hill Ditch Company who constructed the Negro Hill Ditch, these operations were overshadowed by the large scale projects of the Natoma Water and Mining Company and the later American River Ditch Company.

First founded by A.P. Catlin in 1851 and later acquired by H.G. Livermore in 1862, the Natomas Water and Mining Company completed its first water conveyance from near Salmon Falls on the South Fork of the American River, to Granite City (Folsom) in 1854. That same year, several shareholders organized the American River Ditch Company to complete a similar project along the North Fork of the American River. Following the company's acquisition by Livermore in 1862, the company became increasingly interested in water development for industry as well as for logging. The Natomas Water and Mining Company spawned two additional entities under Livermore, the Folsom Water and Power Company, which promoted water-powered industry, and the American

River Land and Lumber Company, which controlled the timber-related activities (Waechter and Mikesell 1994:10). As part of this move to water power and logging, the original Folsom Dam was completed in 1893.

Although mining continued in importance through the second half of the nineteenth century, the depletion of gold deposits led to an increased investment in other activities, most significantly agriculture. Initially developed for mining, the series of ditches and flumes throughout the area around Folsom Lake provided the necessary water to provide for the agricultural productivity of the region. In response to the switch from mining to agriculture, the Natoma Water and Mining Company as well as the American River Ditch Company organized several new companies, including the Natomas Vineyards Company and the North Fork Ditch Company. In the twentieth century, through a series of reorganizations and sales, the Natomas Water and Mining Company became simply the Natomas Company while the American River Ditch Company became the San Juan Suburban Water District (Waechter and Mikesell 1994).

As the twentieth century progressed, agriculture replaced mining as the dominant industry in the region. The ample supply of water and the rich soils of the area provided for the cultivation of grain, hay, wine grapes, oranges, and other fruits (Peak and Associates 1990:9). Although a small community existed at Salmon Falls, none of the numerous mining communities still existed in the area. By the early 1950s when the federal government acquired the land to create the present Folsom Reservoir, few people inhabited the region.

Folsom Dam was completed in 1956 and consists of a concrete dam flanked by earth wing dams and dikes, with a total length of approximately nine miles. The reservoir created by the dam has approximately 10,000 surface acres of water when full, and approximately 75 miles of shoreline. The reservoir extends approximately 15 miles up the North Fork and 11 miles up the South Fork of the American River. The Folsom Dam is part of the Central Valley Project, which includes a vast network of dams, reservoirs, canals, power plants, and pumping plants throughout California's Central Valley.

Records and Literature Search

An extensive records search of the APE was conducted at the California Historical Resources Information System, North Central Information Center, California State University, Sacramento, in December 2011. The Corps examined previously completed archeological survey and excavation reports, existing site records, and local and regional overviews within and adjacent to the Folsom Reservoir. All or portions of the APE have been surveyed in previous investigations, all consisting of various levels of intensity. In 2007, Pacific Legacy, Inc. (Bartoy et al) performed a cultural resource literature search, inventory, and NRHP evaluation in relation to proposed safety and flood control measures undertaken at Folsom Dam that covered much of the APE. The study area for the 2007 cultural resource inventory consisted of the footprints of Dike 1 through Dike 8, RWD, the area below LWD, and MIAD and is contained within the current APE. Also included in the survey were areas in which the contractor could potentially stage any equipment or materials. Both the records search and survey performed by Pacific Legacy, Inc. concluded with a finding of four cultural resources within the APE for that project, one of which was previously documented (Folsom Dam

[CA-SAC-937H]), two that were newly identified (CA-SAC-944H and CA-SAC-945H), and the recordation of the Folsom Dam Dikes (CA-SAC-1103H).

Previously Documented Sites

Folsom Dam (CA-SAC-937H) was deemed eligible for listing on the NRHP (Corps 2006) under Criterion A with a period of significance of 1948 to 1956. Folsom Dam played an integral role in flood control, resulting in significant flood damage reduction for areas downstream, specifically the City of Sacramento. The dam was found not eligible under Criterions B, C, and D. CA-SAC-937H is currently in the process of being listed by USBR as a contributing element of the Central Valley Project Multiple Property Listing. Similar to CA-SAC-937H, Folsom Lake Dikes (CA-SAC-1103H), which includes Dikes 1 through 8 and MIAD, has been previously determined by USBR as eligible for listing in the NRHP under Criterion A.

Site CA-SAC-944H is located within the APE, within the proposed staging area for Dike 5. This site was originally documented by USBR (Welch 2005a) and has since been revisited by archeologists with Pacific Legacy, Inc. in 2006 (Bartoy, *et al*.) and 2007 (Jones) to assess eligibility for listing in the NRHP. The site is an early 20th century trash scatter with a four-walled concrete box structure appearing to serve as a water conveyance function in association with the San Juan Water District. The property was not found to meet any of the criteria for eligibility in its 2007 evaluation (Bartoy, *et al*. 2007a).

Another site located within the Dike 5 Staging area, Site CA-SAC-945H, is a water conveyance system likely constructed in the early 20th century. The site was first recorded by USBR (Welch 2005b) and has been revisited by Pacific Legacy, Inc. (Bartoy, *et al*. 2006b) as part of intensive survey and inventory efforts, then again to evaluate the property for listing in the NRHP (Bartoy, *et al*. 2007). Characteristics of the conveyance system included six trapezoidal supports, a concrete intake, and the extant remains of an earthen ditch. The property was not found to meet any of the criteria for eligibility in its 2007 evaluation (Bartoy, *et al.* 2007a).

Field Survey Results

After a thorough review of the records and literature available, Corps personnel conducted cultural resource surveys for the presence of cultural resources within the APE. Large portions of the APE had been previously investigated for the presence of cultural material. Subsurface testing was conducted within reaches of the APE where ground visibility was less than sufficient. Much of the areas within the APE were severely disturbed by construction activities associated with the construction of the reservoir. Historic photographs showed ground-disturbing activities involving heavy grading, road building, staging activities, vegetation removal and a batch plan operation had formally occurred in a majority of the APE (Corps 2004a). The cultural resource survey covered a total of 570 acres. No previously unknown cultural resources were identified during the cultural resource surveys. Existing cultural resources Folsom Dam (CA-SAC-937H), CA-SAC-944H, CA-SAC-945H, and Folsom Dam Dikes (CA-SAC-1103H) are the only known cultural resources within the current APE.

3.12.2 Methodology and Basis of Significance

Analysis of the impacts was based on evaluation of changes to the existing historic properties that would result from implementation of the project. The term "historic property" refers to any cultural resource that has been found eligible for listing, or is listed, in the NRHP. Section 106 of the NHPA requires that Federal agencies evaluate and consider the effects of their undertakings on historic properties. In making a determination of the effects to historic properties, consideration was given to:

- Specific changes in the characteristics of historic properties in the study area.
- The temporary or permanent nature of changes to historic properties and the visual area around the historic properties.
- The existing integrity considerations of historic properties in the study area and how the integrity was related to the specific criterion that makes a historic property eligible for listing in the NRHP.

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.

3.12.3 Alternative 1: No Action Alternative

Under the No Action Alternative, the Federal government would not implement the emergency spillway gate modifications or the 3.5-foot raise, and, therefore, would not cause any additional effects to cultural resources. The conditions in the project area would remain consistent with current conditions. If a great enough flood event, or PMF, were to occur, the dikes would be at risk for failure, threatening the levee system downstream with a surge of flow beyond the current 160,000 cfs levee capacity and affecting the dam as a historic property. As a result, the No Action Alternative would likely result in an adverse effect to cultural resources. However, the magnitude of the adverse effect would depend on the location of the failure in the system and the severity of the storm. As a result, a precise determination of adverse effect and the significance of the effect is not possible and cannot be made. Because of this uncertainty, this potential effect is considered too speculative for meaningful consideration. Additionally, without a Federal undertaking, under the No Action Alternative there would not be a lead Federal agency required to take into account the effects of a proposed undertaking on historic properties. No further action would be required by the Corps.

3.12.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise/Concrete Floodwall

The effects of the emergency spillway gate modification and 3.5-foot raise would result in no adverse effects to historic properties located within the APE for the project. There are four previously recorded sites within the APE. CA-SAC-944H is an early 20th century trash scatter and water conveyance structure associated with the San Juan Water District and was determined not eligible for listing in the NRHP in 2007. CA-SAC-945H is an early 20th century water conveyance system and was determined not eligible for listing in the NRHP in 2007. USBR submitted these determinations to SHPO, who concurred on July 5, 2007. No further evaluation or consideration of either CA-SAC-944H or CA-SAC-945H is required.

Folsom Dam, including the RWD and LWD (CA-SAC-937H) has been previously determined by the Corps as eligible for listing in the NRHP under Criterion A. SHPO concurred with this determination on June 26, 2006. Folsom Lake Dikes (CA-SAC-1103H), which includes Dikes 1 through 8 and MIAD, has been previously determined by USBR as eligible for listing in the NRHP under Criterion A. SHPO concurred with this determination on November 7, 2007. Any federal undertaking is required to determine if the action will result in an alteration, directly or indirectly, to any of the characteristics of these historic properties that qualify them for inclusion in the NRHP.

In accordance with 36 CFR § 800.5 (b) Finding of no adverse effect, the construction of the spillway Tainter gate modification and combination earthen raise/concrete floodwall would result in no adverse effects to historic properties within the APE. Folsom Dam would undergo physical changes due to the spillway Tainter gate modification. Refinements include additional strengthening features to the existing Tainter gates and a new “top seal” bulkhead that will prevent overtopping of the spillway gates during a major flood event. These modifications constitute no adverse effect to the qualities that make Folsom Dam eligible for inclusion in the NRHP. Folsom Dam is eligible for inclusion in the NRHP under Criterion A, and the proposed spillway Tainter gate modification will have no effect on the capacity of the dam to portray the broad patterns of our history. The proposed modifications, in fact, are designed to enhance the important function of this structure for the purposes of flood control, hydropower, and irrigation.

The RWD and LWD, which are a part of Folsom Dam, and Folsom Lake Dikes, would undergo physical changes due to the earthen raise and concrete floodwall construction. The appearance of Folsom Lake Dikes would be slightly altered by raising the height of the dikes by 3.5-feet and by changing the slopes of the dikes and crest widths to conform to Corps’ standards while maintaining USBR’s requirements for security and maintenance. Materials used for fill would be similar to the existing composition of the earthen dikes, and existing riprap would be reprocessed for use on the raised dike. These modifications constitute no adverse effect to the qualities that make Folsom Lake Dikes eligible for inclusion in the NRHP. Folsom Lake Dikes are eligible for inclusion in the NRHP under Criterion A, and the proposed earthen raise will have no adverse effect on the capacity of the dikes to portray the broad patterns of our history. The proposed modifications, in fact, are designed to enhance the important function of these structures for the purposes of flood control, hydropower, and irrigation.

The appearance of the RWD and LWD would be slightly altered by constructing a reinforced 3.5-foot concrete flood wall that would tie into the main dam, the new control structure, and the existing terrain. This would require excavating a portion of the dam or dike crest to place the footing and to replace the embankment fill. The flood wall would be constructed using cast-in-place, reinforced concrete. The construction of the flood wall constitutes no adverse effect to the qualities that make the RWD and LWD, as part of Folsom Dam, eligible for inclusion in the NRHP. Folsom Dam is eligible for inclusion in the NRHP under Criterion A, and the proposed flood wall will have no adverse effect on the capacity of the dam to portray the broad patterns of our history. The proposed modifications, in fact, are designed to enhance the important function of these structures for the purposes of flood control, hydropower, and irrigation.

The APE for the project also includes areas of ground disturbance, including staging areas, haul routes, recreation trails, and geotechnical borings. The vertical depth of disturbance caused by grading the existing ground for use, and in those areas where the footprint of Dikes 1, 2, 3, 7, and 8, will be expanded. The Corps has assumed potential disturbance of up to 3 feet within the APE where there are not currently built environment resources (Folsom Dam and Folsom Lake Dikes). Observations during the 2015 cultural resources surveys of the APE concluded that much of the areas within the APE were severely disturbed by construction activities associated with the construction of the reservoir. Shovel test pits conducted in areas exhibiting limited ground disturbance did not reveal the presence of any historic properties. As a result, the Corps has determined there will be no adverse effects to historic properties for the project.

3.12.5 Avoidance, Minimization, and Mitigation Measures

Folsom Dam (CA-SAC-937H) and Folsom Lake Dikes (CA-SAC-1103H) are the only known historic properties within the APE that could be potentially affected by the proposed project. Consultation with potentially interested Native Americans did not result in the identification of potential historic properties significant to tribes within the APE, although tribes have indicated that Folsom Lake and the surrounding area are sensitive for sites and locations of importance to them. The tribe requested that a previously identified staging area not be used due to the close proximity to a known cultural resource. The Corps modified the APE to remove the staging area from the project activities. The Corps' *Finding of no adverse effect* pursuant to 36 CFR § 800.5 (b) was sent to SHPO for comment and concurrence. The SHPO did not object to the Corps' findings and determination of *no adverse effect* to historic properties in a letter dated March 2, 2017. Based on these identification and evaluation efforts, there would be no adverse effects to historic properties and no mitigation, avoidance, or minimization measures would be required.

However, if archeological deposits or other potential historic properties 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.

CHAPTER 4.0 - CUMULATIVE IMPACTS, GROWTH-INDUCING IMPACTS, AND OTHER REQUIREMENTS

NEPA and CEQA require the consideration of cumulative effects of the proposed action, combined with the effects of the projects. NEPA defines a cumulative effect as an effect on the environment that results from the incremental effects of an action when combined with other past, present, and reasonably foreseeable future actions, regardless of the agency (Federal or non-Federal) or person undertaking such other actions (40 CFR 1508.7). The CEQA Guidelines (CERES 2007) define cumulative effects as "two or more individuals effects, which, when considered together, compound or increase other environmental impacts" (Section 15355).

4.1 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. 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 affect resources.

4.2 Geographic Scope

The geographic area that could be affected by project effects varies depending on the type of environmental resource being considered. An example is air and water resources as they extend beyond the confines of the project footprint; 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 and PCAPCD as air quality leads.
- Climate Change: the air basin under the Jurisdiction of SMAQMD and PCAPCD as air quality leads.
- Water Quality: Folsom Lake and that portion of the American River immediately adjacent to Folsom Dam
- Fisheries: Folsom Lake
- Aesthetics and Visual Resources: the FLSRA and surrounding neighborhoods in the City of Folsom and other neighborhoods
- 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, Placer County, and El Dorado County.
- Cultural Resources: the APE, as described in Section 3.12, Cultural Resources.

4.3 Past, Present, and Reasonably Foreseeable Future Projects

The projects with the potential to contribute to cumulative effects during construction and operation of the Folsom Dam Raise 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.

4.3.1 Folsom Joint Federal Project Activities

Phase 1 of Folsom JFP Auxiliary Spillway

Winter 2007 to Sept 2008 included the initiation of the spillway excavation and construction of MIAD haul road, as well as installation of filter material in the top 20 ft of the LWD and RWD. This Phase 1 work was completed under USBR contract as part of JFP project.

Pier Tendon Installation, Spillway Pier Wraps, and Braces and Main Concrete Dam

April 2011 through Spring 2014. These three projects address seismic concerns at the main concrete dam. These improvements are designed to help stabilize the main concrete dam against movement during a major earthquake. This portion of the JFP is covered under the 2007 FEIS/EIR.

Folsom Dam Modification Project Approach Channel

Spring 2013 to fall 2017. The Approach Channel Project is the final construction activity of Phase IV of the JFP. The primary and permanent structures consist of the 1,100 foot long excavated approach channel and spur dike. Additional existing sites and facilities that would be utilized for the length of the project include the Folsom Prison staging area, the existing USBR Overlook, the MIAD area, and Dike 7. These sites and facilities are connected by an internal project haul road. Criteria pollutant emissions from the Approach Channel Project and the downstream project would be less than significant for ROG, CO, SO_2, and $PM_{2.5}$, and less than significant with mitigation for PM_{10}. NO_x exceeds the GCR *de minimis* threshold but would be addressed by inclusion in the State Implementation Plan, which would provide compliance with the GCR of the Federal Clean Air Act. The SEIS/EIR was released for public review in December 2012.

Auxiliary Spillway Excavation

Spring 2009 to fall 2010. Major work under Phase II of the JFP includes partial excavation of the western portion of the auxiliary spillway, construction of the downstream cofferdams, relocation of the Natoma Pipeline, and the creation of an access road to the stilling basin. This portion of the JFP is covered under the 2007 EIS/EIR. Construction was conducted by USBR and was completed prior to the start of the Control Structure construction effort.

Control Structure, Chute, and Stilling Basin

Spring 2011 to fall 2017. Phase III of the JFP construction of the auxiliary spillway control structure was completed in August 2015. Concrete lining of the spillway chute and stilling basin would be conducted by the Corps as the final phase of the JFP. These actions would 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 all covered under the Corps' 2010 EA/EIR (Corps 2010).

Dike 1 Modification Project

Winter 2014 to spring 2015. The Dike 1 Modification is a portion of the Folsom Dam Safety Project that was approved in 2005 to address seepage exiting from downstream of Dike 1. USBR concluded that the seepage is likely occurring through the foundation and is being collected by the downstream horizontal blanket drain and exiting onto the ground surface at the toe. Modifications to Dike 1 include constructing a downstream overlay with sand chimney filter and toe drain to prevent internal erosion under flood loading conditions.

4.3.2 Folsom Dam Water Control Manual (WCM) Update

The WCM Update is being completed in conjunction with the JFP by the Corps, USBR, CVFPB, and SAFCA. The WCM Update for Folsom Dam would develop, evaluate, and recommend changes to the flood control operations at Folsom Dam that would 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 use of improved forecasts from the National Weather Service.

Further, the WCM Update would 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 potential for improved releases for fish flows, and possibly increased flexibility of water storage during drought periods. The study would result in a Corps decision document and would be followed by a WCM implementing the recommendations of the Study. It should be recognized that the initial WCM would implement the recommendation of the study but would 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.

4.3.3 Other Projects

Dike 4, 5, and 6 Repairs, USBR Dam Safety

Summer 2009 to October 2010. To address seepage concerns due to static and hydrologic loadings for Dikes 4 and 6, USBR installed full height filters, toe drains, and overlays on the downstream face of each earthen structure. This portion of the JFP is covered under the 2007 Folsom Dam Safety and Flood Damage Reduction Project EIS/EIR (2007 EIS/EIR).

Mormon Island Auxiliary Dam Modification Project

Construction of this project began in the summer of 2010 and was completed in late 2016. USBR released the Draft EIS/EIR for the MIAD Modification Project in December 2009. Four action alternatives were analyzed in the MIAD Draft Supplemental EIS/EIR. The preferred MIAD action alternative of jet grouting selected in the FEIS/EIR was determined to be neither technically nor economically feasible. The preferred alternatives addressed methods to excavate and replace the MIAD foundation, place an overlay on the downstream side, and install drains and filters; the alternatives differ only in their methods of excavation. In addition, the alternative in the Final 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.

Johnny Cash Folsom Prison Blues (Folsom Lake) Trail: Historic Truss Bridge to Green Valley Road Segment

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 would 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 realignment was included within the new bridge crossing construction. Construction began in 2011, with continued work expected through the early years of the Folsom Dam Raise 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 construction of the Bureau's MIAD Modification Project limited their ability to conduct the road widening project. There is currently an environmental compliance documentation but 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 would 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 would 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 modification, lighting improvements, and new asphalt overlay. The project would be constructed in three phases: Phase 1 would extend the current HOV lanes from their existing terminus west of El Dorado Hills Boulevard, to west of Bass Lake Road with construction started in fall 2008 and completion scheduled for fall 2011; Phase 2 would extend the lands from west of Bass Lake Road to approximately Ponderosa Road with construction targeted to begin in Summer 2013 and completion in Fall 2015; Phase 3, currently on hold pending determination of funding source, would extend the lands 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 would also include traffic signal modification 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 targeted to begin in 2015 with completion in 2017.

4.4 Cumulative Effects

This section discusses the potential cumulative effects of the Folsom Dam Raise 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. Resources include recreation, vegetation and wildlife, special status species, water quality, air quality, climate change, aesthetics and visual resources, traffic and circulation, noise, and cultural resources.

4.4.1 Air Quality

The Folsom Dam Raise project's construction period (2018-2022) would not overlap with JFP construction activities, including the Approach Channel Project (2012-2017) and the Phase V site restoration activities (2016-2017). These other activities are considered to be a codependent project subject to evaluation for the General Conformity Rule by the USEPA.

Other concurrent projects are considered discrete projects outside the consideration of the General Conformity ruling for the Folsom Dam Raise project. Long-term emissions associated with the completion of the JFP were analyzed in associated environmental documents, such as the Folsom Dam Modification Project Approach Channel Supplemental EIS/EIR and the 2007 Folsom Dam Safety and Flood Damage Reduction Project EIS/EIR. However, it is anticipated that any long-term emissions associated with operations of the auxiliary spillway would be below State and Federal thresholds and would not significantly contribute to the overall cumulative impacts.

Combined JFP Analysis

This section discusses the quantitative analysis of the cumulative short-term air quality effects of the Folsom Dam Raise project 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 4.3 are also included. Prior cumulative air quality effects from the 2007 EIS/EIR did not address the Folsom Dam Raise project alternatives and other regional projects in depth. Air emission models, project elements, the NOx *de minimis* threshold, and resulting calculated emissions differed substantially between the 2007 EIS/EIR and the current JFP project.

Construction of the Alternative 2 (proposed Dam Raise project) would result in emissions of criteria pollutants. However, with the implementation of mitigation measures, these emissions are expected to be less than significant. With the exception of the Folsom Dam WCM Update, which has no construction associated with it, all of the related projects discussed above would cumulatively contribute to emissions of criteria pollutants throughout the region, which could have a significant cumulative effect on air quality. It is anticipated that each of these projects would implement their own mitigation plan to reduce the emissions to below the significance levels.

4.4.2 Climate Change

It is unlikely that any single project by itself would have a significant impact on the environment with respect to greenhouse gases (GHGs). However, the cumulative effect of human activities has been linked to quantifiable changes in the composition of the atmosphere, which, in turn, has 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 would 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, each of these projects would mitigate emissions below the general federal reporting threshold. If these projects are implemented concurrently, it is possible that the combined cumulative effects could be above reporting requirements for GHG emissions. However, with the implementation of mitigation measures, which would be required for each of these projects, it is possible that the effects could be reduced to less than significant.

In addition, the majority of the related projects are flood risk management projects. By implementing these projects, the action agencies would be reducing potential future emissions associated with flood fighting and future emergency actions. As a result, the related projects could combine to reduce long-term potential GHG emissions in the Sacramento region. As a result, the overall cumulative GHG emissions from these projects are considered to be less than significant.

4.4.3 Aesthetics and Visual Resources

Cumulative impacts to aesthetics and visual resources are primarily related to other construction projects that have already occurred or could occur in the future within the vicinity of the study area and result in loss of visual quality both during and after construction. There would be some overlap with the construction of other projects as mentioned above (*e.g.* Folsom Dam Modification Project Approach Channel). Concurrent construction of the Folsom Dam Raise project would result in short-term cumulative effects in the visual resources in the project area. Additional vegetation clearing, earth moving, construction equipment, and stockpile from the projects could contribute to a larger, temporary overall 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 man-made features (such as the main dam) are already well established in the landscape.

4.4.4 Water Quality

Water quality to be affected within the actual construction area. Construction activities such as rock placement, clearing and grubbing, and slope realignment have the potential to temporarily degrade water quality through the direct release of soil and construction materials into water bodies, or the indirect release of contaminants into water bodies through runoff. Related projects, including the American River Common Features and the Folsom Dam Modification Project Approach Channel, could be under construction during the same timeframe as the Folsom Dam Raise project. If construction occurs during the same timeframe, water quality could be diminished primarily due to increased turbidity. All projects would be required to coordinate with the CVRWQCB and overall water quality would be required to meet the Basin Plan objectives. These projects, however, would culminate in long-term beneficial impacts for flood damage reduction and dam safety. There are no anticipated long-term water quality affects with the implementation of multiple projects.

4.4.5 Recreation

Cumulative impacts to recreation would primarily be related to other construction projects that could occur during the same timeframe and the within the same vicinity as those considered for the Folsom Dam Raise Project. At the time of this analysis, some projects have the potential to increase recreational access on a long-term basis (*e.g.* Johnny Cash Folsom Prison Blues (Folsom Lake) Trail), and some have the potential to have short-term impacts (*e.g.* Folsom Dam Modification Project Approach Channel). The Johnny Cash Folsom Prison Blues (Folsom Lake) Trail would increase bicycle and pedestrian access from the Historic Truss Bridge to Green Valley. 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 project was completed in the fall of 2016. This project produced short-term impacts to recreation. The Folsom Dam Modification Project Approach Channel started in 2013 and is going to continue until the fall of 2017. The Approach Channel would impact water-based activities during the construction period. The trails atop MIAD and the associated parking lots would be closed to the public during construction due to 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 Folsom Dam Raise project would only temporarily impact land-based activities, whereas the Approach Channel construction would impact water-based activities.

4.4.6 Vegetation and Wildlife

Implementation of the Folsom Dam Raise project has the potential to disturb large amounts of vegetation within the project area. The Folsom JFP and the MIAD Modification Project also required the disturbance of, and in some cases the removal of, habitat within the Folsom area. These impacts, along with the historical decline of natural habitats in the general region due to urbanization, would result in significant cumulative effects to both vegetation and wildlife.

All the projects would include avoidance, minimization, and mitigation measures. However, potential adverse effects on biological resources would remain significant due to the amount of habitat affected by these projects and the time lapse before new vegetation would mature to the level of those removed. Once all the compensatory mitigation has achieved required performance/success criteria, the effects to vegetation and wildlife would be less than significant, but the temporary loss of vegetation would be significant.

4.4.7 Special Status Species

Potential cumulative impacts to various special status species (listed species) from the combination of these projects are addressed below. During preconstruction engineering and design, the Corps designs would avoid and minimize impacts to special status species, where possible, or otherwise provide compensatory mitigation.

Valley Elderberry Longhorn Beetle (VELB)

Concurrent construction of multiple projects over the next 10 to 15 years within the Sacramento area would likely cause mortality to beetles due to construction operations. Construction activities for the multiple projects would occur each year during the flight season of beetles. Since construction activities would be adjacent to known VELB locations and would require removal of elderberry shrubs (host plant for the VELB), it is likely that some mortality may occur. The exact number that may be injured or killed is unknown. No designated critical habitat would be affected with the construction of any of the projects.

Elderberry shrubs removed during the course of JFP construction were largely transplanted to areas in relatively close proximity to Folsom Dam. Transplanting of elderberry shrubs and planting other associated native plant species within the project vicinity would provide connectivity for the beetle. Connectivity is a primary cause of the beetle decline and an important element in the recovery and sustainability of the beetle. Some of the direct impacts to elderberry shrubs during JFP construction were mitigated via purchase of conservation bank credits. Removal of elderberry shrubs during the construction of the Dam Raise project would also be mitigated via purchase of conservation bank credits. While these projects would both adversely affect the VELB, cumulative impacts would not jeopardize the continued existence of the VELB.

Bald Eagle

Past JFP and MIAD Modification project construction activities did not adversely affect bald eagles. Through implementation of previously stated mitigation measures, the Folsom Dam Raise project would also not have no cumulative effects on bald eagles. It also appears that known future projects in the general vicinity of the Folsom Facilities would not significantly affect this species, assuming proper avoidance and minimization measures are employed.

Swainson's Hawk

Concurrent construction of multiple projects within the Folsom Lake area would not likely cause any adverse impacts to the Swainson's hawk. The Swainson's hawk is known to occur in the vicinity Folsom Dam and Reservoir, thus could be a concern for many of the projects in the area. However, there have been no recorded nesting sites above the Nimbus Dam on the American River. In addition, the staging and construction areas for this project and others in progress, or areas planned for the future, are highly disturbed and do not provide high quality habitat for this species. No critical habitat has been designated for this species, and the proposed project would not have a direct or indirect effect on the growth, survival, or reproductive success of the Swainson's hawk. There would be no cumulative effects caused by the Folsom Dam Raise project.

4.4.8 Traffic and Circulation

Several short-term projects have the potential to affect traffic. The Hazel Avenue Improvement Project, the widening of Green Valley Road, and the Folsom Bridge Project are completed projects that have benefited traffic volumes. There is potential for future projects in the vicinity of Folsom Lake to affect traffic, and some would be constructed concurrently with the proposed action. The Approach Channel and the MIAD Modification Projects have resulted in some temporarily increased traffic levels due to the transport of materials and the labor force's shift work. Construction of the Folsom Dam Raise project would temporarily increase traffic on some local and regional roadways.

These projects, if implemented concurrently, would affect freeways and other regional roadways, even though these roadways are designed to handle increased traffic, but the projects are likely to occur at different times. Even with the implementation of avoidance and minimization measures, the Folsom Dam Raise Project would contribute to a cumulatively considerable increase in traffic that would be significant and unavoidable.

4.4.9 Noise

There is the potential for future construction activities in the vicinity of the Folsom Dam and Reservoir to be constructed concurrently with the proposed action and other concurrent projects. This project and other local projects would result in temporarily increased levels of ambient noise in the study area. Simultaneous construction of projects would increase noise levels from the onsite construction and the transport of materials. However, the effects would be limited to the people in the immediate proximity to the construction sites and none of the local projects are in close enough proximity to the various proposed construction sites to create a cumulative effect.

4.4.10 Cultural Resources

Cumulative impacts to cultural resources would be primarily related to individual ground disturbance sites, with potential regional implications for sites if they are considered part of a historic district, landscape, or multiple sites that may be ethnographically significant, and to other construction projects that could occur during the same timeframe as those considered for this study and within the same vicinity. For this project, the Corps has determined there will be no adverse effects to historic properties. Federal undertakings are required to avoid, minimize, and/or mitigate any significant adverse effects on cultural resources. At the time of this analysis, there are several ground disturbing construction projects anticipated that could result in adverse effects to historic properties that have not yet been identified as part of those projects. As a result, the cumulative overall impact to non-renewable cultural resources is possible, as well as significant and unavoidable. Individual projects would implement separate mitigation measures that would address the effects caused by these projects. Although mitigation would minimize these impacts, there is still a possible significant cumulative effect to cultural resources.

4.5 Growth Inducing Impacts

NEPA and CEQA both require a discussion on how a project, if implemented, could induce growth. This section presents an analysis of the potential growth-inducing effects of the proposed project. Direct growth inducement would result if a project involved construction of new housing. Indirect growth inducement would result, for instance, if implementing a project results in any of the following:

- Substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises);
- Substantial short-term employment opportunities (e.g., construction employments) that indirectly stimulates the need for additional housing and services to support the new, temporary employment demand; and/or
- Removal of an obstacle to additional growth and development, such as removing a constraint on a required public utility or service (e.g., construction of a major sewer line with excess capacity through an undeveloped area.

Growth inducement may lead to environmental effects, such as increased demand for utilities and public services, increased traffic and noise, degradation of air or water quality, degradation or loss of plant or animal habitats, and conversion of agricultural and open space land to urban uses. Growth within a floodplain area increases the risk to people or property from flooding.

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 Folsom Dam Raise project would not contribute directly to population or economic growth as no additional housing or businesses would be built. However, the overall Folsom Dam Safety and Flood Damage Reduction Project (including the JFP and other aspects of the Folsom Dam Raise project) would generate additional economic benefits during construction and would contribute to greater flood risk management for the Sacramento area once complete and the WCM has been modified to account for these projects. The potential for any growth-inducing effects associated with the overall JFP were analyzed under the 2007 EIS/EIR.

The Folsom Dam Raise project is of a limited scope and would not promote or contribute to any regional economic or population growth. Any future local growth would be consistent with the local general plans, as described above.

4.6 Unavoidable Adverse Effects

State CEQA Guidelines CCR Section 21100(b)(2)(A) provides that an EIR shall include a detailed statement setting forth "any significant effects on the environment that cannot be avoided if the project is implemented." Similarly, NEPA requires discussion of "any adverse environmental effects which cannot be avoided should the proposal be implemented" (see 40 CFR 1502.16). Chapter 3 provides a detailed analysis of all potentially significant environmental impacts of the Folsom Dam Raise project, feasible mitigation measures that could reduce or avoid the project's impacts, and whether these mitigation measures would reduce these impacts to less than significant levels. Cumulative impacts are discussed above. If a specific impact cannot be reduced to less than significant level, it is considered a significant and unavoidable impact.

The Folsom Dam Raise would have the following significant and unavoidable environmental effects (direct, indirect, and/or cumulative):

- Traffic on public roadways;
- Noise
- Temporary closure of recreation facilities including bike and walking trails during construction combined with impaired access to certain open-space recreation areas;

4.7 Relationship of Short-Term Uses and Long-Term Productivity

NEPA requires that an EIS include a discussion of the relationship between short-term uses of the environment and long-term productivity. Within the context of the SEIS/EIR "short-term" refers to the construction period, while "long-term" refers to the operational life of the project and beyond.

Project construction would result in short-term construction-related effects such as interference with local traffic and recreation facilities, increased air emissions, ambient noise level, and dust, yet are not expected to alter the long-term productivity of the natural environment. Project implementation would also result in long-term effects, including long-term minor changes in visual resources.

Project implementation would contribute to long-term productivity of the environment by improving the dike system and the operation of the spillway gates that maintain flood protection to the downstream area by reducing the overall flood risk. The long-term beneficial effects of the project would outweigh its potentially significant short-term impacts to the environment.

4.8 Irreversible and Irretrievable Commitment of Resources

NEPA requires that an EIS include a discussion of the irreversible and irretrievable commitments of resources which may be involved should the project be implemented. Similarly, the State CEQA Guidelines require a discussion of the significant irreversible environmental changes that would be caused by the project should it be implemented.

The irreversible and irretrievable commitments of resources are a permanent loss of the resources for future or alternative purposes. Irreversible and irretrievable resources are those that cannot be recovered or recycled, or those that are consumed or reduced to unrecoverable forms. Project implementation would result in the irreversible and irretrievable commitments of energy and material resources during the project construction and maintenance, including the following:

- Construction materials, including such resources as soil and rocks;
- Land and water area committed to new/expanded projects facilities; and
- Energy expended in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for project construction and O&M.

The use of these nonrenewable resources is expected to account for only a small portion of the region's resources and would not affect the availability of these resources for other needs within the region. Construction activities would not result in inefficient use of energy or natural resources.

As described throughout this SEIS/EIR, without implementation of the Folsom Dam Raise project, including modifications to the WCM, flood risk would remain at its current level which would be higher than it would be if the Folsom Dam Raise project is implemented. While a precise quantification of potential adverse impacts associated with the no action alternative (e.g. not implementing the Folsom Dam Raise project) is not possible, there could be a variety of such impacts. Flooding and the resulting emergency and reconstruction efforts could expend more energy, overall, than with construction of the Folsom Dam Raise project. Depending upon the location and extent of flooding, a large volume of debris could result from a flood event; such things as cars, appliances, housing materials, and vegetation would all be generated during a flood event and would likely have to be disposed of in a landfill. After debris removal is completed, re-building could occur and new materials would be required to repair and/or construct homes, businesses, roads, and other urban infrastructure. Thus, project implementation preempts potentially substantial future consumption and is likely to result in long-term energy and materials conservation.

CHAPTER 5.0 - COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

This chapter summarizes the environmental laws and regulations that apply to the Folsom Dam Raise project and describes the status of compliance with those laws and regulations. The project would not only comply with the Federal environmental laws and regulations, but would also comply with all state, regional, and local laws, regulations, and ordinances.

5.1 Federal Laws, Regulations, and Policies

Clean Air Act of 1972, as amended (42 U.S.C. 7401, et seq.)

Full compliance. The Federal 1970 Clean Air Act (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 CAA) made major changes in deadlines for attaining National Ambient Air Quality Standards (NAAQS). As required by the Federal CAA, the USEPA has established and continues to update the NAAQS for specific criteria air pollutants: O3, CO, NO2, SO2, PM10, PM2.5, and Pb.

Pursuant to CAA Section 176(c) requirements, USEPA promulgated the General Conformity Rule which applies to the most federal actions, including the Folsom Dam Raise project. The General Conformity Rule is used to determine if Federal actions meet the requirements of the CAA and applicable SIPs 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 would 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.

For the Folsom Dam Raise project, the entire construction footprint was analyzed under the CAA. For this footprint, construction emissions associated with the dike raises, the concrete floodwalls, and the Tainter gate modifications were analyzed to determine potential air quality impacts. The analysis conducted determined that the emissions associated with construction of this action would be below the *de minimis* level, based on implementing the BMPs and other air quality mitigation measures identified in Section 3.6.5.

Federal Sustainability in the Next Decade, Executive Order 13693, March 19, 2015

Full Compliance. Signed on March 15, 2015, Federal agencies are directed to promote building energy conservation, efficiency, and management, and reduce energy use by vehicle fleets. Federal agencies shall also reduce greenhouse gas emissions and increase water efficiency in industrial, landscape, agricultural and potable water uses. Specific percentage goals by year are established. The Corps is requiring lower emission producing equipment for use in construction.

Clean Water Act of 1972, as amended (33 U.S. C. 1251, et seq.)

Partial Compliance. The potential effects of the proposed project on water quality and on jurisdictional Waters of the United States have been evaluated and are discussed in Section 3.11, as well as in Appendix I (the CWA Section 404(b)(1) evaluation). Prior to construction, the contractor would prepare a Stormwater Pollution Protection Plan (SWPPP) as part of an application for a Construction General Permit (NPDES permit). The SWPPP would help identify the sources of sediment and other pollutants, and establish BMPs for stormwater and non-stormwater source control and pollutant control. The Corps would review and approve the SWPPP, then the construction contractor would submit this as part of the Construction General Permit (CGP) application to CVRWQCB. Once the CGP is issued, the contractor would be required to comply with the SWPPP and other applicable permit conditions and requirements. Once the work is completed, the construction contractor would submit a Notice of Termination in order to terminate coverage by the CGP. If necessary, a CWA Section 401 Water Quality Certification would also be obtained from the CVRWQCB prior to project construction. The proposed project would be in full compliance with the Clean Water Act once the necessary permits are obtained and the construction contractor subsequently abides by the applicable requirements of these permits.

The proposed project (Alternative 2) would not require any direct impacts to jurisdictional wetlands. Raising some of the dikes could involve activities within the jurisdictional boundary of Folsom Lake, these being the removal of riprap and similar material from upstream dike sideslopes followed by placement of riprap and similar material. If it is determined that such work is required in the lake, the Corps would prepare a Clean Water Act (CWA) Section 404(b)(1) analysis of the work and would obtain a CWA Section 401 Water Quality Certification (WQC) from CVRWQCB. The construction contractor would be required to comply with all applicable conditions and requirements of the WQC. The proposed project would necessitate temporary fill placement in approximately 0.5 acre of Folsom Lake in order to establish the proposed temporary Park Road detour. Appendix I provides a CWA Section 404(b)(1) analysis for this detour. The Corps would obtain a WQC from CVRWACB for the construction phase that includes the Park Road detour (i.e. WP3 project phase) and would require the construction contractor to comply with the applicable conditions and requirements of this WQC.

The proposed project would be in full compliance with the CWA once the necessary permits are obtained from CVRWQCB and the construction contractor abides by the applicable requirements of these permits.

Endangered Species Act of 1973, as amended (16 U.S.C. 1531. et seq.)
Partial Compliance. A list of the threatened and endangered species that have the potential to occur in the Folsom area was obtained from USFWS on January 21, 2015 (see Appendix D). Based on the analysis contained in this document, the Corps has determined that the proposed project would adversely affect the Federally-listed valley elderberry longhorn beetle (VELB). An amended Biological Opinion (BiOp) for the proposed project was issued by USFWS on October 13, 2016. This BiOp concluded that the incidental take of the VELB anticipated for the proposed project is not likely to result in jeopardy to the species. Once the Corps implements the conservation measures called for in the cited BiOp (which equate to the VELB mitigation measures discussed in Section 3.5.5), including the purchase of conservation bank credits as compensatory mitigation for any removal of elderberry shrubs, the Dam Raise project would be in full compliance with the Endangered Species Act and the BiOp.

Executive Order 11988: Flood Plain Management
Full Compliance. The objective of this E.O. is to avoid, to the extent possible, any long term and short-term adverse effects associated with the occupancy and modification of the base floodplain (1% annual event), and to avoid direct and indirect support of development in the base floodplain wherever there is a practicable alternative. While the proposed project reduces flood risk to the population in the study area, it also removes an obstacle to growth for portions of the study area that are slated for redevelopment and are within the base floodplain. The Dam Raise, in combination with other area flood risk reduction projects, protects the existing urban population of the greater Sacramento area. Modifying existing structures such as the Folsom Facility was determined to be the only practicable alternative to address the specific dam safety and flood management issues at Folsom. There is no practicable alternative that does not indirectly induce development in the flood plain by removing flood risk as an obstacle to growth, therefore the project is in compliance with the E.O.

Executive Order 11990: Protection of Wetlands
Full Compliance. Executive Order 11990, signed May 24, 1977, directs all Federal agencies to refrain from assisting in or giving financial support to projects that encroach on publicly or privately owned wetlands. It further requires that Federal agencies support a policy to minimize the destruction, loss, or degradation of wetlands. A project that encroaches on wetlands may not be undertaken unless the agency has determined that 1) there are no practicable alternatives to such construction, 2) the project includes all practicable measures to minimize harm to wetlands that would be affected by the project, and 3) the effect would be minor. The proposed project would protect and preserve any jurisdictional wetlands located within the project's limits of construction or immediately adjacent to these limits. The mitigation measures discussed in Section 3.11.5 would be implemented to help avoid and minimize potential indirect impacts to such wetlands.

Executive Order 12898, 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 Dam Raise would extend to all areas of the greater Sacramento area; therefore it would not provide disproportionate burdens, benefits, or effects to any minority or low income populations and is in compliance with this Executive Order.

Executive Order 13112: Invasive Species

Full Compliance. Executive Order 13112, signed February 3, 1999, directs all Federal agencies to prevent and control the introduction of invasive species in a cost-effective and environmentally sound manner. The order established the National Invasive Species Council, which is composed of Federal agencies and departments, and the supporting Invasive Species Advisory Committee which is composed of state, local, and private entities. The council's national invasive species management plan recommends objectives and measures to implement Executive Order 13112 and to prevent the introduction and spread of invasive species (National Invasive Species Council 2008). Executive Order 13112 requires consideration of invasive species in NEPA analyses, including their identification and distribution, their potential effects, and measures to prevent or eradicate them.

Executive Order 13690: Establishing a Federal Flood Risk Management Standard

EO 13690, signed January 30, 2015, establishes a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input. It also amends EO 11988 to include the Federal Flood Risk Management Standards. Once implemented EO 13690 will assist in reducing the risk and cost of future flood disasters by ensuring that Federal investments in and affecting floodplains are constructed to better withstand the impacts of flooding. The EO encourages agencies to consider natural systems, ecosystem processes, and nature-based approaches when development alternatives are considered. In October 2015, the Water Resources Council approved revised guidelines for implementing EO 11988 as amended by EO 13690. These guidelines are advisory and were informed by public dialogue and comment aggregated through FEMA-hosted stakeholder sessions. The Corps will not implement the revised decision making process under EO 11988, as amended, until agency specific guidance for implementation is issued.

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 1934, as amended (16 U.S.C. 661, et seq.)

Full Compliance. Federal agencies undertaking water resources 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 CDFW have participated in evaluating the proposed project, and USFWS has prepared a final CAR which accompanies this document (Appendix B). The Corps has considered the recommendations provided in the final CAR, as discussed in Appendix H.

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 are potential migratory bird nesting habitats scattered throughout the overall project footprint. The project is in a very urbanized area where traffic congestion and human activities are very common. Birds in these areas have adjusted to the human environment and continue to nest in areas with multiple human activities occurring. To help ensure that the project does not adversely affect migratory birds to the extent practicable, the avoidance, minimization, and mitigation measures discussed in Section 3.6.5 (those pertaining to migratory birds) would be implemented as part of the project. Should it be necessary to remove one or more active migratory bird nests, the Corps would first obtain a Special Purpose Permit from the USFWS authorizing such removal.

Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c)
Full compliance. The Federal 1940 Bald and Golden Eagle Protection Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle… [or any golden eagle], alive or dead, or any part, nest, or egg thereof." This Act also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment. The Corps communicated with State Parks staff to determine documented locations of eagle nests in the Folsom Lake area. All nests discovered are located more than a mile away from the proposed project and thus would not be affected.

National Environmental Policy Act of 1969, as amended (42 U.S. C. 4321, et seq.)
Partial 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. NEPA also requires: coordination and cooperation with other federal agencies, state and local governments, and tribal organizations; and, opportunities for meaningful public participation in governmental planning and decision making. This SEIS/EIR constitutes partial compliance with NEPA. Full compliance would be achieved when the final SEIS/EIR is filed with USEPA, circulated for a final 30-day public review, and the Corps signs a Record of Decision (signed by the Commander of the Corps' Sacramento District).

National Historic Preservation Act of 1966, as amended (16 U.S.C. 470)
Full Compliance. Section 106 of the National Historic Preservation Act (NHPA) 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 (NRHP). If cultural resource(s) have been identified during a survey, a records and literature search, through consultation, or by other means, the federal agency overseeing the project begins the process to

determine whether the cultural resources are eligible for listing in the NRHP. Section 106 of the NHPA, as amended, mandates the evaluation process. The implementing regulations for Section 106 are at 36 C.F.R. § 800 et seq.

Inventory, evaluation for listing in the NRHP, and determinations of effects to cultural resources, are made by Federal agencies for cultural resources within a project's APE. For purposes of complying with Section 106 of the NHPA, a Federal agency will make a determination of the APE for the project or undertaking. The APE is defined as "the geographic areas or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." Additionally, the APE "is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking."

The APE for an undertaking may extend beyond the physical impacts associated with a project. Depending on the scale and nature of the undertaking, and the known and anticipated types of cultural resources, the direct or indirect effects may include physical modification, intrusion to the visual or esthetic characteristics of landscapes or features, or even access to a historic property.

After a cultural resource has been determined eligible for listing in the NRHP, it is regarded the same as any other property that is listed and becomes formally known as a "historic property," regardless of age. The term "historic property" refers exclusively to NRHP listed or eligible properties.

For a federal project to be in compliance with Section 106, one of the following five scenarios will occur: (1) no historic properties exist in the APE; (2) the undertaking does not have the potential to affect historic properties; (3) there are known historic properties in the APE but the undertaking will not adversely affect them; (4) known historic properties will be adversely affected by the project and a Memorandum of Agreement (MOA) or Programmatic Agreement (PA) may be executed that will guide the mitigation or resolution of adverse effects; or (5) adverse effects are not known and a PA may be executed that will guide the inventory and identification of historic properties, evaluation of potential adverse effects to historic properties, and mitigation or resolution of adverse effects. For this undertaking, the Corps has determined that in accordance with 36 CFR § 800.5 (b) *Finding of no adverse effect*, the construction of the proposed project would result in no adverse effects to historic properties within the APE. The SHPO concurred with this determination in a letter dated March 2, 2017 (see Appendix G). The following subsection provide additional information concerning SHPO consultation and coordination with Native American tribes.

SHPO Consultation

Full compliance. In a letter dated March 3, 2015, the Corps initiated consultation with SHPO, informing SHPO of the proposed project and asking for comments on and concurrence with the determination of the APE, and comments on the proposed efforts to identify historic properties within the APE. In an email dated March 6, 2015, SHPO responded that they would wait to comment until the Corps submitted a document that fully addresses the identification efforts and results. The cultural resources survey report documenting the identification and evaluation efforts, as well the *Finding of no adverse effect* pursuant to 36 CFR § 800.5 (b), was sent to SHPO for comment and concurrence. The SHPO did not object to the Corps' findings and determination of *no adverse effect* to historic properties in a letter dated March 2, 2017. Correspondence with SHPO is included in Appendix G.

Native American Consultation
Full compliance. As part of the Section 106 process, the Corps is required to identify Native American tribes that attach cultural affiliation to historic properties that may be affected by the proposed undertaking (36 CFR Part 800.3(f)(2). As part of 36 CFR Part 800.4(a)(4), the Corps has consulted with and is presently consulting with the Wilton Rancheria, the Tsi-Akim Maidu of the Taylorsville Rancheria, the Shingle Springs Band of Miwok Indians, and the United Auburn Indian Community of the Auburn Rancheria (UAIC) in an effort to identify sites of religious and cultural significance that may be affected by the proposed undertaking. A detailed consultation log is included in Appendix G. Through consultation with the UAIC, the tribe requested that a previously identified staging area not be used due to the close proximity to a known cultural resource. The Corps modified the APE to remove the staging area from the project activities.

Native American Graves Protection and Repatriation Act (25 U.S.C. 3001 et seq.)
Full compliance. In the unlikely event that human remains are encountered, all activities in the vicinity of the discovery will cease immediately and a USBR official will be contacted immediately. The USBR official will ensure the appropriate officials are contacted, including contacting USBR's Regional Law Enforcement Officer. If the remains are skeletal, the USBR official will immediately notify USBR's Regional Archaeologist. Information regarding the discovery, including contents and location, will be kept confidential and relayed only to responsible officials. Human remains will be treated with respect, will not be disturbed, and must be protected as necessary to lessen further exposure or impacts. Photographs will not be taken and no posting on social media is permitted. Ongoing activities in the vicinity of the discovery will not proceed until USBR provides authorization to proceed.

USBR will be responsible for identification of skeletal human remains as Native American. Inadvertent and unpermitted discoveries of Native American human remains and Native American funerary objects, sacred objects, and objects of cultural patrimony discovered on Federal land are subject to the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. 3001 et seq.) and the implementing regulations at 43 CFR Part 10. USBR is responsible for compliance with NAGPRA and for conducting tribal consultations. Under NAGPRA, the discovery and location of human remains is confidential and will not be shared with anyone, especially the press or social media, who is not a designated official.

5.2 State of California Laws, Regulations, and Policies

Alquist-Priolo Earthquake Fault Zoning Act
Full compliance. The Alquist-Priolo Earthquake Fault Zoning Act (California PRC Sections 2621-2630 was passed by the California Legislature in 1972 to mitigate the hazard of surface faulting to structures. The Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface tract of active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. Local agencies must regulate most

development in fault zones established by the State Geologist. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults. The Folsom Dam Raise project does not contain any Alquist-Priolo Earthquake Fault Zones.

Assembly Bill 52

In September of 2014, the California Legislature passed Assembly Bill (AB) 52, which added provisions to the Public Resources Code regarding the evaluation of impacts on tribal cultural resources under CEQA, and consultation requirements with California Native American tribes. In particular, AB 52 now requires lead agencies to analyze project impacts on "tribal cultural resources," separately from archaeological resources (PRC § 21074; 21083.09). The Bill defines "tribal cultural resources" in a new section of the PRC Section 21074. AB 52 also requires lead agencies to engage in additional consultation procedures with respect to California Native American tribes (PRC § 21080.3.1, 21080.3.2, 21082.3). Finally, AB 52 requires the Office of Planning and Research to update Appendix G of the CEQA Guidelines by July 1, 2016 to provide sample questions regarding impacts to tribal cultural resources (PRC § 21083.09). The proposed project would not directly impact any known tribal cultural resources. Coordination and consultation conducted with California Native American tribes is documented in Appendix G.

Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations

Full Compliance. As required by the California EPA Air Resources Board, Section 93105 Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations requires compliance on any work done in any portion in a geographic ultramafic rock unit, any portion of the area to be disturbed has naturally-occurring asbestos, serpentine, or ultramafic rock as determined by the owner / operator, or the Air Pollution Control Officer (APCO); or naturally-occurring asbestos, serpentine, or ultramafic rock is discovered by the owner / operator, a registered geologist, or the APCO in the area to be disturbed after the start of any construction, grading, quarrying, or surface mining operation. The Folsom Dam Raise project would be in compliance with the implementation of dust control best management practices, as defined by Section 93105 (CARB 2016).

California Clean Air Act

Partial Compliance. The California Clean Air Act was signed into law in 1988 and, for the first time, clearly spelled out in statute California's air quality goals, planning mechanisms, regulatory strategies, and standards of progress. The California Clean Air Act provides the State with comprehensive framework for air quality planning regulation. Prior to passage of the Act, Federal law contained the only comprehensive planning framework.

The California Clean Air Act requires attainment of state ambient air quality standards by the earliest practicable date. For air districts in violation of the state ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide standards, attainment plans were required by July 1991. 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. A summary of the major California GHG regulations that would affect the project's GHG emissions are presented in Section 3.7. Section 202(a) of the California Clean Air Act requires projects to determine whether emission sources and emission levels significantly affect air quality based on Federal standards established by the USEPA and State standards set by CARB. Compliance with the California Clean Air Act for GHG emissions is expected with incorporated mitigation specified in Sections 3.6.5 and 3.7.5. As a result, full compliance with this Act is expected.

California Endangered Species Act

Partial Compliance. This Act requires the non-Federal partner to consider the potential adverse effects to State-listed species. As a joint NEPA/CEQA document, this SEIS/EIR has considered the potential effects to State-listed species, as discussed in Section 3.5. There is the potential for the Folsom Dam Raise project to impact the state-listed bald eagle, Swainson's hawk, loggerhead shrike, and white-tailed kite, but only if nests are present at or in close proximity to the construction sites. The Corps has been coordinating with CDFW regarding potential impacts to State-listed species. Prior to construction of any site, the Corps would conduct preconstruction surveys to determine the presence of nests at or near construction sites. If active nests are present, coordination with CDFW would occur to determine any mitigation or minimization measures that would need to be implemented. The project would be in full compliance with this Act once these surveys are conducted and coordination has occurred.

California Environmental Quality Act

Partial Compliance. CEQA requires that State and local agencies identify the significant environmental impacts of their actions, and 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 partner, would 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. The CVFPB would consider certifying the final SEIS/EIR and adopting its findings. Certification of the final SEIS/EIR by the CVFPB would provide full compliance with CEQA.

California Fish and Game Code (Sections 3511, 4700, 5050, and 5515), Fully Protected Species

Full Compliance. Section 3511 of this code prohibits the take or possession of any birds designated as fully protected by the State. Section 4700 prohibits the same things regarding mammals designated as fully protected, as does Section 5050 (for fully protected reptiles and amphibians), and Section 5515 (for fully protected fish). No mammals, reptiles, amphibians, or fish species designated as fully protected species occur at the project site. The bald eagle is the only fully protected bird species that has been documented in the general vicinity of the project site. However, no take (as defined in the California Fish and Game Code) of bald eagles is proposed as part of Alternative 2.

California Fish and Game Code (Sections 3503), Protection of Bird Nests and Raptors

Full Compliance. Section 3503 of this code makes it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Subsection 3503.5 of this code makes it unlawful to take, possess, or destroy birds-of-prey (raptors) or to destroy the nests or eggs of such birds. The destruction of raptor eggs or nests is not proposed as part of Alternative 2 (proposed project) and measures would be taken during construction to help avoid unintentional destruction of such nests and eggs. "Needless" destruction of bird nests and eggs is also not proposed as part of Alternative 2. To help ensure that the project does not adversely affect migratory birds, the avoidance, minimization, and mitigation measures discussed in Section 3.6.5 (those pertaining to migratory birds) would be implemented as part of the project. Should it be necessary to remove one or more active migratory bird nests, the Corps would first obtain a Special Purpose Permit from the USFWS authorizing such removal. This approach is in keeping with California Fish and Game Code Section 3513.

California Seismic Hazards Mapping Act

Full Compliance. The California Seismic Hazards Mapping Act of 1990 (California Public Resources Code [PRC] Sections 2690-2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and induced landslides. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites, and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils. The project area is within the Foothills Fault System, which is located in the metamorphic belt. No active faults have been mapped within the project area by the California Geological Survey or U.S. Geological Survey. The closest fault is a Quaternary (younger than 1,600,000 years) is just over 8 miles to the northwest. As a result, there would be no significant effects on the project due to seismicity and the Folsom Dam Raise Project is in full compliance with this Act.

California Water Code

Partial Compliance. The Folsom Dam Raise project is located within the jurisdiction of the CVRWQCB, within the greater Sacramento Valley watershed. The preparation and adoptions of water quality control plans, or Basin Plans, and statewide plans, is the responsibility of the SWRCB according to State law and 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, Basins Plans consist of a designation or establishment for the waters within a specific 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. Because beneficial uses, together with their corresponding water quality objectives, can be defined per Federal regulations as water quality standards, the Basin Plans are regulatory references for meeting the State and Federal requirements for water quality control (40 CFR 131.20). The potential effects of the proposed project on water quality have been evaluated and are discussed in Section 3.11. Compliance with the California Water Code would be accomplished by obtaining a Construction General Permit and, if necessary, a CWA Section 401 Water Quality Certification from the CVRWQCB prior to any project construction activities.

Porter-Cologne Water Quality Control Act
Partial Compliance. The Porter-Cologne Water Quality Control Act of 1970 established the SWRCB and RWQCBs 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 regulate 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. 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 adherence to water quality objectives to protect those uses. The potential effects of the proposed project on water quality have been evaluated and are discussed in Section 3.11. This project expects to achieve full compliance with the Water Quality Control Act by achieving compliance with CVRWQCB certification mandates for Section 401 of the Federal CWA.

CHAPTER 6.0 - COORDINATION AND REVIEW OF THE SEIS/EIR

This chapter summarizes public and agency involvement activities undertaken by the Corps, CVFPB, and SAFCA that have been conducted to date, are ongoing, and/or would be conducted for this project, and which satisfy NEPA and CEQA requirements for public participation (including scoping) and agency consultation and coordination. Additionally, Native American consultation activities are described.

6.1 Public Involvement Under NEPA and CEQA

The lead agencies have implemented a public participation program to inform and engage potentially affected agencies, stakeholders, and communities. This section describes public involvement to date and future steps to be taken with the public.

6.2 Public Involvement

6.2.1 Scoping

The Notice of Intent was published in the Federal Register on February 6, 2014. The Notice of Preparation was filed on February 17, 2014. Two public scoping meetings were held for the Folsom Dam Raise project. One was held on Wednesday, February 19, 2014, at the Folsom Community Center, and one was held on Monday, February 24, 2014, at the Sacramento Library Galleria. Both meetings were from 5:00 p.m. to 7:00 p.m. The meetings were advertised in the Sacramento Bee and the Folsom Telegraph, plus mail and e-mail announcements were also sent to stakeholders and other interested parties. The purpose of the meetings was to inform the public about the proposed project and to solicit input to help scope the SEIS/EIR.

The main issues of concern expressed by the public during the scoping process included the following: (1) Several objections to achieving the 3.5-foot raise by using concrete floodwalls instead of using the earthen raise approach, due to concerns about aesthetics, fragmentation of wildlife habitat/access, and public safety (ex. potential assailants using walls for cover); (2) Avoid impacts to oak woodlands, riparian areas, and wetland areas; (3) Continue coordination with the Shingle Springs Band of Miwok Indians as the SEIS/EIR and the proposed project progress (Corps, 2014).

The first two issues mentioned above were primarily considered during the process of refining the design of the proposed project. The use of concrete floodwalls had been considered for raising Dikes 1 through 8 and MIAD. This design approach was eliminated from further consideration based on the public scoping comments and other factors. The use of concrete floodwalls to raise the LWD and RWD was retained, however, since this was the most cost-effective design and because the LWD and RWD are not accessible to the public and are highly secure (thus, not subject to primary aesthetic concerns and public safety concerns), plus the LWD and RWD are not immediately adjacent to significant wildlife habitats and are not typically traversed by wildlife. The last issue mentioned above was addressed by continuance of coordination with the cited tribe.

6.2.2 Draft SEIS/EIR

The draft SEIS/EIR was circulated for 64 days to agencies, organizations, and individuals known to have an interest in the proposed project. The public review period began July 19, 2016 and ended September 20, 2016. Public workshops were held in Sacramento on July 25, 2016, and in Folsom on July 27, 2016. All comments received were considered and incorporated into the final SEIS/EIR, as appropriate. The comments received and the responses to these comments are contained in Appendix H. The proposed project (Alternative 2) and the draft SEIS/EIR were coordinated with various government agencies including but not limited to USBR, CVFPB, Folsom State Prison, USFWS, State Parks, SAFCA, SMAQMD, and CVRWQCB.

6.2.3 Final SEIS/EIR

A Notice of Availability (NOA) for the final SEIS/EIR will be published in the Federal Register. No sooner than 31 days following publication of the NOA, the Corps will make a decision concerning the proposed project and then complete a Record of Decision (ROD). Subsequent to this, the CVFPB will consider certification of the final Supplemental EIR (e.g. certification of the final SEIS/EIR) and approval of the proposed project (Alternative 2). Assuming the CVFPB certifies the final SEIS/EIR and approves the proposed project, it will also prepare a Statement of Overriding Considerations and then file a Notice of Determination with the Office of Planning and Research.

6.3 Native American Consultation

As part of the Section 106 process, the Corps is required to identify Native American tribes that attach cultural affiliation to historic properties that may be affected by the proposed undertaking

(36 CFR Part 800.3(f)(2). As part of the 36 CFR Part 800.4(a)(4), the Corps has consulted with and is presently consulting with the Wilton Rancheria, the Tsi-Akim Maidu of the Taylorsville Rancheria, the Shingle Springs Band of Miwok Indians, and the United Auburn Indian Community of the Auburn Rancheria in an effort to identify sites of religious and cultural significance in the APE that may be affected by the proposed undertaking. Through consultation with the UAIC, the tribe requested that a previously identified staging area not be used due to the close proximity to a known cultural resource. The Corps modified the APE to remove the staging area from the project activities. A detailed consultation log is included in Appendix G.

The provisions of AB 52 only apply to projects that have a NOP filed on or after July 1, 2015, and therefore the Bill's requirements are not applicable to the proposed project (the NOP was filed February 17 2014 SCH# 2006022091). Although AB 52 requirements were not in place at the time of the NOP, Tribal coordination noted above and documented in Appendix G, occurred and is substantially consistent with the intent of AB52 for this project.

6.4 Consultation with Other Federal, State, and Local Agencies

Copies of the draft and final SEIS/EIR were provided to the following agencies. Direct coordination also occurred with several of these agencies regarding the proposed project.

U.S. Government Agencies

- Council on Environmental Quality
- Federal Emergency Management Agency
- U.S. Bureau of Reclamation
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- Western Area Power Administration

State of California Agencies

- Assembly Committee on Water, Parks, and Wildlife
- California Air Resources Board
- California Department of Conservation
- California Department of Corrections and Rehabilitation
- California Department of Fish and Wildlife
- California Department of Parks and Recreation
- California Department of Water Resources
- Central Valley Flood Protection Board
- Central Valley Regional Water Quality Control Board
- Governor's Office of Emergency Services
- Native American Heritage Commission
- Senate Committee on Natural Resources
- State Clearinghouse

- State Lands Commission
- State Office of Historic Preservation
- State Water Resources Control Board

Regional, County, and City Agencies

- City of Folsom
- City of Roseville
- El Dorado County
- Placer County
- Sacramento County
- Placer County Flood Control and Water Conservation District
- Sacramento Area Flood Control Agency
- Sacramento County
- Sacramento Metropolitan Air Quality Management District

CHAPTER 7.0 - LIST OF PREPARERS

U.S. Army Corps of Engineers

- Lisa Aley, Environmental Manager – 2 years of experience
- Mariah Brumbaugh, Senior Environmental Manager – 11 years of experience
- Clay Carithers, Environmental Manager – 31 years of experience
- Victoria Hermanson, Environmental Manager – 3 years of experience
- Deborah Lewis, Environmental Manager – 1 year of experience
- Anne Baker, Senior Environmental Manager – 10 years of experience
- Tanis Toland, Regional Technical Specialist - 28 years of experience
- Katie Charan, Senior Project Manager – 9 years of experience
- Cory Koger, Senior Chemist & Water Quality Program Manager-- 15 years of experience
- Brian Luke, Natural Resources Specialist – 10 years of experience
- Nancy Sandburg, Senior Environmental Manager - 25 years of experience
- Melissa Montag, Historian – 16 years of experience
- Jane Rinck, Supervisory Biological Sciences Environmental Manager – 30 years of experience
- Sara Ross Arrouzet, Lead Planner, Environmental Studies Manager – 8 years of experience

California Department of Water Resources

- Vincent Heim, Environmental Scientist – 7 years of experience
- David Martasian, Senior Environmental Scientist (Supervisor) – 13 years of experience
- Erin Brehmer, Environmental Scientist – 7 years of experience
- Michael Zelazo, Project Manager - 10 years of experience
- Ruth Darling, Environmental Scientist – 10 years of experience

CHAPTER 8.0 - REFERENCES

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CHAPTER 9.0 - FIGURES

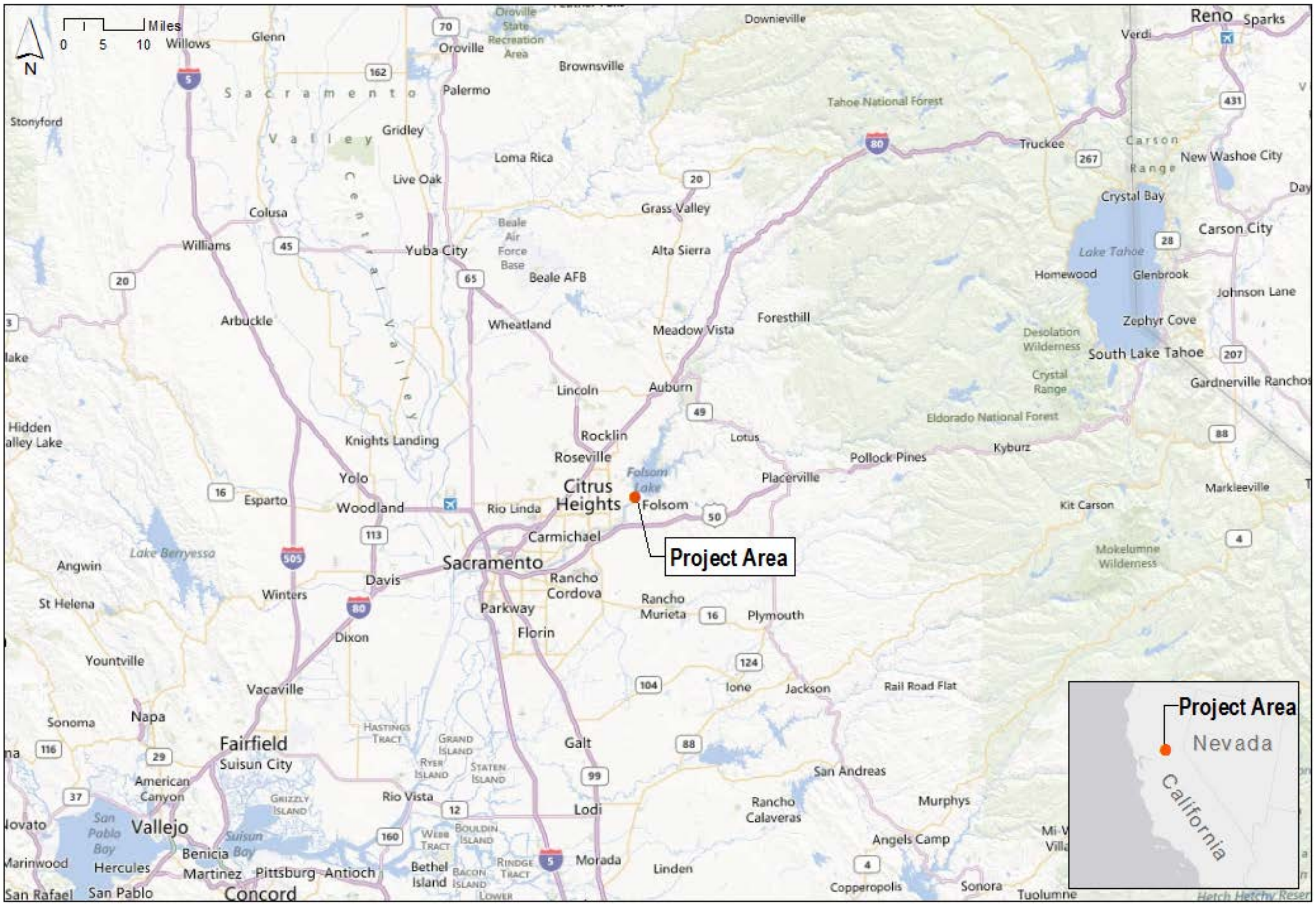

Figure 1-1. Project Area Map.

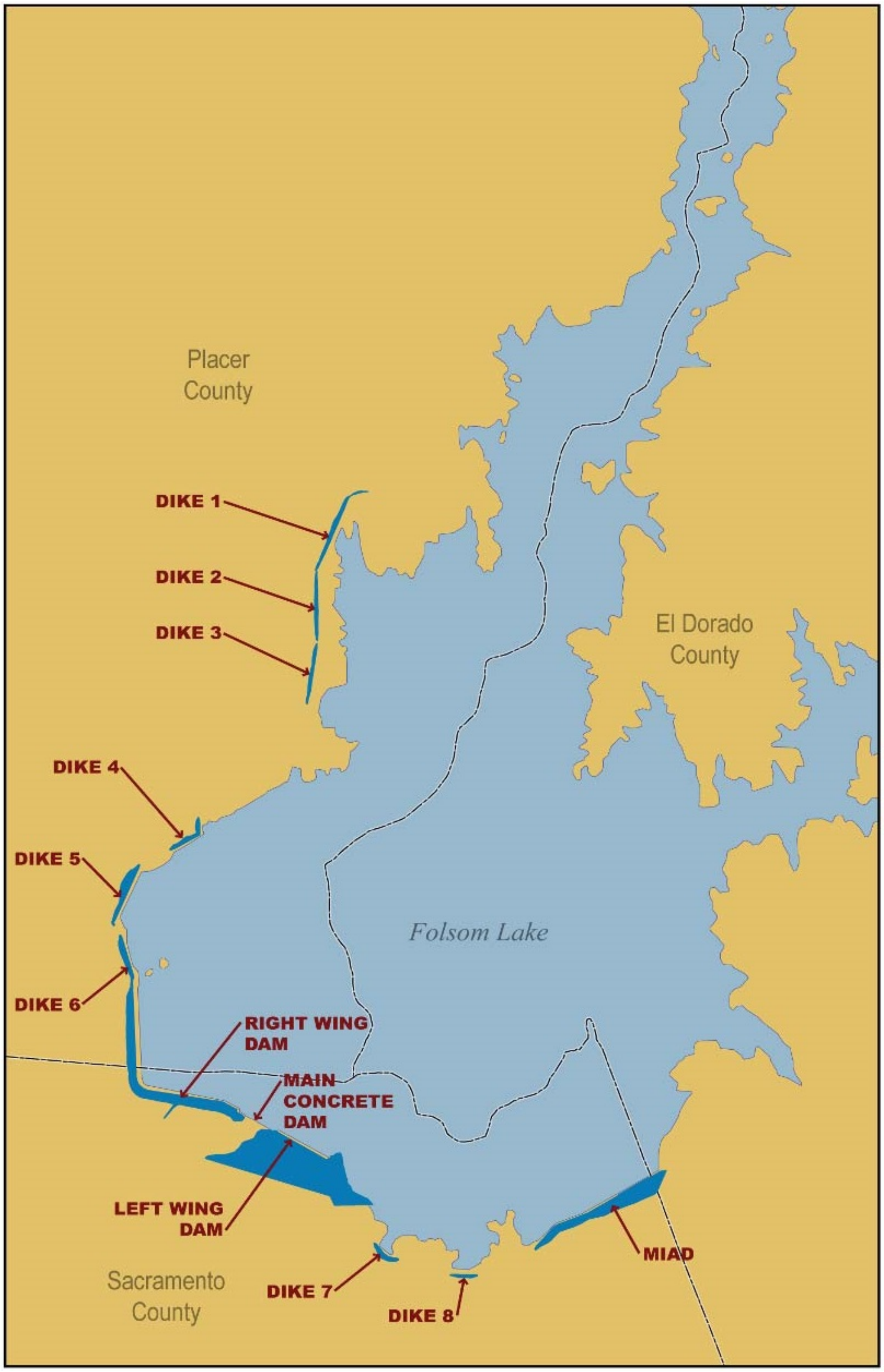

Figure 1-2. Folsom Lake and the Locations of the Structural Aspects of the Folsom Dam.

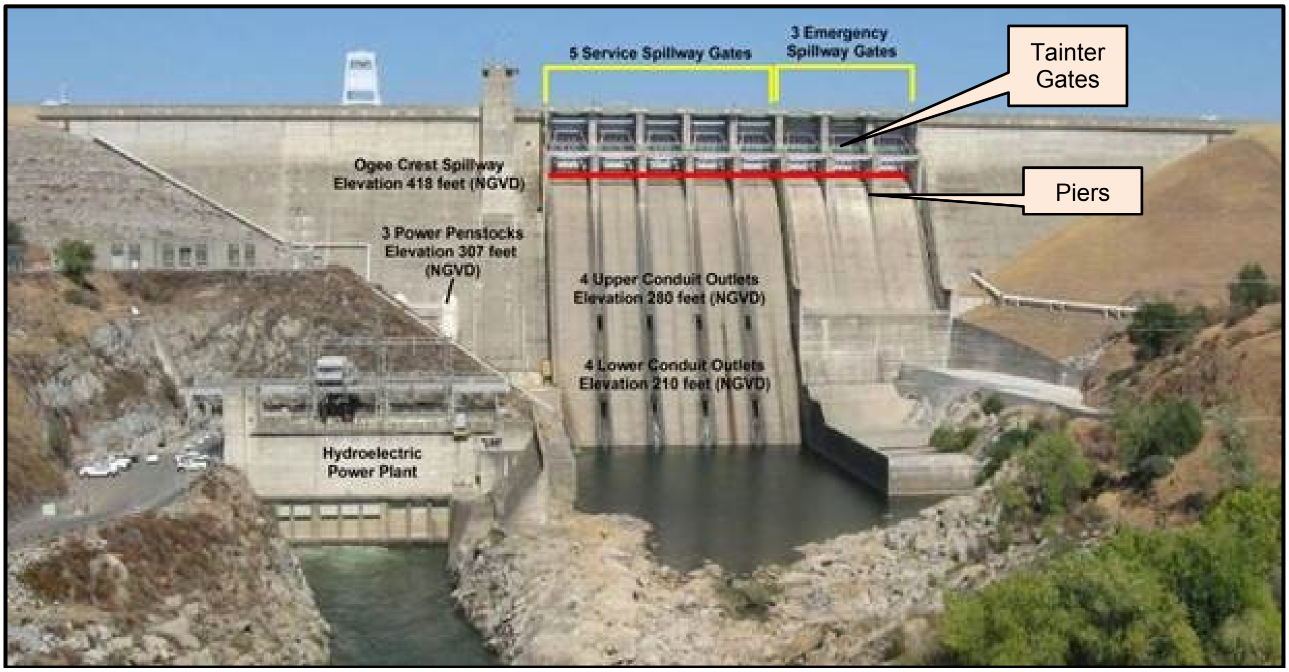

Figure 2-1. Main dam with various existing elements identified.

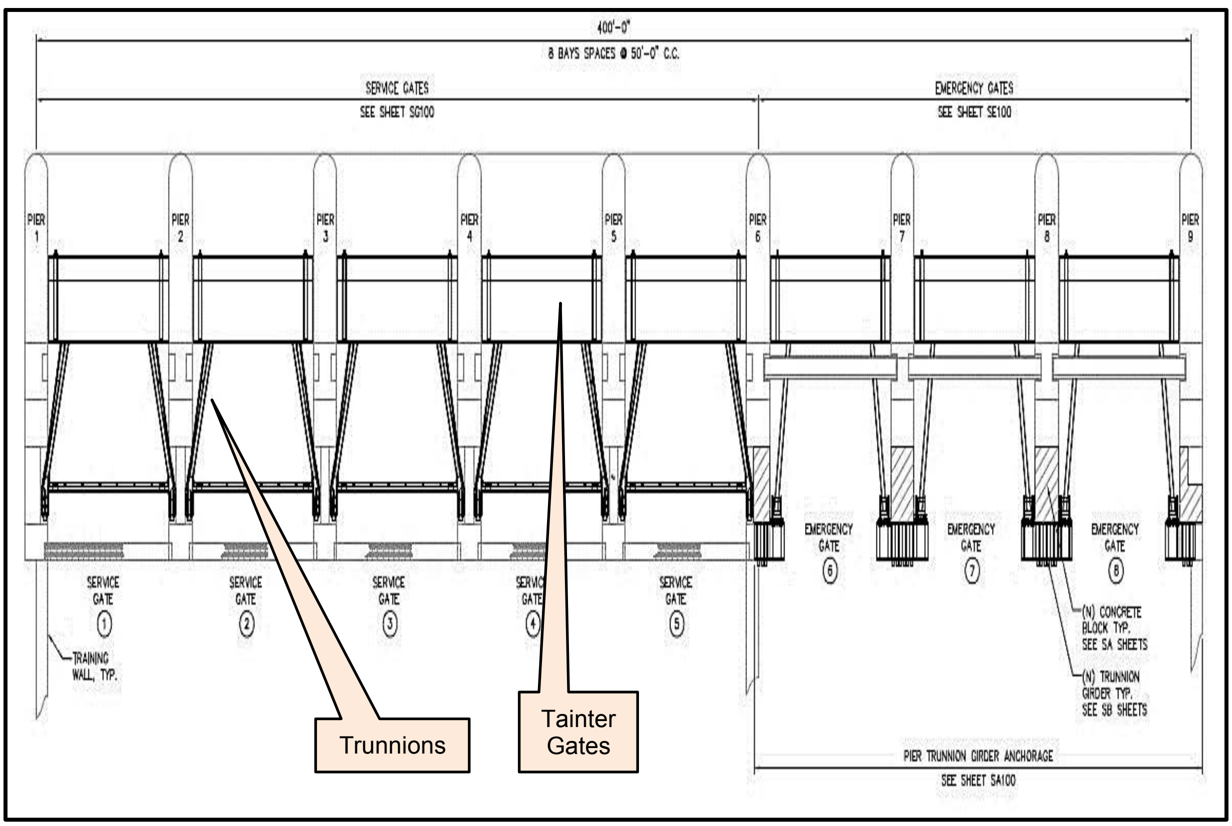

Figure 2-2. Depiction of main dam Tainter gates, trunnions, and associated piers. View from downstream side of dam looking upstream toward dam itself.

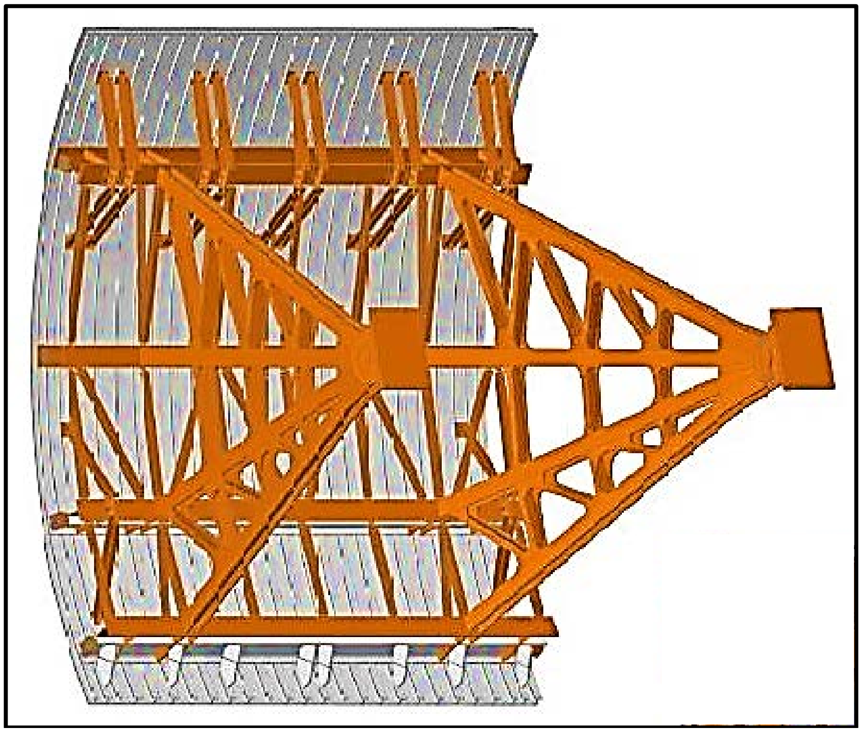

Figure 2-3. Drawing of a typical Tainter gate as viewed obliquely from the downstream side. Curved front panel (shown in gray) faces upstream.

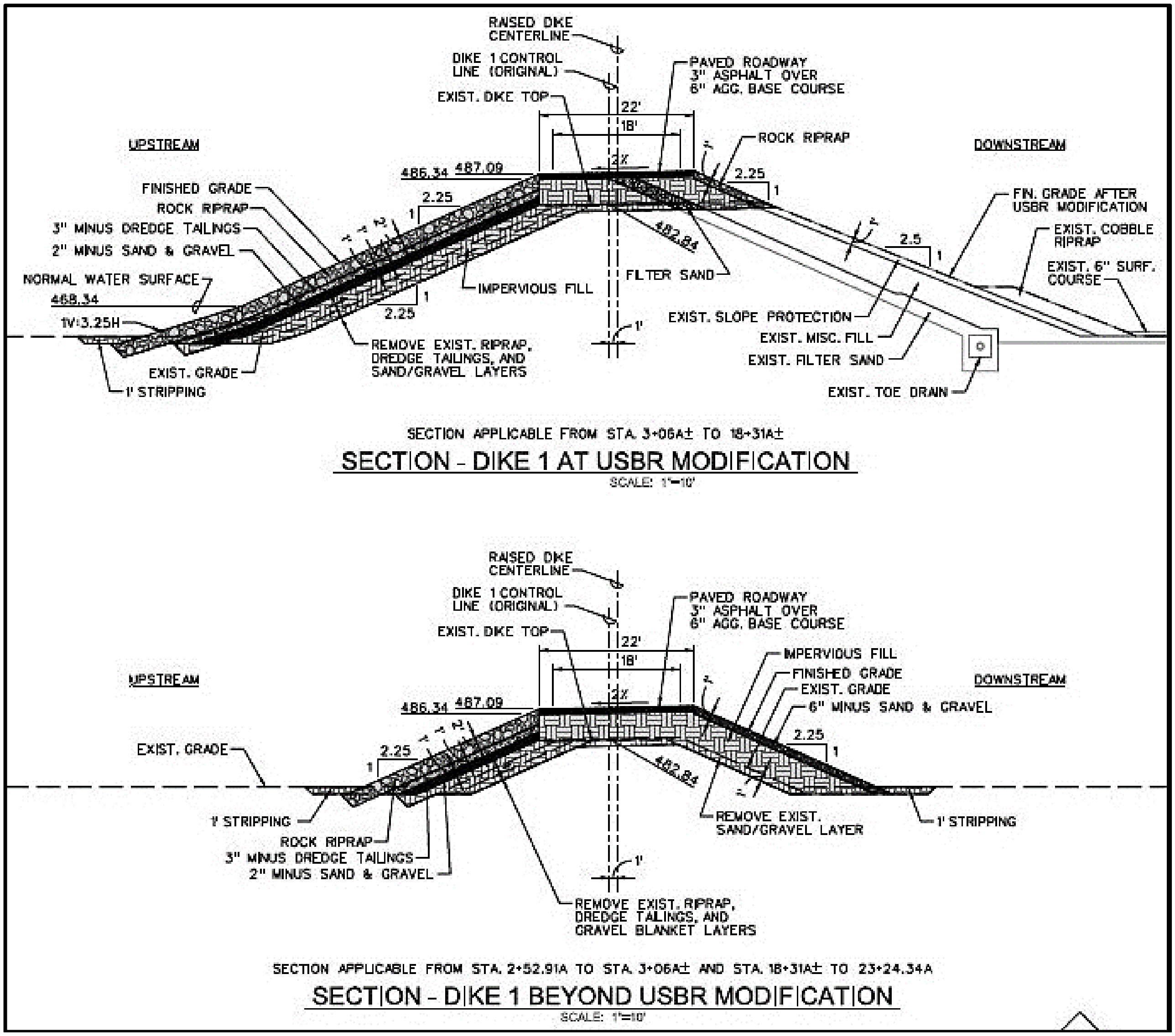

Figure 2-4. Preliminary typical cross section for 3.5-foot raise at Dike 1

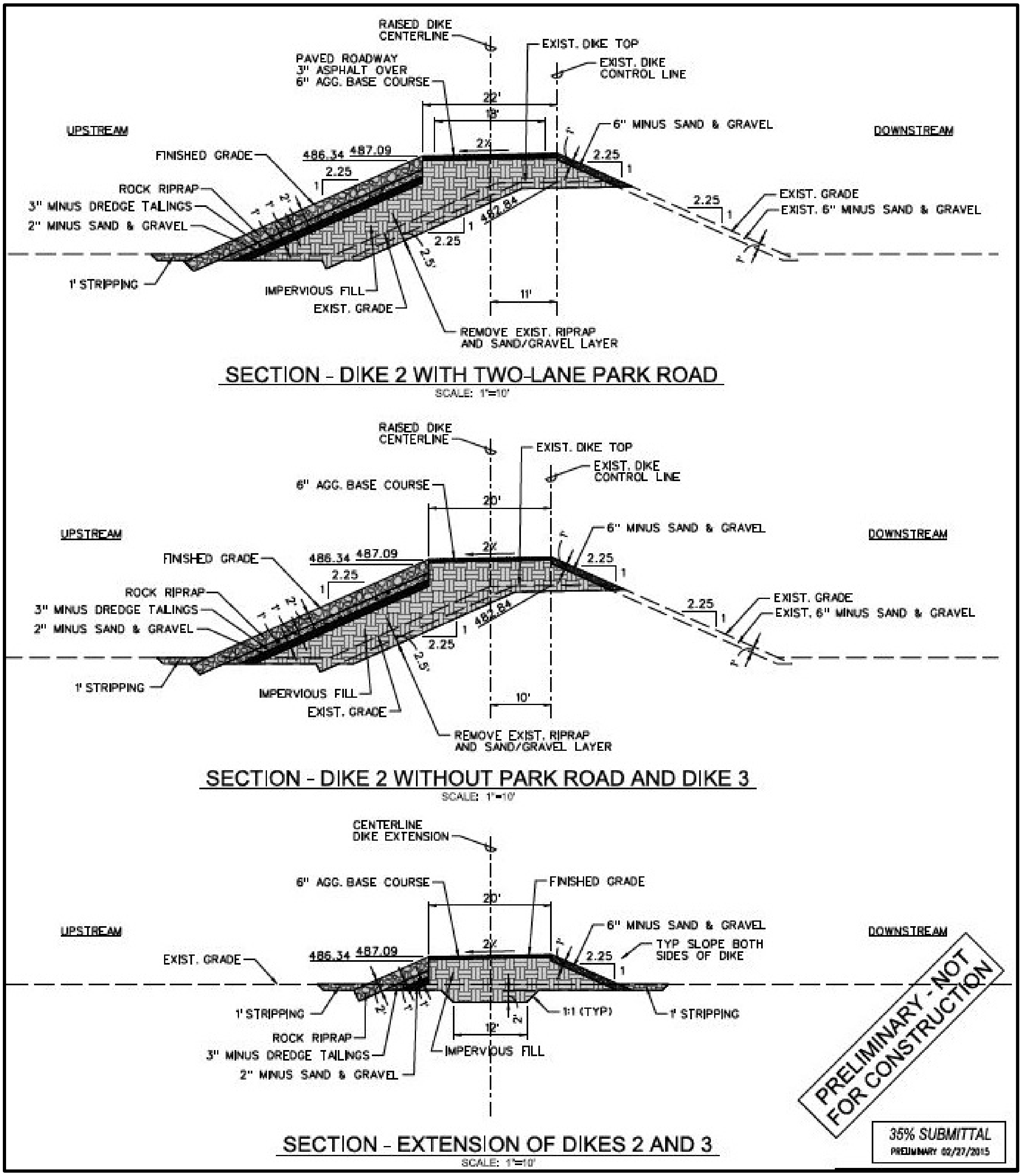

Figure 2-5. Preliminary typical cross section for 3.5-foot raise at Dike 2 and Dike 3.

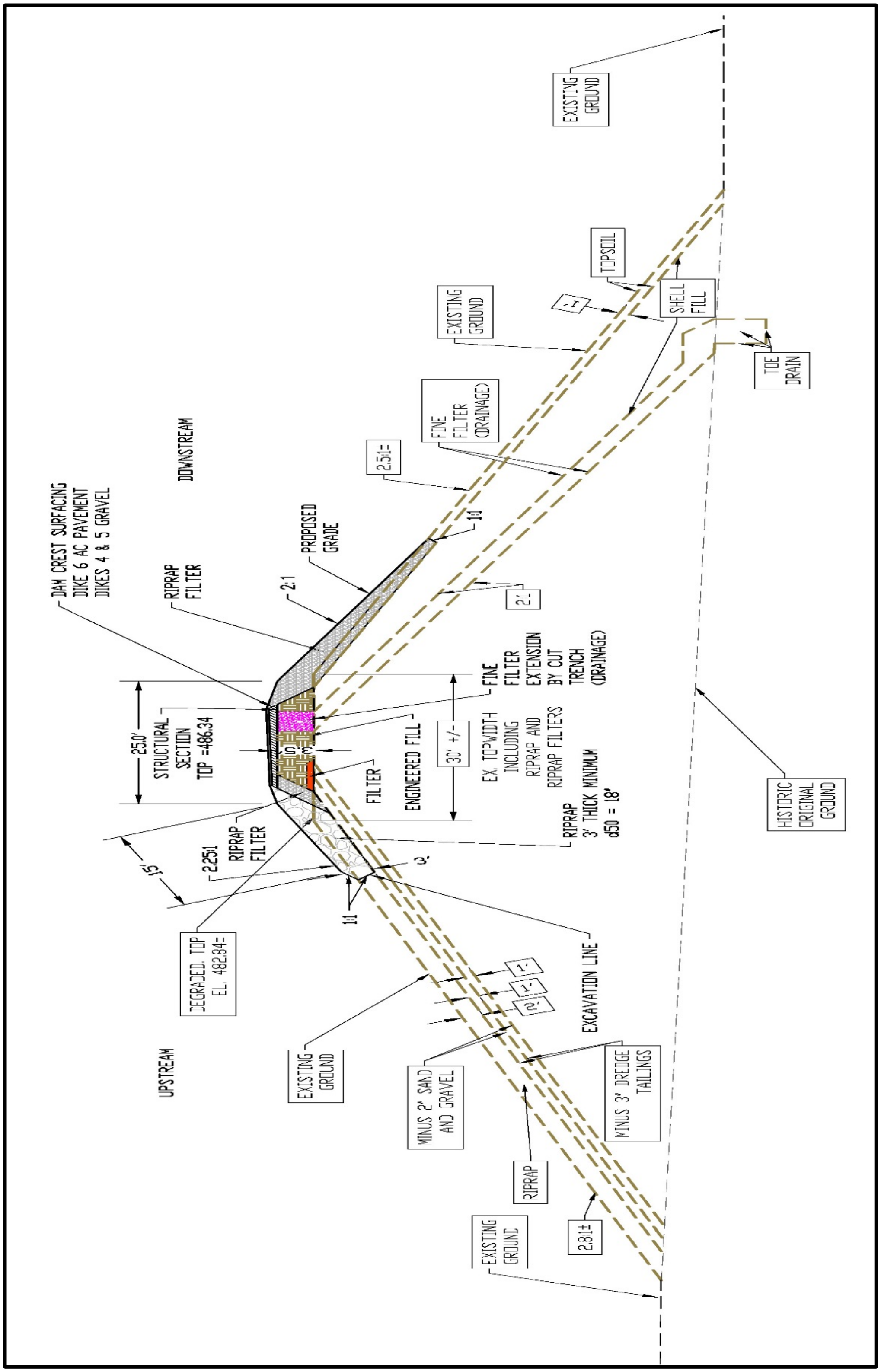

Figure 2-6. Preliminary typical cross section for 3.5-foot raise at Dikes 4, 5, and 6.

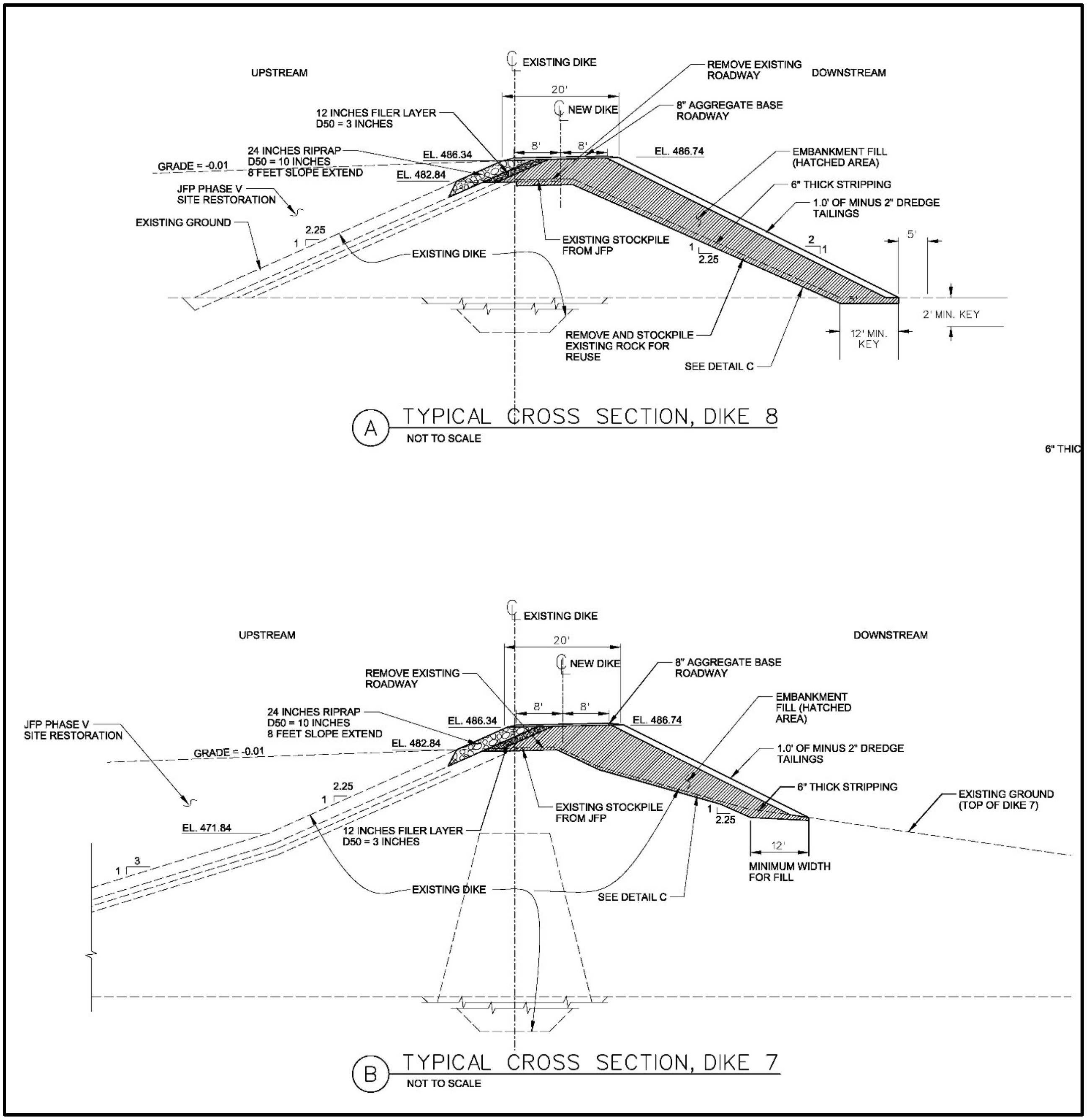

Figure 2-7. Preliminary typical cross section for 3.5-foot raise at Dikes 7 and 8.

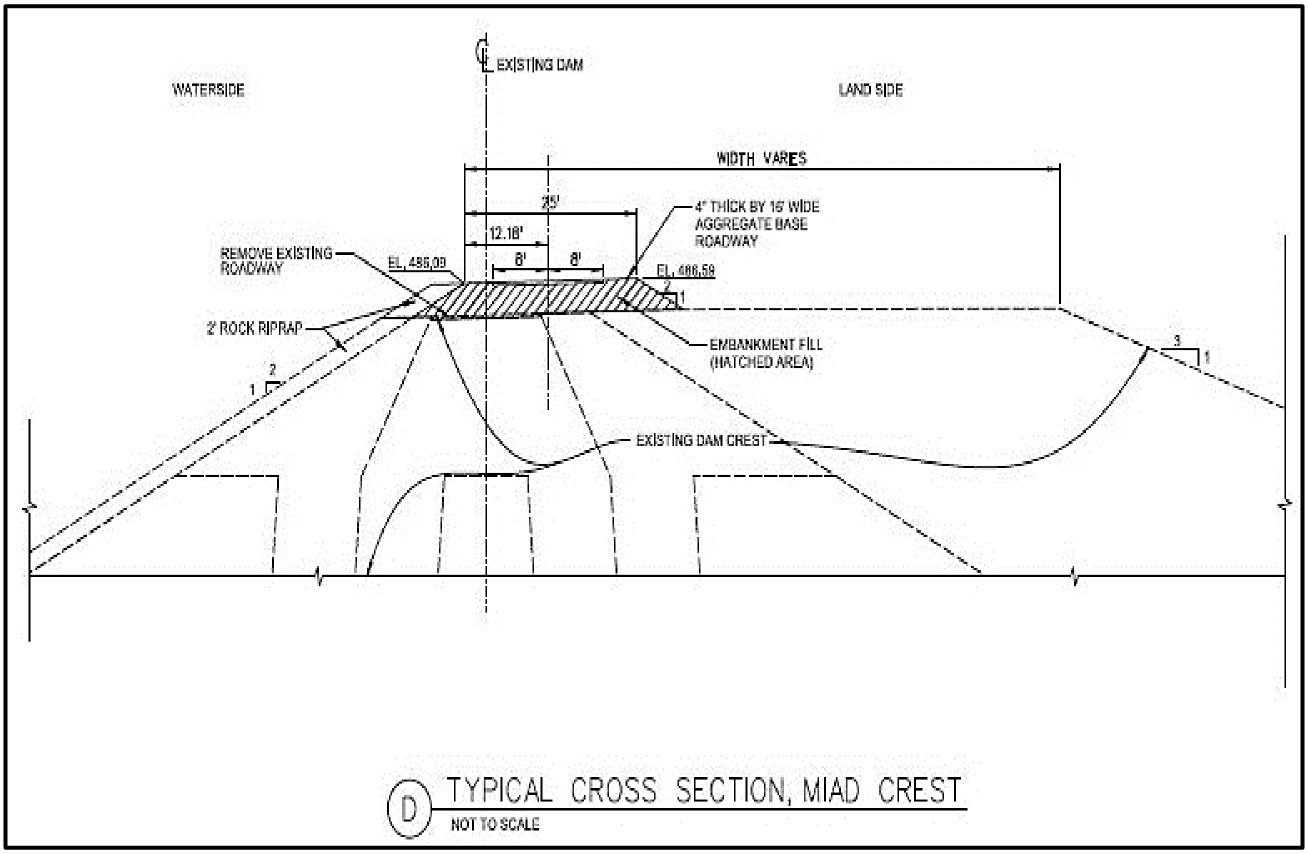

Figure 2-8. Preliminary typical cross section for 3.5-foot raise at Mormon Island Auxiliary Dam (MIAD).

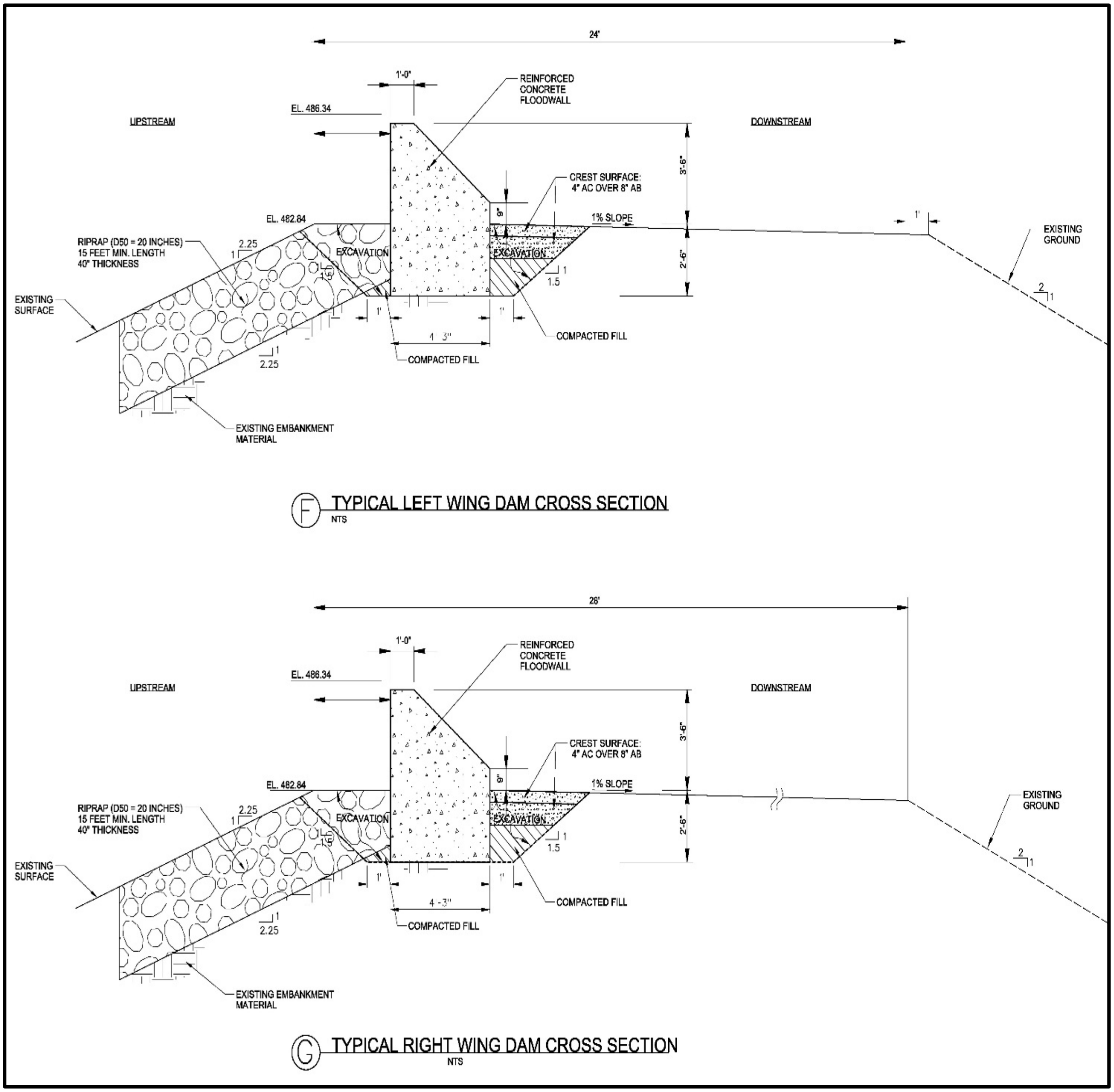

Figure 2-9. Preliminary typical cross sections for new floodwalls at the Left Wing Dam (LWD) and the Right Wing Dam (RWD).

Figure 2-10. Main dam Tainter gate refinements: Limits of construction (red lines), construction staging areas (blue lines), and construction access route (orange lines).

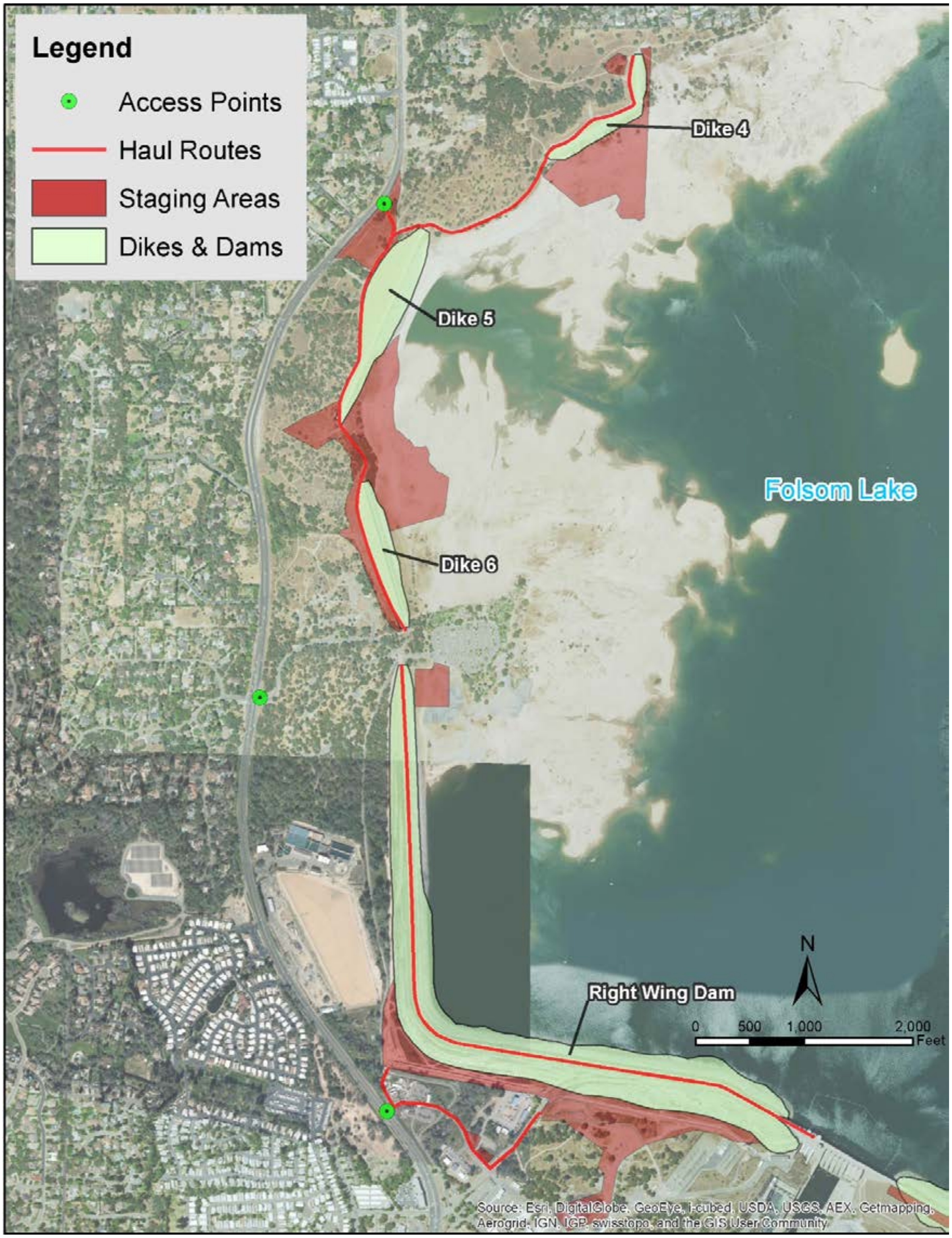

Figure 2-11. Haul routes, access points, and staging areas for the Right Wing Dam (RWD) floodwall construction work (one of the concrete floodwall elements) and for the raising of Dikes 4, 5, and 6 (one of the earthen raise elements).

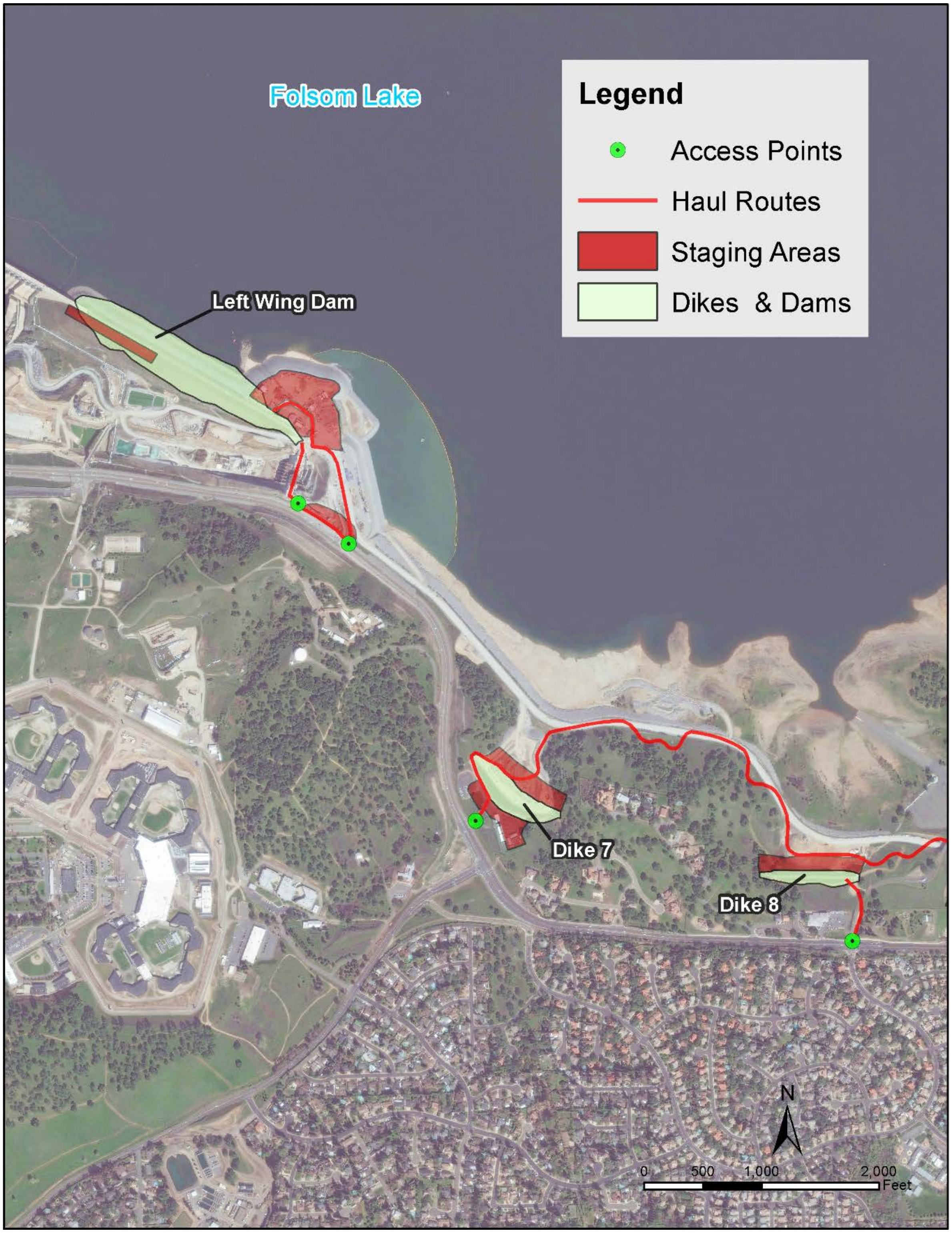

Figure 2-12. Haul routes, access points, and staging areas for the Left Wing Dam (LWD) floodwall construction work (one of the concrete floodwall elements) and for the raising of Dikes 7 and 8 and MIAD (one of the earthen raise elements).

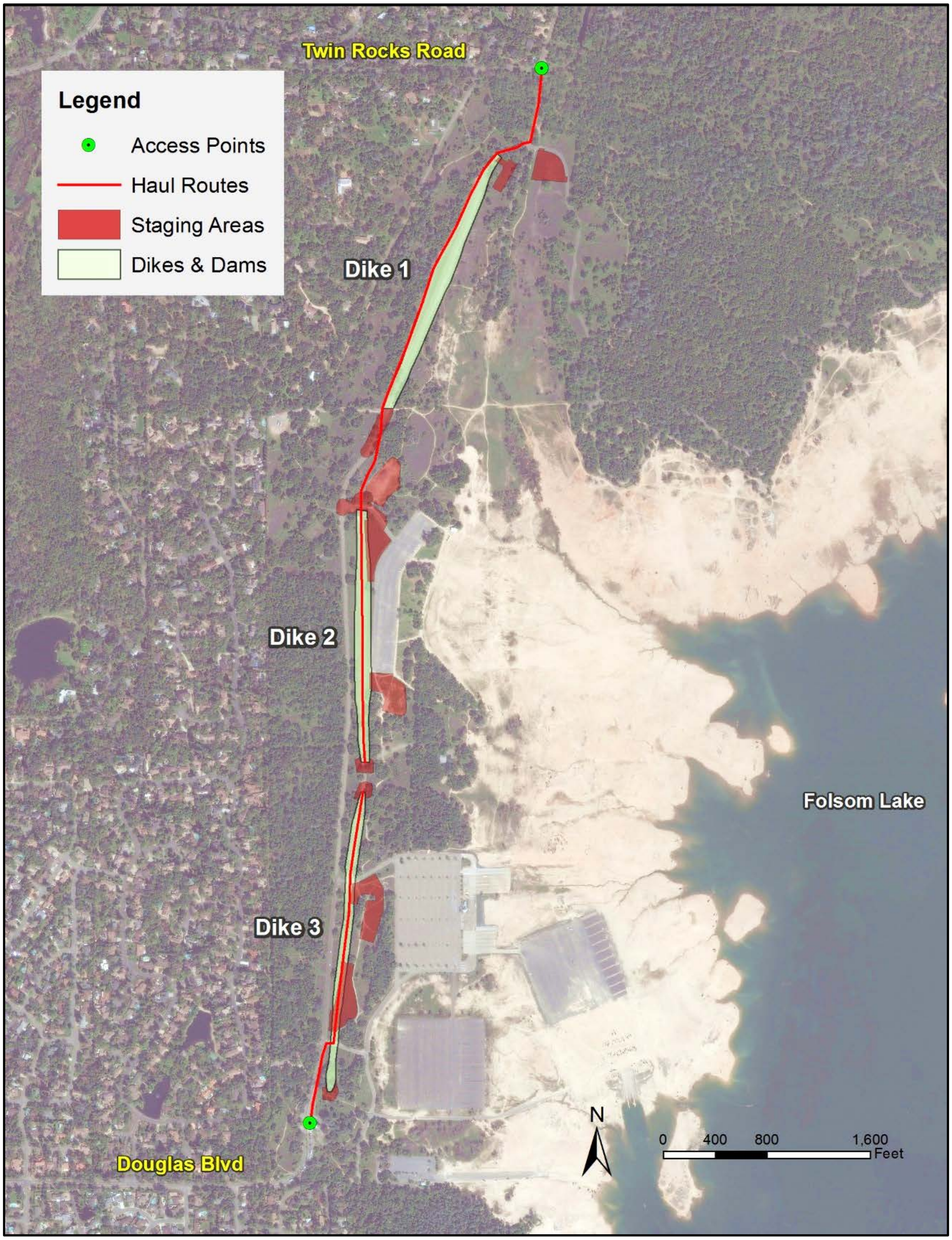

Figure 2-13. Haul routes, access points, and staging areas for the raising of Dikes 1, 2, and 3 (one of the earthen raise elements).

Figure 2-14. Haul routes, access points, and staging areas for the raising of Mormon Island Auxiliary Dam (MIAD) , as well as for the raising of Dikes 7 and 8 (one of the earthen raise elements).

Figure 2-15. Approximate location of existing riprap stockpile within the MIAD East Area.

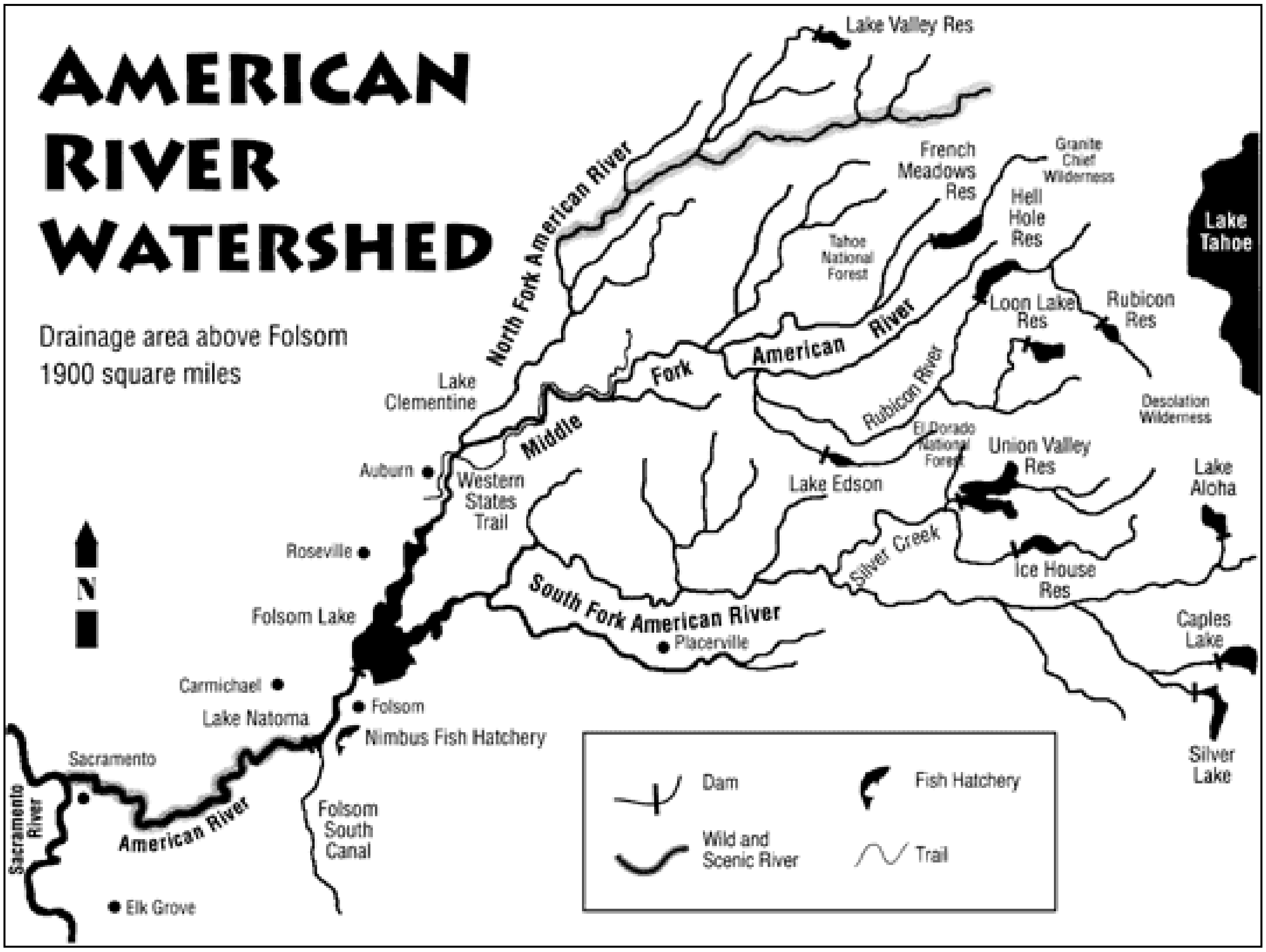

Figure 3-1. The Hydrology of Folsom Lake, Including Tributaries and Streams.

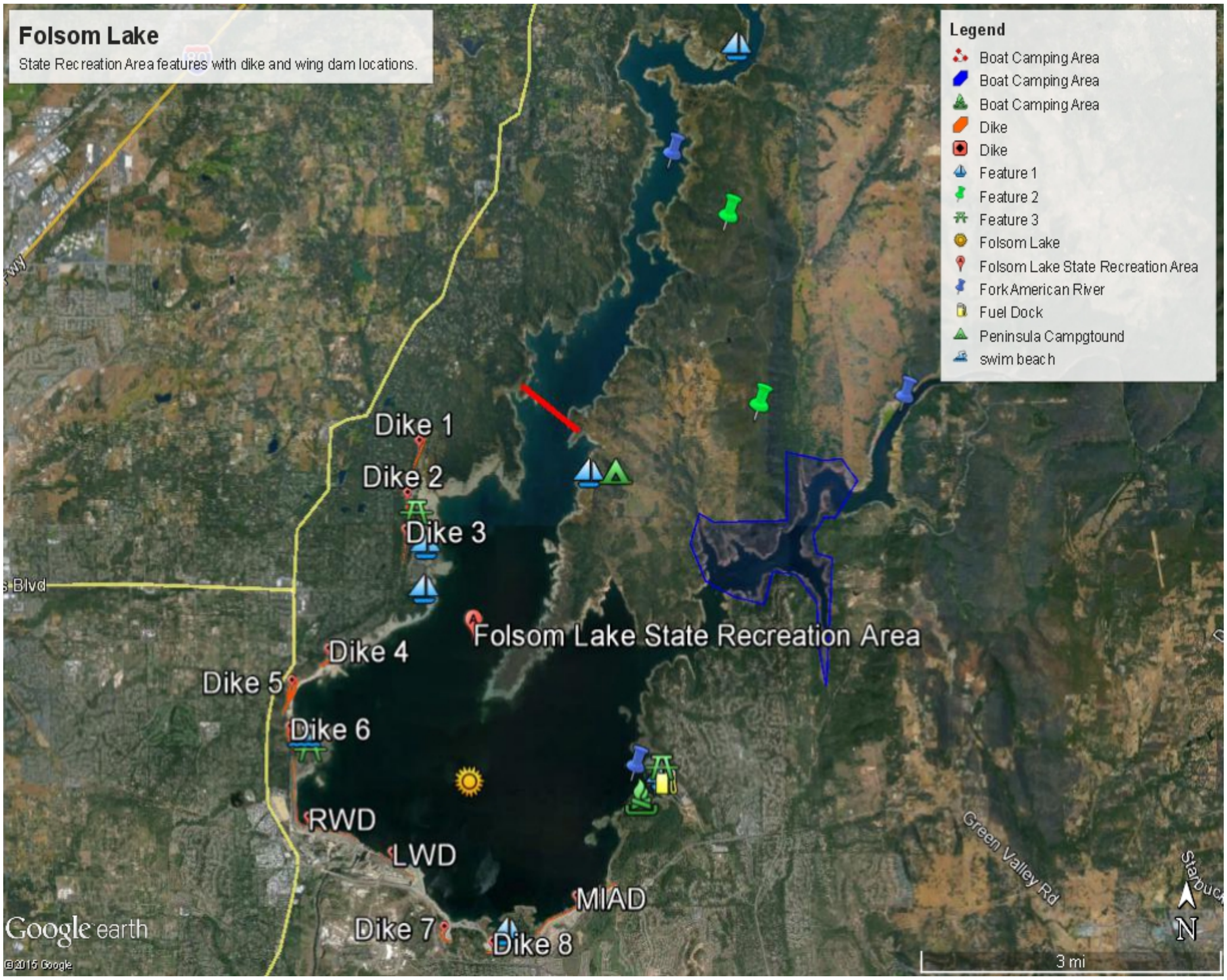

Figure 3-2. Folsom Lake State Recreation Area General Features, Associated with the Dikes and Wing Dams of Folsom Dam. Area above the red line and within the blue line denotes boat camping areas.

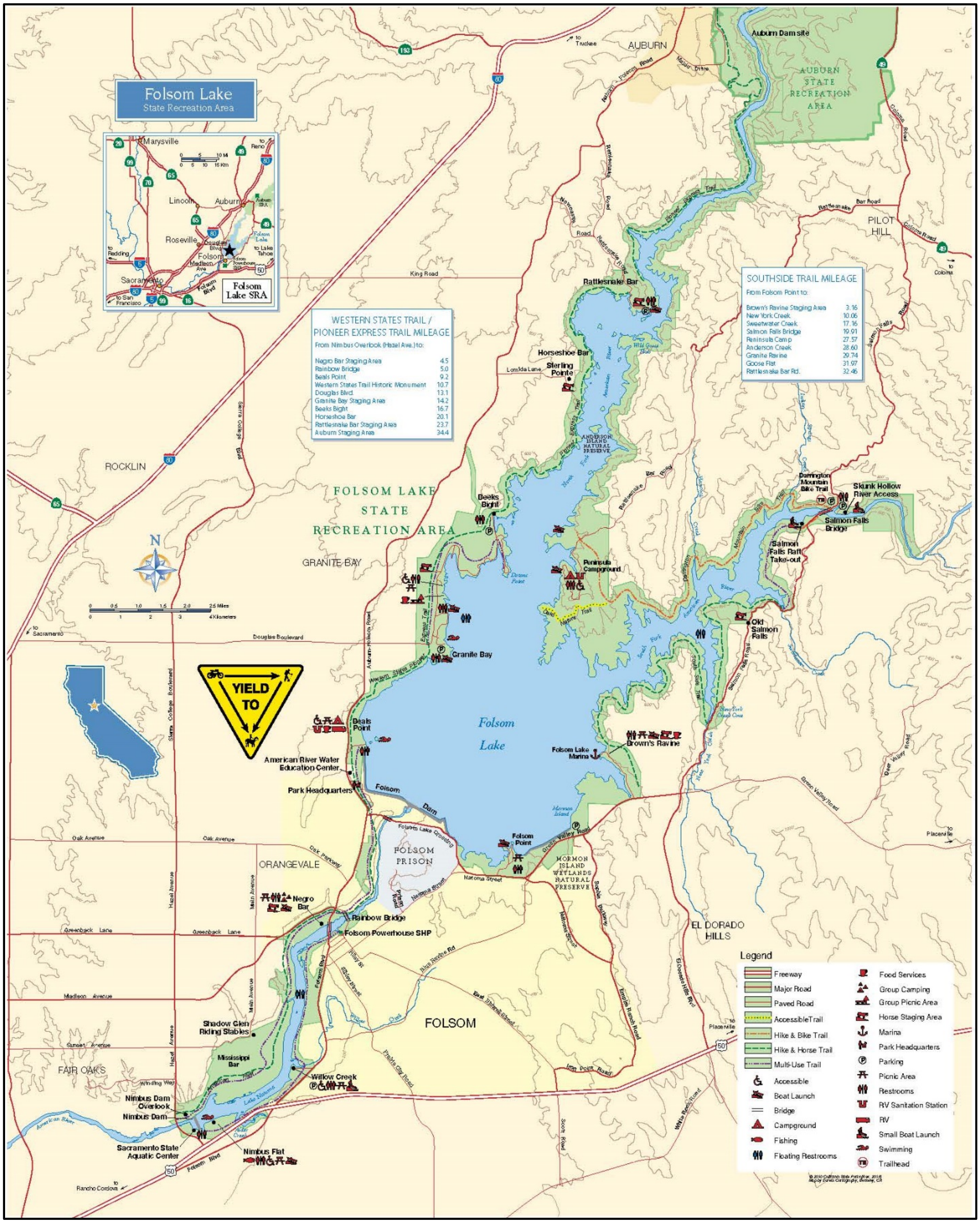

Figure 3-3. Recreational Trail System within the Folsom Lake State Recreation Area (Folsom Lake State Recreation Area, 2015).

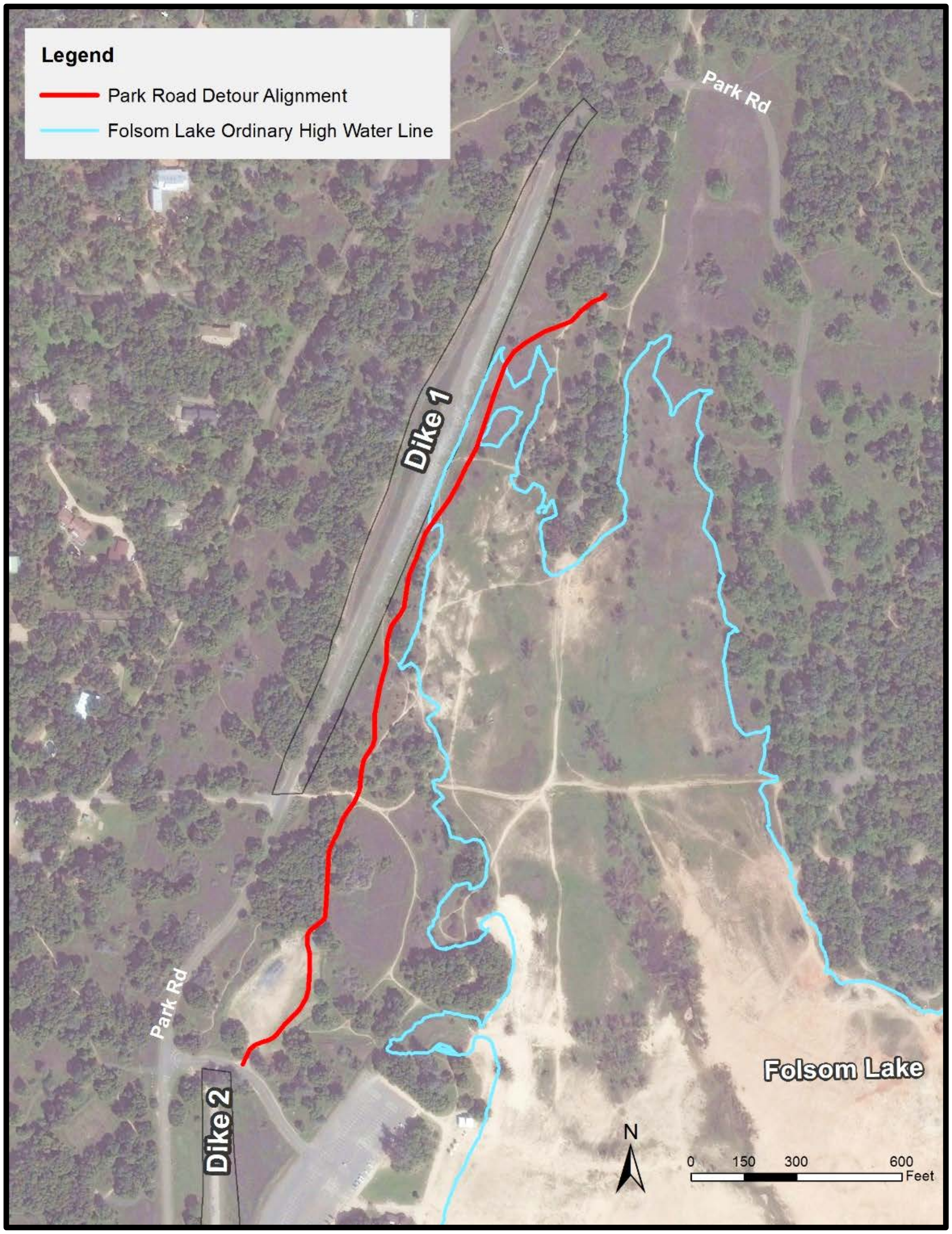

Figure 3-4. Temporary Park Road detour route (red line) that would be employed during the raising of Dikes 1, 2, and 3. Road alignment shown is approximate.

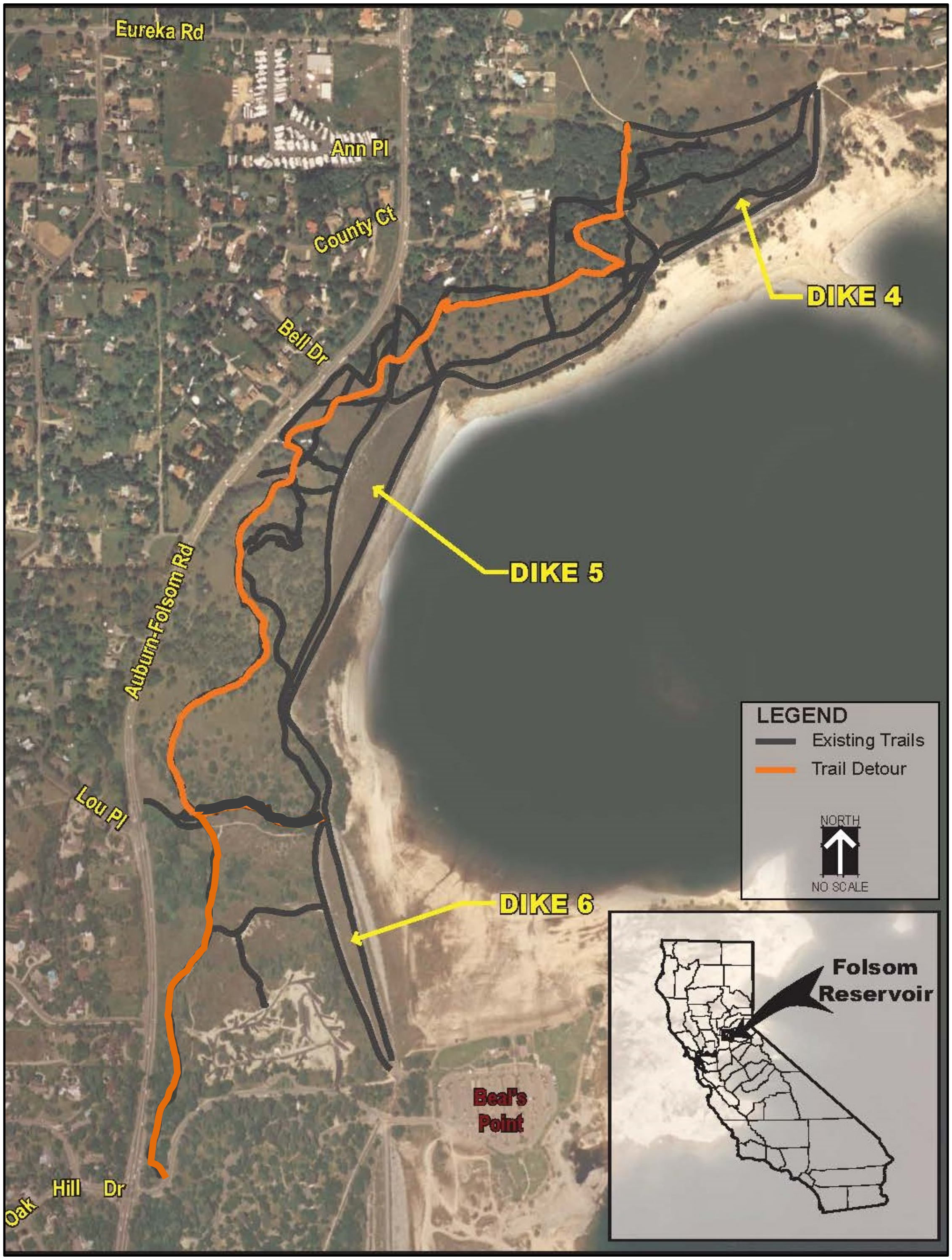

Figure 3-5. Potential Trail Detour for Dikes 4, 5, and 6.

Figure 3-6. The Current MIAD Bike Trail Detour (red line).

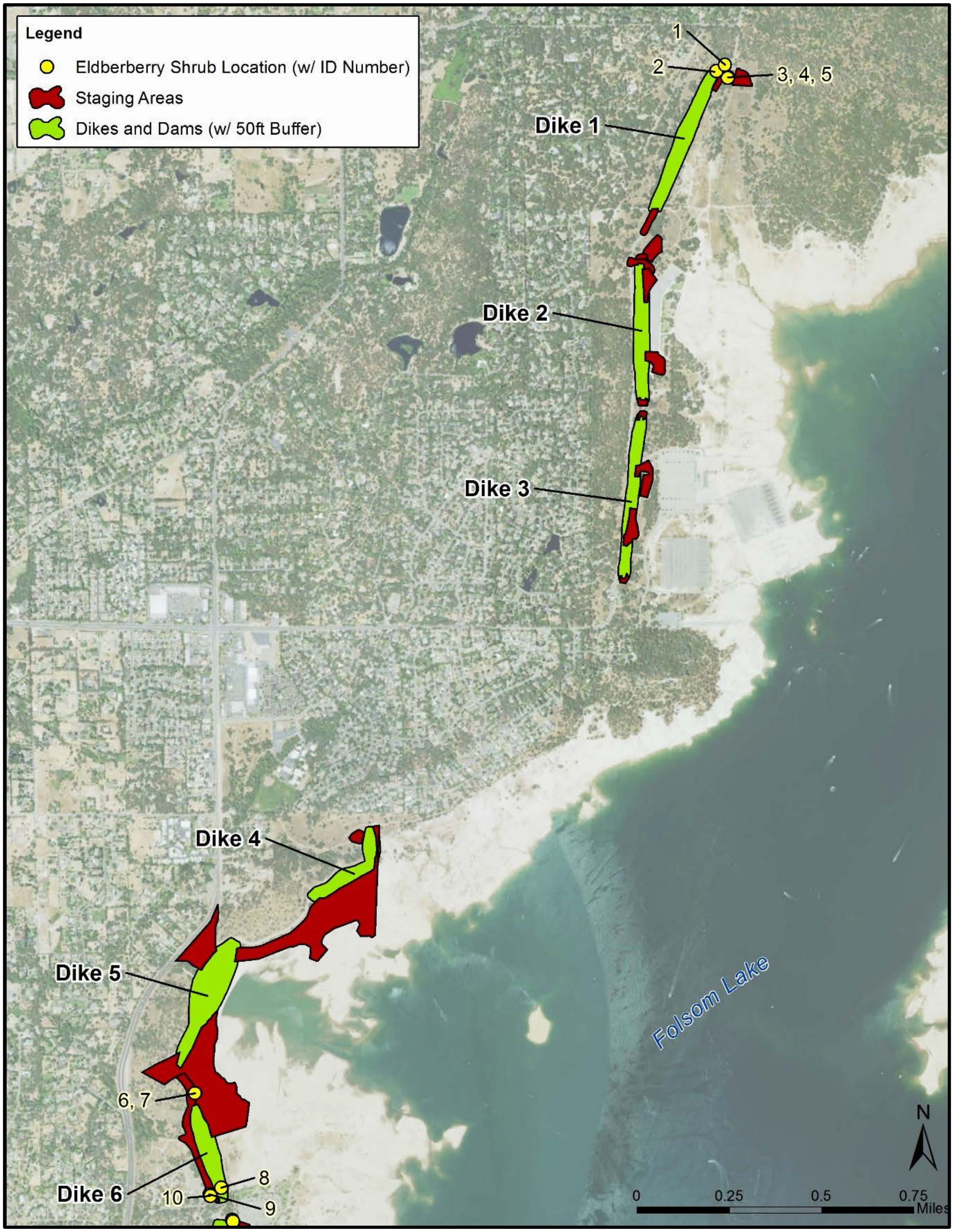

Figure 3-7. Approximate locations of existing elderberry shrubs located within or near the Folsom Dam Raise project features. Northern portion of project.

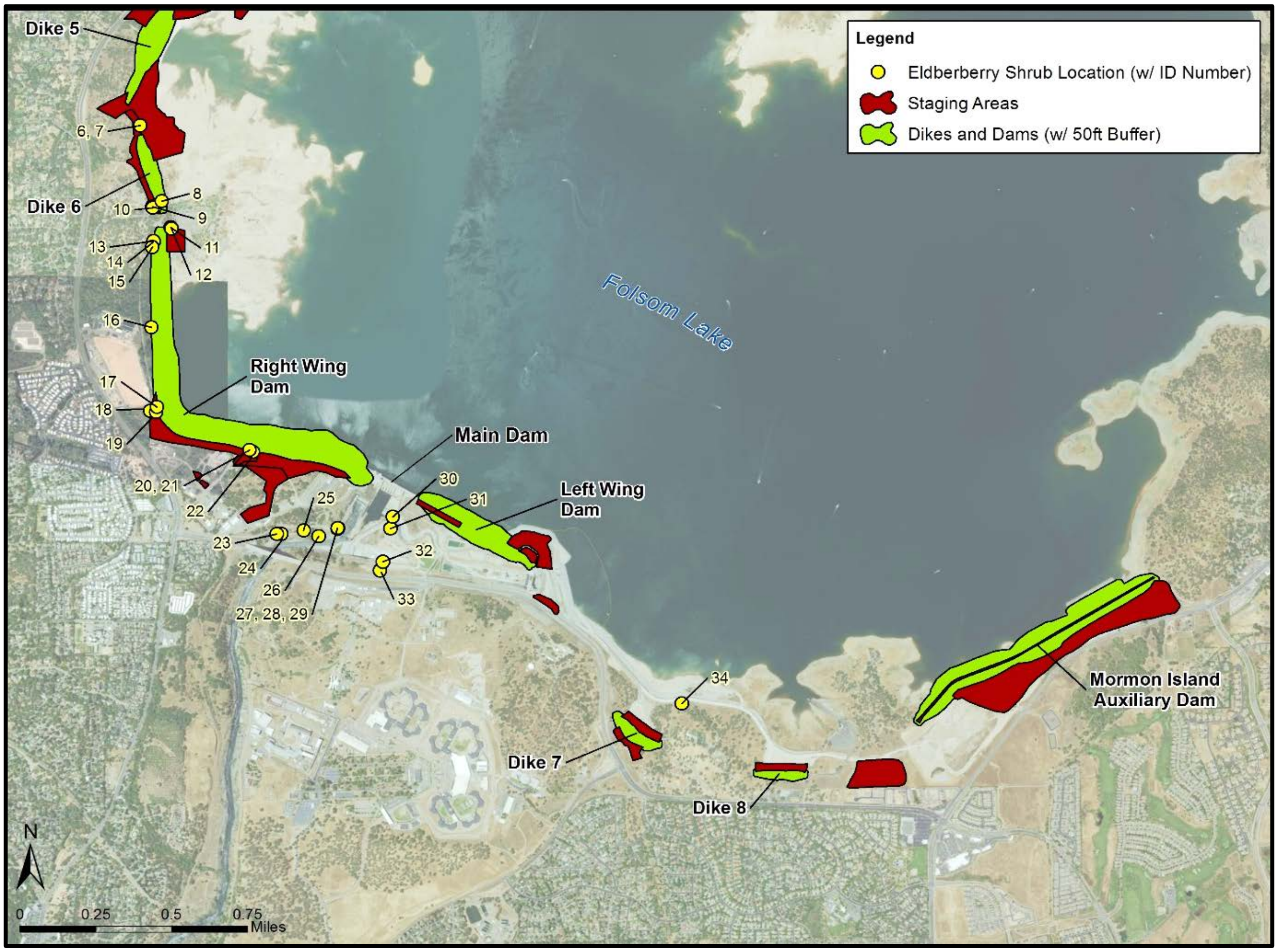

Figure 3-8. Approximate locations of existing elderberry shrubs located within or near the Folsom Dam Raise project features. Southern portion of project.

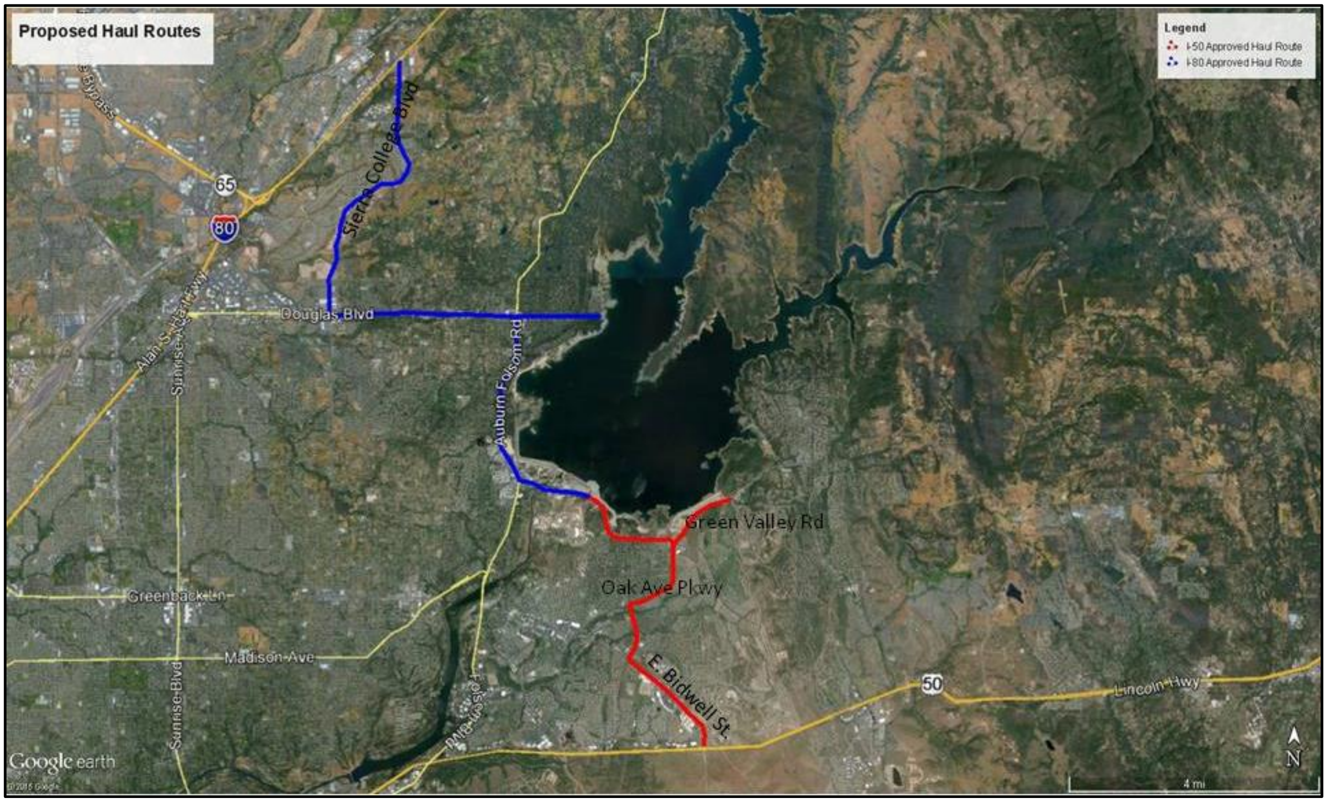

Figure 3-9. Proposed Folsom Dam Raise Project Haul Roads Vicinity Map.

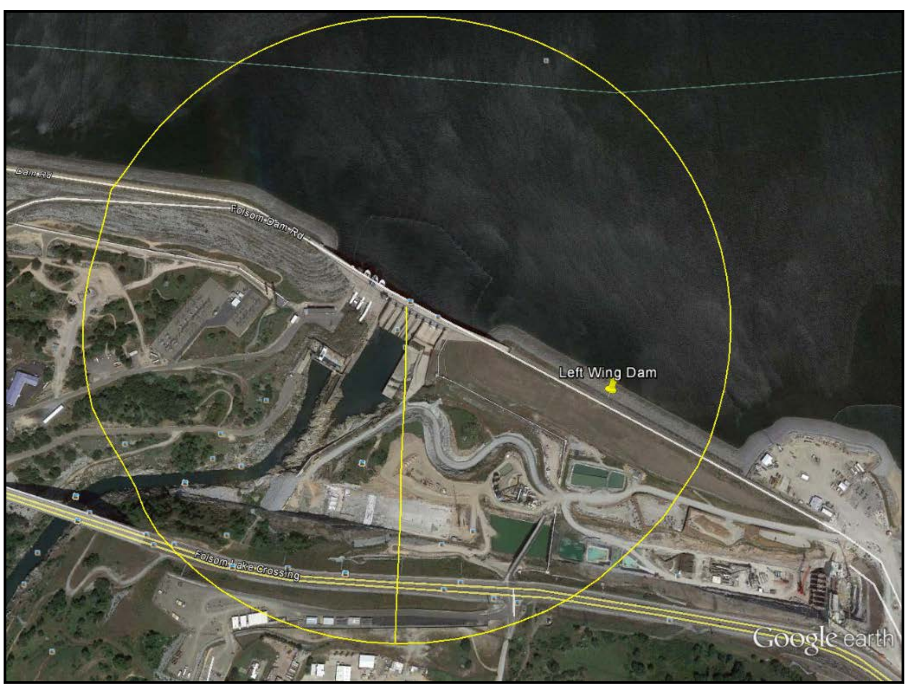

Figure 3-10. 2,000 Foot Noise Buffer around Folsom Main Dam.

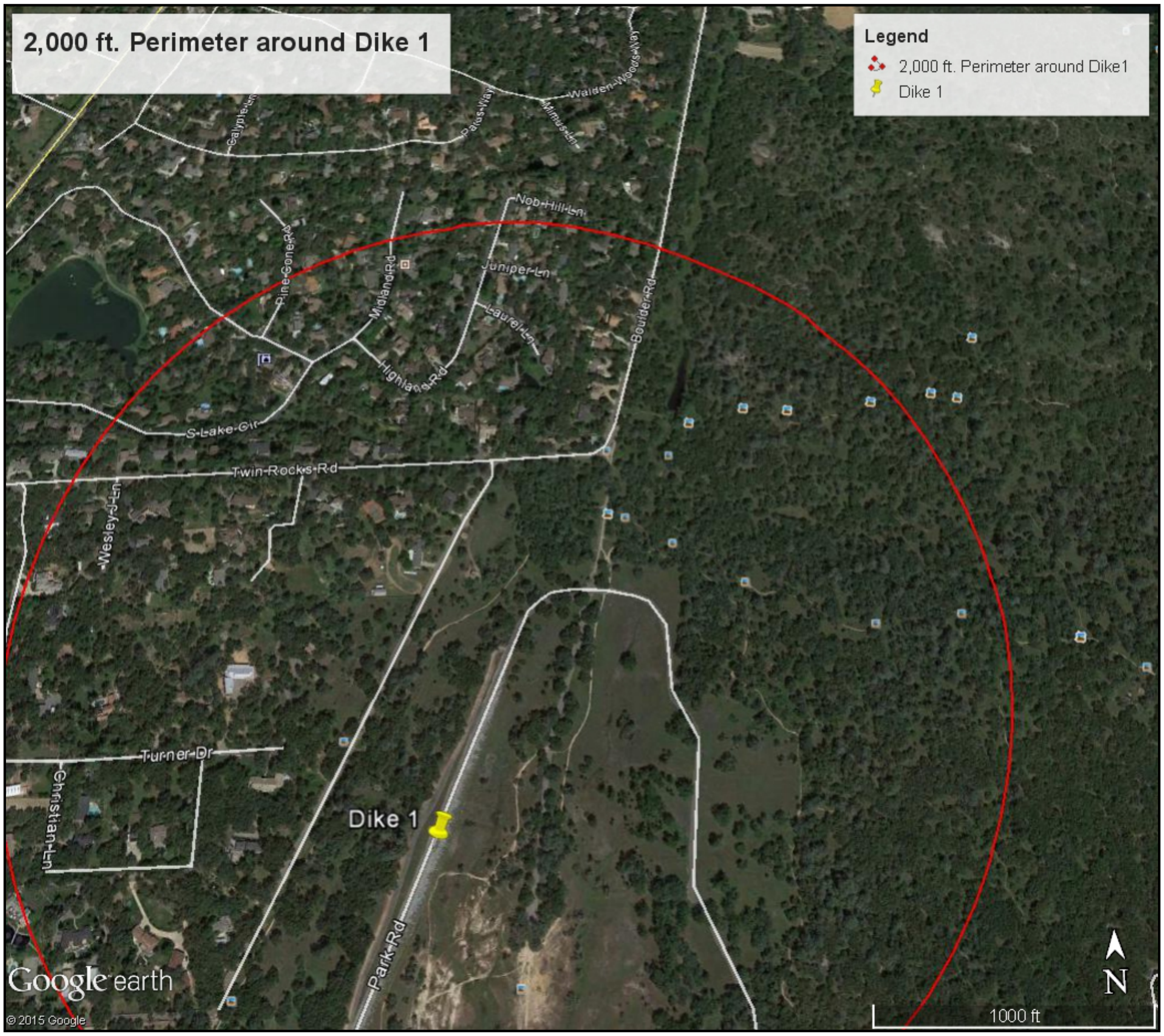

Figure 3-11. 2,000 Foot Noise Buffer around Dike 1.

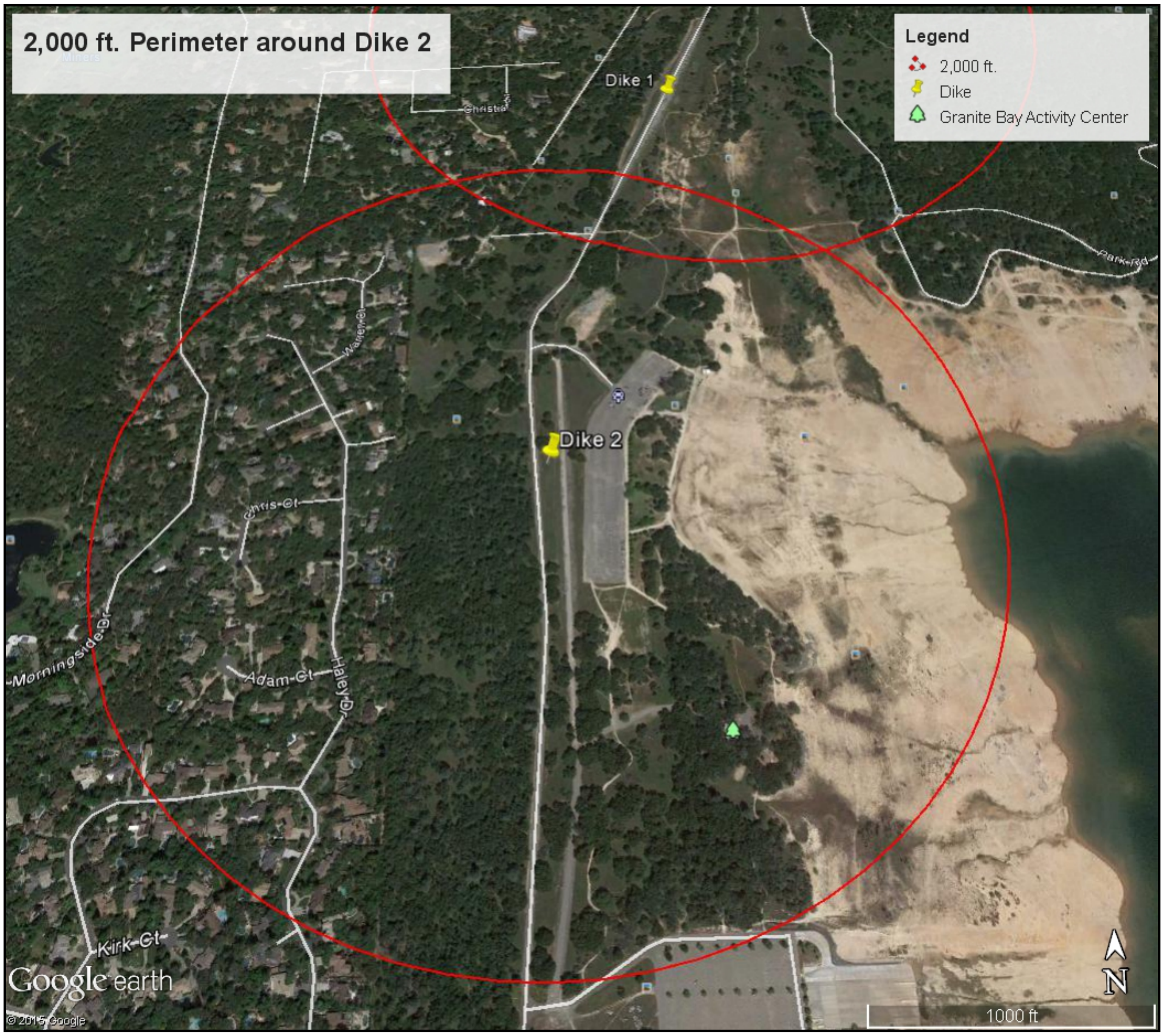

Figure 3-12. 2,000 Foot Noise Buffer around Dike 2.

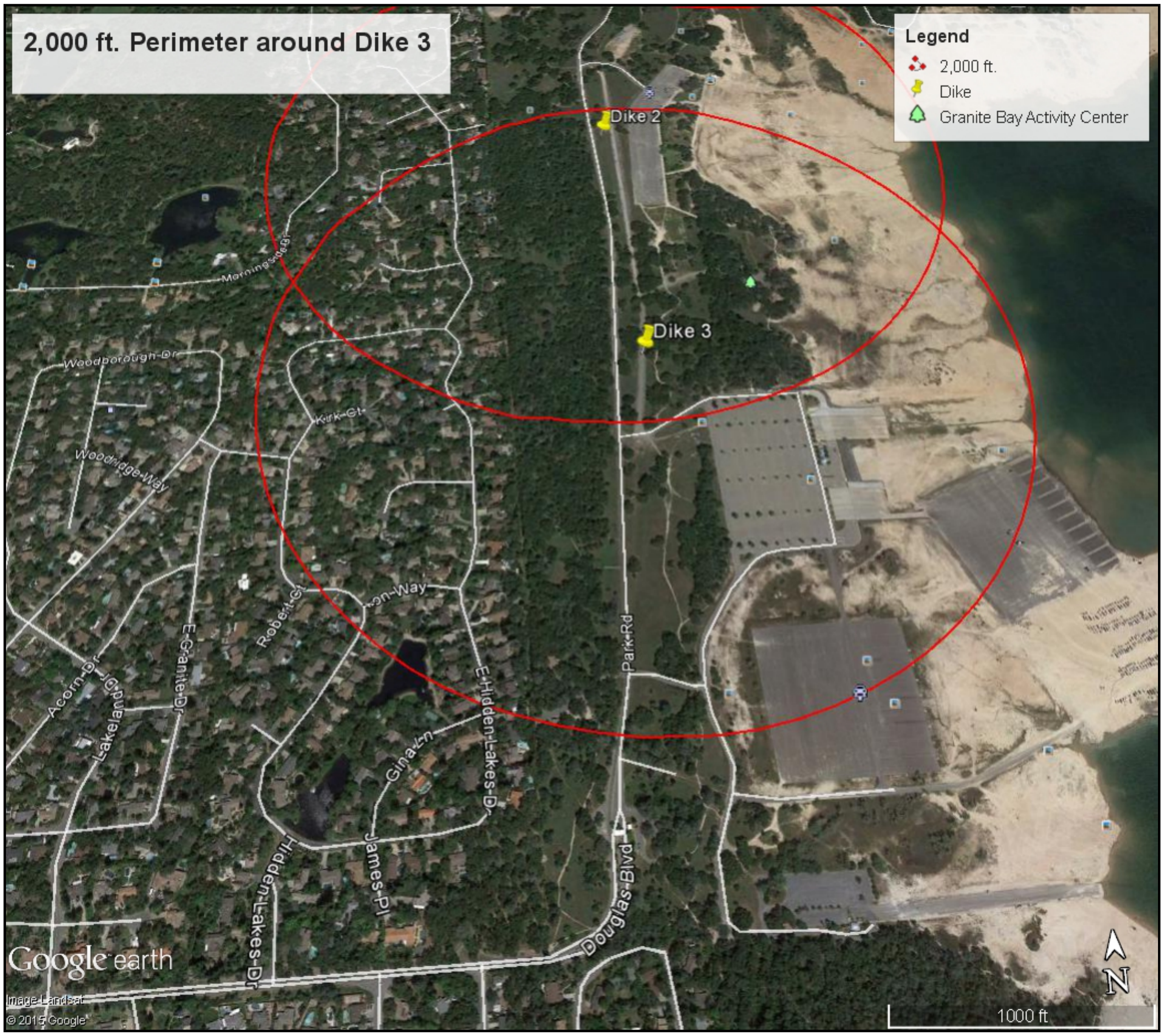

Figure 3-13. 2,000 Foot Noise Buffer around Dike 3.

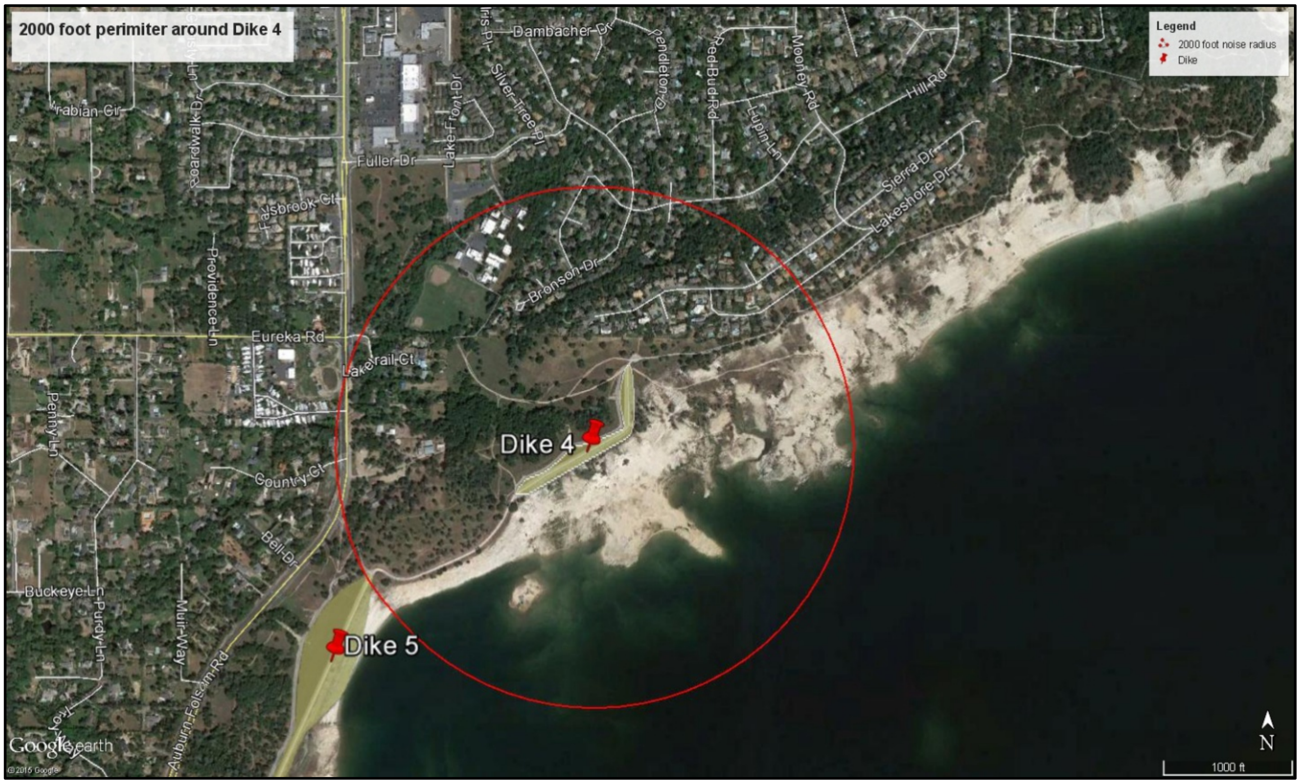

Figure 3-14. 2,000 Foot Noise Buffer around Dike 4.

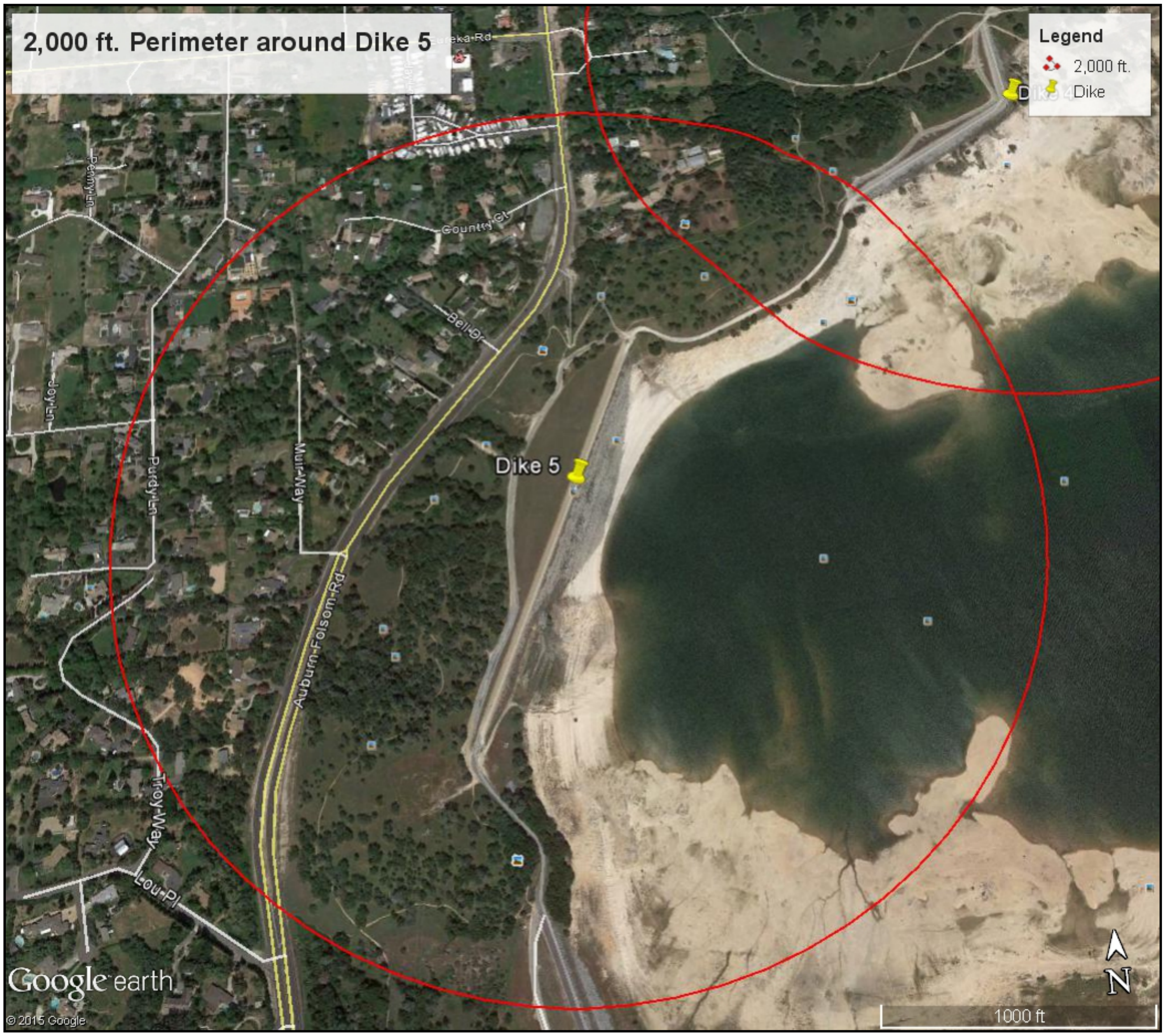

Figure 3-15. 2,000 Foot Noise Buffer around Dike 5.

Figure 3-16. 2,000 Foot Noise Buffer around Dike 6.

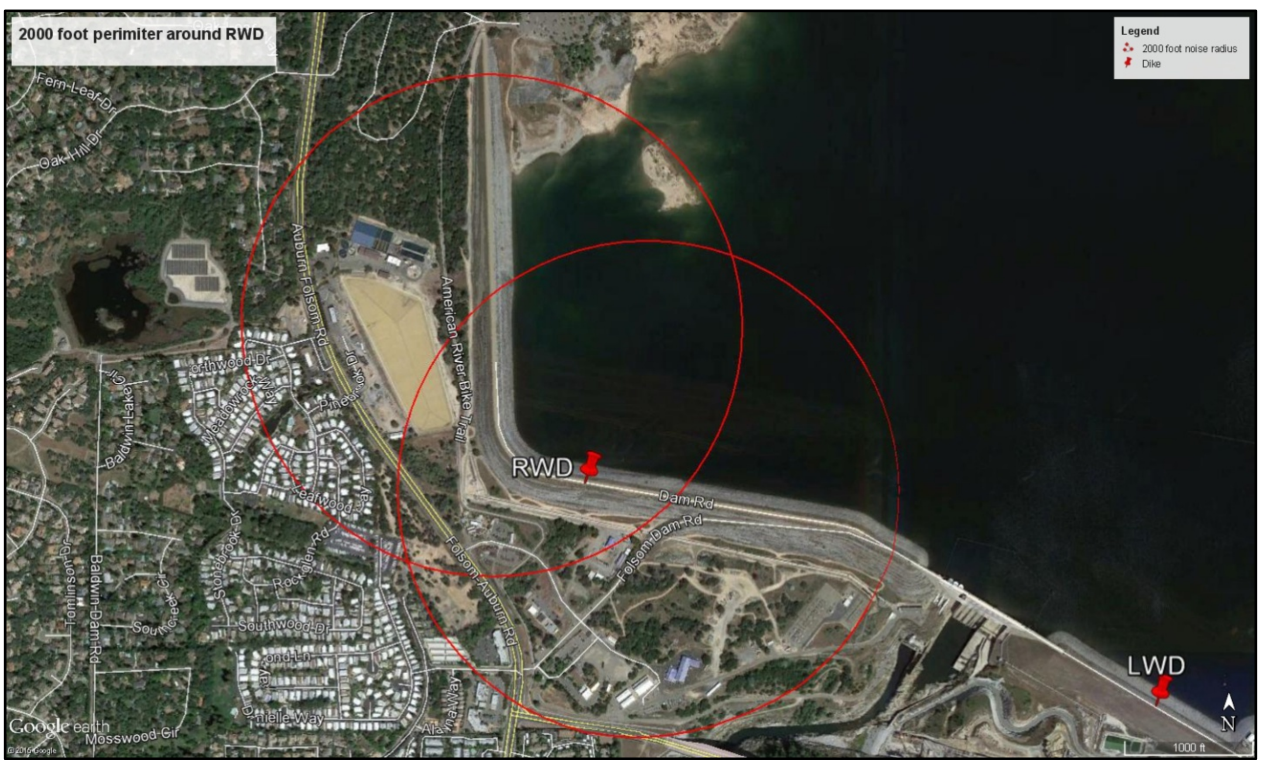

Figure 3-17. 2,000 Foot Noise Buffer around the Right Wing Dam.
*Two buffers were used in assessment due to size of the Right Wing Dam.

Figure 3-18. 2,000 Foot Noise Buffer around the Left Wing Dam.

Figure 3-19. 2,000 Foot Noise Buffer around Dikes 7 and 8.

Figure 3-20. 2,000 Foot Noise Buffer around the Mormon Island Auxiliary Dam (MIAD).

*Two buffers were used in assessment due to size of the Mormon Island Auxiliary Dam.

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APPENDIX A

WETLAND DELINEATIONS

APPENDIX A

PART 1

DIKE 1 WETLAND DELINEATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

JUL 11 2014

Memorandum

To: Drew F. Lessard, Area Manager, U.S. Bureau of Reclamation, Folsom, California

From: Acting Field Supervisor, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Wetland Delineation Report for the for the Folsom Dam Safety and Flood Damage Reduction Project, Sacramento, Placer, and El Dorado Counties, California

This memorandum is in response to your request that the U.S. Fish and Wildlife Service (Service) complete a wetland delineation at Dike 1 of Folsom Dam and the area adjacent to Dike 1 for future use in planning dam safety and flood damage reduction activities. Enclosed is the Service's Wetland Delineation Report for Dike 1 of the Folsom Dam Safety and Flood Damage Reduction Project. We are providing this report for the U.S. Bureau of Reclamation (Reclamation) to include in Reclamation's environmental documents currently being prepared for the above referenced project.

I look forward to a continuing cooperative partnership with Reclamation in development of this document. If you have any questions regarding this memorandum, please contact Mark Littlefield, Chief, Watershed Planning Branch, or Amber Aguilera, Fish and Wildlife Biologist, at (916) 414-6600.

Enclosure

Wetland Delineation Report for the U.S. Bureau of Reclamation

Folsom Dam Safety and Flood Damage Reduction Project

Prepared for:
U.S. Bureau of Reclamation
Central California Area Office

Prepared by:
U.S. Department of the Interior
Fish and Wildlife Service
Sacramento Fish and Wildlife Office

July 2014

Introduction

The U.S. Army Corps of Engineers (Corps) regulates impacts to waters of the United States under the jurisdictional authority of Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (33 U.S.C. 403; 33 U.S.C. 1344). Jurisdictional waters of the United States include all navigable waters, interstate waters, their tributaries, and adjacent wetlands (Environmental Laboratory 1987).

The purpose of this report is to describe the extent and type of jurisdictional wetlands and other waters of the United States present within the proposed project area that fall under the jurisdiction of Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Accordingly, this report addresses all identified potential jurisdictional waters of the United States, including wetlands, within Dike 1 located east of the town of Granite Bay in southeastern Placer County, California, for the Bureau of Reclamation's (Reclamation) Folsom Dam Safety and Flood Damage Reduction Project (project). Data and conclusions contained in this report are based on information gathered in the field, the *1987 U.S. Army Corps of Engineers Wetland Delineation Manual*, and Federal regulations governing wetland areas.

Definitions and Criteria

Wetlands. For regulatory purposes, wetlands are a subgroup of waters of the United States defined as areas that are inundated, or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328.3; 40 CFR 230.3).

Other Waters of the United States. As used in this report, this term refers to unvegetated waterways and water bodies with a defined bed and bank and an ordinary high water mark, such as drainages, creeks, rivers, and lakes. Other waters of the United States typically lack hydrophytic vegetation and may also lack hydric soils.

Study Area

Folsom Dam is located about 25 miles east of the City of Sacramento in the American River Basin. Folsom Dam and Lake, a multipurpose water project, was constructed by the Corps in 1955 and is operated by Reclamation as part of the Central Valley Project. Folsom Dam regulates runoff from about 1,875 square miles. The lake provides flood protection for the Sacramento area; water supply for irrigation, domestic, municipal, and industrial uses; and hydropower. The lake also provides extensive water-related recreational opportunities; water quality control in the Sacramento-San Joaquin Delta; and maintenance of flows stipulated to balance anadromous and resident fisheries, wildlife, and recreational considerations in and along the lower American River. The maximum crest elevation for Folsom Lake is 480.5 feet, but Reclamation operates the lake at a maximum elevation volume of 466 feet. For the purposes of this report, the maximum pool elevation of 466 feet is used as the maximum normal pool elevation of the lake. Appendix 1 depicts a general location map of Dike 1 in relation to Folsom Lake, a project vicinity map, and a study area map.

Summary of Findings

The project area supports a total of 36.0484 acres of jurisdictional wetlands and other waters of the United States. Jurisdictional wetlands include limited areas of freshwater marsh and seasonal wetlands typically located within or adjacent to streams, swales, or other drainages. Upland areas included areas lacking indicators of wetland vegetation, wetland soils, and/or other wetland hydrology, such as riparian and oak woodlands, annual grasslands, historic borrow/spoil sites, roads, parking areas, and disturbed areas.

Project Area and Description

The project area is located on Reclamation lands adjacent to Folsom Lake in southeastern Placer County, California, near the town of Granite Bay. Large portions of the project area have been historically altered (graded, leveled, etc.) during the construction of Dike 1 and for public recreation facilities; however, some areas of open space and native habitat remain.

Soils. Soils within the project area are mapped as Andregg and Xerorthent. Some of the sites are mapped as water, but are currently not inundated due to Folsom Lake being below the maximum normal pool elevation. These sites were still surveyed, but it is understood that they would normally be inundated from the lake and may not show the typical soil characteristics of a wetland. The following soil descriptions are adapted from the most recent U.S. Department of Agriculture, Soil Conservation Service Soil Survey of Placer County, California, Western Part (SCS 1980). See Appendix 2 for maps of the soils within the project area.

Andregg soils occur within the project area on 2 to 15 percent slopes. This moderately deep, well-drained soil is located on foothill locations. Parent material for these soils is granitic. Slopes are complex. Typically surface layers are grayish-brown coarse sandy loam about 15 inches thick. Sub-soils are pale brown and very pale brown coarse sandy loam about 14 inches thick.

Xerothent soils, or cut and fill areas, occur throughout the project area. This well-drained material consists of mechanically removed and mixed soil in which horizons are no longer discernable. Surface runoff is very rapid and the hazard for erosion is moderate. Permeability and available water capacity is variable.

Vegetation. Vegetation within the project area is mainly oaks, willows, annual grasses, and a variety of native and non-native forbs.

Methodology

Delineation of wetlands and waters of the United States within the project area was based on the delineation process for routine determinations as described in the *1987 U.S. Army Corps of Engineers Wetland Delineation Manual* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*. For non-wetland waters of the United States, areas located below the maximum pool elevation (elevation of 466 feet) of Folsom Lake were considered other waters of the United States whether or not wetland criteria were met. For areas not within the pool of Folsom Lake, non-wetland waters of the United States located within the Ordinary Mean Waterline were considered waters of the United States.

The objective of the wetland assessment was to gather information on the vegetation, soils, and hydrologic conditions of the project area and then determine the total acreage of areas potentially subject to the Corps' jurisdiction. Plant species were identified based on Reed 1988 and Hickman 1993, and then recorded as hydrophytic or upland based on classifications by Reed, 1988. Soil colors were determined based on the Munsell® soil color chart (Munsell 1992). Soil taxonomy and drainage characteristics were determined based on the U.S. Department of Agriculture, Soil Conservation Service's 1980 soil survey for the western part of Placer County.

Field investigation procedures for wetlands were conducted on May 29-30, 2014, by U.S. Fish and Wildlife Service and Reclamation staff (see Appendix 3 for a list of delineators and preparers). The entire corridor within and adjacent to the project area was assessed visually on foot. Data forms for each site are included in this report as Appendix 4.

Vegetation

The vegetation within each site was examined for the presence of wetland indicator species as listed in the *National List of Plant Species that Occur in Wetlands: California (Region 0).* When more than 50 percent of the dominant species in a plant community have an indicator status of obligate wetland, facultative wetland, and/or facultative, hydrophytic vegetation is determined to be present. A total of 10 sites within the project area were closely examined during the assessment to identify and determine the plant species present and their composition. See Appendix 5 for a list of species common to all sites.

Hydrology

Each site was assessed for the presence of wetland hydrology. The term "wetland hydrology" encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Indicators of wetland hydrology may include but are not limited to:

- Drift lines
- Sediment deposition
- Watermarks
- Historic records and
- Visual observation of saturated soils and/or inundation

Soils

Hydric soils require long periods (hundreds of years) for development of wetland soil characteristics and most man-induced wetlands have not been in existence for a sufficiently long enough period to allow for their development. Soil pits were dug and soil color was noted at sites where there was the presence of wetland hydrology and/or hydrophilic vegetation. Soil maps for the project area can be accessed online through the U.S Department of Agriculture's Natural Resources Conservation Service Web Soil Survey (NRCS 2013). This soil survey and its attendant maps were reviewed prior to field visits.

Conclusions

The project area contains 36.0484 acres of jurisdictional wetlands and other waters of the United States. The wetland features within the project area are characterized as seasonal swales and drainages. One of the wetland features on the landside of Dike 1 may receive water year around as a result of seepage under Dike 1 from Folsom Lake. In addition, about 36.0 acres of the project area is normally inundated by Folsom Lake, which would be classified as other waters of the United States. Due to 2 years of drought within the California Central Valley, the pool elevation of Folsom Lake is extremely low and several vegetated features were identified below the maximum normal pool elevation. Table 1 describes the wetland types and acreages found within the project area. Appendix 6 contains map locations of the jurisdictional wetlands and other waters of the United States within the project site. Appendix 7 contains site photos.

<u>Other Waters of the United States</u>
A total of 36.0 acres of other waters of the United States occur within the project area. This includes 2.1535 acres of vegetated wetlands which occur below the maximum normal pool elevation of Folsom Lake. SW010 is bisected by the maximum normal pool elevation of Folsom Lake, so 0.0069 acre of the feature is defined as a vegetated wetland below the maximum normal pool elevation, while the remaining 0.0335 acre is defined as a wetland swale/drainage feature.

Table 1. Summary of the jurisdictional waters of the United States within the project site.

Wetland Type	ID#	Acreage	Total Acreage
Other Waters of the U.S. Folsom Lake	--	--	36.0
Other Waters of the U.S. Vegetated Wetlands Below the Maximum Pool Elevation of Folsom Lake	SW001	0.0190	2.1535
	SW002	0.5176	
	SW003	0.6285	
	SW004	0.2511	
	SW005	0.1446	
	SW006	0.4854	
	SW007	0.0489	
	SW009	0.0515	
	SW010*	0.0069	
Wetland Features Swales/Drainages[1]	SW008	0.0149	0.0484
	SW010*	0.0335	

[1] Areas identified as swales/drainages are also waters of the U.S., but are separated within the table as they may also have wetland features such as hydrophilic vegetation and/or indicators of hydric soils in addition to a hydrologic connection to a navigable waterway.
*SW010 is bisected by the maximum normal pool elevation of Folsom Lake.

Seasonal Wetland

There is 0.0484 acre of seasonal wetlands located within the project area. As described above, feature SW010 is classified as both a seasonal wetland and a vegetated wetland below the maximum normal pool elevation of Folsom Lake. In general, plant species found in seasonal wetlands within the project area range from facultative to wetland obligates as defined in the *National List of Plant Species that Occur in Wetlands: California (Region 0).* Vegetation within these seasonal wetlands is highly variable, but these features commonly support annual wildrye (*Lolium perenne*), curly dock (*Rumex crispus*), *Eleocharis palustris*, and *Mimulus* spp.

For the purposes of this report, the 0.0484 acre of seasonal wetlands located within the project area are further described as swales and drainages, which are defined as slope wetlands which convey water on a seasonal basis. Vegetation within swales and drainages within the project area are variable and have few wetland species present. Portions of these swales exhibit wetland species typically found in disturbed habitat types, as described above.

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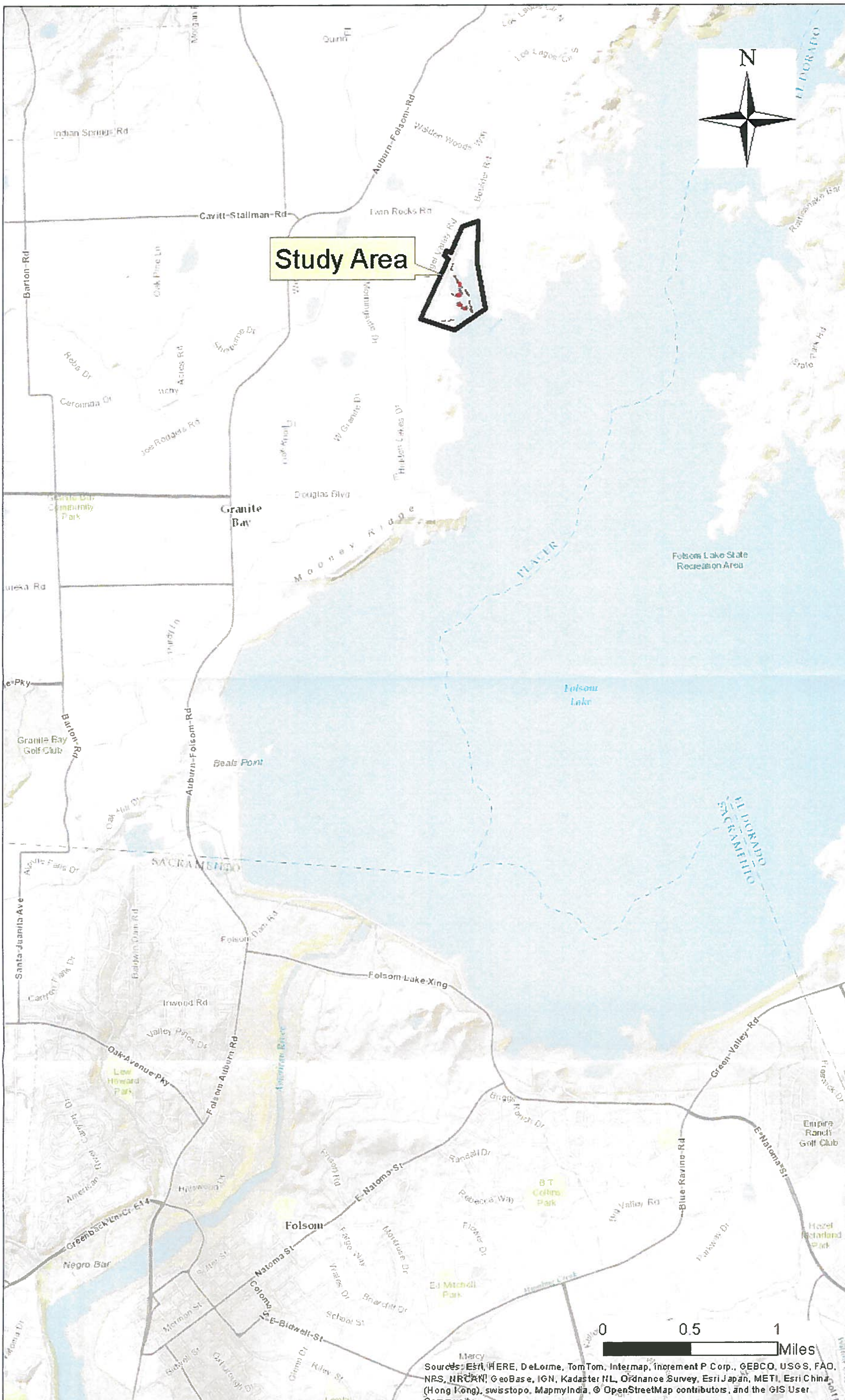
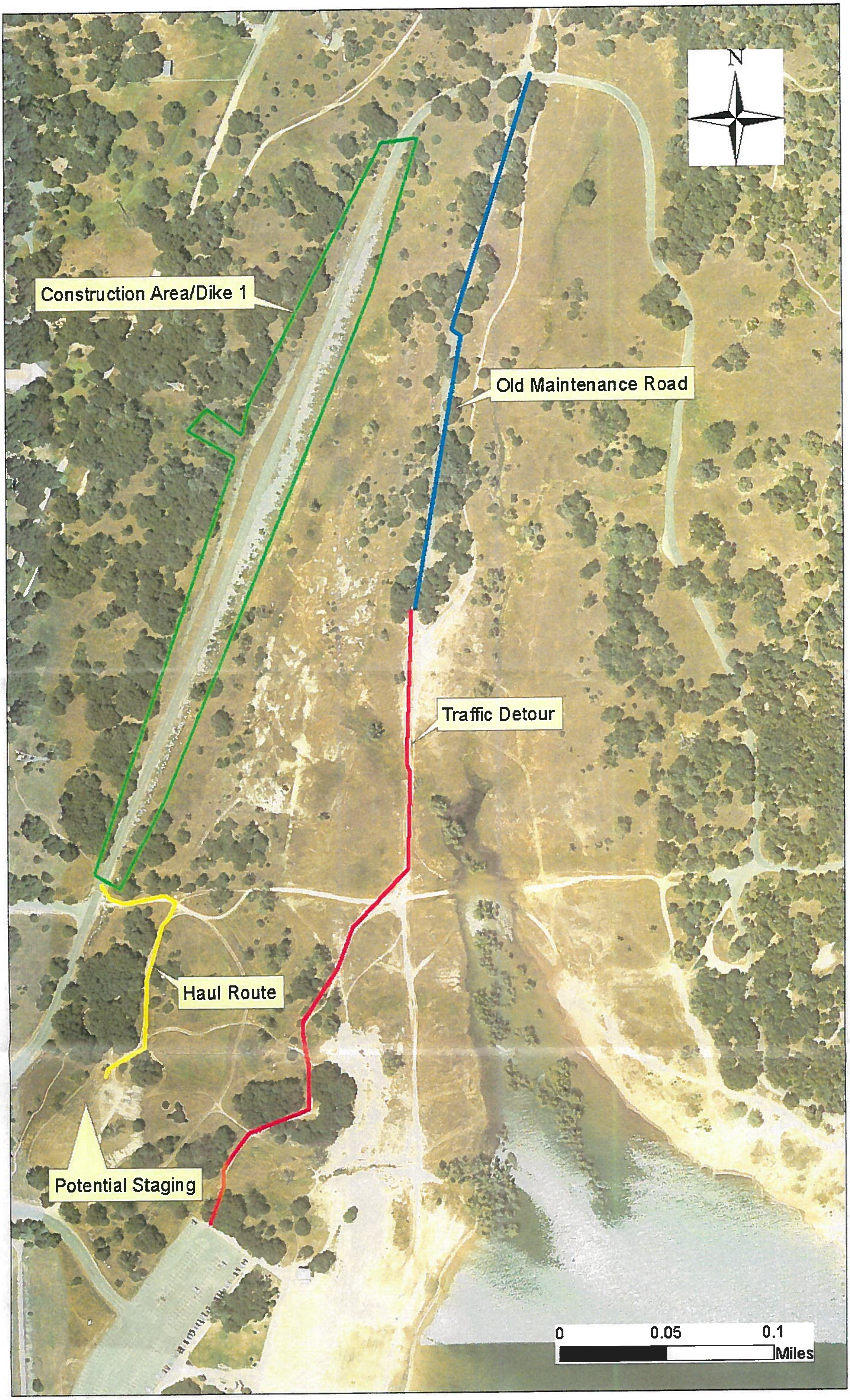
Appendix 1
General Location, Project Vicinity and Study Area Maps

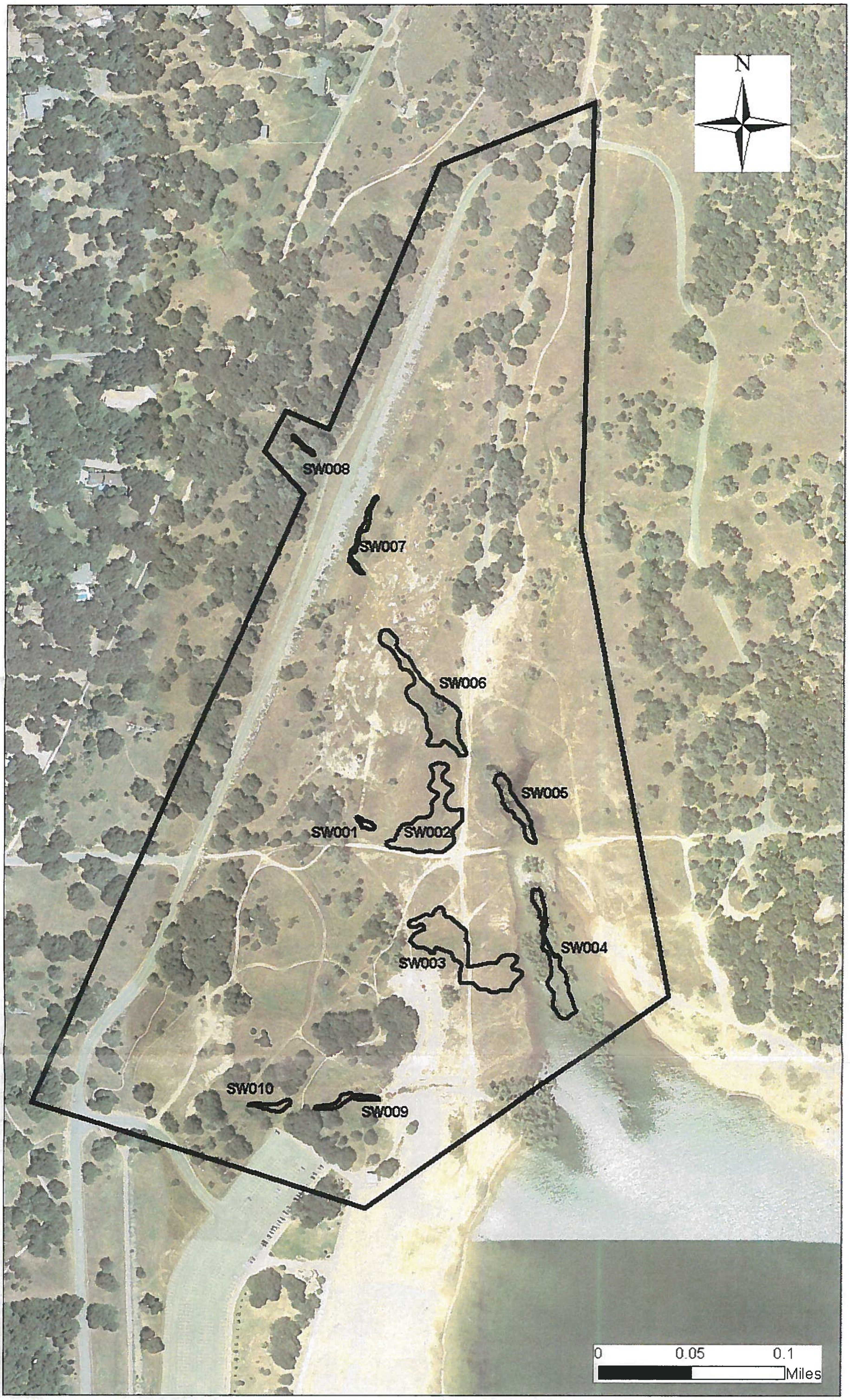
General Location of Project Area



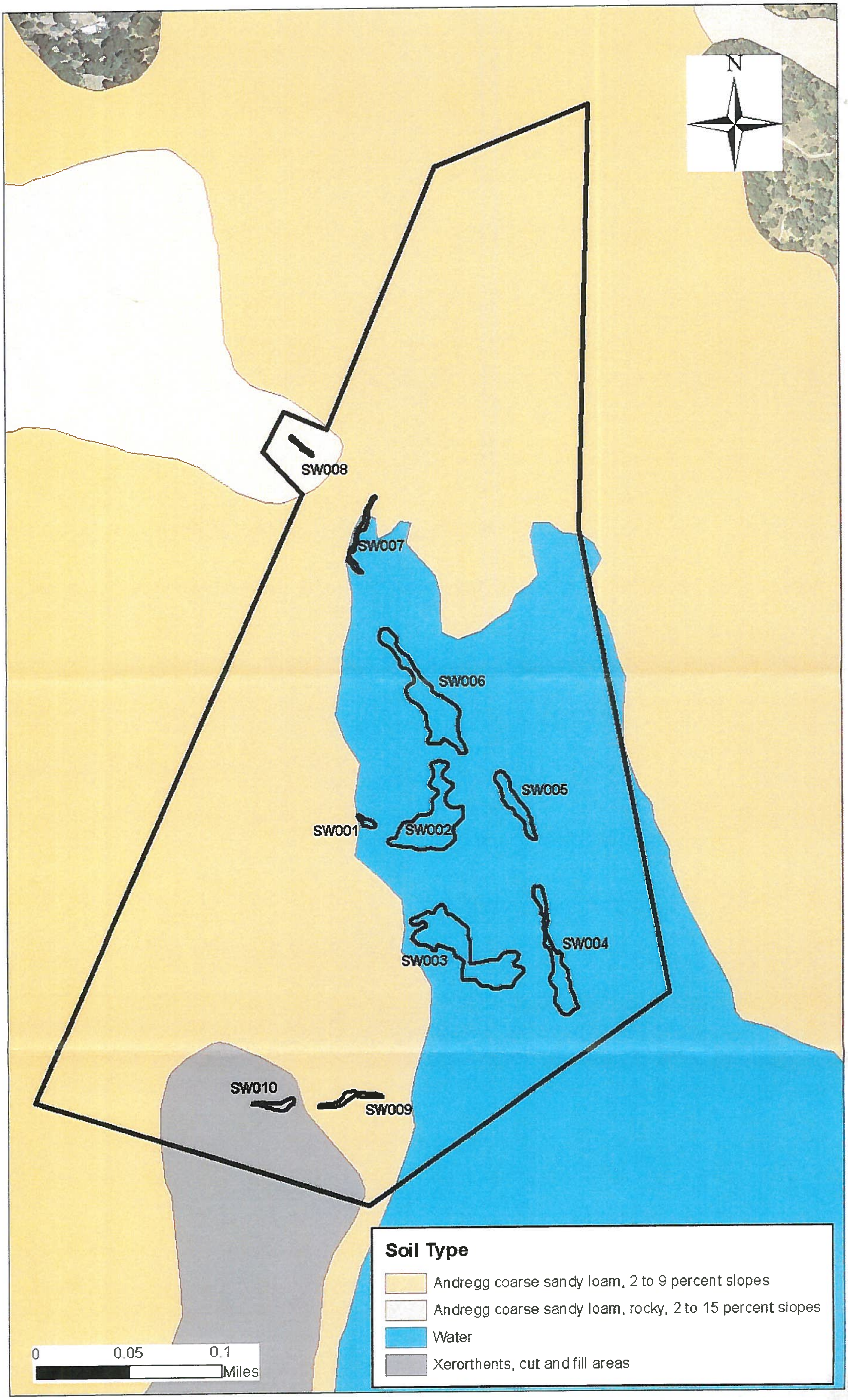
Project Vicinity Map



Study Area


N
SW008
SW007
SW006
SW005
SW001
SW002
SW003
SW004
SW010
SW009
0
0.05
0.1
Miles

Soil Types


N
SW008
SW007
SW006
SW005
SW001
SW002
SW004
SW003
SW010
SW009
Soil Type
Andregg coarse sandy loam, 2 to 9 percent slopes
Andregg coarse sandy loam, rocky, 2 to 15 percent slopes
Water
Xerorthents, cut and fill areas
0
0.05
0.1
Miles

Appendix 2
Soil Map

Soil Map—Placer County, California, Western Part

Map Scale: 1:5,630 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 6, Dec 13, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

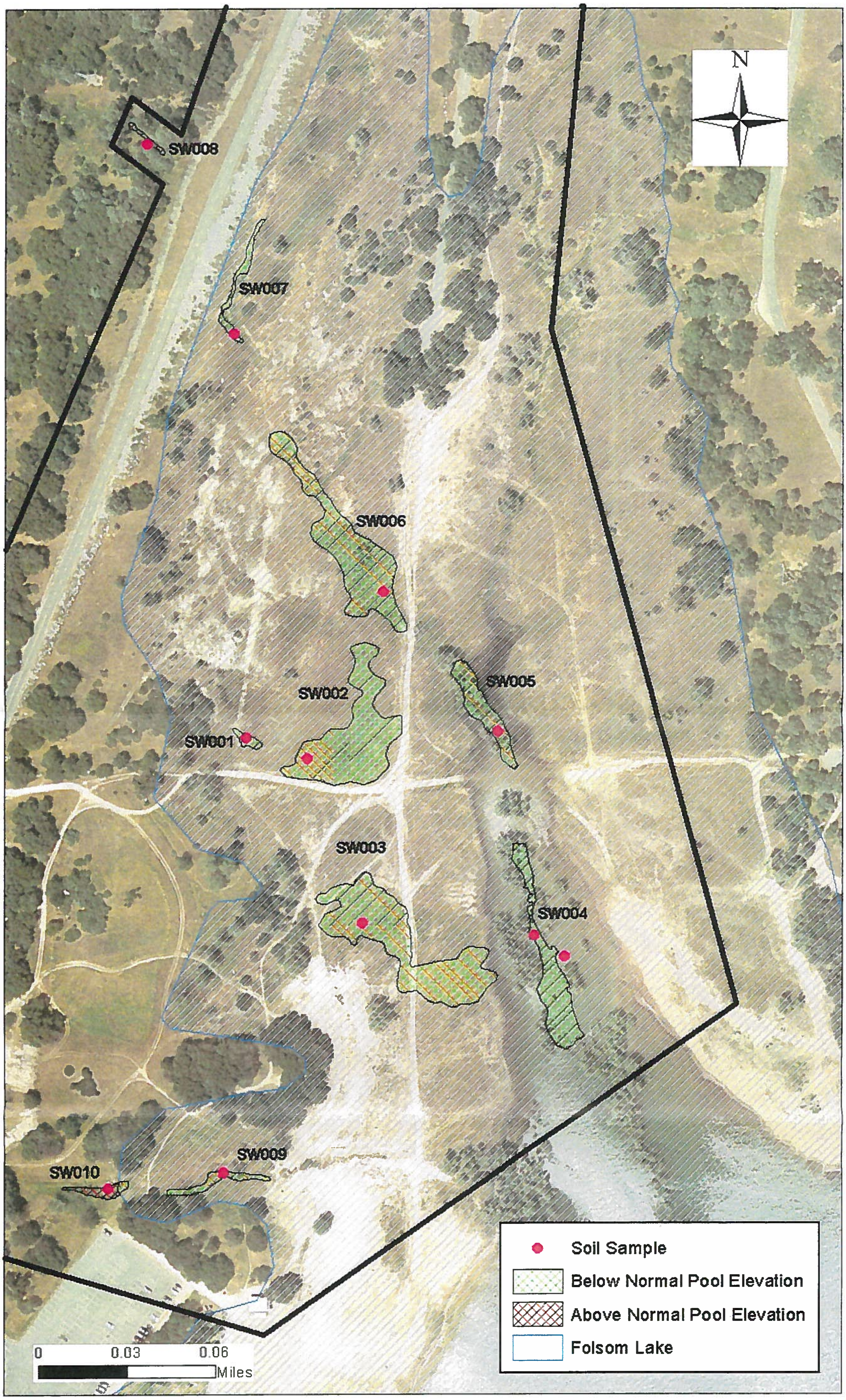
Date(s) aerial images were photographed: Nov 3, 2010—Apr 29, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Placer County, California, Western Part (CA620)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
106	Andregg coarse sandy loam, 2 to 9 percent slopes	47.1	63.2%
109	Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	1.2	1.6%
196	Xerorthents, cut and fill areas	3.0	4.0%
198	Water	23.3	31.2%
Totals for Area of Interest		**74.6**	**100.0%**

Jurisdictional Wetlands and Other Waters of the U.S. near Dike 1



SW001 - SW006


N
SW006
SW002
SW001
SW005
SW003
SW004
Soil Sample
Below Normal Pool Elevation
Above Normal Pool Elevation
Folsom Lake
0
0.03
0.06
Miles

SW007 and SW008

Appendix 3
Names of Delineators and Preparers

<u>Delineators</u>

Mark Littlefield, U.S. Fish and Wildlife Service
Amber Aguilera, U.S. Fish and Wildlife Service
Harry Kahler, U.S. Fish and Wildlife Service
Jessica Andrieux, U.S. Bureau of Reclamation

<u>Preparer</u>

Amber Aguilera, U.S. Fish and Wildlife Service

Appendix 4
Datasheets

Acreage: 0.018995
5100/01

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom - Dike 1 City/County: Granite Bay/Placer Sampling Date: 5/29/14

Applicant/Owner: USBOR State: CA Sampling Point: WM001

Investigator(s): HL, AA, HK, JA Section, Township, Range: ________ VW001

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): ________ Slope (%): 1-2%

Subregion (LRR): ________ Lat: ________ Long: ________ Datum: ________

Soil Map Unit Name: 198 NWI classification: non wetland
NWI - juncus wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✓

Are Vegetation ✓, Soil ✓, or Hydrology ✓ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ✓
Hydric Soil Present?	Yes ____	No ✓
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks: site was below pool elevation and potentially disturbed during construction of adjacent dike
- vegetated wetland

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Trifolium Sp.	8%	✓	FAC?
2. Eleocharis palustris	50%	✓	OBL
3. Distichlis Spicata	4%	✓	FACW*
4. Bare ground	28%		—
5. Rattlesnake grass Briza Media	6	✓	FAC
6. Threeawn grass	3		UP
7. Dove weed Croton setigerus	3		UP
8. Phyla nodiflora	3		FACW
Lotus corniculatus	3		FAC
Total Cover:	Total: 100		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust 0

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ~~6~~ 4 (A)

Total Number of Dominant Species Across All Strata: ~~8~~ 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ~~.75~~ 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	7	x 2 =	14
FAC species	17	x 3 =	51
FACU species	—	x 4 =	
UPL species	6	x 5 =	30
Column Totals:	80 (A)		145 (B)

Prevalence Index = B/A = 1.81

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ____

Wetland

SOIL

Sampling Point: WM001

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
16	2/4 5YR	100%					Sandy Loam	A. 1/4 in organic material

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No X

Remarks:
Soil type, vegetation roots are black, Dry Sandy Loam
No streaks of different colors w/in soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ✓ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ________

Water Table Present? Yes ____ No ✓ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes X No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
Photo: 87-93 GPS: VW001 / WM001

Remarks:
Below gross pool elevation

Acreage: 0.517601
SW002

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom - Dike 1 City/County: Granite Bay/Placer Sampling Date: 5/29/14

Applicant/Owner: US BOR State: CA Sampling Point: WM002

Investigator(s): ML, AA, HK, JA Section, Township, Range: VW002

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): ______ Slope (%): 1-2%

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: 198 NWI classification: non-wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No ✓ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No ✓

Are Vegetation ✓, Soil ✓, or Hydrology ✓ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ___	No ✓
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? Yes ✓ No ___

Remarks: Site was below pool elevation and most likely disturbed during construction of adjacent dike.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Hair grass (Deschampsia danthonioides)	5%		FACW
2. Eleocharis palustris	80%	✓	OBL
3. Lactuca serriola	2%		FACU
4. Rumex crispus	2%		FACW-
5. Vicia sativa (vetch)	2%		FACU
6. Unknown #1 (Trifolium spp.)	2%		FAC?
7. Distichlis spicata	5%		FACW*
8. Sporobolus airoides	2%		FAC+
Solidago spp (golden rod) → trace			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum Ø % Cover of Biotic Crust Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	80	x 1 = 80
FACW species	12	x 2 = 24
FAC species	4	x 3 = 12
FACU species	4	x 4 = 16
UPL species	0	x 5 = 0
Column Totals:	100 (A)	132 (B)

Prevalence Index = B/A = 1.32

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%
✓ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: WM002

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
6	3/3 10YR	100%					Sandy Silt/Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
✓ Drift Deposits (B3) (**Nonriverine**)
__ Surface Soil Cracks (B6)
✓ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______
Water Table Present? Yes ___ No ✓ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Photo 94-96 GPS VW002

Remarks: Below gross pool elevation

acreage: 0.628539
SW003

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike 1 City/County: Granite Bay/Placer Sampling Date: 5/29/14

Applicant/Owner: US BOR State: CA Sampling Point: WM003

Investigator(s): ML, AA, HK, JA Section, Township, Range: VW003

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): ______ Slope (%): 0-1%

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: 198 NWI classification: Wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✓

Are Vegetation ✓, Soil ✓, or Hydrology ✓ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks: Site is below pool elevation and was most likely disturbed during construction of the adjacent dike.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. (Cocklebur) Xanthium spp	1		FAC+
2. (Monkey Flower) Mimulus spp	2		OBL
3. Eleocharis palustris	55	✓	OBL
4. Erodium botrys (stork bill)	4		FACU
5. Sporobolus airoides	1		FAC+
6. Persicaria lapathifolia (?)	25	✓	FACW
7. ? (Rabbit Foot) Polypogon elongatus	4		OBL
8. Briza minor	4		FAC
Distichlis spicata	2%		FACW+
Total Cover:			
Woody Vine Stratum			
1. Sisymbrium (Mustard)	2%		
2. altissimum			FACU
Total = 100%			
Total Cover:			

% Bare Ground in Herb Stratum Ø % Cover of Biotic Crust Ø

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	61	x 1 = 61
FACW species	27	x 2 = 54
FAC species	6	x 3 = 18
FACU species	6	x 4 = 24
UPL species	Ø	x 5 =
Column Totals:	100 (A)	157 (B)

Prevalence Index = B/A = 1.57

Hydrophytic Vegetation Indicators:

- ✓ Dominance Test is >50%
- ✓ Prevalence Index is ≤3.0[1]
- __ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: Pacific Chorus Frog adult

SOIL

Sampling Point: WM003

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 5/3	100					Sandy clay	
2-8	10YR 4/4	95	7.5YR 5/8	5			Sandy clay	Redox ↑ deeper

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______________________

Depth (inches): ______________________

Hydric Soil Present? Yes ✓ No ______

Remarks:

Redox increases w/ depth.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- X Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ______	No ✓	Depth (inches): ______
Water Table Present?	Yes ______	No ✓	Depth (inches): ______
moist Saturation Present? (includes capillary fringe)	Yes ✓	No ______	Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

GPS WW003 Photos 97-107

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike #1 City/County: Granite Bay/Placer Sampling Date: 5/29/14

Applicant/Owner: US BOR State: CA Sampling Point: WM004

Investigator(s): ML AA HK JA Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland? Yes ______ No X
Hydric Soil Present?	Yes ✓ No ______	
Wetland Hydrology Present?	Yes ✓ No ______	

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:			
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)

Total Number of Dominant Species Across All Strata: ______ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ______ No ✓

Remarks: Multiple Pacific Chorus Frogs Toad — outside of VW003

SOIL

Sampling Point: WM004

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3		10YR 5/8				Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ______ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- X Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ______ Depth (inches): ____________

Water Table Present? Yes ______ No ______ Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ______ No ______ Depth (inches): ____________

Wetland Hydrology Present? Yes ______ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Based on ocular estimate of vegetation - not a wetland.

No photos?

Acreage: 0.251141
SWΦΦ4

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike #1   City/County: Granite Bay/Placer   Sampling Date: 5/29/14 WM005

Applicant/Owner: US BOR   State: CA   Sampling Point: 1 VW004

Investigator(s): ML AA HK JA   Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______   Local relief (concave, convex, none): ______   Slope (%): ______

Subregion (LRR): ______   Lat: ______   Long: ______   Datum: ______

Soil Map Unit Name: 198   NWI classification: Wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed?   Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ✓, Soil ✓, or Hydrology ✓ naturally problematic?   (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______
Hydric Soil Present?	Yes X	No ______
Wetland Hydrology Present?	Yes X	No ______
Is the Sampled Area within a Wetland?	Yes X	No ______

Remarks:
Site is normally below pool elevation. Potentially disturbed during construction of adjacent parking lot/dike.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	30	✓	FACW
2. (Salix gooddingii?)			
3.			
4.			
Total Cover:	30%		
Sapling/Shrub Stratum			
1. ~~[illegible]~~	30		
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Eleocharis palustris	38	✓	OBL
2. (nut sedge) Cyperus spp	2		FAC
3. Polypogon monspeliensis	Trace		OBL
4. Scirpus spp. (bulrush)	25	✓	OBL
5. Unknown [illegible] (?)	5		
6. Persicaria lapathifolia	15	✓	FACW
7. Poa spp.	Trace		
8. (Monkey Flower) Mimulus spp.	Trace		OBL
Sporobolus airoides	2%		FAC+
~~Woody Vine Stratum~~			
★ 1. Carex spp	10		OBL
2. Typha latifolia	2%		OBL
Herb Total Cover:	100%		

% Bare Ground in Herb Stratum ______   % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	76	x 1 = 76
FACW species	45	x 2 = 90
FAC species	4	x 3 = 12
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	125 (A)	178 (B)

Prevalence Index = B/A = 1.424

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:
Many Pacific Tree Frogs
Western Toad

SOIL

Sampling Point: WM 005

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	5Y 5/1	45	7.5YR 4/6	55	RM			Gley

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- __ Stratified Layers (A5) (**LRR C**)
- __ 1 cm Muck (A9) (**LRR D**)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- X Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1)
- X Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)
- __ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (**LRR C**)
- __ 2 cm Muck (A10) (**LRR B**)
- __ Reduced Vertic (F18)
- __ Red Parent Material (TF2)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- __ Surface Water (A1)
- __ High Water Table (A2)
- X Saturation (A3)
- __ Water Marks (B1) (**Nonriverine**)
- __ Sediment Deposits (B2) (**Nonriverine**)
- __ Drift Deposits (B3) (**Nonriverine**)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- __ Salt Crust (B11)
- __ Biotic Crust (B12)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- X Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Plowed Soils (C6)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water Marks (B1) (**Riverine**)
- __ Sediment Deposits (B2) (**Riverine**)
- __ Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Thin Muck Surface (C7)
- __ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): 0-1

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

VW ØØ4

Remarks:

acreage: 0.144599
SW005

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike 1 City/County: Granite Bay / Placer Sampling Date: 5/29/14

Applicant/Owner: U.S. BOR State: CA Sampling Point: WM006 / WW005

Investigator(s): ML AA HK JA Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: 198 NWI classification: Wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ✓, Soil ✓, or Hydrology ✓ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______
Hydric Soil Present?	Yes X	No ______
Wetland Hydrology Present?	Yes X	No ______

Is the Sampled Area within a Wetland? Yes X No ______

Remarks:
Site is normally below pool elevation. Potentially disturbed during construction of adjacent dike

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra w/ mistletoe goodingii	20%	✓	FACW
2.			
3.			
4.			
Total Cover:	20%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1.	35%	✓	FAC(?)
2. (Nut Sedge) Cyperus spp	10%		FAC
3. (Cocklebur) Xanthium spp	2%		FAC
4. ( ) Eleocharis palustris			OBL
5. (Bulrush) Scirpus spp		✓	OBL
6. Sporobolus airoides			FAC
7. (Golden rod) Solidago spp			
8. Lapathifolia	2%		FACW
Total Cover:		2%	OBL
Woody Vine Stratum elogatus			
1. ( ) Mimulus spp	2%		OBL
2. (Soft chess) Bromus hordeaceus	1%		FACU
(Storksbill) 5% Total Cover:			FACU

Erodium botrys
% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Remarks:
Trifolium spp 1% FAC?
Italian Rye grass trace, 1% FAC Lolium perenne
Anthriscus Caucalis trace, 1% UPL

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	39	x 1 = 39
FACW species	22	x 2 = 44
FAC species	50	x 3 = 150
FACU species	6	x 4 = 24
UPL species	1	x 5 = 5
Column Totals:	118 (A)	262 (B)

Prevalence Index = B/A = 2.22

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%
✓ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ______

SOIL

Sampling Point: WM006

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	7.5YR 4/2	70	10YR 5/6	30	RM		Clay/loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes X No ______

Remarks:
Matrix chroma of 2 or less on non-sandy soils = positive hydric soil indicator.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- X Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ______	No ______	Depth (inches): ______
Water Table Present?	Yes ______	No ______	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes X	No ______	Depth (inches): ______

Wetland Hydrology Present? Yes X No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
VW005

Remarks:

Acreage: 0.485381
SWØØ6

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike 1 City/County: Granite Bay/Placer Sampling Date: 5/29/14
Applicant/Owner: US BOR State: CA Sampling Point: WP0037 / VW006
Investigator(s): ML AA HK JA Section, Township, Range: ______
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): ______ Slope (%): 0-1%
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: 198 NWI classification: Wetland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ✓, Soil ✓, or Hydrology ✓ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______	
Wetland Hydrology Present?	Yes ✓ No ______	

Remarks:
Site is normally below pool elevation. Potentially disturbed during construction of adjacent dike

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra w/ mistletoe	2%		FACW
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: –)			
1. (Cockle burr) Xanthium spp.	7%		FAC+
2. Briza minor	10%		FAC
3. (Monkey flower) Mimulus sp.	5%		OBL
4. Trifolium spp.	trace		FAC?
5. Italian Rye grass	4%		FAC
6. Eleocharis palustris	25%	✓	OBL
7. Alopecurus?	5%		OBL
8. Persicaria lapathifolia	15%		FACW
(Soft chess) Bromus hordeaceus	4%	~~Total Cover~~	FACU
Woody Vine Stratum (Plot size: ______)			
1. Sporobolus airoides	20%	✓	FAC+
2. Rumex crispus	trace		FACW
(Rabbits foot) Polypogon elongatus	4%	~~Total Cover~~	OBL

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ______

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	39	x 1 = 39
FACW species	17	x 2 = 34
FAC species	41	x 3 = 123
FACU species	4	x 4 = 16
UPL species		x 5 =
Column Totals:	101 (A)	212 (B)

Prevalence Index = B/A = 2.1

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
✓ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:
(Mullein) trace
Verbascum thapsus trace FACU

Total = 100%

SOIL

Sampling Point: WM007

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/4	90	7.5YR 5/8	10%	RM			A Horizon: Silty loam, some clay
								B Horizon: Sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3) → Moist not saturated
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ✓ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ✓ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No ✓	Depth (inches): ______
Water Table Present?	Yes ___	No ✓	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes ___	No ✓	Depth (inches): ______

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

VW006

Remarks:

Acreage: 0.04888
SW007

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike 1 City/County: Granite Bay/Placer Sampling Date: 5/30/14
Applicant/Owner: US BOR State: CA Sampling Point: WM008 VW007
Investigator(s): ML AA HK JA Section, Township, Range: ______
Landform (hillslope, terrace, etc.): Swale/toe drain Local relief (concave, convex, none): ______ Slope (%): ______
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: 198/106 NWI classification: Wetland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓
Are Vegetation ✓, Soil ✓, or Hydrology ✓ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland?	Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______		
Wetland Hydrology Present?	Yes ✓ No ______		

Remarks:
Base of Dike 1. Soils disturbed during Construction of dike, part of site normally below pool elevation

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. X			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1. X			
2.			
3.			
4.			
5. (Storksbill) Erodium botrys	1%		FACU
Total Cover:			
Herb Stratum			
1. (Monkey flower) Mimulus spp	60%	✓	OBL
2. Italian Ryegrass (Lolium)	trace		FAC
3. Eleocharis palustris	20%	✓	OBL
4. (Soft chess) Bromus hordeaceus	trace		FACU
5. Polypogon elongatus/ Rabbit's foot	2%		OBL
6. Briza ...	5%		FAC
7. (Hair grass) Deschampsia spp	2%		FACW
8. (Cocklebur) Xanthium spp.	2%		FAC+
Rumex crispus Total Cover:	trace		FACW-
~~Woody Vine Stratum~~			
1. (Bulrush) Scirpus spp.	5%		OBL
2. Distichlis spicata	trace		FACW+
Persicaria lapathifolia ~~Total Cover~~:	1%		FACW
	Total = 100%		

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	87	x 1 =	87
FACW species	4	x 2 =	8
FAC species	7	x 3 =	21
FACU species	2	x 4 =	8
UPL species		x 5 =	
Column Totals:	100 (A)		124 (B)

Prevalence Index = B/A = 1.24

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%
✓ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:
Frogs and toads in site
Foxtails - Ripgut brome
Dr... ...

SOIL

Sampling Point: WM 008

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.) VW 007

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
4	7.5YR 4/2	100	X	X	X	X	Clay loam	Upper layer
6in	10YR 4/3	100	X	X	X	X	Sand	Middle layer
12in	7.5YR 3/2	95	7.5YR 3/4	5	RM	M	loam	Bottom layer

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ 1 cm Muck (A9) (LRR D)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

Disturbed

Non-sandy soils w/ a chroma ≤ 2 = hydric soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3) wet, not fully saturated
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ✓ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ______

Water Table Present? Yes ___ No ___ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

VW 007

Remarks:

Swale (toe drain?)

Acreage: 0.014873
SW008
WM009

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike #1 City/County: Granite Bay/Placer Sampling Date: VW 009 5/30/14
Applicant/Owner: US BOR State: CA Sampling Point:
Investigator(s): ML AA HK JA Section, Township, Range:
Landform (hillslope, terrace, etc.): drainage Local relief (concave, convex, none): Slope (%):
Subregion (LRR): Lat: Long: Datum:
Soil Map Unit Name: 109 NWI classification: Wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✓
Are Vegetation ✓, Soil ✓, or Hydrology ✓ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ✓	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks: Highly disturbed. Used as a drainage from the dike. Possibly was once a swale

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Italian Rye grass (Lolium perenne)	91%	✓	FAC
2. Brome spp.	5%		FACU
3. Polypogon	1%		OBL
4. Vetch	trace		FACU
5. Dandelion	trace		—
6. Plantain ...	trace		—
7. Briza minor	1%		FAC
8. Monkey flower	trace		OBL
Distichlis	1%		FACW*
~~Total Cover:~~ Total	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	1	x 1 = 1
FACW species	1	x 2 = 2
FAC species	92	x 3 = 276
FACU species	6	x 4 = 20
UPL species		x 5 =
Column Totals:	100 (A)	299 (B)

Prevalence Index = B/A = 2.99

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: Clearly used as a drainage (designed) highly disturbed

SOIL

Sampling Point: WAM 009

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
12	7.5YR 3/4	90	7.5YR 4/6	10	RM	M	Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Stratified Layers (A5) (LRR C)
- __ 1 cm Muck (A9) (LRR D)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)
- __ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (LRR C)
- __ 2 cm Muck (A10) (LRR B)
- __ Reduced Vertic (F18)
- __ Red Parent Material (TF2)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- __ Surface Water (A1)
- __ High Water Table (A2)
- ✓ Saturation (A3) - Moist
- __ Water Marks (B1) (Nonriverine)
- __ Sediment Deposits (B2) (Nonriverine)
- __ Drift Deposits (B3) (Nonriverine)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- __ Salt Crust (B11)
- __ Biotic Crust (B12)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- ✓ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Plowed Soils (C6)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water Marks (B1) (Riverine)
- __ Sediment Deposits (B2) (Riverine)
- __ Drift Deposits (B3) (Riverine)
- ✓ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Thin Muck Surface (C7)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ____ No ✓ Depth (inches): ____

Saturation Present? Moist Yes ____ No ✓ Depth (inches): ____
(includes capillary fringe)

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

VW 008

Remarks:

Swale, Water appears to be Coming from seepage under the Dike and historically a Swale

Acreage: 0.051459

SW009

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike #1 City/County: Placer @ Granite Bay Sampling Date: 5-30-14

Applicant/Owner: US BOR State: CA Sampling Point: VW 009

Investigator(s): ML AA HK JA Section, Township, Range: ______ WIN 010

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): ______ Slope (%): 0-1

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: 106 NWI classification: Wetland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ✓ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ✓

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ✓	No ______
Wetland Hydrology Present?	Yes ✓	No ______

Is the Sampled Area within a Wetland? Yes ✓ No ______

Remarks: Site most likely disturbed from the construction of the adjacent parking lot.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Spikerush	15	✓	OBL
2. Goldenrod	Trace		—
3. Persicaria	75	✓	FACW
4. Epilobium	Trace		UPL
5. Brasica spp. (?)	Trace		FACU
6. Cocklebur	Trace		FAC+
7. Italian Rye	9		FAC
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	15	x 1 = 15
FACW species	75	x 2 = 150
FAC species	10	x 3 = 30
FACU species	1	x 4 = 4
UPL species		x 5 =
Column Totals:	101 (A)	199 (B)

Prevalence Index = B/A = 1.97

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

WM610

SOIL

Sampling Point VW009

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
16	10YR 5/3	95	7.5YR 5/8	5	RM	M	Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Stratified Layers (A5) (LRR C)
- __ 1 cm Muck (A9) (LRR D)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)
- __ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (LRR C)
- __ 2 cm Muck (A10) (LRR B)
- __ Reduced Vertic (F18)
- __ Red Parent Material (TF2)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____

Depth (inches): ____

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- __ Surface Water (A1)
- __ High Water Table (A2)
- __ Saturation (A3)
- __ Water Marks (B1) (Nonriverine)
- __ Sediment Deposits (B2) (Nonriverine)
- __ Drift Deposits (B3) (Nonriverine)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- __ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- ✓ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Plowed Soils (C6)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water Marks (B1) (Riverine)
- __ Sediment Deposits (B2) (Riverine)
- __ Drift Deposits (B3) (Riverine)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Thin Muck Surface (C7)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

~~Saturation~~ Present? MOIST Yes ____ No X Depth (inches): ____
(includes capillary fringe)

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

VW 009

Remarks:

Skunks ~6-7 Swale Feature Photo Phone 146-148

acreage: 0.040363
S20Ø1Ø

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike #1 City/County: Granite Bay / Placer Sampling Date: [illegible]
Applicant/Owner: US BOR State: CA Sampling Point: 5/30/14
Investigator(s): ML AA HK JA Section, Township, Range: ______
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): ______ Slope (%): 0-1
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: 196 NWI classification: Non-Wetland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No ✓ (If no, explain in Remarks.)
Are Vegetation ✓, Soil ✓, or Hydrology ✓ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No ✓
Are Vegetation ✓, Soil ✓, or Hydrology ✓ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes ___ No ✓
Hydric Soil Present?	Yes ___ No X	
Wetland Hydrology Present?	Yes X No ___	

Remarks
Cut and fill area (Soil map unit 196). Disturbed from the construction of the adjacent parking lot

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Italian Rye	93	✓	FAC
2. Soft chess	T		FACU
3. Monkey Flower	T		OBL
4. Rumex crispus	T		FAC
5. Mentha spp.	T		FACW
6. Eleocharis	5		OBL
7. Poa spp.	T		—
8.			
Total Cover:	100%		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	5	x 1 = 5
FACW species		x 2 =
FAC species	93	x 3 = 279
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	98 (A)	284 (B)

Prevalence Index = B/A = 2.90

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%
✓ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks
Depressional swale Feature
Photos [illegible] 149-151

WMO11 ·

SOIL

Sampling Point VW010

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
								Sandy
								Some biotic crust

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ 1 cm Muck (A9) (LRR D)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

No evidence of hydric characteristics

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- X Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches) ______

Water Table Present? Yes ____ No ____ Depth (inches) ______

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches) ______

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Between parking lot and old gravel area, old stone pile.

Appendix 5
Plant Species List

Anthriscus caucalis
Briza media
Briza minor
Bromus hordeaceus
Carex spp.
Croton setigerus
Cyperus spp.
Deschampsia danthonioides
Distichlis spicata
Eleocharis palustris
Epilobium spp.
Erodium botrys
Lactuca serriola
Lolium perenne
Lotus corniculatus
Mentha spp.
Mimulus spp.
Persicaria lapathifolia
Phyla nodiflora
Poa spp.
Polypogon elongatus
Rumex crispus
Salix gooddingii
Scirpus spp.
Sisymbrium altissimum
Solidago spp.
Sporobolus airoides
Trifolium spp.
Typha latifolia
Verbascum thapsus
Vicia sativa
Xanthium spp.

Appendix 6
Map Locations of Jurisdictional Wetlands and Other Waters of the United States

SW009 and SW010

Appendix 7
Site Photos


SW001


SW002


SW002


SW003


SW007

SW008

SW009

SW010

APPENDIX A

PART 2

DIKES 4-6 WETLAND DELINEATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-
2014-CPA-0010-1

JUL 10 2014

Ms. Alicia E. Kirchner
Chief, Planning Division
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814

Subject: Wetland Delineation Report for the Dikes 4-6 project area of the American River Watershed Investigation – Folsom Dam Raise Project, Placer County, California

Dear Ms. Kirchner:

The U.S. Fish and Wildlife Service's Wetland Delineation Report for the Dikes 4-6 project area of the American River Watershed Investigation – Folsom Dam Raise Project is attached. We are providing this report for the U. S. Army Corps of Engineers (Corps) to include in the Corp's environmental documents currently being prepared for the Folsom Dam Raise Project.

Thank you for providing the opportunity to contribute to your planning process. If you have any questions or comments, please contact either Harry Kahler at (916) 414-6612 or Mark Littlefield at (916) 414-6520.

Sincerely,

Daniel Welsh
Acting Field Supervisor

Enclosure

cc:
Brian Luke, COE, Sacramento, California

American River Watershed Investigation – Folsom Dam Raise Project
Wetland Delineation Report for Dikes 4-6, Folsom Lake, California

Prepared for:
United States Army Corp of Engineers
1325 J Street, 10th Floor
Sacramento, California

Prepared by:
United States Department of the Interior
U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
Sacramento, California

July 2014

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Summary

On behalf of the U.S. Army Corps of Engineers (Corps), the U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office (Service) has conducted a delineation of waters of the United States (wetland delineation) for the proposed American River Watershed Investigation, Folsom Dam Raise Project (Folsom Dam Raise) in Granite Bay, Placer County, California. The project site involves Dikes 4-6, north of the right wing dam of Folsom Dam. This delineation identifies the type and extent of "navigable waters," "wetlands," and "other waters" that occur within or adjacent to the 69.9-acre, Dikes 4-6 project area. A total of 0.083 acre of seasonal wetlands in two distinct parts was delineated adjacent to the Dike 4-6 project area. The Dikes 4-6 project area, as currently proposed, would include Folsom Lake when the lake is at its maximum pool elevation, normally about 466 feet above sea level. The wetland delineation reported herein discusses two areas identified as wetlands; both in the vicinity of Dike 6. No wetlands were identified in the staging and construction areas of Dike 4 and Dike 5.

The delineation of waters of the United States, including wetlands, is subject to verification by the Corps. The Service advises all parties to treat the information contained herein as preliminary until the Corps provides written verification of the boundaries of its jurisdiction.

Introduction

The Corps regulates impacts to waters of the United States under the jurisdictional authority of Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act of 1972 (33 U.S.C. 403; 33 U.S.C. 1344). Jurisdictional waters of the United States include all navigable waters, interstate waters, their tributaries, and adjacent wetlands (Environmental Laboratory 1987).

The purpose of this report is to describe the extent and type of jurisdictional wetlands present within, or nearby, a portion of the proposed Folsom Dam Raise study area that fall under the jurisdiction of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Accordingly, this report addresses all identified potential jurisdictional waters of the United States, including wetlands, for the proposed project in the vicinity of Dikes 4-6. Data and conclusions contained in this report are based on information gathered in the field, the 1987 *U.S. Army Corps of Engineers Wetland Delineation Manual*, the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (U.S. Army Corps of Engineers 2008), and Federal regulations governing waters of the United States.

a) Definitions and Criteria

Navigable Waters of the United States. Generally, waters of the United States are subject to the ebb and flow of the tide shoreward to the mean high water mark, and/or are presently used, or have been used in the past, or may be susceptible to use transport interstate or foreign commerce (33 CFR §329).

Other waters of the United States. As used in this report, this term refers to features determined to be waters of the United States by the Corps, and includes unvegetated waterways and water bodies with a defined bed and bank and an ordinary high water mark, such as drainages, creeks, rivers, and lakes. Other waters of the United States typically lack hydrophytic vegetation and may also lack hydric soils (33 CFR §328.3).

Wetlands. For regulatory purposes, wetlands are a subgroup of waters of the United States defined as areas that are inundated, or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR §328.3; 40 CFR §230.3).

Study Area Location

a) **Project Location**: The study area is located along the west boundary of Folsom Lake along Dikes 4 – 6 in Granite Bay, Placer County, California. The study area is located within the Folsom 7.5-minute U.S. Geological Survey quadrangle. Dike 5 lies between Dikes 4 and 6 at latitude 38° 43' 44.3" and longitude 121° 10' 15.8," which in Universal Transverse Mercator (UTM) Zone 10 coordinates is northing 4288289 and easting 658979.

b) **Acreage**: The Dikes 4-6 project area of the Folsom Dam Raise Project encompasses about 69.9 acres (Figure 1). Folsom Lake usually operates at pool elevations between 425 and 466 feet above sea level. The operational normal maximum pool elevation is 466 feet. Other adjacent areas with suitability as potential staging areas also were analyzed for wetlands and comprise about 35 acres. In total we analyzed an area of about 105 acres.

c) **Proximity to Major Highways and other roads**: Folsom-Auburn Road passes from Folsom through Granite Bay, northward to Auburn and within 300 feet to the west of the project area by Dike 5 (Figure 1). At the south end of Dike 6, the entrance to the Beals Point State Recreation Area crosses from Auburn-Folsom Road to a parking area for the recreation facility on the waterside.

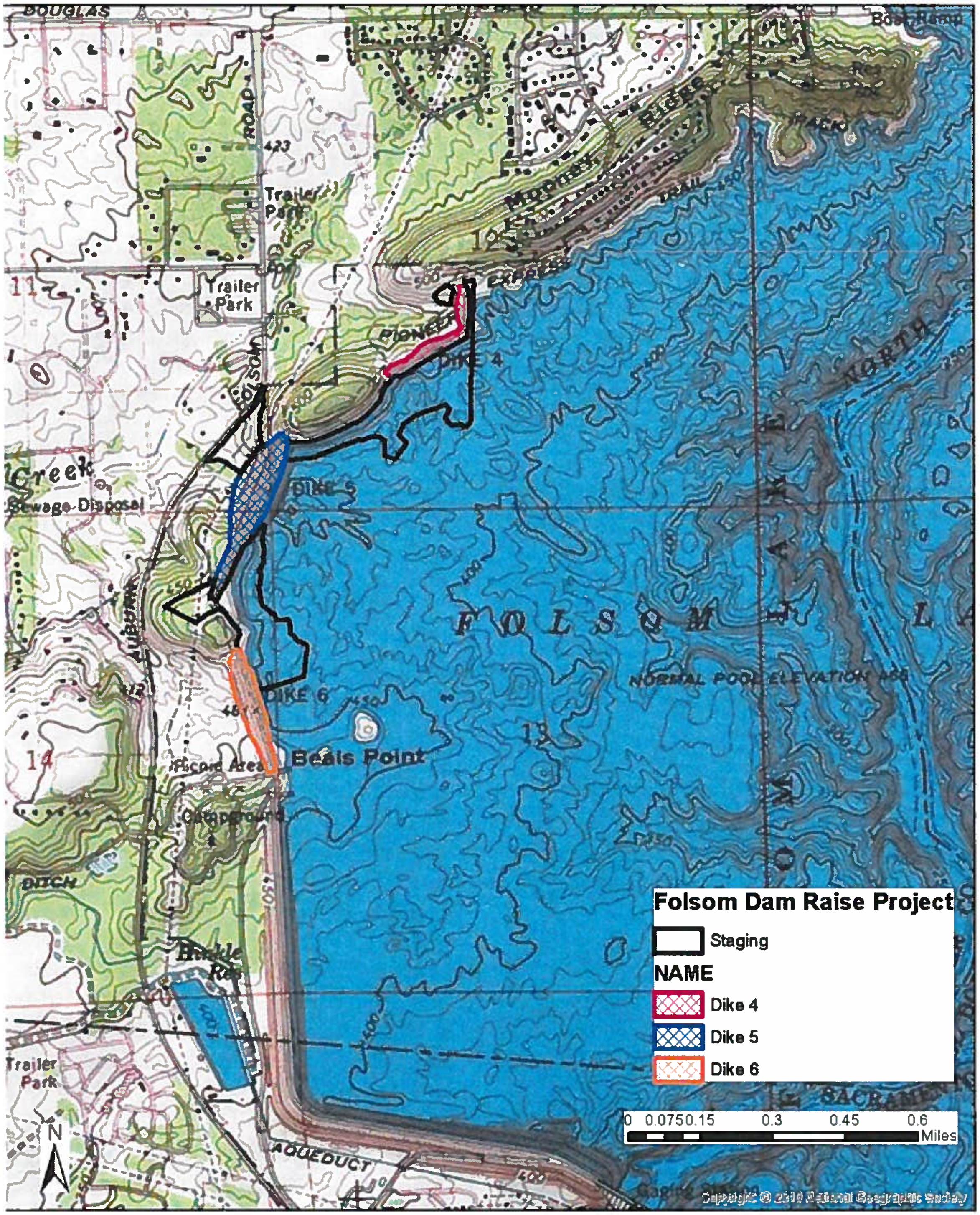
d) **USGS Hydrologic Unit**: The Dikes 4-6 mark the boundary between the North Fork American, California USGS Hydrologic Map Unit (Number 18020128) on the lakeside, and the Lower American, California USGS Hydrologic Map Unit (Number 18020111) to the landside.

Environmental Setting

a) **Current/Recent Land Use**: An access road runs north from the Beals Point Road north across the crowns of Dikes 4, 5, and 6. From the Beals Point Road northward, across the crown of Dike 6, to the southern end of Dike 5 is paved with asphalt. Otherwise the access roads are gravel.

The Beals Point State Recreation Area lies at the south end of Dike 6. A large, asphalt parking area, restrooms, and other recreational facilities are on the waterside, east of the south end of Dike 6. When the pool of the lake is at design level, most of the waterside

Figure 1. Dikes 4-6 project area, Granite Bay, Placer County, California. The outlined areas represent the dikes and potential staging areas.



of the Dikes 4-6 project area is submerged. A camping area occupies about 11.5 acres adjacent to the landside of Dike 6, just north of the Beals Point entrance road. A private, equestrian boarding facility is located on the east side of Auburn-Folsom Road, to the landside of Dike 4. Multipurpose trails for non-motorized use line the landside area north from the campground by Dike 6 to the equestrian facility by Dike 4 and beyond.

b) **Site Elevation**: The crowns of the dikes have an elevation of about 483 feet above mean sea level. The lowest area of the Dikes 4-6 project area lies to the landside of Dike 5, where the elevation is about 380 feet above mean sea level.

c) **Climate**: The climate is typically Mediterranean, with cool, wet winters and hot, dry summers. Annual precipitation recorded at Folsom Dam averages 23.92 inches, of which 20.48 inches fall from October through March (Western Regional Climate Center 2014). Water years 2012 and 2013 were dry years, and 2014 continues the drought trend (California Department of Water Resources 2014). The annual maximum air temperature for Folsom is 75.4°F, ranging from an average in July of 97.0 °F to 54.3 °F in January (Western Regional Climate Center 2014).

d) **Site Topography/Landscape**: The City of Folsom is located south of Folsom Dam, while Granite Bay is located along the western shores of the lake. The Dikes 4-6 project area is situated within the suburban landscape, with the dikes designed to keep lake waters from the lower lying areas to the west. The immediate area contains rolling hills and the dikes are among the highest points on the landscape.

e) **Hydrology/Hydrologic Features/Hydrologic Connectivity**: The dikes contain Folsom Lake to the east. The San Juan Water District facility, containing Hunkle Reservoir, lies directly south of the Dikes 4-6 project area, adjacent to the right wing dam of Folsom Dam. From Hunkle Reservoir, an open ditch flows westward about 0.25 mile, under Auburn-Folsom Road to Baldwin Reservoir. Groundwater drainage from each of the dikes collects to form the headwaters of Linda Creek. Linda Creek flows in a northwesterly direction toward the City of Roseville and into Dry Creek, which in turn flows into the Natomas East Main Drainage Canal and eventually the Sacramento River.

f) **Soils**: Appendix A contains a soil survey map for the Dikes 4-6 project area. The soils of the study area are predominantly Andregg coarse sandy loam (Soil Survey Staff 2014). However, much of the area directly occupied by the dikes appears to be Xerothents as well. The Dikes 4-6 project area also occupies areas of the Ink-Exchequer complex (Soil Survey Staff 2014).

<u>Andregg Soils</u> – Andregg soils occur on the project site on 2 to 50 percent slopes. This moderately deep, well-drained soil is located on foothill locations. Parent material for these soils is granitic. Slopes are complex and can be rocky. Typically surface layers are grayish-brown coarse sandy loam about 15 inches thick. Sub-soils are pale brown and very pale brown coarse sandy loam about 14 inches thick.

Inks Soils – Inks soils occur on the project site on 2 to 30 percent slopes. This shallow, well-drained cobbly soil is located on long, broad volcanic ridges and side slopes. Parent material for these soils is andesitic conglomerate. Inclusions of Exchequer soil may be present. Typically surface layers are yellowish brown cobbly loam about 5 inches thick. The sub-soils are brown very cobbly clay loam about 13 inches thick.

Xerothent Soils – Xerothent soils, or cut and fill areas, occur throughout the project site. This well-drained material consists of mechanically removed and mixed soil in which horizons are no longer discernable. Surface runoff is very rapid and the hazard for erosion is moderate. Permeability and available water capacity is variable.

g) **Plant communities**: Three major natural plant community cover-types were identified in the project area: valley oak woodland, riparian woodland, and annual grassland. Also, much of the land on the waterside of the dikes is bare ground that would be covered in standing water when not in drought years. These land cover-types include jurisdictional wetlands and other waters of the United States, as well as non-jurisdictional upland habitat.

Valley oak woodland – The valley oak woodland habitat is best developed on deep, well-drained alluvial soils, usually in valley bottoms. Most large, healthy valley oaks are probably rooted in permanent water supplies. These woodlands are dominated by valley oak, with black walnut, interior live oak, boxelder, and blue oak as common associates. Oak woodlands with little or no grazing tend to develop a bird-disseminated understory cover, which is best developed along natural drainage areas. Poison oak, blue elderberry, California buckeye, toyon, California coffeeberry, and California blackberry are common understory species. Ground cover includes wild oats, brome, barley, ryegrass, and needle-grass.

Verner (1980) reported that 30 bird species, known to use oak habitats in California, include acorns in their diet. Gaines (1977) reported two dozen breeding bird species in the habitat, including: California quail, plain titmouse, scrub jay, spotted towhee, Bewick's wren, bushtit, willow flycatcher, and acorn woodpecker. Western gray and fox squirrels, as well as mule deer, are common mammals that use the food and shelter of the habitat.

Riparian woodland – Riparian woodland is found on the waterside of the dikes within the study area. The upper canopy is dominated by several species including Fremont cottonwood, box elder, white alder, Chinese tallow, sycamore, valley oak, live oak, Goodding's willow, and other willow species. The lower shrub canopy is dense and thicket-like, with dominant species including California buckeye, California rose, blackberry, blue elderberry, poison oak, and shrub-like forms of the various willow species. The herbaceous understory ranges from very developed to sparse depending on the amount of light filtering through the upper canopies, but typically includes various grasses, sedges, and rushes.

Transition to non-riparian habitat types is usually abrupt and related to water and soil saturation. Shrubby willow thickets can last 15-20 years before becoming overtopped by cottonwoods. Wildlife guilds of the riparian woodlands are generally the same as those of valley oak woodlands.

Annual grassland – Annual grasslands occur on both the landside and waterside of the dikes. Grassland composition and structure is largely dependent on weather patterns and vegetation management (i.e., mowing). Generally, germination occurs in the fall and growth remains low in stature until temperatures rise in the spring. In areas of light grazing, dead plant material accumulates over the summer months, whereas heavy spring grazing favors the growth of summer-annual forbs. No grazing occurs in the Dikes 4-6 project area. In general, annual grassland habitat occurs mostly on flat plains to gently rolling foothills.

The dominant species of the annual grasslands are introduced grasses, including wild oats soft chess, Italian rye grass, ripgut brome, red brome, wild barley, and foxtail fescue. Common forbs include broadleaf filaree, redstem filaree, turkey mullein, true clovers, bur clover, and popcorn flower. In moist or lightly grazed areas perennial grasses also are found, including purple needlegrass and Idaho fescue. Species composition is mainly dependent on seasonal and annual fluctuations in precipitation levels.

Reptiles of annual grasslands include the western fence lizard, mountain garter snake, and northern Pacific rattlesnake (Basey and Sinclear 1980). Typical mammals include the black-tailed jackrabbit, California ground squirrel, Botta's pocket gopher, western harvest mouse, California vole, badger, and coyote (White et al. 1980). Breeding birds may include the short-eared owl, horned lark, and western meadowlark (Verner et al. 1980). Foraging birds include the turkey vulture, northern harrier, American kestrel, black-shouldered kite, and prairie falcon. Areas with annual grassland vegetation in the project area are dominated by a mixture of annual grasses and herbaceous, nonnative or ruderal, weedy species. This cover-type generally occurs on dike slopes and in areas subject to periodic disturbance. Ruderal areas are common along the edge of agricultural fields and on the faces of dikes.

Delineation Methods and References

a) **Review of aerial imagery:** Prior to making field observations, aerial imagery was reviewed to assess the study area for potential wetland acreage.

b) **Date of Field Observations:** The field observations for this delineation occurred on June 10, 2014. All observations were made by Service biologists Mark Littlefield, Harry Kahler, and Amber Aguilera. Completed Wetland Data Forms – Arid West Region are provided in Appendix B.

c) **Wetland Vegetation Indicator Status Reference**: Taxonomic nomenclature for plant species is in accordance with the *Jepson Manual* (Hickman 1993), wetland indicator status for plant species was determined using *National List of Plant Species That Occur in Wetlands: California (Region 0)* (Reed 1988), and the "Dominance Test" and "Prevalence Index" were applied to determine plant dominance (U.S. Army Corps of Engineers 2008).

d) **Hydric Soil Method of Determination Followed**: A soil pit to a depth of up to 12 inches was dug within each suspected wetland feature. Soils were examined in order to assess field indicators of hydric soils. Positive indicators of hydric soils were observed in the field in accordance with the criteria outlined in Field Indicators of Hydric Soils in the United States (Hurt 2006) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (U.S. Army Corps of Engineers 2008). The color of the soils was determined using a Munsell® soil color chart.

e) **Wetland Hydrology Method of Determination Followed**: Presence of primary and secondary wetland hydrology indicators were documented for each suspected wetland feature. These include inundation, saturation within the upper 12 inches of the soil profile, water marks, drift lines, sediment deposits, surface soil cracks, oxidized rhizospheres along living roots, presence of reduced iron, hydrogen sulfide odor, biotic crust, salt crust, and drainage patterns in wetlands.

f) **Wetland Mapping**: All sample points and wetland polygon boundaries were recorded using a Garmin Global Positioning System (GPS) unit capable of sub-meter accuracy (NAD 83 projection, UTM Zone 10). The data was then overlaid onto a site-specific topographic map and aerial National Agriculture Imagery Program images from 2012.

Delineation Results and Discussion
Two areas were identified as wetlands in our analyses of the Dikes 4-6 project area. The two wetland features were identified on the landside of Dike 6 (Figure 2). Although each wetland feature is outside the Dikes 4-6 project area as currently planned, the wetland features are within areas that potentially could be used as staging areas if the project is modified.

Wetland WM012 occupies a highly disturbed area near the landside toe of Dike 6. Although many non-native and upland plant species are present, indicators showed the presence of hydrophytic vegetation. A strong sulfur odor and redox features indicated a wetland soil. Also, the ground at the wetland WM012 site is saturated and shows drainage patterns. Wetland WM013 also is on the landside toe of Dike 6. Hydrophytic vegetation indicators, the gleyed soils with a sulfurous odor, and the presence of surface water indicate the site is a wetland.

After examining aerial imagery and ground truthing, we took soil sample points within areas where wetland species were readily visible within the vegetation strata. Plant species were noted and the percentage of absolute cover and dominant species were determined throughout the vegetation community. Species that could not be identified in the field were collected and identified by experts in the Sacramento Fish and Wildlife Office. The wetland indicator status for each plant species across all vegetation strata were recorded on data forms found in Appendix A.

Soil surveys were conducted in two areas where ocular estimations of plant communities indicated a potential for the area to meet the wetland definition. Vegetation data collected on a site on the waterside of Dike 6 indicated wetland status (Figure 3). The soils within that area consisted of a thin loamy layer (about 6-10 inches) above granite, with no mottling. However, roots along willow branches, about 10 feet above ground level, indicated the site was within the high water mark of normal pool flooding of Folsom Lake. No other hydrology indicators were present. At another site by Dike 5 the vegetation data collected indicated a prevalence and dominance of upland species (Figure 4). Furthermore, the soils were sandy and demonstrated no wetland characteristics. A drainage area flows nearby, but it is outside the current project boundary and is not likely to be included in any future staging plans. No potential wetland areas were identified in or adjacent to project boundaries near Dike 4.

The Dikes 4-6 project area contains portions of Folsom Lake when the pool elevation is at its operational maximum pool elevation of 466 feet. No waters of the United States were identified with the Dikes 4-6 project area, yet other waters (Folsom Lake) lie on the waterside of the dikes. The WM014 site is about 0.50 acre, yet would be covered by water when the lake is at the operational maximum pool elevation of 466 feet. Table 1 provides an acreage summary of waters of the United States.

Table 1. Acreage Summary of Waters of the United States, Dikes 4-6 project area, Granite Bay, Placer County, California.

WATERS OF THE UNITED STATES		
WETLANDS	**ACREAGE**	**LINEAR FEET**
Wetland WM012	0.067	N/A
Wetland WM013	0.016	N/A
Total Wetlands	0.083	N/A
OTHER WATERS	**ACREAGE**	**LINEAR FEET**
Folsom Lake*	58.243	5422
TOTAL WATERS OF THE UNITED STATES	58.326	5422

* The Dikes 4-6 project area includes only a portion of Folsom Lake. The WM014 acreage is not included within the Waters of the United States because it would be covered by water when the lake is at the operational maximum pool elevation.

Figure 2. Wetlands WM012 and WM013, adjacent to Dike 6, Dike 4-6 project area, Granite Bay, Placer County, California.

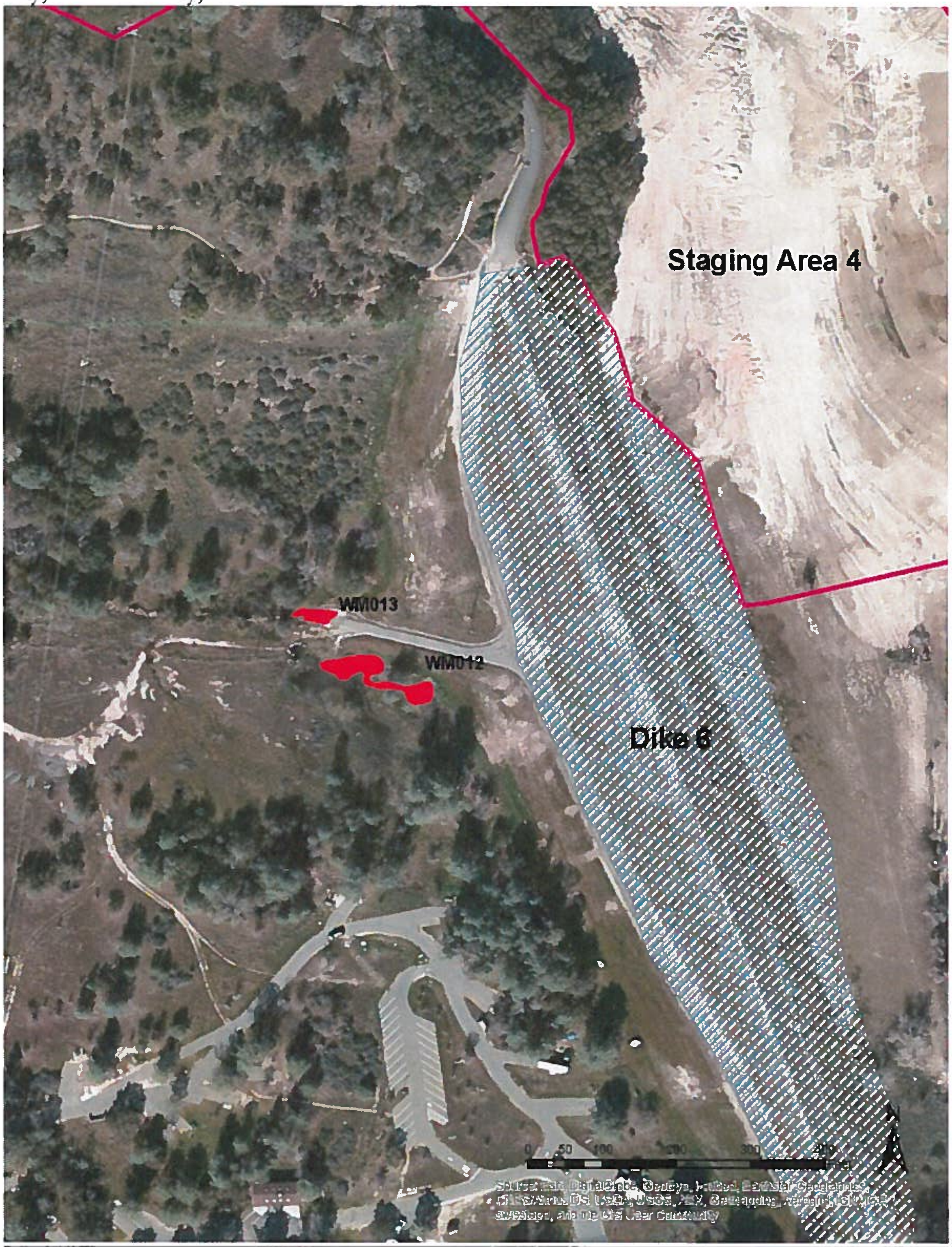


Figure 3. Area of wetland vegetation within the normal high water pool elevation of Folsom Lake, Granite Bay, Placer County, California. The site (WM014) was found to be non-wetland.

Figure 4. A data collection site (WM015) by Dike 5 that was found to be non-wetland, Granite Bay, Placer County, California.

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APPENDIX A

Natural Resources Conservation Service
Soil Survey Map
Folsom Dikes 4-6 Project

Map Scale: 1:5,770 if printed on B portrait (11" x 17") sheet.

N

0 50 100 200 300 Meters

0 250 500 1000 1500 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 6, Dec 13, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2010—Apr 29, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Placer County, California, Western Part (CA620)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
106	Andregg coarse sandy loam, 2 to 9 percent slopes	4.2	6.0%
109	Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	0.2	0.3%
110	Andregg coarse sandy loam, rocky, 15 to 30 percent slopes	7.4	10.7%
111	Andregg coarse sandy loam, rocky, 30 to 50 percent slopes	0.1	0.2%
152	Inks cobbly loam, 2 to 30 percent slopes	3.3	4.8%
196	Xerorthents, cut and fill areas	12.4	17.8%
198	Water	37.3	53.4%
DAM	Dams	4.8	6.9%
Totals for Area of Interest		**69.9**	**100.0%**

APPENDIX B

Wetland Determination Data Forms
Arid West Region

Acreage: 0.0601+1

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike 6 City/County: Placer Sampling Date: 6/10/14

Applicant/Owner: State: CA Sampling Point: WM012

Investigator(s): AA, ML, HK, JA Section, Township, Range:

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%):

Subregion (LRR): Lat: Long: Datum:

Soil Map Unit Name: 152 - NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ✓	No ___
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? Yes ✓ No ___

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pine Pinus sabiniana	5		UPL
2. Oak Quercus lobata	10		FACU
3.			
4.			
Bare Ground — Total Cover:	1%		
Sapling/Shrub Stratum			
1. Spurge	1%		
2. Dandelion	1%		
3. Tallows	1%		
4. Vetch Vicia sativa	2%		FACU
5. Briza media	1%		FAC
Silverhair grass Aira caryophyllea — Total Cover:	3%	✓	FACU
Herb Stratum			
1. Monkeyflower Mimulus spp.	1%		OBL
2. Pacific Iris Iris hartwegii	15%	✓	FACU
3. Eleocharis palustris	2%	✓	OBL
4. Italian Rye grass, Lolium perenne	5%	✓	FAC
5. Polygonum elongatus	5%	✓	OBL
6. Cattails Typha latifolia	5%	✓	OBL
7. plantago	2%		
8. Soft Chess Bromus hordeaceus	3%		FACU
Blackberry Rubus discolor — Total Cover:	2%		FACW[x]
~~**Woody Vine Stratum**~~			
1. Pink unknown	5%		
2. Rumex crispus	1%		FAC
Nut sedge Cyperus spp. ~~Total Cover:~~	4%		FAC
Gnaphalium (Slender cud weed) stramineum	5%		FACW

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	13	x 1 =	13
FACW species	7	x 2 =	14
FAC species	7	x 3 =	21
FACU species	23	x 4 =	92
UPL species	0	x 5 =	0
Column Totals	50 (A)		140 (B)

Prevalence Index = B/A = 2.8

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

? Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

Site has been mowed recently, highly disturbed

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
12	10YR 3/3	50	10YR 5/8	50			Sandy	Graded

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✓ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ 1 cm Muck (A9) (LRR D)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? Yes ✓ No ______

Remarks:
Strong sulfur smell Iron streaking
Soil is disturbed, graded

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ________

Water Table Present? Yes ____ No ____ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): ________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
Photo: 126-131 GPS VW011

Remarks:

Acreage: 0.0162

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike 6 City/County: Granite Bay / Placer Sampling Date: 6/10/14

Applicant/Owner: ______ State: CA Sampling Point: WM013

Investigator(s): AA JA HK ML Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: 106 NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophylic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______	
Wetland Hydrology Present?	Yes ✓ No ______	

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Willow Salix goodingii	10	✓	FACW
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1.			
2. Cattail Typha latifolia	80%	✓	OBL
3. Rabbits foot Polypogon elongatus	1%		OBL
4. Bare ground	19%		
5.			
6.			
7.			
8.			
Total Cover:			
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	81	x 1 = 81
FACW species	10	x 2 = 20
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	91 (A)	101 (B)

Prevalence Index = B/A = .9

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
12	2.5YR 3/0	100						bley

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- ✓ Hydrogen Sulfide (A4)
- __ Stratified Layers (A5) (**LRR C**)
- __ 1 cm Muck (A9) (**LRR D**)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- ✓ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)
- __ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (**LRR C**)
- __ 2 cm Muck (A10) (**LRR B**)
- __ Reduced Vertic (F18)
- __ Red Parent Material (TF2)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ✓ Surface Water (A1)
- __ High Water Table (A2)
- ✓ Saturation (A3)
- __ Water Marks (B1) (**Nonriverine**)
- __ Sediment Deposits (B2) (**Nonriverine**)
- __ Drift Deposits (B3) (**Nonriverine**)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- __ Salt Crust (B11)
- __ Biotic Crust (B12)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Plowed Soils (C6)
- ✓ Other (Explain in Remarks) *

Secondary Indicators (2 or more required)

- __ Water Marks (B1) (**Riverine**)
- __ Sediment Deposits (B2) (**Riverine**)
- __ Drift Deposits (B3) (**Riverine**)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Thin Muck Surface (C7)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ______ Depth (inches): 1-2

Water Table Present? Yes ______ No ______ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 1-2

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

GPS: VW012 Photos: 132-135

Remarks:

Non-veg. wetland. Drainage from Dike *Algae

Immediately downstream of pipe bandeng

acreage: 0.505342

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike #6 City/County: Placer Sampling Date: 6/10/14

Applicant/Owner: Aguilera Kohler Littlefeld State: ______ Sampling Point: WM014 (VW013)

Investigator(s): ~Photos 136-140 Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	X	
Hydric Soil Present?	X	
Wetland Hydrology Present?		X

Is the Sampled Area within a Wetland? Yes ______ No X

Remarks: Not a wetland

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Black willow Salix gooddingii	30	✓	FACW
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1. Plum Prunus spp.	T		NI*
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Eleocharis palustris	60	✓	OBL
2. Aira caryophylla	2		FACU
3. Cocklebur Xanthium spp	2		FAC+
4. Phyla nodiflora	30	✓	FACW
5. Briza minor	2		FAC
6. Solidago spp.	5		?
7. Lotus corniculatus	T		FAC
8.			
Total Cover:			
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	60	x 1 = 60
FACW species	60	x 2 = 120
FAC species	5	x 3 = 15
FACU species	2	x 4 = 8
UPL species	1	x 5 = 5
Column Totals:	128 (A)	208 (B)

Prevalence Index = B/A = 1.62

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: Soils thin. Lots of organic matter, roots

SOIL

Sampling Point: W/M 01?

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
4	10YR 4/3	100						No mottling, streaking thin soil on granite

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ______

Remarks: A horizon loamy 1-2 inches below loamy

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ______

Water Table Present? Yes ____ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ______

Wetland Hydrology Present? Yes ______ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of flooding. Roots high (10 feet?) on willow branches. within lake pool.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Folsom Dike #5 City/County: Placer Sampling Date: 6/10/14

Applicant/Owner: Andrew State: ______ Sampling Point: WM015

Investigator(s): Aguilera, Kahler, Littlefield Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ______ No X		Is the Sampled Area within a Wetland? Yes ______ No X
Hydric Soil Present? Yes ______ No X		
Wetland Hydrology Present? Yes ______ No X		

Remarks:

Pictures 146-149

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4. Bromus hordeaceus	1		FACU
5. Centaurea solstitialis	40	✓	UPL
Total Cover:			
Herb Stratum			
1. slender wheatgrass Agropyron sp.	1		NI*
2. Lolium perenne	15	✓	FAC
3. Epilobium [illegible]	2		UPL
4. Foxtail Alopecurus spp.	1	✓	–
5. Vetch Vicia sativa	15	✓	FACU
6. Rumex crispis	5		FAC
7. Clover sp.	2		–
8. yellow mustard (Sisy[illegible])	T		FACU
Total Cover:			
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	33	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 = 0
FACW species		x 2 = 0
FAC species	20	x 3 = 60
FACU species	17	x 4 = 68
UPL species	42	x 5 = 210
Column Totals:	79 (A)	338 (B)

Prevalence Index = B/A = 4.27

Hydrophytic Vegetation Indicators:

– Dominance Test is >50%

– Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ______ No X

Remarks:

SOIL

Sampling Point: ________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ______ No ✓

Remarks:

Sandy soils no wetland characteristics

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No X Depth (inches): ________

Water Table Present? Yes ______ No X Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Dike #4 - Waterside City/County: Placer Sampling Date: 6/10/11

Applicant/Owner: ________ State: ________ Sampling Point: ________

Investigator(s): Aguilera, Andrieux, Kahler, Littlefield Section, Township, Range: ________

Landform (hillslope, terrace, etc.): ________ Local relief (concave, convex, none): ________ Slope (%): ________

Subregion (LRR): ________ Lat: ________ Long: ________ Datum: ________

Soil Map Unit Name: ________ NWI classification: ________

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophylic Vegetation Present? Yes ____ No ____ Hydric Soil Present? Yes ____ No ____ Wetland Hydrology Present? Yes ____ No ____	Is the Sampled Area within a Wetland? Yes ____ No ____

Remarks:
Photos → 150-159 - No Wetlands

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:			
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum ________ % Cover of Biotic Crust ________

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ________ (A)

Total Number of Dominant Species Across All Strata: ________ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ________ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	________	x 1 = ________
FACW species	________	x 2 = ________
FAC species	________	x 3 = ________
FACU species	________	x 4 = ________
UPL species	________	x 5 = ________
Column Totals:	________ (A)	________ (B)

Prevalence Index = B/A = ________

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: ____________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) **(LRR C)**
__ 1 cm Muck (A9) **(LRR D)**
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) **(LRR C)**
__ 2 cm Muck (A10) **(LRR B)**
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______________________________

Depth (inches): ______________________

Hydric Soil Present? Yes ______ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) **(Nonriverine)**
__ Sediment Deposits (B2) **(Nonriverine)**
__ Drift Deposits (B3) **(Nonriverine)**
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) **(Riverine)**
__ Sediment Deposits (B2) **(Riverine)**
__ Drift Deposits (B3) **(Riverine)**
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ______ Depth (inches): ____________
Water Table Present? Yes ______ No ______ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ______ No ______ Depth (inches): ____________

Wetland Hydrology Present? Yes ______ No ______

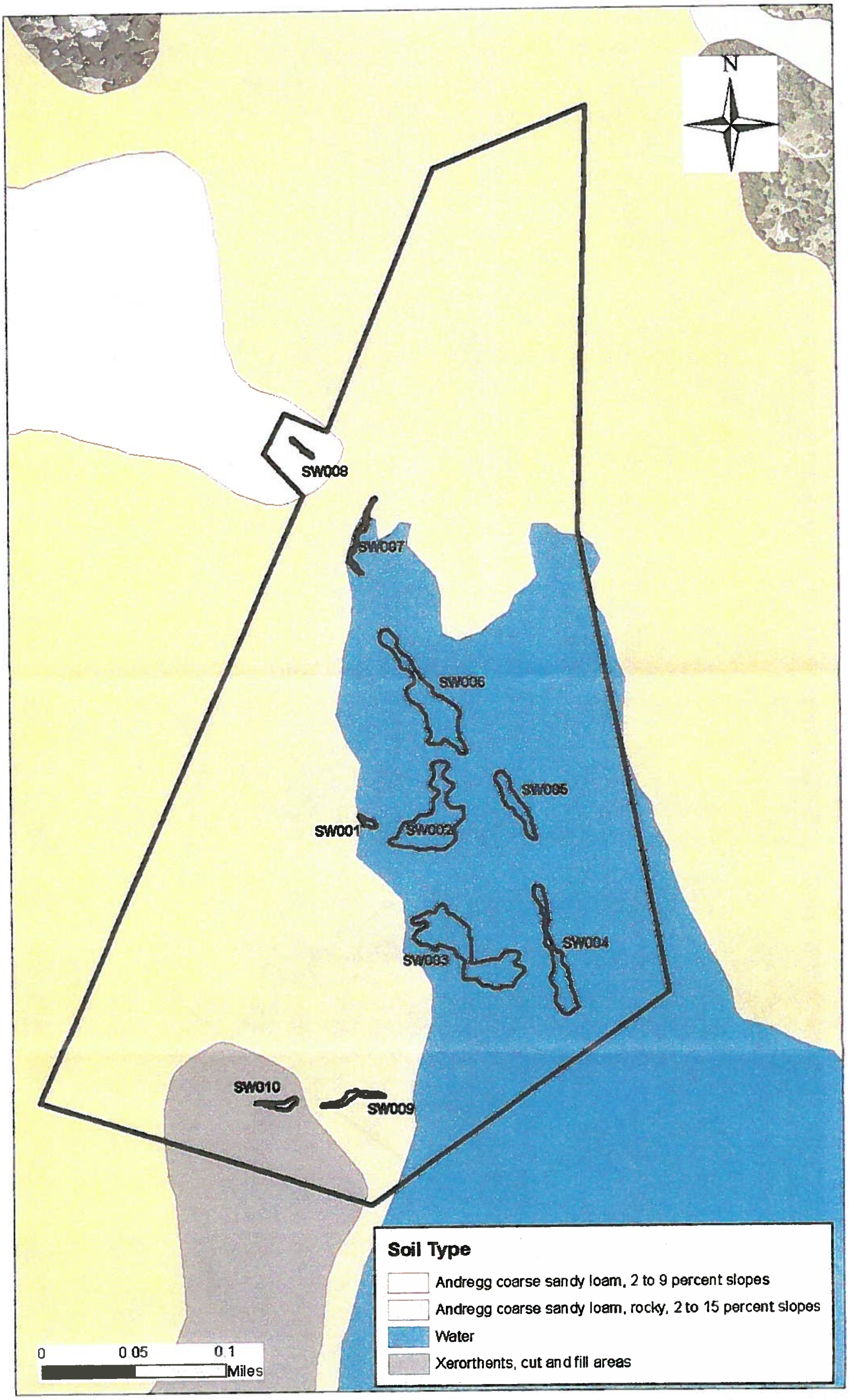
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Study Area

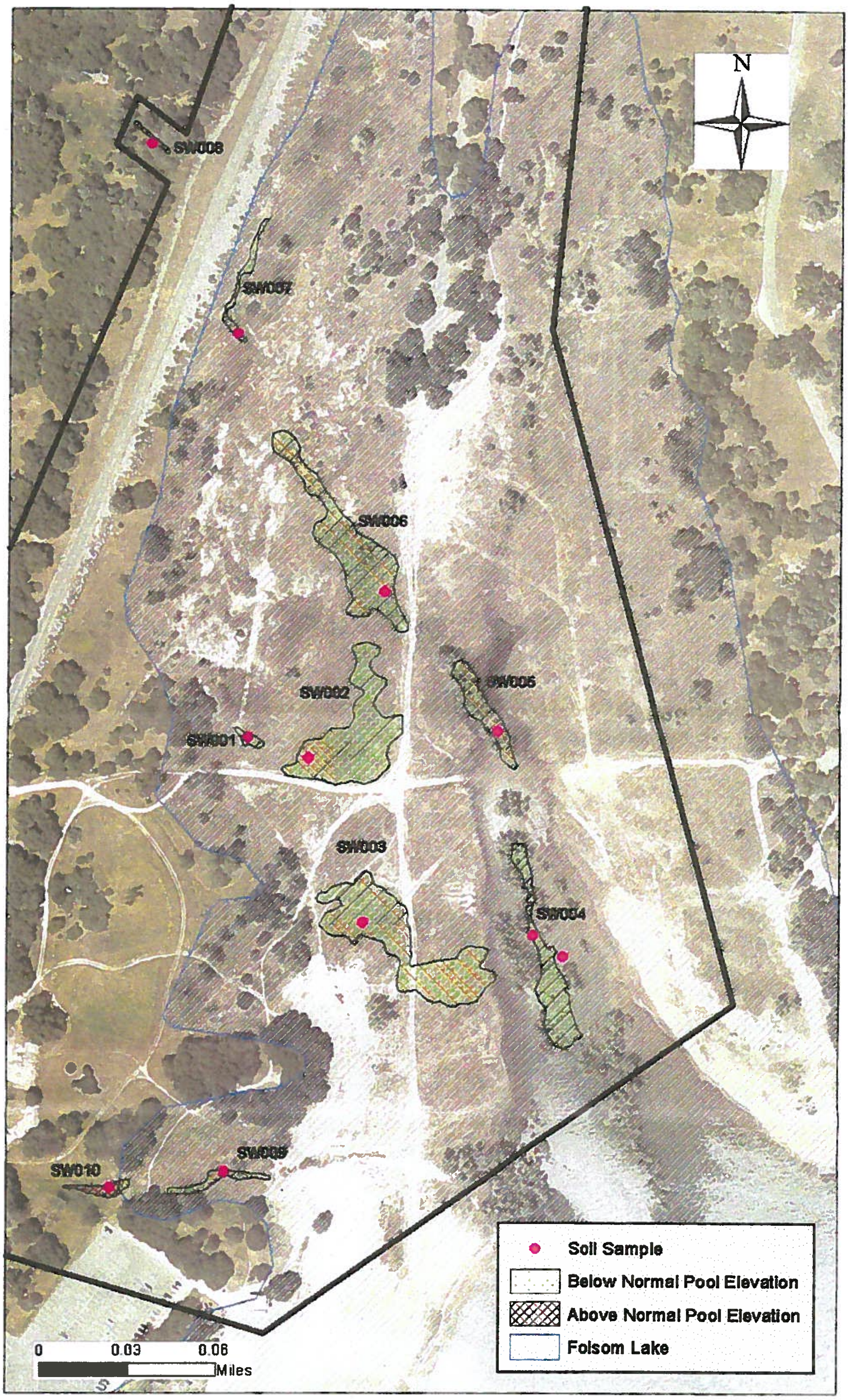

N
SW008
SW007
SW006
SW005
SW001
SW002
SW003
SW004
SW010
SW009
0
0.05
0.1
Miles

Soil Types



N
SW008
SW007
SW006
SW005
SW001
SW002
SW004
SW003
SW010
SW009
Soil Type
Andregg coarse sandy loam, 2 to 9 percent slopes
Andregg coarse sandy loam, rocky, 2 to 15 percent slopes
Water
Xerorthents, cut and fill areas
0
0.05
0.1
Miles

Jurisdictional Wetlands and Other Waters of the U.S. near Dike 1



SW001 - SW006


N
SW006
SW002
SW005
SW001
SW004
SW003
Soil Sample
Below Normal Pool Elevation
Above Normal Pool Elevation
Folsom Lake
0
0.03
0.06
Miles

SW007 and SW008

APPENDIX B

USFWS COORDINATION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-
2014-CPA-0010

OCT 24 2016

Mr. Mark Ziminske
Chief, Environmental Resources Branch
Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814

Dear Mr. Zimiske:

The U.S. Army Corps of Engineers (Corps) has requested supplemental coordination under the Fish and Wildlife Coordination Act (FWCA) for design refinements to the project description under the Folsom Dam Safety/Flood Damage Reduction Project (Folsom JFP). The design refinements are specific to the construction of the Folsom Dam Raise portion of the Folsom JFP (proposed project), which includes: refinements to the main dam's tainter gates, structural alterations to the main dam, raising the existing earthen embankment dikes and the Mormon Island Auxiliary Dam (MIAD), and the construction of floodwalls at the left and right wing dams at Folsom Lake in Sacramento, El Dorado, and Placer Counties, California. This letter transmits the U.S. Fish and Wildlife Service's final supplemental FWCA report for the proposed project (enclosed).

If you have any questions regarding this report on the proposed project, please contact Amber Aguilera (amber_aguilera@fws.gov), Fish and Wildlife Biologist, at (916) 414-6577, or Doug Weinrich, Assistant Field Supervisor, at (916) 414-6563.

Sincerely,

Doug Weinrich

for Jennifer M. Norris
Field Supervisor

Enclosures

cc:
Clay Carithers, Corps, Sacramento, CA

FINAL SUPPLEMENTAL FISH AND WILDLIFE COORDINATION ACT REPORT
FOLSOM DAM SAFETY/FLOOD DAMAGE REDUCTION PROJECT
FOLSOM DAM RAISE
October 2016

BACKGROUND

Folsom Dam and its associated facilities (collectively referred to as the Folsom Facility) are located 23 miles northeast of Sacramento, near the City of Folsom, California. The Folsom Facility impounds waters from the north and south forks of the American River and was constructed to provide flood damage reduction, water supply, and hydropower. The Folsom Facility is made up of the main concrete dam, the right and left wing dams, Mormon Island Auxiliary Dam (MIAD), and eight dikes that collectively impound 1,010,000 acre-feet (AF) of water at a reservoir water surface elevation of 466 feet. The concrete dam and earthen wing dams serve to impound water associated with the main stem of the American River. MIAD serves to dam water within a historic river channel, while the earthen dikes serve to contain water at low areas in the topography during periods when the reservoir is full or nearly full.

The Folsom Dam Safety/Flood Damage Reduction Project, also referred to as the Folsom Dam Modification Project or the Folsom Joint Federal Project (Folsom JFP), is a cooperative effort among the U.S. Army Corps of Engineers (Corps), the U.S. Bureau of Reclamation (Reclamation), the State of California Central Valley Flood Protection Board (CVFPB), and the Sacramento Area Flood Control Agency (SAFCA). The Folsom JFP includes measures to remedy dam safety issues associated with seismic, static, and hydrologic concerns, and to provide increased flood damage protection by increasing the flood storage capacity and/or pool release mechanisms of the Folsom Facility. The potential effects of the Folsom JFP on environmental resources were evaluated in the 2007 Folsom Dam Safety and Flood Damage Reduction, Final Environmental Impact Statement/Environmental Impact Report (2007 FEIS/EIR)(Reclamation 2007) and 2007 Fish and Wildlife Coordination Act (FWCA) report. The Folsom Dam Raise was described in the 2007 FEIS/EIR and 2007 FWCA report; however, a full environmental analysis on the Folsom Dam Raise was not completed since the various components of the project were not fully designed. In order to incorporate new information and consider the alternatives for raising the Folsom Facility and refinements to the emergency and service spillway tainter gates, the Corps is completing a supplemental EIS/EIR to the 2007 FEIS/EIR. The U.S. Fish and Wildlife Service (Service) previously coordinated with the Corps on the various aspects of the Folsom JFP.

Ongoing Folsom JFP construction, including the installation of a new auxiliary spillway and approach channel, and updates to the Folsom Water Control Manual (WCM), may allow Folsom Dam to safely pass the Probable Maximum Flood (PMF) without further improvements. The Folsom Dam Raise Project is an element of the Folsom JFP that would increase the flood storage capacity by increasing the height of Dikes 1 through 8, the left and right wing dams, and MIAD by 3.5 feet. Dikes 1 through 8 and MIAD would be raised using earthen engineered fill material similar to the existing dike and auxiliary dam composition, and a reinforced 3.5 foot concrete floodwall would be constructed on the left and right wing dams. In addition, the main spillway and emergency spillway gates would be modified to allow higher flood pools across the spillway, adding flood damage reduction benefits while still safely passing the PMF without overtopping the tainter gates. This supplemental FWCA report only addresses the work specific to raising the associated facilities of Folsom Dam by 3.5 feet and the modification of the main spillway and emergency spillway gates.

PROJECT DESCRIPTION

The Corps and the CVFPB propose to implement design refinements to the Folsom JFP that were previously described in the 2007 FEIS/EIR, but not fully addressed since the project components were not yet designed. The Folsom Dam Raise was designed to remediate all of the dam safety deficiencies that are significant risk factors at the Folsom Facility and important refinements and remediation measures are planned for all of the Folsom Facility components. These refinements and measures can be grouped into three main categories: refinements to the main dam's tainter gates and related structural alterations at the main dam; raising the crest elevation of Dikes 1 through 8 and MIAD (the "earthen raise" elements of the project); and raising the effective crest elevation of the left and right wind dams through the addition of floodwalls (the "concrete floodwall" elements of the project).

Tainter Gate Refinements

The existing main dam has a total of eight tainter gates, with five of the gates designated as "service gates" and the remaining three gates designated as "emergency gates" (see Enclosure 1, Figure 1). Tainter gates are simply a type of flood gate and in the case of the main dam, the tainter gates are located near the crest (top) of the dam. These tainter gates are opened to release water stored in Folsom Lake in order to create adequate flood storage upstream of the main dam. The main dam also releases water via outlet tubes near the bottom of the main dam, but these tubes do not provide sufficient discharge capacity to restore flood storage. The five service gates are typically opened to drain water from Folsom Lake, while the three emergency gates are generally left closed as long as possible to help minimize the velocity of discharges and the possible destruction of some of the dam's downstream features.

The proposed project would include replacing most of the components of the three emergency tainter gates and reinforcing the five service tainter gates. The "tainter gate refinements" element of the proposed project would also include a variety of other structural changes/refinements to the main dam. These would include, but not be limited to:

- Constructing new "top seal" bulkheads to prevent overtopping of the tainter gates during a major flood event. These hydraulic steel structures would be positioned immediately above the tainter gates at their closed position, and would run horizontally, connecting to the dam's concrete piers. The top of the bulkheads would be at elevation 486.34 feet NAVD88, which is the elevation of the Probable Maximum Flood (PMF) (483.34 feet NAVD88) with an additional 3 feet of freeboard. The top seal bulkheads would also increase the height of the flood pool upstream of the dam that can be retained before the emergency tainter gates must be opened.

- Constructing vertical concrete extensions to the nine existing concrete piers (see Enclosure 1, Figure 1) in order to provide the necessary elevated platform for a new hoist system for the tainter gates. The new top seal bulkheads would mount to and seal against the pier extensions.

- Installing a new hoist system to raise and lower the modified tainter gates. The new system would be installed to handle increased hydrostatic PMF loads, as well as the slightly heavier gates.

As shown in Figure 2 in Enclosure 1, general construction access to the tainter gates would follow a path beginning at the existing Gate 1 construction entry to the ongoing Folsom JFP off of Folsom

Lake Crossing and would terminate at the intersection of the southern portion of Folsom Dam Road and Folsom-Auburn Road. An alternate egress route for construction traffic may include the northern portion of Folsom Dam Road, which also eventually terminates at Folsom-Auburn Road. The construction access route would follow existing roadways and would not require construction of new roads.

The main construction staging area would be located near the east end of the left wing dam (LWD) in an area referred to as the Overlook Area (see Enclosure 1, Figure 2). The main staging area would occupy approximately 6.6 acres within this area, which is heavily disturbed and has been used as a construction staging site for the Folsom JFP for many years. An optional staging area, located within Reclamation's work yard just north of Reclamation's Central California Area Office (CCAO) facilities, may also be used if necessary. As depicted in Figure 2 in Enclosure 1, this optional staging area could encompass as much as 13 acres; however if this optional staging site is used at all, it is unlikely the entire 13 acres would be utilized. Land within the boundaries of the optional staging area has been previously cleared and is heavily disturbed by past and ongoing usage by Reclamation. Should the optional staging area be used for the tainter gate refinement project, the few existing native trees and shrubs that remain would be preserved to the degree practicable.

Earthen Raise Elements

The current crest elevations of Dikes 1 through 8, the right wing dam (RWD), LWD, and MIAD do not provide sufficient freeboard to meet Corps design criteria for resisting wave height and run-up. Therefore, increasing the height of all the reservoir dikes and embankment dams would be required.

The current crest elevations of Dikes 1 through 8 and MIAD would be raised by approximately 3.5 feet using engineered fill material similar to the existing composition of these features, thereby allowing seepage and pore pressure to be maintained through the interface between the existing embankment material and the new material. The side slopes and crest widths would conform to Corps standards while maintaining Reclamation's requirements for security and maintenance. Preliminary typical cross-sections for the proposed modifications to Dikes 1 through 8 and MIAD are provided in the following figures in Enclosure 1: Figure 3 (Dike 1), Figure 4 (Dikes 2 and 3), Figure 5 (Dikes 4, 5, and 6), Figure 6 (Dikes 7 and 8), and Figure 7 (MIAD).

Modifications to Dike 1 would primarily affect the dike's existing crest and landward side slope of the dike through the removal of existing materials (ex. riprap, earthen materials, roadway pavement) and the addition of new materials (ex. engineered fill, riprap, roadway). Modifications to certain segments of Dike 1 not previously modified by Reclamation would affect the dike's crest and both the landward side slope and lake-side side slope in a similar manor. Park Road intersects Dike 1 near its southern end before it runs along the dike's crest. A portion of the western leg of this road would need to be raised to meet the new dike crest elevation. A park horse trail also extends eastward from the dike near the Park Road intersection and a small segment of this trail would need to be raised to merge with the new dike crest.

Modifications to Dikes 2 and 3 would primarily affect each dike's existing crest and landward side slope in manner similar to the modifications to Dike 1. Limited extensions would be required to both Dikes 2 and 3 in order for the new crest elevation to merge with adjacent existing topography that is higher than the new crest elevation.

As with Dikes 1, 2, and 3, the proposed modifications to Dikes 4, 5, and 6 would also primarily affect the existing crest and landward side slopes of these dikes through the removal of existing materials (ex. riprap, earthen materials, roadway pavement, roadway gravel) and the addition of new materials (ex. engineered fill, riprap, pavement). An existing gravel road/trail currently extends from the south end of Dike 4 to the north end of Dike 5. A significant portion of this road would be raised to the same elevation as the proposed raised crest elevation of the adjacent dikes because the affected road segments are presently lower than the necessary dike elevation. Gravel maintenance roads currently run along the landward side toe of the slope at Dikes 4, 5, and 6. Portions of these maintenance roadways would be relocated in a manner that mimics their current alignments to accommodate changes in the side slopes of the dikes.

The proposed modifications to Dikes 7 and 8 would be very similar to one another, as shown in Figure 6 in Enclosure 1. The existing dike crests and landward side slopes would be degraded slightly. New engineered embankment fill would then be added to the top of the dikes and to the landward side slopes of the dikes. Aggregate base maintenance roads would be established on the crest of each dike to replace the existing gravel roads on these dikes.

Work necessary to raise the elevation of MIAD would involve limited removal of existing materials (embankment fill, aggregate roadway) along the existing crest of this dam. Additional engineered fill would then be added to the crest of the dam along with aggregate base to replace the existing maintenance road/shared use trail that runs the length of the dam and riprap would be added along the water-side of the dam adjacent to the raised area.

Construction access to Dikes 1 and 2 would be from the north at the east end of Twin Rocks Road (see Enclosure 1, Figure 8). From this point, the construction access/haul road would continue south along an existing maintenance road to the north end of Park Road. The western leg of Park Road would be used to access the top of Dike 1. A new haul road would continue south from Park Road, roughly parallel to the east side of Dike 1, and would connect to the north end of Dike 2. The haul road would then continue along the crest of Dike 2. Construction access to Dike 3 would be from Douglas Boulevard south of the southern end of Dike 3 and also via the haul road/access routes discussed for Dikes 1 and 2. The construction access/haul road on the southern end of Dike 3 would likely follow Park Road northward, then jog slightly east near the south end of Dike 3 before turning northward to run along the dike itself.

Various construction staging areas would be used while raising the elevation of Dikes 1, 2, and 3. These would largely be situated in disturbed uplands near the water-side of the dikes, although some staging areas would be at or near the ends of the dikes as shown in Figure 8 in Enclosure 1.

The main construction access to Dikes 4, 5, and 6 would be from Auburn-Folsom Road near the north end of Dike 5 (see Enclosure 1, Figure 9). A secondary construction access from Auburn-Folsom Road along the existing Beals Point roadway near the south end of Dike 6 may also be utilized to access these three dikes. Construction haul roads for the three dikes would mainly follow existing maintenance roads that run along the landward side of the dikes and connect the dikes (see Enclosure 1, Figure 9).

Construction staging areas would be established adjacent to the landward sides of the dikes. Approximate limits of these staging areas are depicted in Figure 9 in Enclosure 1. Some construction staging areas were previously established and used by Reclamation on the water-side of Dikes 4, 5, and 6, as illustrated in Figure 9 in Enclosure 1. Portions of these areas may also be used as staging areas when building the proposed project. Large areas of the two water-side staging areas are below the ordinary high water (OHW) elevation of Folsom Lake, which is elevation 466 feet NAVD88. Construction staging for the proposed project would only happen in areas below the lake's OHW when such areas are not inundated or saturated by lake surface water. In no case would fuels or other hazardous materials be stored in the water-side staging areas.

The main construction access to Dike 7 would be at Folsom Lake Crossing, using the north access point shown in Figure 10 in Enclosure 1. From this point, the construction access/haul road would follow an existing road and haul road that have been used during the construction of the Folsom JFP. The construction access to Dike 8 may include the same construction access used for Dike 7; however, it may also include Folsom Point Road where it intersects with East Natoma Street (see Enclosure 1, Figure 10). The construction haul road at this location would follow a segment of Folsom Point Road before turning northwest to follow an existing maintenance road that runs to the southeast corner of Dike 8. If the access route to Dike 7 is also used for construction access to Dike 8, the construction haul road would generally follow the Operations & Maintenance (O&M) Bench road that would have been established as part of the final phase (Phase V, restoration phase) of the Folsom JFP. This future maintenance road runs through areas that were previously disturbed by the Folsom JFP.

There would be two different ways for construction vehicles and equipment to access MIAD and its associated construction staging areas. One route would use the Folsom Point Road access to Dike 8, then it would follow the O&M Bench road extending from Dike 8 to near the western boundary of the primary MIAD area (aka MIAD East), then would continue east to the west end of MIAD to its southern construction staging area (see Enclosure 1, Figure 11). The other construction access route would begin at the intersection of Access Road and Sophia Parkway with Green Valley Road (see Enclosure 1, Figure 11). From this point, construction traffic would follow Access Road northward to the east end of MIAD and its southern construction staging area. The existing maintenance road/shared use trail along the crest of MIAD would also be used as a construction access/haul road.

Construction staging areas for the proposed work on Dike 7 would include the existing "Dike 7 Office Complex" area immediately south of the dike, plus previously disturbed land along the north side of the dike (see Enclosure 1, Figure 10). Both of these areas have been previously used as staging areas during various Folsom JFP construction phases. The main construction staging area for Dike 8 would likely be a previously disturbed area immediately adjacent to the north side of this dike (see Enclosure 1, Figure 10), but the Dike 7 Office Complex area may also be used.

The main construction staging areas for the proposed work on MIAD would be an extensive area of previously disturbed land on the landward side of MIAD (see Enclosure 1, Figure 11). Immediately west of MIAD, referred to as the "MIAD West" area, is an area previously used for construction staging and disposal purposes during phases of the Folsom JFP. This area (see Enclosure 1, Figure 11) may also be used as an ancillary construction staging area for the proposed work on MIAD.

Concrete Floodwall Elements

In combination with the earthen dam raises on the dikes and MIAD, the proposed project would also include construction of a new reinforced concrete floodwall on the top of the LWD and RWD. The floodwall for the RWD would run the length of the dam, tying into the existing grade at the RWD's northern end and terminating at the west end of the main concrete dam and the RWD's eastern end. The floodwall for the LWD would also run the length of the dam, beginning at the east end of the main concrete dam and continuing to the east end of the LWD. Just beyond the east end of the LWD, the new floodwall would turn southward and connect to the top of the existing auxiliary spillway control structure at its northern end. A separate segment of new floodwall would begin at the southern end of the auxiliary spillway control structure, then run in a southeastern direction for roughly 580 feet (parallel to Folsom Lake Crossing), before terminating at the existing roadway that leads to the main dam.

Both the LWD and RWD floodwalls would be installed adjacent to the existing access/maintenance road that runs along the crest of the two dams, on the water-side. Floodwall construction would include degrading a portion of the existing crest of the two dams, as well as a portion of the water-side slopes of both dams. After construction of the floodwalls, the degraded areas adjacent to the floodwalls would be backfilled with compacted fill and, on the water-side slopes of the floodwalls, riprap. Portions of the access/maintenance road affected by construction would be restored (see Enclosure 1, Figure 12).

There would be two construction access points for work on the RWD (see Enclosure 1, Figure 9). One would be off Auburn-Folsom Road at the Beals Point roadway (e.g. the same access point used to access the southern end of Dike 6). The other access point would be off Folsom-Auburn Road at Folsom Dam Road. The construction access/haul route from this access point would follow established roads within Reclamation's CCAO facilities. The main construction access point for work on the LWD would be off Folsom Lake Crossing at the existing Gate 1 construction access (see Enclosure 1, Figure 10). The construction access/haul route from this access point would follow an existing haul road before passing over the control structure of the new auxiliary spillway. During construction work on the LWD and RWD, one lane of the existing road that runs from the LWD to the main dam and then to the RWD (e.g. Folsom Dam Road) would be open to traffic.

Two construction staging areas would be utilized during the construction of the RWD floodwall (see Enclosure 1, Figure 9). One would be located at the north end of the dam on the water-side within an area that has been previously cleared and disturbed. The other staging area would be located along the southern leg of the RWD on its landward side. This large staging area would occupy various disturbed areas within Reclamation's CCAO facilities.

Three construction staging areas would be used during the construction of the LWD floodwall (see Enclosure 1, Figure 10). The main staging area would be located in the Overlook Area which is the same disturbed area that would be used for staging associated with the proposed refinements to the tainter gates at the main concrete dam. Another small staging area would be situated adjacent to the Gate 1 access point in an area previously disturbed by Folsom JFP construction activities. The third staging area would be located in a previously disturbed area near the north end of the RWD on its landward side.

Other Project Construction Details

A significant portion of the materials removed from the eight dikes and MIAD during the initial stages of project construction (i.e. excavated fill, rock riprap) would also be utilized in constructing the raised dike areas, the raised MIAD area, and the floodwalls at the LWD and RWD. With one exception, all the other materials required would be obtained from off-site commercial sources. The exception pertains to rock riprap. Riprap placed during prior phases of the Folsom JFP is currently being removed from what is referred to as the Haul Road Restoration Area. This 58 acre area is located east of the LWD and new auxiliary spillway adjacent to Folsom Lake. Most of the riprap removed is being temporarily stockpiled in the MIAD east area as part of Phase V of the Folsom JFP. The stockpiled riprap would be used as needed to provide riprap called for in the proposed construction of the dike and MIAD raises.

All the materials necessary to construct the tainter gate refinements would be obtained from off-site commercial sources. The construction debris generated during the course of the overall proposed project would be removed from the project site and disposed of in licensed disposal facilities located near the project site. Most of the construction staging areas would be restored following completion of the main construction activities. This restoration would typically include restoring the topography to mimic the topography present prior to construction and then planting the disturbed areas with native grass and forb seeds.

Project Schedule

The proposed project would be constructed in phases over time. Table 1 below depicts the currently estimated schedule for the four main phases comprising the overall project.

Table 1. Estimated construction schedule for the Folsom Dam Raise Project

Project Phase	Project Activity	Starting Year	Ending Year	Phase Duration
1	Main Dam Tainter Gates – tainter gate refinements	2017	2021	4 years
2	Dikes 4, 5, & 6 – earthen embankment raise	2017	2019	2 years
3	Dikes 1, 2, & 3 – earthen embankment raise	2018	2020	2 years
4	Dikes 7 & 8 plus MIAD, LWD, & RWD – earthen embankment raise for dikes and MIAD, floodwall additions for LWD and RWD	2019	2021	2 years

Even though Table 1 indicates that Phase 1 and Phase 2 would both begin in 2017, construction of Phase 1 (main dam tainter gate refinements) would likely commence several months prior to construction of Phase 2.

BIOLOGICAL RESOURCES/DISCUSSION

All of the biological resources, Service Mitigation Policy, and resource category determinations were previously described in the Service's 2007 FWCA report except for the use of the lakebed for staging. The descriptions and determinations that were described in the Service's 2007 FWCA report have not changed for the Folsom Dam Raise portion of the Folsom JFP.

The project is located in the area surrounding Folsom Lake and includes Dikes 1 through 8, the LWD, the RWD, MIAD, and the main dam and spillway. The project area consists mainly of federally-owned lands that are leased by the California Department of Parks and Recreation (State Parks). A majority of the project area is highly disturbed and experiences heavy traffic and recreation usage by the public, State Parks, and Reclamation staff. There are five cover-types found in the Folsom Dam Raise project footprint which include: oak/pine woodland, annual grassland, riparian forest, seasonal wetland, and lakebed. The oak/pine woodland, annual grassland, riparian forest, and seasonal wetland cover-types were described in the Service's 2007 FWCA report and the potential impact acreage for these cover-types due to construction of the project are shown below in Table 2.

Table 2. Summary of cover-types and impacted acres for the construction of the Folsom Dam Raise Project, Sacramento, El Dorado, and Placer Counties.

Cover-Type Impacted	Impacted Acres[1]
Oak/grey pine woodland	4.9
Annual Grassland	50.4
Riparian Woodland	0.1
Seasonal Wetland	0.3
Lakebed	19.6

Construction impacts include a 50 foot construction area from the landside toe. Impacts to seasonal wetlands from raising MIAD may occur from changes in water quality or the discontinued/muted flow of water from Folsom Lake into/out of the wetlands.

No evaluation species were identified for the lakebed cover-type. Generally, this cover-type would not provide any significant habitat value for wildlife species. Canada geese and other avian species, as well as small mammals, may occasionally forage on the lakebed when the lake level recedes. Therefore, the Service designates the lakebed cover-type in the project area as Resource Category 4. Our associated mitigation planning goal for this cover-type is "minimize loss of in-kind habitat value."

A habitat assessment using Habitat Evaluation Procedures (HEP) was completed in February 2007 to develop the compensatory mitigation acreage for the oak/grey pine woodland, riparian woodland, and seasonal wetland cover-types, and is included in Enclosure 2. The team evaluating the updated project proposal determined the 2007 HEP results were still valid as habitat attributes (tree height, crown cover, percent shrub cover, tree diameter at breast height, tree composition, etc.) have not changed significantly. Based on the results of the 2007 HEP, compensation ratios are: 1.2:1 for oak/grey pine woodland; 1.1:1 for riparian woodland; and 4:1 for seasonal wetland.

Scattered trees and stands of oak/pine and riparian woodland occur within and adjacent to the project area, and measures are included in the project description to avoid impacts to migratory birds which may be nesting in affected or adjacent vegetation. Pre-construction surveys should be performed to determine if there are migratory birds nesting in the area and if nests are located, work should be deferred until any young have fledged the nest. The Corps has included measures to compensate for any oak/pine or riparian woodland habitat at a 1.2:1 and 1.1:1 ratio, respectively. In addition, the Corps has included measures in the project description to avoid impacting a wetland feature located on the landside of Dike 1 that receives water input year-round, most likely from the seepage that is occurring at the dike.

The enlargement of Folsom Lake through a raise would allow for additional flood surge storage capacity, on a temporary basis, and not for increasing the storage capacity of the reservoir. Initially, the operation requirements at the Folsom Facility would not change after the project is constructed. However, the raise would result in ability to sustain an increased flow of 160,000 cubic feet per second for a longer period of time and would have possible inundations up to 486.34 feet (NAVD88). Within

1 Note: The impact acreages calculated for construction of the project were provided by the Corps using aerial imagery and vegetative delineations conducted by the Northern Sierra Nevada Foothills Vegetation Project (CNPS 2015; CDFW 2015).

this additional inundation space there are areas that are already developed or contain otherwise disturbed habitat, which provides little or no value for wildlife species, and some that supports vegetation that is tolerant of flooding. Inundation effects around Folsom Lake would occur in large part by the frequency, timing, and duration of flooding. However, any post-construction operational changes, such as increased levels of inundation, would be defined in the new WCM update. Therefore, any operational effects from the Folsom Dam Raise would be covered in a subsequent environmental update.

Based on an Information, Planning, and Conservation System (IPaC) (Service 2016) query for the project area, there are several listed species which could occur within or near the project area. The species under the jurisdiction of the Service which may be affected by the project includes the valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, and California red-legged frog. The complete list is included in Enclosure 3, as well as a summary of Federal agencies responsibilities under the Endangered Species Act of 1973, as amended.

Elderberry survey counts have been conducted numerous times for other portions of the Folsom JFP and on February 9, 2014, specifically for the Folsom Dam Raise. A total of 34 shrubs have been identified within the project footprint, but only 3 are anticipated to be directly impacted by project activities. The Corps has completed consultation with the Service on the project effects to these shrubs, which are the sole host plant for the federally-listed as threatened valley elderberry longhorn beetle, and the Service concurred that the project would adversely affect the species, but would not jeopardize the continued existence of the species (see Enclosure 4).

RECOMMENDATIONS

The Service recommends:

1. Avoid impacts to oak/grey pine woodland, riparian woodland, and seasonal wetlands adjacent to, but outside of, construction areas through use of construction fencing.

2. Avoid impacts to woody vegetation at all staging areas, borrow sites, and haul routes by enclosing them with construction fencing.

3. Avoid impacts to water quality at Lake Natoma and Folsom Lake when loading, unloading, and transporting materials to be used for the project by taking appropriate measures to prevent soil, fuel, oil, lubricants, etc. from entering into these waters.

4. Avoid future impacts to the site by ensuring all fill material is free of contaminants.

5. Avoid impacts to migratory birds nesting in trees or on the ground along the access routes and adjacent to the proposed repair sites. Impacts can be avoided by conducting pre-construction surveys for active nests along proposed haul roads, staging areas, and construction sites. This would especially apply if construction begins in the spring or early summer. Work activity around active nests should be avoided until the young have fledged. The following protocol from the CDFW for Swainson's hawk would suffice for the pre-construction survey for raptors nesting in trees.

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 mile 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 mile 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 Wildlife. If work is begun and completed between September 1 and February 28, a survey is not required.

6. Minimize impacts to wildlife from by selection materials least likely to lead to entrapment.

7. Minimize impacts to annual grassland habitat and other disturbed areas, by re-seeding all disturbed areas with appropriate native species as construction elements are completed.

8. Minimize project impacts by reseeding all disturbed areas at the completion of construction with forbs and grasses.

9. Minimize the impact of removal and trimming of all trees and shrubs by having these activities supervised and/or completed by a certified arborist.

10. Compensate for the loss of 4.9 acres of oak/grey pine woodland habitat by developing 5.9 acres of oak/grey pine woodland habitat at a site jointly selected with the Service.

11. Compensate for the loss of 0.1 acre of riparian woodland habitat by developing 0.11 acre of riparian woodland habitat at a site jointly selected with the Service.

12. Compensate for the loss of 0.3 acre of seasonal wetland habitat by developing 1.2 acres of seasonal wetland habitat at a site jointly selected with the Service.

13. Develop a monitoring and adaptive management program to monitor vegetation around the reservoir over the life of the project. Baseline conditions would be established and updated at intervals (10 years). After major flood events (those that encroach above the existing maximum flood pool elevation), vegetation would be surveyed and damages attributable to inundation would be mitigated as deemed appropriate using best management practices at the time.

14. Develop operation and maintenance manuals for all mitigation sites developed for this project. Coordinate with the Service on the development of these manuals.

15. Contact the NOAA Fisheries for possible effects of the project on federally-listed species under their jurisdiction.

16. Contact the CDFW regarding possible effects of the project on State listed species.

17. Re-survey the construction and staging areas, borrow sites, and access/haul roads for the presence of any new elderberry shrubs prior to construction activity.

REFERENCES

California Department of Fish and Wildlife (CDFW). 2015. Northern Sierra Nevada Foothills Vegetation Project. Available: http://www.dfg.ca.gov/biogeodata/bios/dataset_index.asp, accessed April 2015. California Department of Fish and Wildlife, Sacramento, California.

California Native Plant Society (CNPS). 2015. A Manual of California Vegetation, Online Edition. Available: http://www.cnps.org/cnps/vegetation/, accessed July 2015. California Native Plant Society, Sacramento, California.

U.S. Bureau of Reclamation (Reclamation), Mid-Pacific Region. 2007. Folsom Dam Safety and Flood Damage Reduction Project Final Environmental Impact Study/Environmental Impact Report. March 2007.

U.S. Fish and Wildlife Service (Service). 2007. Fish and Wildlife Coordination Act Report Folsom Dam Safety and Flood Damage Reduction Project. U.S. Fish and Wildlife Service, Sacramento, California. April 2007

____. 2016. Information, Planning, and Conservation System (IPaC) (Online), Available: http://ecos.fws.gov/ipac/, accessed October 19, 2016.

ENCLOSURE 1

FIGURES 1-12
(Figures provided by the Corps)

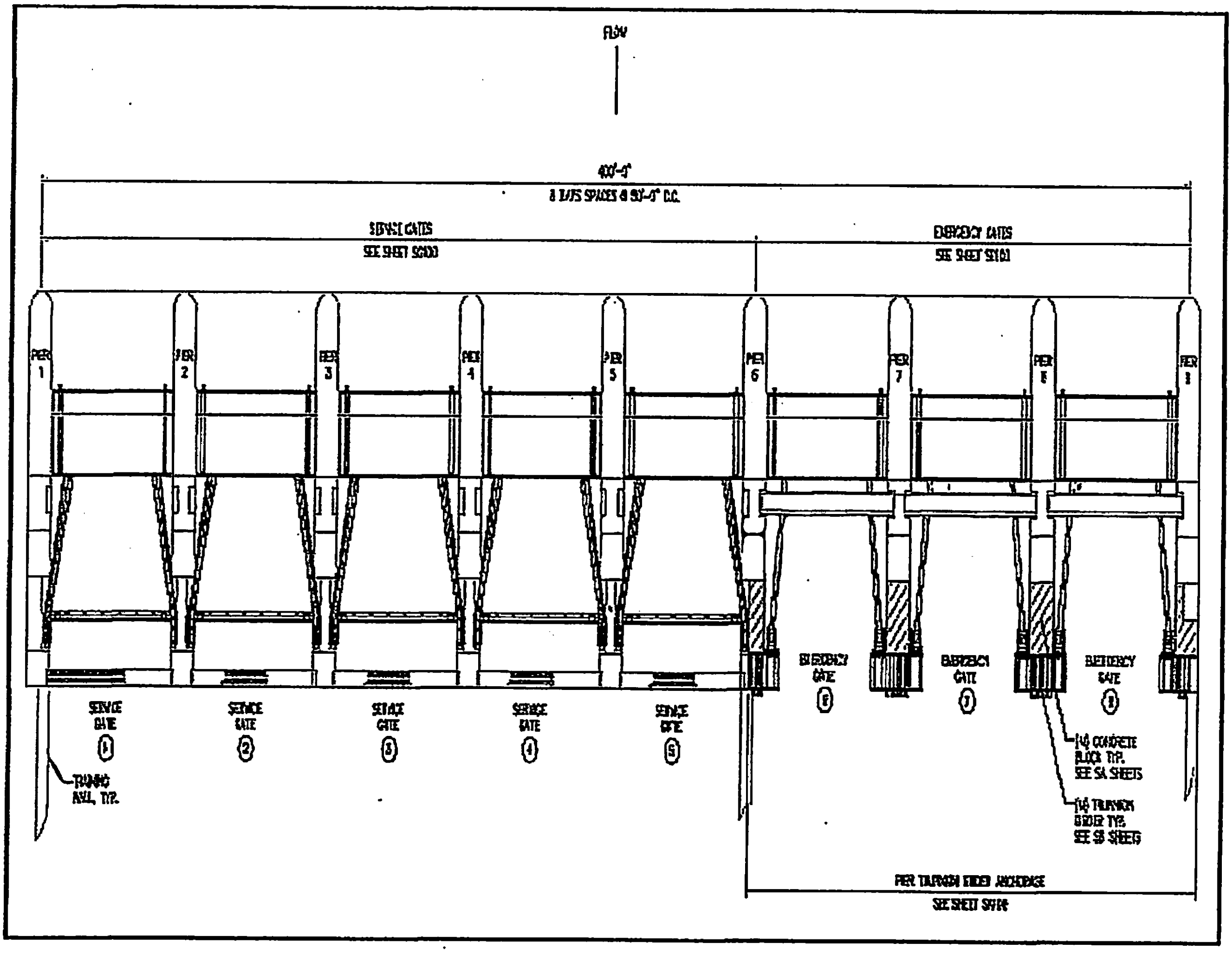


Figure 1. Depiction of main dam tainter gates and associated piers. View from downstream side of dam looking upstream toward dam itself.

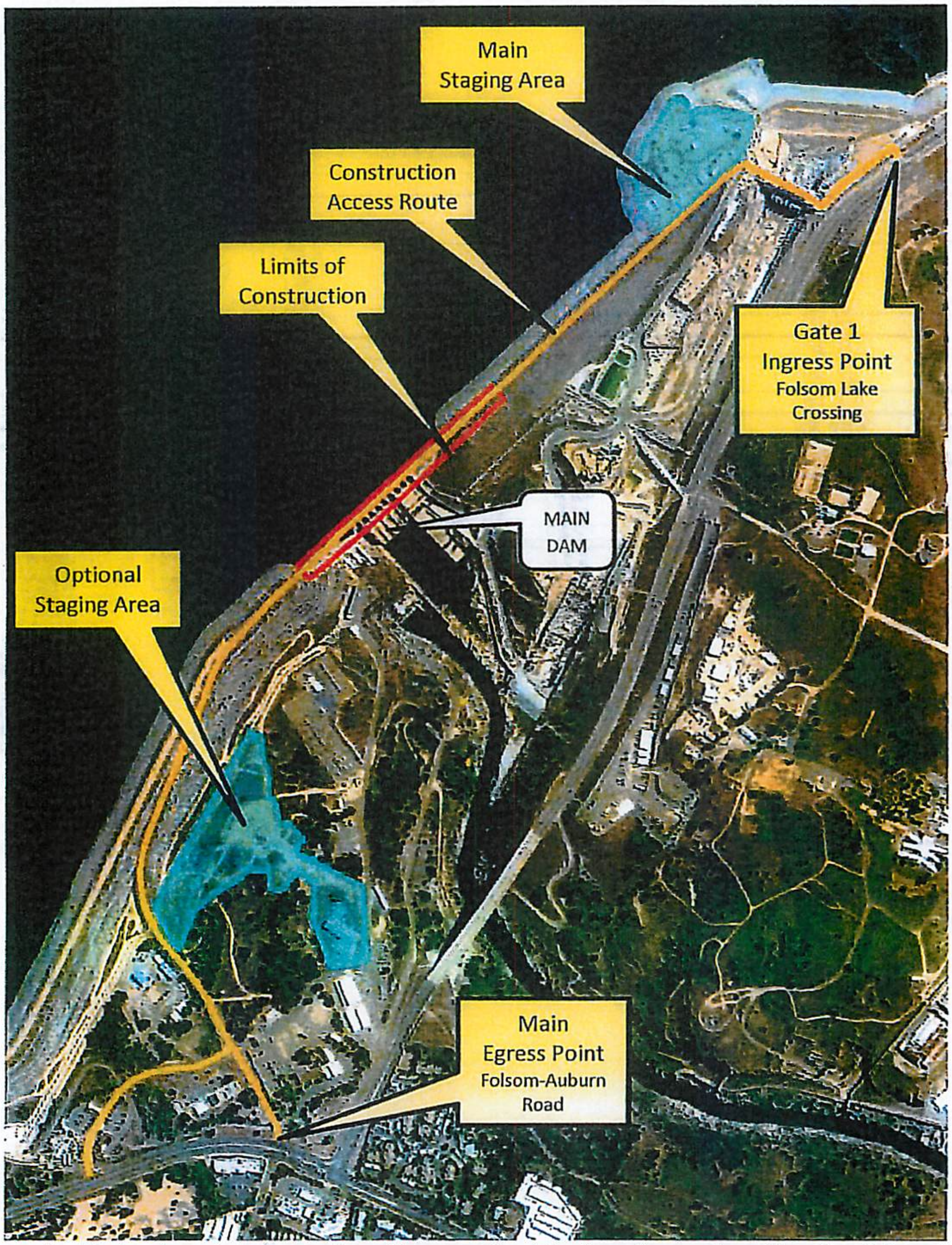


Figure 2. Main dam tainter gate refinements: Limits of construction (red lines), construction staging areas (blue lines), and construction access route (orange lines).

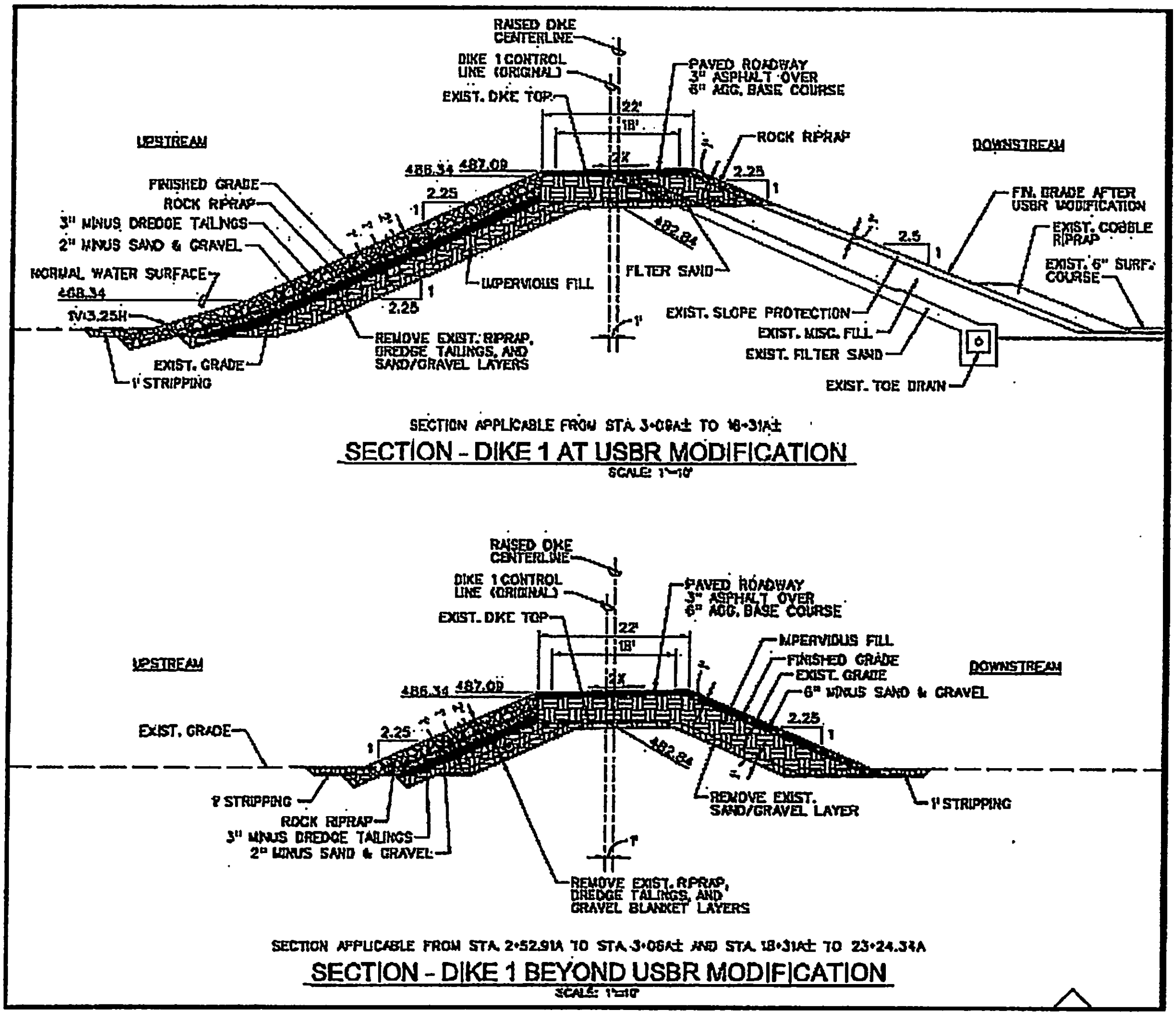


Figure 3. Preliminary typical cross section for 3.5-foot raise at Dike 1.

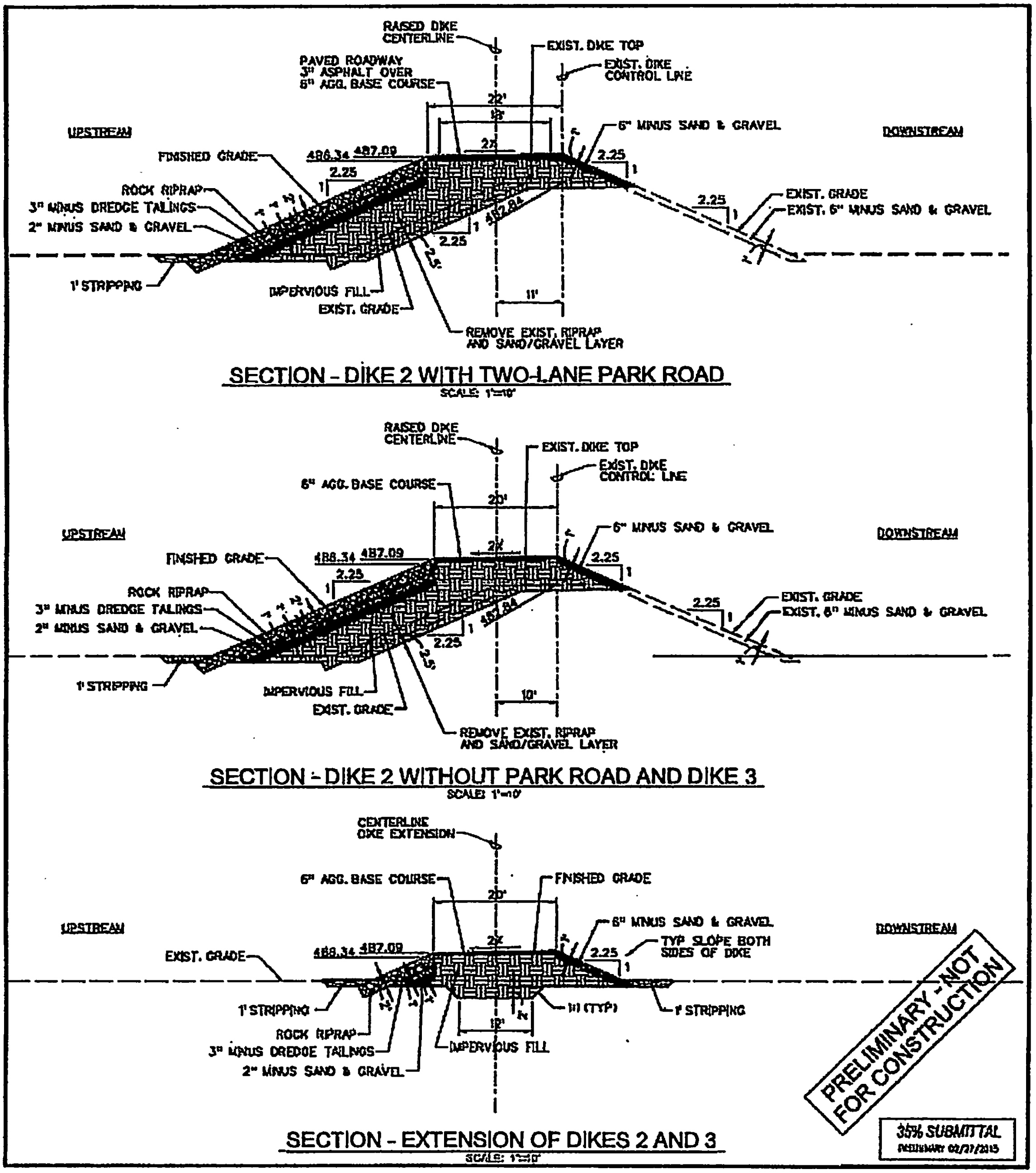


Figure 4. Preliminary typical cross sections for 3.5-foot raise at Dike 2 and Dike 3.

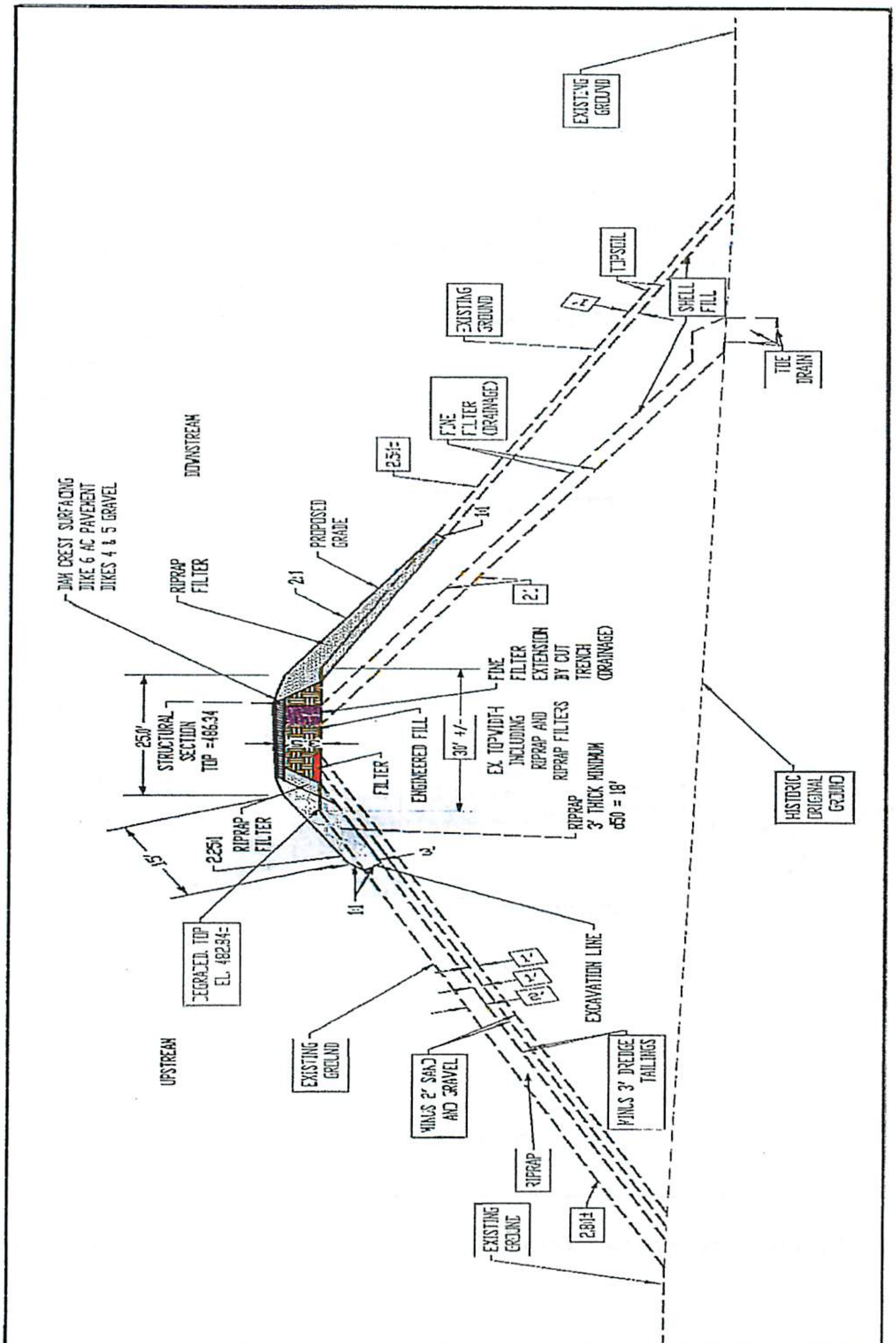


Figure 5. Preliminary typical cross section for 3.5-foot raise at Dikes 4, 5, and 6.

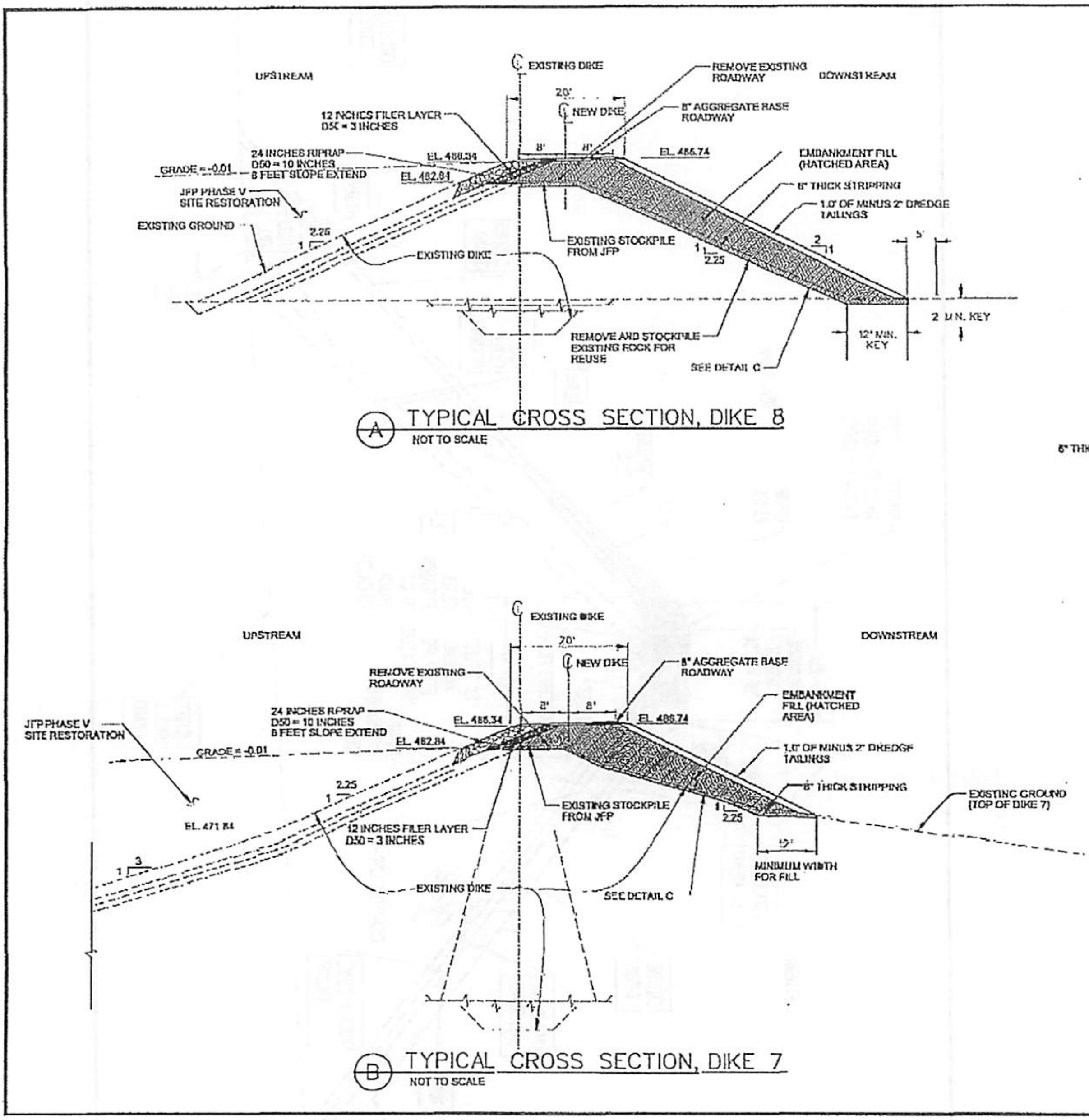


Figure 6. Preliminary typical cross sections for 3.5-foot raise of Dike 7and Dike 8.

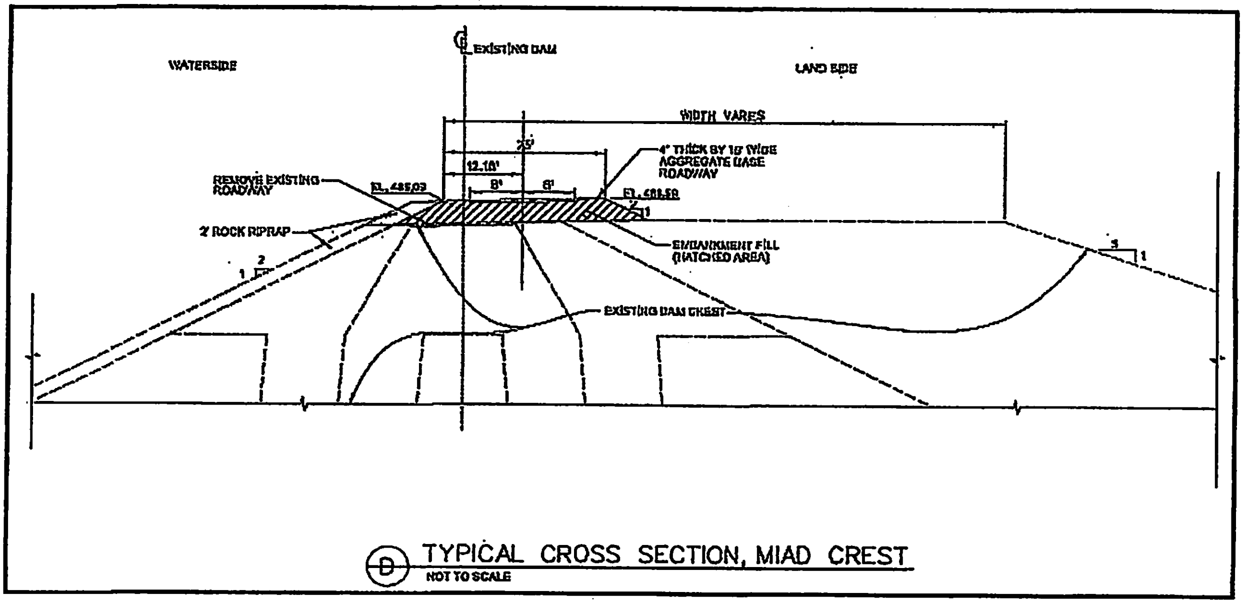


Figure 7. Preliminary typical cross section for 3.5-foot raise at Mormon Island Auxiliary Dam (MIAD).

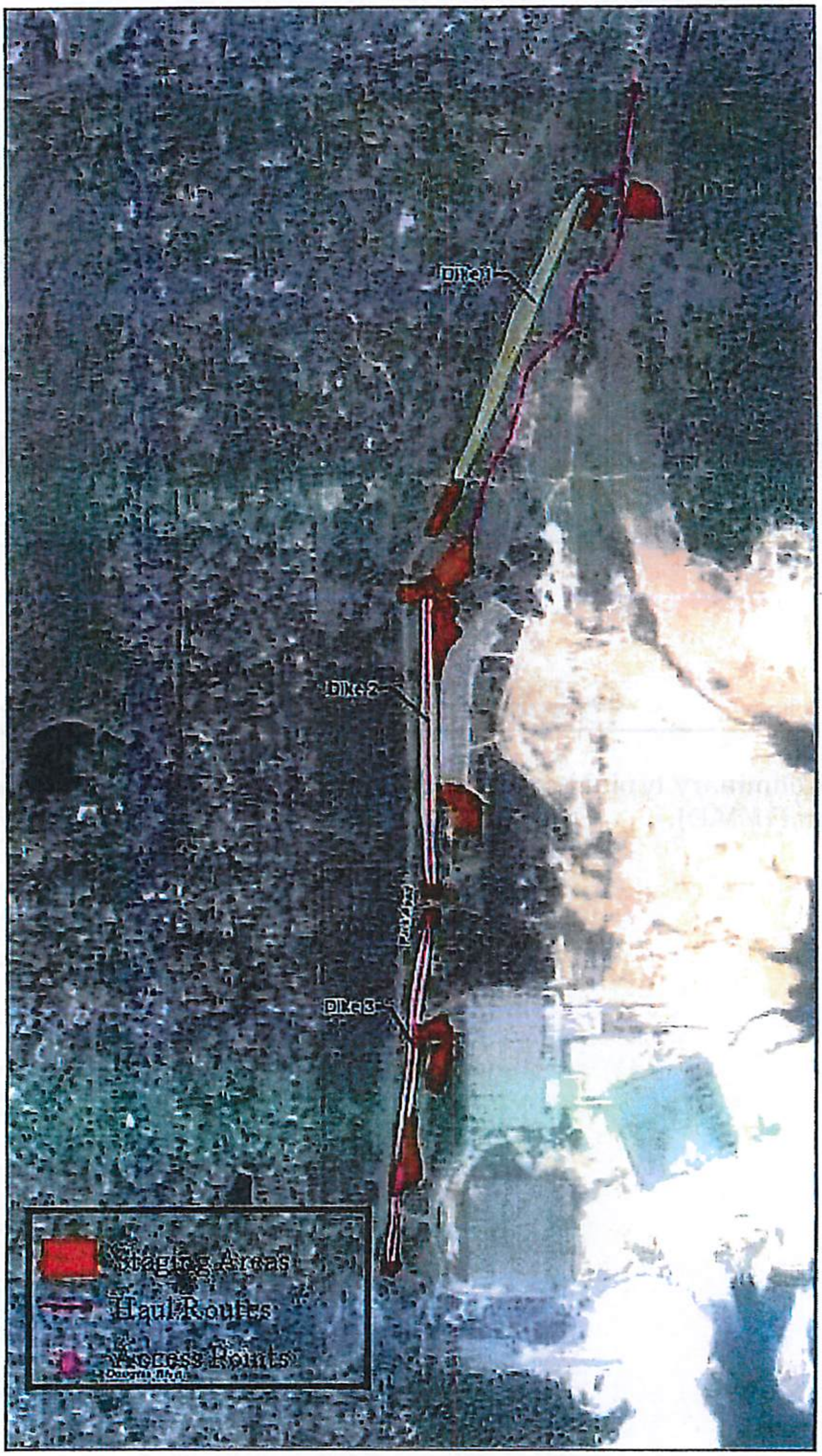


Figure 8. Staging areas, access points, and haul routes associated with Dikes 1, 2, and 3.

Figure 9. Staging areas, access points, and haul roads associated with Dikes 4, 5, and 6, as well as Right Wing Dam.

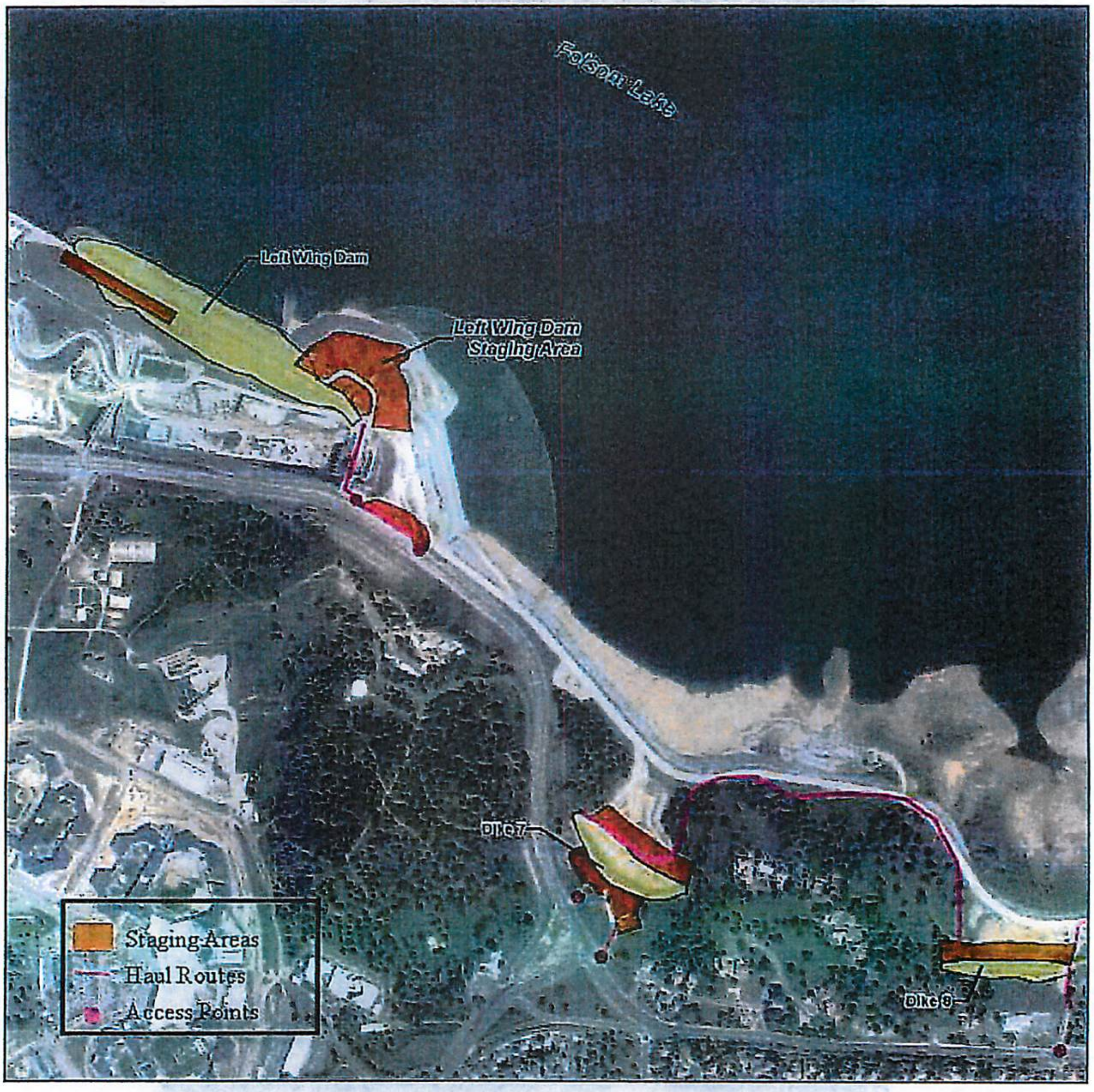


Figure 10. Staging areas, access points, and haul roads associated with Dikes 7 and 8, as well as the Left Wing Dam.

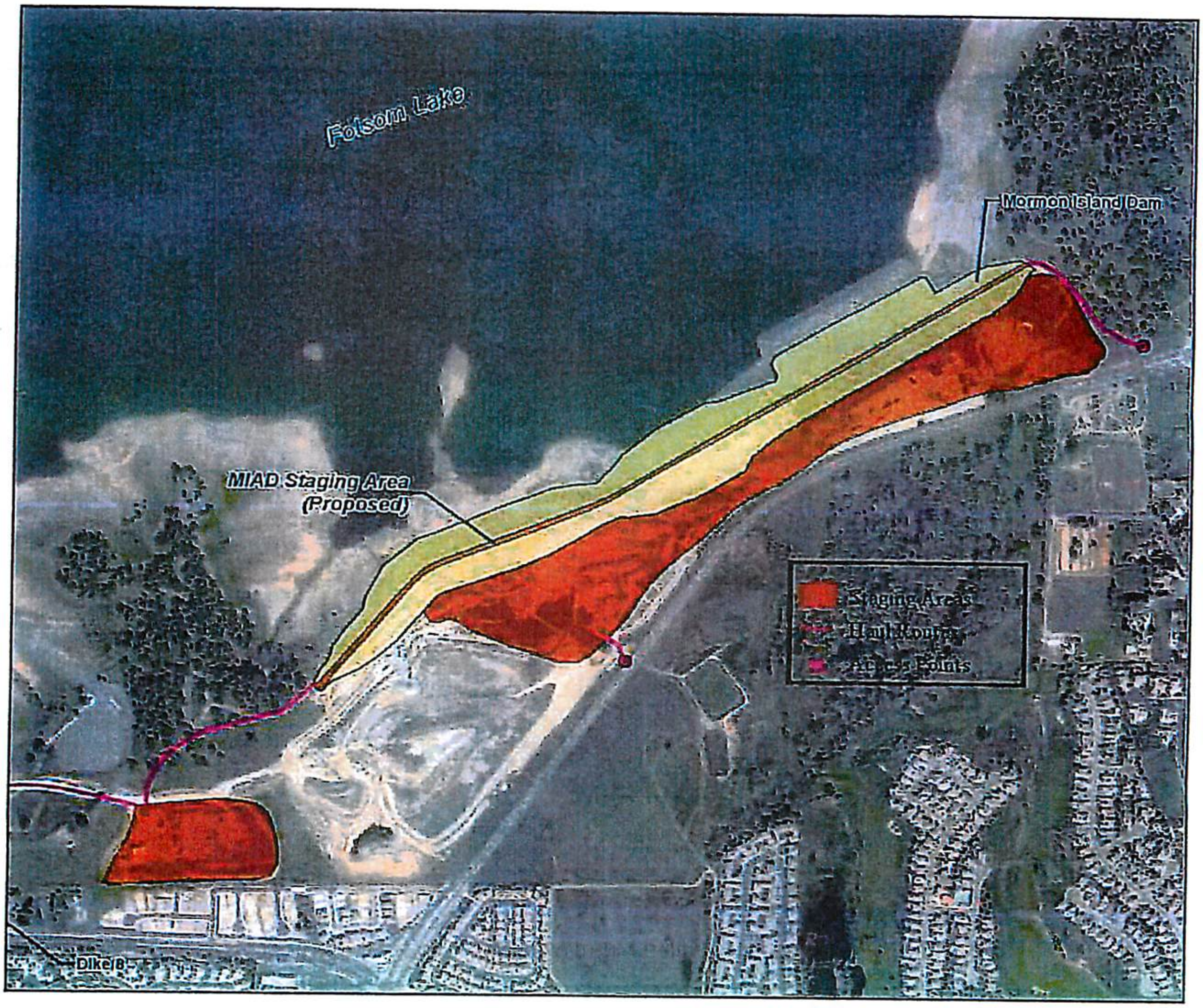


Figure 11. Staging areas, access points, and haul roads associated with Mormon Island Auxiliary Dam (MIAD).

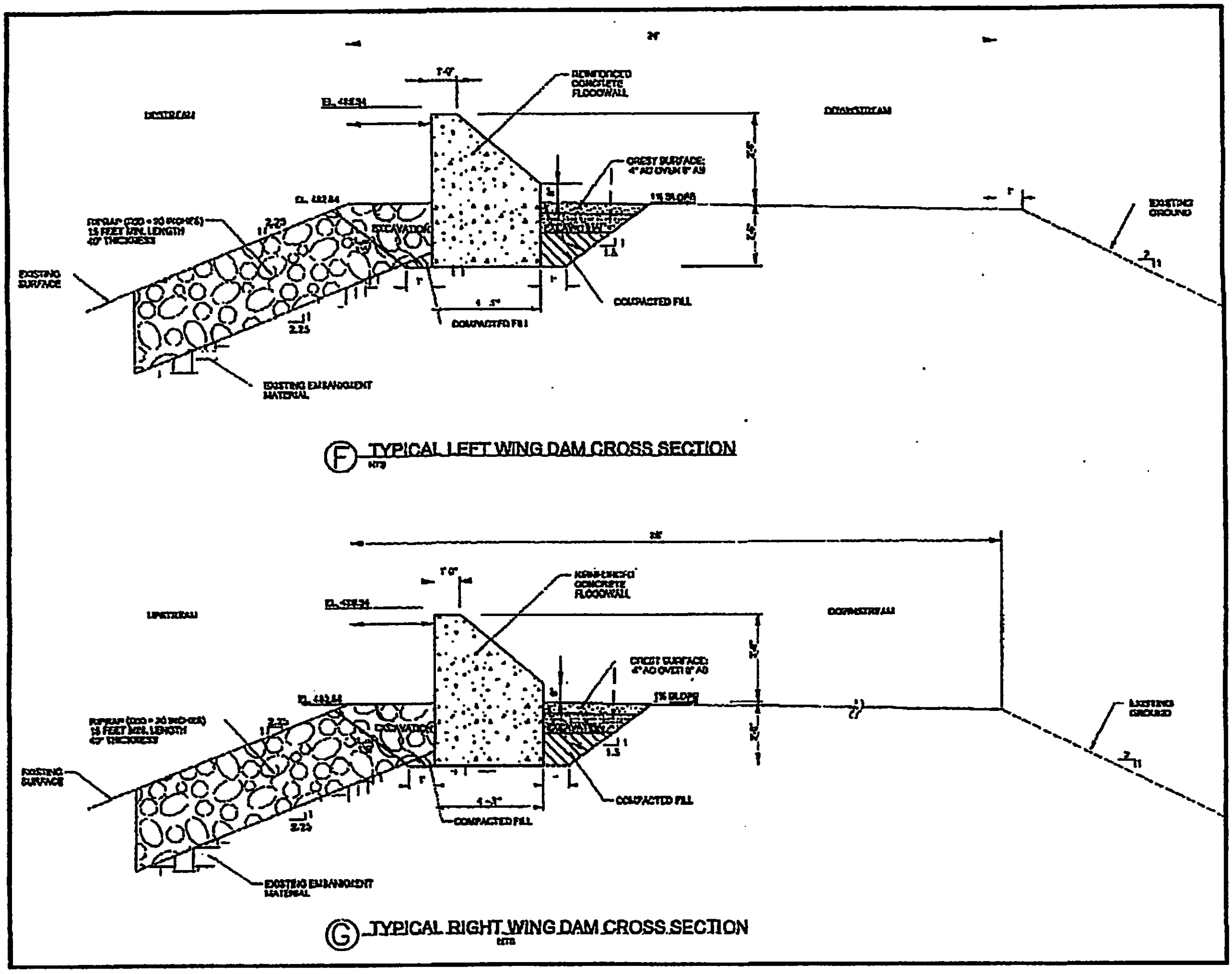


Figure 12. Preliminary typical cross sections for new floodwalls at the Left Wing Dam and the Right Wing Dam.

ENCLOSURE 2

HABITAT EVALUATION PROCEDURES (HEP)
(February 2007)

INTRODUCTION

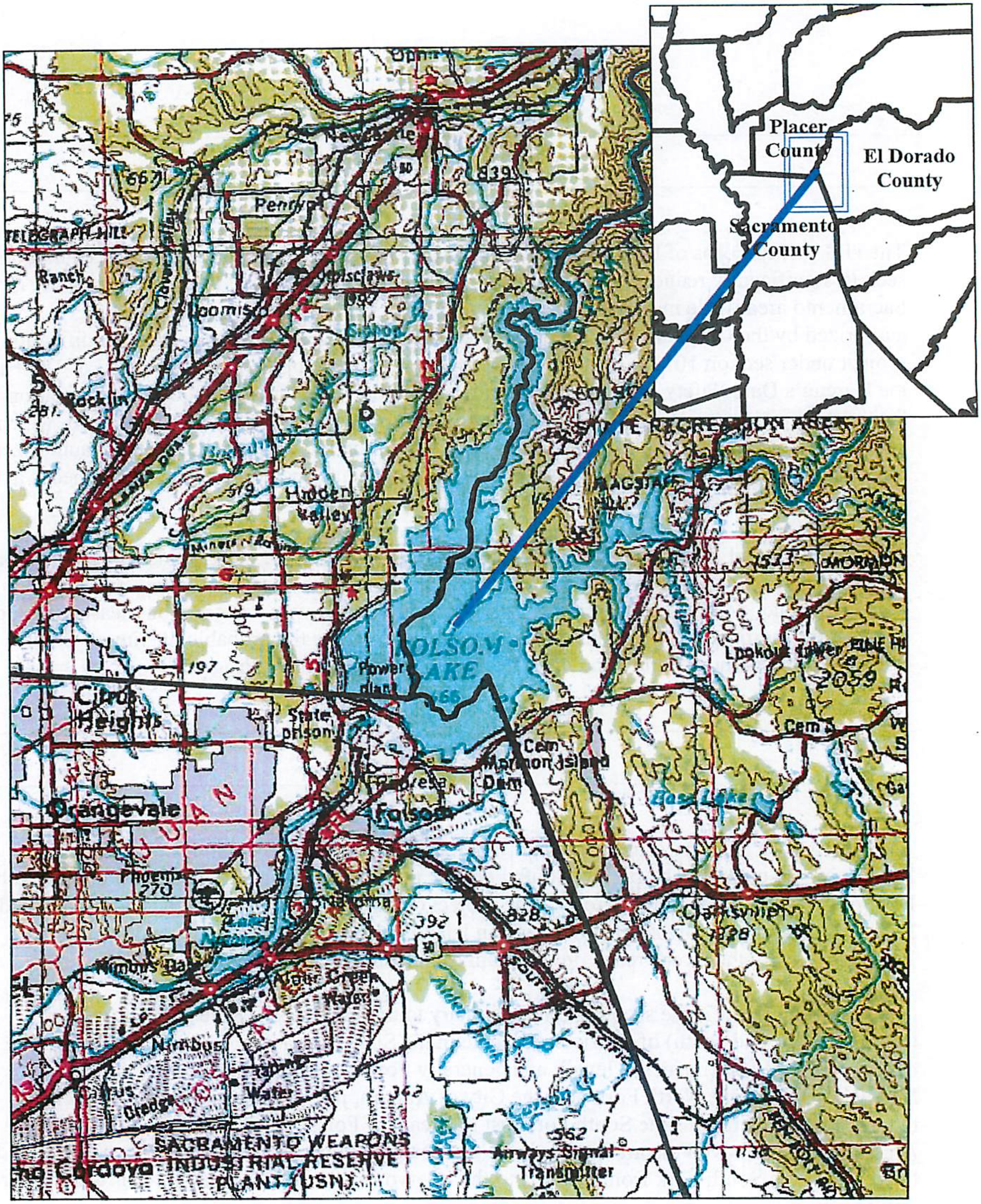
The U.S. Army Corps of Engineers (Corps) and the U.S. Bureau of Reclamation (Reclamation) seek to significantly reduce the risk of flooding along the main stem of the American River in the Sacramento area while meeting dam safety and public safety objectives. The project is authorized by the Corps' American River Watershed Investigation, Folsom Dam Modification project under section 101 (a) (6) of the Water Resources Development Act (WRDA) of 1999 and the Bureau's Dam Safety Program (static, earthquake, etc) (Reclamation 2006). Modifications to the existing authorities were made in the Energy and Water Appropriations Act of 2006, which directed the Secretary of the Army and the Secretary of the Interior to collaborate on authorized activities to maximize flood damage reduction improvements and address dam safety needs at Folsom Dam and Reservoir as one Joint Federal Project.

This application of Habitat Evaluation Procedures (HEP) is intended to provide a quantification of the impacts on fish and wildlife resources associated with Folsom Dam Safety and Flood Damage Reduction (Folsom DS/FDR). Any dam raise or spillway construction measure would be a major modification and would allow Folsom Dam to pass the probable maximum flood (PMF) volume without failure and meet Reclamation's Dam Safety Program.

PROJECT AREA

The project area is in the American River watershed, and would affect lands around Folsom Reservoir, and along the North and South Forks of the American River, which are impounded by Folsom Dam (Figure 1 and Figure 2). The project could also directly affect the Mormon Island Preserve located just downstream of Mormon Island Auxiliary Dam (MIAD) and the lower American River--the river's reach downstream of Folsom Dam (Figure 3).

The American River is the second largest tributary to the Sacramento River. The three forks (north, middle, and south) of the river originate in the Sierra Nevada Mountains at an elevation of about 10,400 feet (mean sea level), and generally flow in a southwesterly direction. The Middle Fork joins the North Fork near the City of Auburn, just upstream of Folsom Reservoir; the North Fork then joins the South Fork just upstream of Folsom Dam. All three forks of the American River above Folsom Reservoir are nationally popular areas for whitewater sports, and the reach of the South Fork from Coloma to the reservoir is the State's most popular whitewater rafting run.



Project Vicinity- Folsom Reservoir

Figure 1

Prepared by the US Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Flood and Waterway Planning Branch, Sacramento, CA; September 18, 2006

This map is for illustrative purposes only. The US Fish and Wildlife Service shall not be held liable for improper or incorrect use of the data described and/or contained herein.

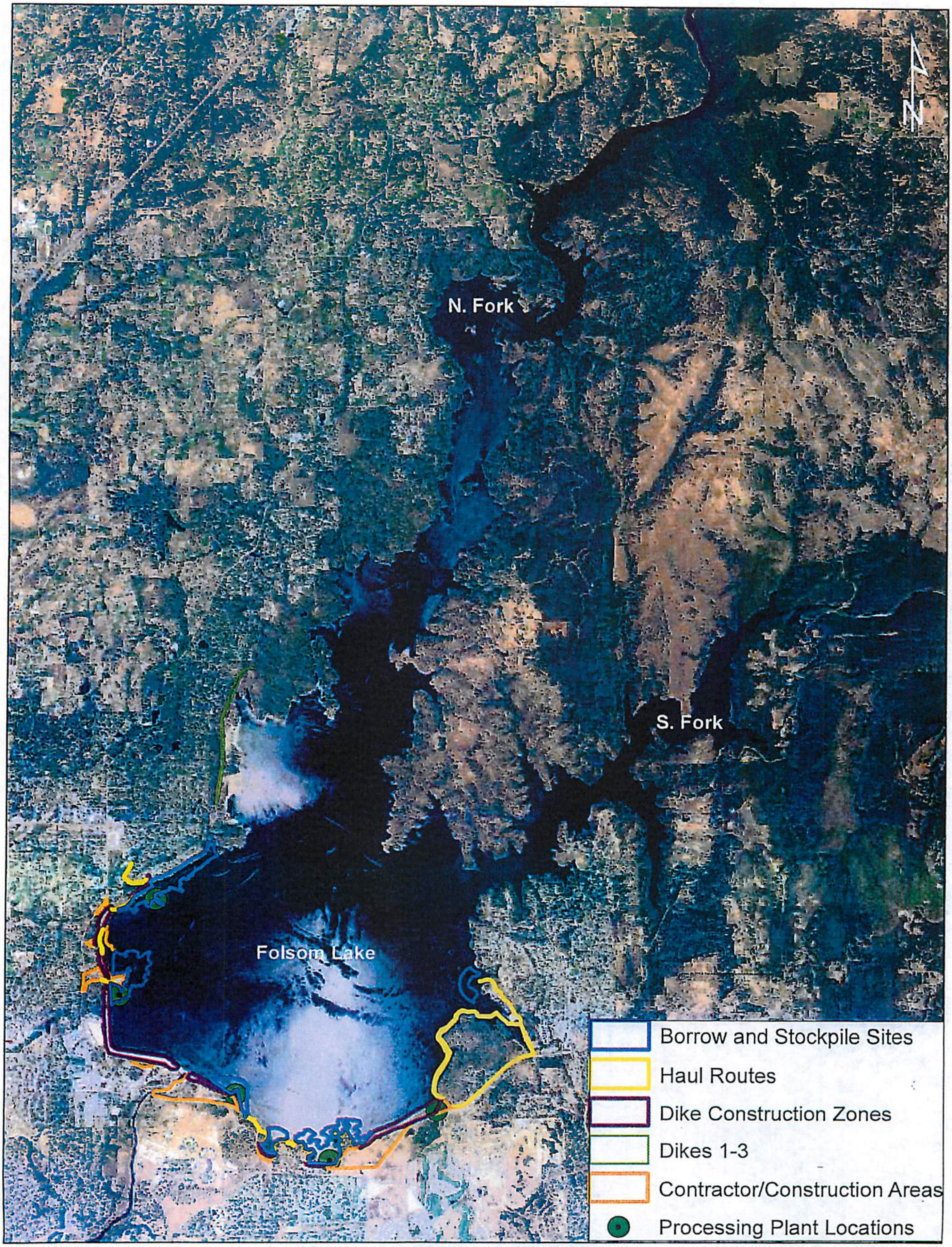


Figure 2- Project Location

Prepared by the US Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Flood and Waterway Planning Branch; February 27, 2007

This map is for illustrative purposed only. The US Fish and Wildlife Service shall not be held liable for improper or incorrect use of the data described and/or contained herein.

0 0.5 1 2 Miles

Mormon Island Auxiliary Dam and Morman Island Preserve Figure 3

Folsom Dam, located near the city of Folsom, is a multi-purpose dam built by the Corps in 1955, and operated by Reclamation. It is the largest of about 20 dams in the American River watershed and, except for Nimbus Dam, is the furthest downstream. Five reservoirs in the upper American River watershed (Loon Lake, Ice House, Union Valley, French Meadows, and Hell Hole) represent 90% of the existing storage capacity upstream of Folsom Reservoir.

The main dam is a 345-foot high concrete gravity dam across the American River channel. Associated with Folsom Dam is a series of auxiliary dams and dikes which span topographic lows; these structures are needed to contain the reservoir. Mormon Island Dam is the largest of these structures, and is located on the southeast end of the reservoir. Folsom Reservoir blocks about 20 miles of the North Fork and 10 miles of the South Fork, and has a total storage capacity of 974,000 acre-feet, which fills the reservoir to an elevation of 466 feet above mean sea level (msl).

Reclamation operates Folsom Dam as an integrated component of the Central Valley Project. The dam's primary purposes have been to: provide flood control; provide instream flows; manage Sacramento-San Joaquin Delta water quality; produce hydropower; provide recreation; and ~~more recently, protection and restoration of the region's fish and wildlife resources.~~

PROJECT DESCRIPTION

The Folsom DS/FDR project includes measures to remedy dam safety issues associated with seismic, static, and hydrologic concerns, and to provide increased flood damage protection. These measures include several different options to remedy the various issues at the Folsom facilities. The Folsom Facilities to be addressed by one or more of the engineering options include the main concrete dam, the right and left wing dams, Mormon Island Auxiliary Dam (MIAD), and eight dikes (1 through 8). The concrete dam and earthen wing dams serve to impound water associated with the main stem of the American River. MIAD serves to dam water within an historic river channel, while the earthen dikes serve to contain water at low spots in the topography during periods when the reservoir is full or nearly full.

The improvements would be designed so that they could be constructed and operated without affecting ongoing water conservation and hydropower operations. The plan would maintain the current Folsom Dam design flood control release of 115,000 cubic feet per second (cfs) and an emergency release of 160,000 cfs. Four scales of enlargement alternatives were developed using maximum flood control pool elevations of 468, 486.5, 489.5 and 499.5 feet msl.

Several constraints were imposed on plan formulation for Folsom DS/FDR project, these are:

- o dam raise measures are solely for flood control as stipulated in section 566 of WRDA 1999;

- dam raise measures are to avoid disruptions to the normal operation of Folsom Dam for water supply, hydropower, and flood control;
- no loss of flood protection from existing flood damage reduction projects is permitted;
- minimize disturbance of habitat for threatened and endangered species.

The no action alternative serves as the base against which the proposed flood protection and Dam Safety alternatives will be evaluated to determine effectiveness and to identify effects that would result from them. Several actions that are currently authorized are expected to be completed prior to implementation of any Folsom DS/FDR project. Therefore, the effects and benefits associated with these actions are part of the no-action condition. See the accompanying Fish and Wildlife Coordination Act report for a complete description of the no action condition. A complete project description can be seen in the March 2007 Folsom DS/FDR FEIR/EIR.

Alternative 1 – No Dam Raise/Minimal Embankment Raise, Fuseplug Spillway

Under Alternative 1, there would be no raise to the concrete structure with minimal modifications to the existing spillway. A large auxiliary spillway would be constructed adjacent to the left wing dam to address hydrologic and flood control concerns. Some of the earthen structures would be raised to address hydrologic concerns, but not to increase the flood storage capacity of the reservoir since this alternative is a Dam Safety only alternative.

Alternative 2 – 4-foot Dam and Embankment Raise

Alternative 2 incorporates a 4-foot dam raise with a fuseplug auxiliary spillway and gate-controlled tunnel spillway for better hydrologic control of large flood events. Under this alternative, there could be a 4-foot raise to the concrete structure with some modifications to the existing spillway gates. An auxiliary spillway with a chute or a tunnel would be constructed to address hydrologic and flood control concerns. All of the earthen structures could be raised to address hydrologic concerns and to provide additional flood storage capacity.

Alternative 3; Preferred Alternative- Joint Auxiliary Spillway, 3.5-foot Parapet Wall Raise

Under the Preferred Alternative a smaller six-submerged tainter gate (six gate) auxiliary spillway would be constructed to address both Dam Safety and Flood Damage Reduction objectives including hydrologic and flood control concerns. Construction of the six gate auxiliary spillway would increase project discharge capacity. The 3.5-foot raise, in conjunction with modification and/or replacement of the three emergency spillway gates and the six-gate auxiliary spillway, would only serve as additional freeboard for the Folsom facilities. Once construction is completed the raise would not exceed the existing take line for a 200-year design event and there would be an anticipated lower maximum water surface elevation. The 3.5-foot raise, modification and/or replacement of the three emergency spillway gates and the six-gate auxiliary spillway, have been identified by the Corps as their Selected Plan within the Corps' Post Authorization Change report. The remaining elements of Alternative 3 are Dam Safety Modification as revised above.

A tentative schedule showing the sequencing of construction for the preferred alternative is shown in Table 1.

Table 1 Folsom DS/FDR Project Phase Sequencing		
Activity ID	**Folsom Facility**	**Construction Period**
1	Auxiliary Spillway Excavation Phase 1	September 2007 to March 2009
2	Right and Left Wing Dam Static Modifications	February 2008 to March 2009
3	Mormon Island Jet Grouting	July 2008 to December 2009
4	Auxiliary Spillway Excavation Phase 2	September 2010 to January 2014
5	Dike 5 Static Modifications	September 2009 to May 2010
6	Mormon Island Seismic Overlay	June 2015 to April 2017
7	Dike 4 and 6 Static Modifications	September 2017 to April 2018
8a	Pier Tendon Installation at Main Dam	January 2014 to March 2015
8b	Spillway Pier Wraps & Braces	August 2016 to April 2018
8c	Spillway Gate Repairs	January 2018 to August 2020
9	Auxiliary Spillway Approach Channel Excavation and Gate Structure Construction	September 2011 to December 2014
10	Raise of all Folsom Facilities	September 2018 to September 2019

Alternative 4 – 7-foot Dam and Embankment Raise

Alternative 4 contains many of the same elements as Alternative 3 with the exception of a 7-foot raise that could result in increased reservoir flood storage during large flood events. Under this alternative all Folsom Facilities and earthen structures would be raised 7 feet. A smaller four-submerged tainter gate (four gate) auxiliary spillway would be constructed to address hydrologic and flood control concerns.

Alternative 5 – 17-foot Dam and Embankment Raise

Alternative 5 was specifically developed as an alternative that would address both Dam Safety and Flood Damage Reduction requirements without the construction of an auxiliary spillway. Under this alternative all Folsom Facilities could be raised 17 feet which would increase reservoir storage capacity to control large flood events.

METHODOLOGY

HEP is a methodology developed by the Fish and Wildlife Service (Service) and other State and Federal resource and water development agencies which can be used to document the quality and quantity of available habitat for selected fish and wildlife species. HEP provides information for two general types of habitat comparisons: (1) the relative value of different areas at the same point in time; and (2) the relative value of the same areas at future points in time. By combining the two types of comparisons, the impacts of proposed or anticipated land-use and water-use changes on habitat can be quantified. In a similar manner, any mitigation needs (in terms of acreage) for the project can also be quantified, provided a mitigation plan has been developed for specific alternative mitigation sites.

A HEP application is based on the assumption that the value of a habitat for selected species or the value of a community can be described in a model which produces a Habitat Suitability Index (HSI). This HSI value (from 0.0 to 1.0) is multiplied by the area of available habitat to obtain Habitat Units (HUs). The HUs and Average Annual Habitat Units (AAHUs) over the life of the ~~project are then used in the comparisons described above.~~

The reliability of a HEP application and the significance of HUs are directly dependent on the ability of the user to assign a well-defined and accurate HSI to the selected evaluation elements or communities. Also, a user must be able to identify and measure the area of each distinct habitat being utilized by fish and wildlife species within the project area. Both the HSIs and the habitat acreage must also be reasonably estimable at various future points in time. The HEP team, comprised of Corps, Reclamation and Service staff, determined that these HEP criteria could be met, or at least reasonably approximated, for the Folsom DS/FRD project. Thus HEP was considered an appropriate analytical tool to analyze impacts of the proposed project alternatives[1]. Further the HEP team determined that HSI values for habitats impacted by the Folsom DS/FRD project would be taken from the American River Watershed Investigation, Folsom Bridge (Bridge) project, the American River Watershed Investigation Long-Term Evaluation (Long-Term) and the American River Watershed Investigation Folsom Dam Modification (MODS) project. HSI values for oak/grey pine woodland and seasonal wetland habitats were used from the data collected in Reach 1 and riparian woodland habitat HSI values were used from data collected in Reach 3 in 2005, from the Bridge project. Chaparral HSI values were taken from Long-Term data, collected in 2000 for the inundation impacts and the direct impacts for chaparral HSI values were taken from MODS data, collected in 2004, for the staging, borrow and construction use areas.

GENERAL HEP ASSUMPTIONS

Some general assumptions are necessary to use HEP and Habitat Suitability Index (HSI) Models in the impact assessment:

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[1] For further information on HEP see ESM 100-104 which is available from the Service's Sacramento Fish and Wildlife Office.

Use of HEP:

1. HEP is the preferred method to evaluate the impacts of the proposed project on fish and/or wildlife resources.
2. HEP is a suitable methodology for quantifying project-induced impacts to fish and wildlife habitats.
3. Quality and quantity of fish and wildlife habitat can generally be numerically described using the indices derived from the HSI models and associated habitat units.
4. The HEP assessment is applicable to the habitat types being evaluated.

Use of HSI Models

5. HSI models are hypotheses based on available data.
6. HSI models are conceptual models and may not measure all ecological factors that affect the quality of a given cover-type for the evaluation species (e.g. vulnerability to predation). In some cases, assumptions may need to be made by the HEP Team and incorporated into the analysis to account for loss of those factors not reflected by the model.

The additional HEP field work for the project was completed by staff from the Service's Sacramento Fish and Wildlife Office, the Corps (Sacramento District) and Reclamation and occurred during May 2006 and included vegetation mapping around the Folsom Reservoir. Six cover-types would be permanently impacted by the project including oak woodland, oak savannah, blue oak/grey pine woodland, riparian woodland, seasonal wetland, annual grassland and other[2]. These cover-types were mapped by the HEP Team on aerial photographs in the field then digitized into ArcGIS. Using the project footprint supplied by Reclamation and the Corps acreages were quantified using GIS. The cover-types and acreage affected by the proposed work is summarized in Table 2 and Table 3.

2. "Other" encompasses those areas which do not fall within the other cover-types such as gravel and paved roads, parking areas, buildings, bare ground, riprap, etc.

Table 2. Summary of Cover-Types, Acres Impacted, and Compensation Recommended for the Alternatives Compared to the Preferred Alternative for the Construction of the Folsom DS/FRD Project, California.

Folsom DS/FRD Project					
Alternative	3 (Preferred)	1	2	4	5
Cover-Type	Impacted Acres: Compensation Needed	Difference from the Preferred Alternative Impacted Acres	Difference from the Preferred Alternative Impacted Acres	Difference from the Preferred Alternative Impacted Acres	Difference from the Preferred Alternative Impacted Acres
Oak/grey pine woodland	52.4 : 64.5	0.39	0.39	0.70	-1.07
Riparian woodland	42.7 : 48.0	-0.28	-0.62	-0.15	-1.66
Chaparral	0.7 : 0.8	0	0	0	-0.21
Seasonal wetland	1.2 : 4.7	0	0	0	0
Total	**97.0 : 117.9**				

Table 3. Preliminary Summary of Cover-Types, Impacted Acres and Compensation Recommended for the Inundation and Construction at Dikes 1-3 of the Folsom Reservoir for the Folsom Dam Raise Alternatives 3.5, 4.0, 7.0, or 17 feet as part of the Folsom DS/FDR Project, California.

Folsom Dam Raise Alternatives				
	3.5-ft Raise (Preferred)	**4-ft Raise**	**7-ft Raise**	**17-ft Raise**
Cover Type	Impacted Acres: Compensation Needed	Impacted Acres: Compensation Needed	Impacted Acres: Compensation Needed	Impacted Acres: Compensation Needed
Oak/Grey Pine woodland	781.5 : 939.4	820.2 : 985.8	935.1 : 1,123.8	1,331.8 : 1,600.1
Riparian woodland*	45.47 : 0.02	48.68 : 0.02	56.5 : 0.02	48.68 : 0.02
Chaparral	32.2 : 34.1	34.3 : 36.3	40.8 : 43.2	34.3 : 36.3
Seasonal wetland*	0.58 : 0.0	0.58 : 0.0	0.58 : 0.0	0.58 : 0.0
Total	**859.8 : 973.5**	**903.8 : 995.12**	**1,033 : 1,167**	**1,415.4 : 1,636.4**

*No permanent impacts to riparian woodland and seasonal wetland are expected from the short inundation that would occur from a raise component of the Folsom DS/FDR project. Acres shown are from the construction at Dikes 1-3.

Eleven HSI models were used in this HEP application to quantify project impacts. A summary of the models applied for each cover-type is also included in Table 4. The western gray squirrel and plain titmouse models were selected to evaluate the oak woodland, and oak/grey pine woodland cover-types. These species were chosen because they utilize this cover-type for

Table 4. HEP Cover-types, proposed HSI models, and model variables for the Folsom DS/FDR Project, California.

COVER-TYPE	PROPOSED I	HSI MODEL VARIABLES
(1) Oak woodland	Western gray squirrel	V1 - Canopy closure of mast-producing species>5m tall V2 - Density of leaf litter layer V3 - Tree canopy cover V4 - Den site availability per acre
	Plain titmouse	V1 - Tree diameter V2 - Trees per acre V3 - % composition of tree species that are oaks
(2) Riparian woodland	Yellow warbler	V1 - % deciduous shrub crown cover V2 – Average height of deciduous shrub canopy V3 - % deciduous shrub canopy comprised of hydrophytic shrubs
	Northern oriole	V1 - Average height of deciduous tree shrub V2 – % deciduous tree crown cover V3 – Stand width
	Western fence lizard	V1 - % ground cover V2 – Average size of ground cover objects V3 – Structural diversity/interspersion V4 - % canopy cover
(3) Seasonal wetlands	Great egret (feeding)	V1 - Percentage of area with water 10-23 cm deep V2 - Percentage of submerged or emergent vegetation cover in zone 10-23 cm deep
	California vole	V1 - Height of herbaceous vegetation V2 - Percent cover of herbaceous vegetation V3 - Soil type V4 - Presence of logs and other types of cover
	Red-winged blackbird	V1 - Predominance of narrow or broadleaf monocots V2 - Water presence throughout the year V3 - Presence or absence of carp V4 - Presence or absence of damselflies or dragonflies V5 - Mix of herbaceous vegetation V6 - Suitability of foraging substrate
(4) Chaparral	Bobcat	V1 - % shrub cover V2 - % herbaceous cover V3 – degree of patchiness V4 – rock outcroppings
	Wrentit	V1 - % shrub cover V2 - % shrub cover ≤5 feet
	California thrasher	V1 – Presence of low shrub openings V2 – Shrub/seedling cover
(5) Annual grassland	No HEP proposed; disturbed areas will be reseeded after construction is complete.	

nesting and foraging. The western fence lizard, yellow warbler, and northern oriole models were chosen to evaluate the project impacts to the riparian woodland cover-type. These species were selected because the bird species utilize the riparian tree canopy provided by the cover-type for nesting and foraging. For analysis purposes these two cover types were treated as one because the same models were chosen by the HEP Team. The western fence lizard utilizes the ground component of the cover-type including rocks boulders, and downed wood for shelter and foraging.

The red-winged blackbird, great egret (feeding) and California vole models were selected for evaluating impacts to the seasonal wetland cover-type because these species forage, nest, or inhabit this cover-type.

The bobcat, wrentit and California thrasher models were selected for evaluating impacts to the chaparral cover-type because these species forage, nest, or inhabit this cover-type.

The annual grassland and "other" cover-types were not included in the HEP analysis because they do not currently provide significant habitat for wildlife species or the conditions (habitat values) ~~after the completion of work are expected to be similar to pre-project conditions.~~

The cover-type designations and HSI models were also selected in part to be consistent with previous impact analyses completed for the American River Watershed Investigation Folsom Dam Modification project which is occurring concurrently with the Folsom Bridge project. More information on the HEP for those projects can be found in the Service's Fish and Wildlife Coordination Act Report for those projects.

RESULTS AND DISCUSSION

This HEP analyzed the potential impacts of the proposed Folsom DS/FDR project. Impact areas were divided into five components to facilitate possible design changes and subsequent impact analyses as the planning process proceeds toward selection of a construction alternative. The components are: (1) the construction footprint of the spillway alternatives; (2) impacts associated with Safety of Dams construction at dikes 4 thru 8, both wing dams, and MIAD; (3) impacts from borrow and stockpile; (4) impacts associated with the Flood Damage Reduction construction as dikes 1 thru 3; and (5) the potential impacts to vegetation in the new reservoir inundation zone.

The HEP does not address potential impacts to aquatic resources at Folsom Reservoir during construction, nor are potential lower American River fishery impacts addressed for the construction period or subsequent reservoir operation.

Construction Impacts
The impacts and mitigation recommended for the Preferred Alternative for the Folsom DS/FDR project is summarized in Table 5. A specific compensation site was not analyzed in this HEP application. Instead a typical site was developed, and assumptions were made that the site would be an annual grassland area without existing woody vegetation for a baseline condition. For the riparian and seasonal wetland cover-types, a critical assumption was made that any site selected for compensation would require the appropriate hydrology to support these cover-types.

<u>Folsom Reservoir Inundation</u>
Between 811.74 and 1,323.35 acres could be affected by enlarging Folsom Dam, depending on which dam raise alternative is selected. Some of these lands are already developed or otherwise disturbed habitat which provides little or no value for wildlife species, and some support vegetation that is tolerant of flooding. Table 5 summarizes the acreages of each habitat which provides value for wildlife and is expected to receive inundation over the life of the project. Inundation effects around Folsom Reservoir would occur in large part by the frequency, timing, and duration of flooding. Studies to date indicate that predicting the effects of inundation on vegetation is not straightforward. The raising of Folsom Dam would have potential for at least two significant impacts on vegetation: (1) changes in vegetation composition caused by inundation affecting survival and reproduction of vegetation within the zone between current and proposed maximum reservoir levels; and (2) effects of inundation on soil erosion and slippage, especially on steep slopes as are found along the upper reservoir and the forks of the American River.

The vegetation types exposed to flooding are not, in general, highly tolerant of flooding. With the exception of riparian and riverine habitats, natural flooding does not occur in the areas which would be flooded by raising Folsom Dam. Studies of the effects of inundation on blue oaks (1975 *in* USFWS 1980; MWA-JSA 1994) have found that blue oaks can survive some flooding, but may be sensitive to periods of inundation of as little as 7 days. It is not clear from these studies, however, at what time of year flooding occurred, and the ability of vegetation to tolerate inundation depends on the time of year. For example, deciduous trees, such as oaks, tend to be much more sensitive to flooding during their period of active growth (i.e., in the spring), while winter-dormant plants appear to be more tolerant of flooding (USFWS 1980). Folsom Reservoir can reasonably be expected to fill during a major spring flood event, when oaks are actively growing. The absence of blue oaks within the current inundation zone of Folsom Reservoir and other foothill impoundments indicate that blue oaks cannot tolerate the flooding regime existing there. Further, evergreen species, including grey pines and live oaks, occur commonly around the reservoir, and tend to be more sensitive to inundation than deciduous trees such as blue oaks (MWA-JSA 1994).

The other factor which could affect vegetation is erosion of the saturated soil in the new inundation area during a flood event from the water being drawn down or wind driven wave wash during a major storm event. Slopes in the Folsom Reservoir area are generally between 5 and 25% (USACE 2001). Slopes in the Mooney Ridge area in the northwestern corner of the

Table 5. **Alternative 3, Preferred**- Summary of Cover-Types, Acres Impacted, Net Change in Average Annual Habitat Units With- and Without-Project, and Compensation Recommended for the Direct Impacts and Inundation Impacts of Construction and Raise of the Folsom DS/FDR Project, California.

Folsom Dam Auxiliary Spillway and Dike Construction						
	Cover-Type	**Acres Impacted**	**AAHUs W/O Project**	**AAHUs W/ Project**	**Net Change in AAHUs**	**Compensation Needed**
Construction, Haul Rds, Borrow & Stockpile	Oak - grey pine woodland	35.29	0.07	16.23	-16.16	42.37
	Riparian woodland	39.08	0.13	30.09	-19.96	43.88
	Seasonal wetland	0.89	0.00	0.18	-0.18	3.56
	Chaparral	0.26	0.04	0.15	-0.10	0.27
Dikes 4-8, Wing Dams & MIAD	Oak - grey pine woodland	16.04	7.38	0.04	-7.34	20.75
	Riparian woodland	1.93	1.49	0.01	-1.48	2.19
	~~Seasonal wetland~~	~~0.28~~	~~0.06~~	~~0.00~~	~~-0.06~~	1.12
	Chaparral	0.26	0.15	0.04	-0.10	0.28
Spillway (Six-Gate)	Oak - grey pine woodland	1.07	0.49	0.00	-0.49	1.38
	Riparian woodland	1.66	1.28	0.01	-1.27	1.88
	Seasonal wetland	0	0	0	0	0
	Chaparral	0.21	0.12	0.03	-0.08	0.22
Raise- 0 feet (Inundation)	Oak - grey pine woodland	773.08	355.62	1.57	-354.04	928.23
	Riparian woodland	45.45	35.00	35.00	0.00	0
	Seasonal wetland	0.58	0.12	0.12	0.00	0
	Chaparral	32.22	23.20	5.24	-17.96	34.08
[3]Dikes 1-3 Raise	Oak - grey pine woodland	8.46	3.89	0.02	-3.87	11.16
	Riparian woodland	0.02	0.02	0.54	-0.02	0.02
	Seasonal wetland	0	0	0	0	0
	Chaparral	0	0	0	0	0

[3] Construction at Dike 1-3 is dependent on the implementation of the raise component of the Folsom DS/FDR project. Impact acres for this component are preliminary in this document.

reservoir and the shoreline just west of the South Fork of the American River exceed 30% (USACE 2001). It is likely that during a major flood event some, or all, of the soil on steep slopes would experience some erosion. The extent of erosion and its effect on vegetation would be difficult to predict.

Assuming a worst case scenario that over the life of the project all of the existing vegetation (except riparian and seasonal wetlands) in the inundation zone would be lost, a mitigation need was developed for each cover-type using the HEP results. Statistically, there is a relatively small chance of complete inundation coupled with total loss of vegetation. However, it is reasonable to expect some impacts, especially at the lower zones due to the potential for more frequent inundation, over the life of the project.

Given the uncertainties on effects of inundation on vegetation and soil erosion, the HEP Team decided to recommend that a monitoring and adaptive management program be developed to monitor vegetation around the reservoir over the life of the project. Baseline conditions would be managed~~-and-updated-at-intervals-(10-years). After-major-flood-events-(those-which~~encroach above the existing maximum flood pool elevation), vegetation would be surveyed and damages attributable to inundation would be mitigated as deemed appropriate using the best management practices at the time (replanting on site would be the first priority).

FOLSOM BRIDGE PROJECT

REACH 1 EAST NATOMA STREET TO PARKING LOT NEAR SOUTH END OF DAM

PA 1 - Future Without Project (Impact Area)

OAK WOODLAND

WESTERN GRAY SQUIRREL

TY 0 - Baseline (measured)
- V1 - % canopy closure of trees and shrubs that produce hard mast (65%)
- V2 - Density of leaf litter layer (M)
- V3 - % tree cover (61%)
- V4 - Den site availability (53)

HSI Food $= (V1 \times V2)^{1/2}$ HSI Cover/Reproduction $= (V3 \times V4)^{1/2}$

HSI = 0.46 (lowest of values)

TY 1
- V1 - no change from TY 0
- V2 - no change from TY 0
- V3 - no change from TY 0
- V4 - no change from TY 0

HSI = 0.46

TY 60
- V1 - no change from TY 1
- V2 - no change from TY 1
- V3 - no change from TY 1
- V4 - no change from TY 1

HSI = 0.46

PLAIN TITMOUSE

TY 0 - Baseline (measured)
- V1 - dbh
- V2 - Number trees/acre
- V3 - % trees that are oaks

$$HSI = \frac{V1 + V2 + V3}{3}$$

HSI = 0 .65

TY 1
- V1 - no change from TY 0
- V2 - no change from TY 0
- V3 - no change from TY 0

HSI = 0.65

TY 60 V1 - no change from TY 0
V2 - no change from TY 0
V3 - no change from TY 0

HSI = 0.65

PA 2 - Future With Project (Impact Area)

Assume: 1. All vegetation removed from temporary and permanent impact zones in year 1
2. temporary easement areas will not be replanted with woody vegetation

WESTERN GRAY SQUIRREL

TY 0 - Baseline (measured) HSI = 0.46

TY 1 -	V1 - no trees	SI = 0
	V2 - low leaf litter	SI = 0.2
	~~V3 - no trees~~	~~SI = 0~~
	V4 - no den sites	SI = 0

HSI Food = $(V1 \times V2)^{½}$
= $(0 \times 0.2)^{½}$
= 0

HSI Cover/Reproduction = $(V3 \times V4)^{½}$
= $(0 \times 0)^{½}$
= 0

HSI = 0

TY 60- V1 - no change from TY 1
V2 - no change from TY 1
V3 - no change from TY 1
V4 - no change from TY 1

HSI = 0

TY 100 no change from TY60

PLAIN TITMOUSE

TY 0 - Baseline (measured) HSI = 0.65

TY 1 -	V1 - no trees	SI = 0.2
	V2 - no trees	SI = 0
	V3 - no trees	SI = 0

$$HSI = \frac{V1 + V2 + V3}{3} = \frac{0.2}{3} = 0.06$$

TY 60 - V1 - no change from TY 1
V2 - no change from TY 1
V3 - no change from TY 1

HSI = .06
TY 100 – no change from TY60

MP 1 - Management Area - Future Without Project (Compensation Site)

Assume: 1. Annual grassland area selected for conversion to oak woodland.

WESTERN GRAY SQUIRREL

TY 0 - Baseline (estimated)

V1 - % canopy closure of trees and shrubs that produce hard mast (no trees)	SI = 0
V2 - Density of leaf litter (low)	SI = 0.2
V3 - Den site availability (no trees)	SI = 0

HSI Food $= (V1 \times V2)^{1/2}$
$= (0 \times 0.2)^{1/2}$
$= 0$

HSI Cover/Reproduction $= (V3 \times V4)^{1/2}$
$= (0 \times 0)^{1/2}$
$= 0$

HSI = 0

TY 1 -
V1 - no change from TY 0
~~V2 - no change from TY 0~~
V3 - no change from TY 0
V4 - no change from TY 0

HSI = 0

TY 15 - no change from TY 1 HSI = 0
TY 60 - no change from TY 15
TY 100- no change from TY TY60

PLAIN TITMOUSE

TY 0 - Baseline (estimated)

V1 - dbh (0)	SI = 0.2
V2 - Number trees/acre (0)	SI = 0
V3 - % trees that are oaks (0)	SI = 0

$$HSI = \frac{V1 + V2 + V3}{3} = \frac{0.2 + 0 + 0}{3} = .06$$

TY 1 -
V1 - no change from TY 0
V2 - no change from TY 0
V3 - no change from TY 0

HSI = .06

TY 15 - no change from TY 1 HSI = .06
TY 60 - no change from TY 15 HSI = .06
TY 100- no change from TY 60

MP 2 - Management Area - Future With Project (Compensation Site)

Assume:
1. Acquire lands (currently annual grasslands)
2. Annual grassland area prepared for planting in TY 1 , provide access and maintenance roads
3. Plant 100% blue and live oak trees (4"x4"x14" tree pots) at a density of 400 trees/acre and cover crop
4. Moderate management intensity (assume 1.5 inches dbh after 10 yrs; 90 percent survival).
5. Watering, weed, pest control for minimum of 3 years and remedial actions as necessary to ensure plant establishment.
6. Assume maximum growth rate of 12"/year
7. Develop O&M manual
8. TY 51 values equal values measured for impact zone

WESTERN GRAY SQUIRREL

TY 0 - Baseline (estimated) HSI = 0

TY 1 -	V1 - tree species planted /no mast	SI = 0
	V2 - low	SI = 0.2
	V3 - 0 (no trees)	SI = 0
	V4 - 0 (no trees)	SI = 0

HSI = 0

TY 15 -	V1 - oak trees reach 16ft. high 8%	SI = 0.15
	V2 - low	SI = 0.2
	V3 - 8%	SI = 0.15
	V4 - 0	SI = 0

HSI Food $= (V1 \times V2)^{1/2}$
$= (0.15 \times 0.2)^{1/2}$
$= .17$

HSI Cover/Reproduction $= (V3 \times V4)^{1/2}$
$= (0.15 \times 0)^{1/2}$
$= 0$

HSI = 0

TY60	V1 - 40%	SI = 0.8
	V2 - medium	SI = 0.8
	V3 - 53%	SI = 1.0
	V4 - 24/ac	SI = 1.0

HSI Food $= (V1 \times V2)^{1/2}$
$= (0.8 \times 0.2)^{1/2}$
$= 0.40$

HSI Cover/Reproduction $= (V3 \times V4)^{1/2}$
$= (1.0 \times 1.0)^{1/2}$
$= 1.0$

HSI = 0.40

TY 100	V1 - 60%	SI = 1.0
	V2 - high	SI = 1.0
	V3 - 53%	SI = 1.0
	V4 - 24/ac	SI = 1.0

HSI Food $= (V1 \times V2)^{1/2}$
$= (1.0 \times 1.0)^{1/2}$
$= 1.0$

HSI Cover/Reproduction $= (V3 \times V4)^{1/2}$
$= (1.0 \times 1.0)^{1/2}$
$= 1.0$

HSI = 1.0

PLAIN TITMOUSE

TY 0 - Baseline (estimated)

HSI = .06

TY 1 -	V1 - tree species planted (oak) (0 dbh)	SI = 0.2
	V2 - 400 (100% $\leq$ 16 ft tall; no trees)	SI = 0
	~~V3 - 100% (no trees)~~	~~SI = 0~~

$$HSI = \frac{V1 + V2 + V3}{3} = \frac{0.2 + 0 + 0}{3} = 0\ .06$$

TY 15 -	V1 - oak trees reach 16 ft. high (dbh = 1.75)	SI = 0.2
	V2 - $\geq$ 100 tree/ac	SI = 1.0
	V3 - 100%	SI = 1.0

$$HSI = \frac{0.2 + 1.0 + 1.0}{3} = 0.73$$

TY 60 -	V1 - 13 dbh	SI = 0.6
	V2 - $\geq$ 100 tree/ac	SI = 1.0
	V3 - 100%	SI = 1.0

$$HSI = \frac{0.6 + 1.0 + 1.0}{3} = 0\ .86$$

TY 100- no change from TY60

PA 1 - Future Without Project (Impact Area)

SEASONAL WETLAND

GREAT EGRET

TY 0 – Baseline (measured)

V1 - % area with water 4-9 inches deep
V2 - % of substrate in zone 4-9 inches deep with sub- and emergent vegetation

$$HSI = \frac{V1 + V2}{2} = 0.23$$

TY 1 – no change from baseline HSI = 0.23
TY 60 – no change from baseline HSI = 0.23
TY 100- no change from baseline

RED-WINGED BLACKBIRD

TY 0 – Baseline (measured)

V6 quality of foraging areas within 620 feet of suitable nest areas

Condition C wetland $HSI = (0.1 \times V6)^{1/2} = 0.2$

TY 1 – no change from baseline HSI = 0.2
TY 60 – no change from baseline HSI = 0.2
TY 100 – no change from baseline

CALIFORNIA VOLE

TY 0 – Baseline (measured)

V1 – Height herbaceous vegetation
V2 - % herbaceous cover
V3 – Soil type

$$HSI = \frac{V1 + V2 + V3}{3} = 0.76$$

TY 1 – no change from baseline HSI = 0.76
TY 60 – no change from baseline HSI = 0.76
TY 100- no change from baseline

PA 2 - Future With Project (Impact Area)

Assume: 1. All vegetation removed from temporary and permanent impact zones in year 1
2. temporary easement areas will not be replanted with woody vegetation
3. existing drainages culverted under roads

GREAT EGRET

TY 0 – Baseline (measured)

V1 - % area with water 4-9 inches deep
V2 - % of substrate in zone 4-9 inches deep with sub- and emergent vegetation

$$HSI = \frac{V1 + V2}{2} = 0.23$$

TY 1 – V1 – 0 SI = 0
V2 - 0 SI = 0.1

$$HSI = \frac{0 + 0.1}{2} = 0.05$$

TY 60 – no change from TY 1 HSI = 0.05
TY 100 no change from TY60

RED-WINGED BLACKBIRD

TY 0 – Baseline (measured)

V6 quality of foraging areas within 620 feet of suitable nest areas

Condition C wetland $HSI = (0.1 \times V6)^{1/2} = 0.2$

TY 1 – no change from baseline HSI = 0
TY 60 – no change from baseline TY 1 HSI = 0
TY 100 – no change from baseline

CALIFORNIA VOLE

TY 0 – Baseline (measured)

V1 – Height herbaceous vegetation
V2 - % herbaceous cover
V3 – Soil type

$$HSI = \frac{V1 + V2 + V3}{3} = 0.76$$

TY 1 – V1 – 0 SI = 0
V2 – 0 SI = 0
V3 – not silty or loamy ; not friable SI = 0.2

$$HSI = \frac{0 + 0 + 0.2}{3} = 0.06$$

TY 60 – no change from TY 1 HSI = 0.06
TY 100 – no change from TY60

MP 1 - Future Without Project (Compensation Area)

Assumption: 1. Annual grassland area will be converted to wetlands

GREAT EGRET

TY 0 - Baseline (measured)
V1 - % of area with water 4-9 inches deep (0) SI = 0
V2 - % of area 4-9 deep with emergent/submergent vegetation (0) SI = .1

$$HSI = \frac{V1 + V2}{2} = \frac{0 + 0.1}{2} = .05$$

TY 1 no change from TY 0
TY 4 no change from TY 1
TY 60 no change from TY 4
TY 100 no change from TY 60

CALIFORNIA VOLE

TY 0 - Baseline (estimated)
V1 - Height of herbaceous vegetation (≥ 6in.) SI = 1.0
V2 - % cover of herbaceous vegetation (80%) SI = 6.7
V3 - soil type (mod. friable) SI = 0.5

TY 1 - V1 - no change from TY 0
V2 - no change from TY 0
V3 - no change from TY 0

$$HSI = \frac{V1 + V2 + V3}{3} = \frac{1.0 + 0.7 + 0.5}{3} = .73$$

TY 4 - V1 - no change from TY 1
TY 60 - V1 - no change from TY 4
TY 100- no change from TY 60

RED-WINGED BLACKBIRD

TY 0 - Baseline (estimated) - upland area unsuitable for species HSI = 0

TY 1 - no change from TY 0
TY 4 - no change from TY 1
TY 60 - no change from TY 4
TY 100 – no change from TY 60

MP 2 - Future With Project (Compensation Site)

Assumption:
1. Acquire annual grassland area
2. Portion of wetland area will have permanent water
3. Wetland will be designed to provide equal mix of open water and emergent vegetation
4. Carp will not be stocked
5. Site baseline is a Condition C wetland.
6. Site is minimum of 1-acre in size and access and maintenance roads are provided.
7. 40% of area designed for summer conditions of water 4-9 in deep
8. Plant appropriate wetland plant species, provide pest control and maintenance as needed for minimum of 3 years or until wetland is established.
9. Cover crop planted on all disturbed non-wetland areas.

GREAT EGRET

TY 0 - Baseline (estimated)
V1 - % of area with water 4-9 inches deep (0) SI = 0
V2 - % of area with water 4-9 deep with emergent/submergent vegetation SI = 0.1

$$HSI = \frac{V1 + V2}{2} = \frac{0 + 0.1}{2} = .05$$

TY 1 - V1 - 40% SI = 0.4
V2 - 5% SI = 0.2

$$HSI = \frac{0.4 + 0.2}{2} = \frac{0.6}{2} = .30$$

TY 4 - V1 - 40% SI = 0.4
V2 - 40% - 60% SI = 1.0

$$HSI = \frac{0.4 + 1.0}{2} = .70$$

TY 60 - no change from TY 4 HSI = .70
TY 100 no change from TY 60

CALIFORNIA VOLE

TY 0 - Baseline (estimated)
V1 - Height of herbaceous vegetation ($\geq$ 6 in.) SI = 1.0
V2 - % cover of herbaceous vegetation (80%) SI = 0.7
V3 - soil type (mod friable) SI = 0.5

$$HSI = \frac{V1 + V2 + V3}{3} = \frac{1.0 + 0.7 + 0.5}{3} = .73$$

TY 1 -	V1 - $\geq$ 6 in	SI = 1.0
	V2 - 90%	SI = 0.85
	V3 - no change fro baseline	SI = 0.5

$$HSI = \frac{1.0 + 0.85 + 0.5}{3} = .78$$

TY 4 -	V1 - no change from TY 1	SI = 1.0
	V2 - 100%	SI = 0
	V3 - no change from TY 1	SI = 0.5

$$HSI = \frac{1.0 + 0.85 + 0.5}{3} = .78$$

TY 60- no change from TY 4
TY 100 –no change from TY 60

RED-WINGED BLACKBIRD

TY 0 - Baseline (estimated) - upland area unsuitable for species

HSI = 0

TY 1 -	V1 - Emergent vegetation is old/new growth monocot (other)	SI = 0.1
	V2 - Water present throughout year (yes)	SI = 1.0
	V3 - Carp presence (absent)	SI = 1.0
	V4 - larvae of dragonflies/damselflies presence (yes)	SI = 1.0
	V5 - vegetation density (sparse first year)	SI = 0.1

$$HSI = (V1 + V2 + V3 + V4 + V5)^{½} = (0.1 \times 1.0 \times 1.0 \times 1.0 \times 0.1)^{½} = 0.1$$

TY 4 -	V1 - old/new growth monocots	SI = 1.0
	V2 - no change	SI = 1.0
	V3 - no change	SI = 1.0
	V4 - no change	SI = 1.0
	V5 - 50%	SI = 1.0

$$HSI = (1.0 \times 1.0 \times 1.0 \times 1.0 \times 1.0)^{½} = 1.0$$

TY 60 - no change from TY 4 HSI = 1.0
TY 100- no change from TY 60

REACH 3 - FOLSOM PRISON ACCESS ROAD TO SOUTH END OF BRIDGE

RIPARIAN

YELLOW WARBLER

TY 0 – Baseline (measured)

V1 - % deciduous shrub crown cover
V2 - average height of deciduous shrub canopy
V3 - % deciduous shrub canopy comprised of hydrophytic shrubs

$HSI = (V1 \times V2 \times V3)^{1/3}$

TY 1 – no change from baseline HSI = 0.22
TY 60 – no change from baseline HSI = 0.22
TY 100 – no change from baseline

NORTHERN ORIOLE

TY 0 – Baseline (measured)

V1 - average height of deciduous tree canopy
V2 - % deciduous tree crown cover
V3 – stand width

$HSI = (V1 \times V2 \times V3)^{1/3}$

TY 1 – no change from baseline HSI = 0.77
TY 58 – no change from baseline HSI = 0.77
TY 100 – no change from baseline

WESTERN FENCE LIZARD

TY 0 – Baseline (measured)

V1 - % ground cover
V2 - average size of ground cover objects
V3 - structural diversity/interspersion
V4 - % canopy cover

$CI = (2V1 \times V2 \times V3)^{1/3}$
$TI = (V1 \times V4)^{1/2}$

$HSI = (CI \times TI)^{1/2}$ = 0.63 (average of transects)

TY 1 – no change from baseline HSI = 0.63

TY 60 – no change from baseline HSI = 0.63
TY 100 – no change from basline

PA 2 - Future With Project (Impact Area)

Assume: 1. All vegetation removed from temporary and permanent impact zones in year 1.
2. Temporary easement areas will not be replanted with woody vegetation.

YELLOW WARBLER

TY 0 – Baseline (measured)

V1 - % deciduous shrub crown cover
V2 - average height of deciduous shrub canopy
V3 - % deciduous shrub canopy comprised of hydrophytic shrubs

HSI = $(V1 \times V2 \times V3)^{1/3}$

TY 1 –	V1 – no shrubs	SI = 0
	V2 – no shrubs	SI = 0
	V3 - no shrubs	SI = 0

HSI = $(V1 \times V2 \times V3)^{1/3} = 0$

TY 60 –	V1 – no shrubs	SI = 0
	V2 – no shrubs	SI = 0
	V3 - no shrubs	SI = 0

HSI = $(V1 \times V2 \times V3)^{1/3} = 0$

TY 100- no change from TY 60

NORTHERN ORIOLE

TY 0 – Baseline (measured)

V1 - average height of deciduous tree canopy
V2 - % deciduous tree crown cover
V3 – stand width

HSI = $(V1 \times V2 \times V3)^{1/3}$

TY 1 -	V1 – no trees	SI = 0
	V2 – no trees	SI = 0
	V3 – no trees	SI = 0

HSI = $(V1 \times V2 \times V3)^{1/3} = 0$

TY 60 – V1 – no trees SI = 0
V2 – no trees SI = 0
V3 – no trees SI = 0

HSI = $(V1 \times V2 \times V3)^{1/3} = 0$
TY100 - no change from TY 60

WESTERN FENCE LIZARD

TY 0 – Baseline (measured)

V1 - % ground cover
V2 - average size of ground cover objects
V3 - structural diversity/interspersion
V4 - % canopy cover

CI = $(2V1 \times V2 \times V3)^{1/3}$

TI = $(V1 \times V4)^{1/2}$

HSI = $(CI \times TI)^{1/2}$ = 0.63 (average of transects)

TY 1 – V1 – no ground cover SI = 0
V2 – no cover objects SI = 0
V3 – A SI = 0.1
V4 – no canopy cover SI = 1.0

CI = $(2V1 \times V2 \times V3)^{1/3} = 0$

TI = $(V1 \times V4)^{1/2} = 0$

HSI = $(CI \times TI)^{1/2} = 0$

TY 60 – no change from TY 1
TY100 - no change from TY 60

<u>MP 1 – Management Area – Future Without the Project (Compensation Site)</u>

Assume: 1. Existing riparian river bank upstream of Rossmoor Bar can be enhanced by planting riparian species (south side of river).

YELLOW WARBLER

TY 0 – Baseline (measured)

V1 - % deciduous shrub crown cover (0) SI = 0
V2 - average height of deciduous shrub canopy (5 ft) SI = 0.82
V3 - % deciduous shrub canopy comprised of hydrophytic shrubs (0) SI = 0

HSI = $(V1 \times V2 \times V3)^{1/3} = 0$

TY 1 – no change from baseline HSI = 0
TY 15 – no change from baseline HSI = 0
TY 30 – no change from baseline HSI = 0
TY 60 – no change from baseline HSI = 0
TY100 - no change from TY 60

NORTHERN ORIOLE

TY 0 – Baseline (measured)

V1 - average height of deciduous tree canopy (27 ft)	SI = 0.77
V2 - % deciduous tree crown cover (0)	SI = 0
V3 – stand width (1)	SI = 0.2

$$HSI = (V1 \times V2 \times V3)^{1/3} = 0$$

TY 1 – no change from baseline HSI = 0
TY 15 – no change from baseline HSI = 0
TY 30 – no change from baseline HSI = 0
TY 60 – no change from baseline HSI = 0
TY100 - no change from TY 60

WESTERN FENCE LIZARD

TY 0 – Baseline (measured)

V1 - % ground cover (0)	SI = 0
V2 - average size of ground cover objects (< 1 ft)	SI = 0.2
V3 - structural diversity/interspersion (A)	SI = 0.1
V4 - % canopy cover (0)	SI = 1.0

$$CI = (2V1 \times V2 \times V3)^{1/3} = 0$$

$$TI = (V1 \times V4)^{1/2} = 0$$

$$HSI = (CI \times TI)^{1/2} = 0$$

TY 1 – no change from baseline HSI = 0
TY 15 – no change from baseline HSI = 0
TY 30 – no change from baseline HSI = 0
TY 60 – no change from baseline HSI = 0
TY100 - no change from TY 60

MP 2 – Management Area – Future With Project (Compensation Site)

Assume:
1. Acquire lands.
2. Watering, weed and pest management for a minimum of 3 years and remedial actions as necessary to ensure plant establishment.
3. Willow species and cottonwoods (80% of woody plantings will be planted near the mean summer water surface elevation and less water tolerant plants (oaks, etc) will be planted higher on the bank.
4. The site will extend no more than 25 feet up the bank from mean summer water surface elevation
5. Assume average growth rate of 24 inches/year for willows and cottonwood trees..

YELLOW WARBLER

TY 0 – Baseline (measured)

V1 - % deciduous shrub crown cover (0) SI = 0
V2 - average height of deciduous shrub canopy (5 ft) SI = 0.82
V3 - % deciduous shrub canopy comprised of hydrophytic shrubs (0) SI = 0

HSI = $(V1 \times V2 \times V3)^{1/3} = 0$

TY 1 – V1 - % deciduous shrub crown cover (5%) SI = 0.15
V2 - average height of deciduous shrub canopy (1 ft) SI = 0.17
V3 - % deciduous shrub canopy comprised of hydrophytic shrubs (80%) SI = 0.80

HSI = $(0.15 \times 0.17 \times 0.80)^{1/3} = 0.14$

TY 15 – V1 - % deciduous shrub crown cover (75%) SI = 1.0
V2 - average height of deciduous shrub canopy (5ft) SI = 0.82
V3 - % deciduous shrub canopy comprised of hydrophytic shrubs (80%) SI = 0.80

HSI = $(1.0 \times 0.82 \times 0.80)^{1/3} = 0.81$

TY 30 – V1 - % deciduous shrub crown cover (75%) SI = 1.0
V2 - average height of deciduous shrub canopy (5ft) SI = 0.82
V3 - % deciduous shrub canopy comprised of hydrophytic shrubs (80%) SI = 0.80

HSI = $(1.0 \times 0.82 \times 0.80)^{1/3} = 0.81$

TY 60 – no change from TY 30
TY100 - no change from TY 60

NORTHERN ORIOLE

TY 0 – Baseline (measured)

V1 - average height of deciduous tree canopy (27 ft) SI = 0.77
V2 - % deciduous tree crown cover (0) SI = 0
V3 – stand width (1) SI = 0.2

HSI = $(V1 \times V2 \times V3)^{1/3} = 0$

TY 1 –	V1 - average height of deciduous tree canopy (27 ft)	SI = 0.77
	V2 - % deciduous tree crown cover (0)	SI = 0
	V3 – stand width (< 300 ft)	SI = 0.5

HSI = $(V1 \times V2 \times V3)^{1/3} = 0$

TY 15 –	V1 - average height of deciduous tree canopy (16 ft)	SI = 0.77
	V2 - % deciduous tree crown cover (25%)	SI = 1.0
	V3 – stand width (< 300 ft)	SI = 0.5

HSI = $(0.77 \times 1.0 \times 0.5)^{1/3} = 0.54$

TY 30 –	V1 - average height of deciduous tree canopy (40 ft)	SI = 1.0
	V2 - % deciduous tree crown cover (50%)	SI = 1.0
	V3 – stand width (< 300 ft)	SI = 0.5

HSI = $(1.0 \times 1.0 \times 0.5)^{1/3} = 0.79$

TY 60 -	V1 - average height of deciduous tree canopy (>40 ft)	SI = 1.0
	V2 - % deciduous tree crown cover (75%)	SI = 0.9
	V3 – stand width (< 300 ft)	SI = 0.5

HSI = $(1.0 \times 0.9 \times 0.5)^{1/3} = 0.77$

TY 100- no change from TY 60

WESTERN FENCE LIZARD

TY 0 – Baseline (measured)

V1 - % ground cover (0)	SI = 0
V2 - average size of ground cover objects (< 1 ft)	SI = 0.2
V3 - structural diversity/interspersion (A)	SI = 0.1
V4 - % canopy cover (0)	SI = 1.0

CI = $(2V1 \times V2 \times V3)^{1/3} = 0$

TI = $(V1 \times V4)^{1/2} = 0$

HSI = $(CI \times TI)^{1/2} = 0$

TY 1 –	V1 - % ground cover (0)	SI = 0
	V2 - average size of ground cover objects (< 1 ft)	SI = 0.2
	V3 - structural diversity/interspersion (A)	SI = 0.1
	V4 - % canopy cover (0)	SI = 1.0

CI = $(2V1 \times V2 \times V3)^{1/3} = 0$

TI = $(V1 \times V4)^{1/2} = 0$

HSI = $(CI \times TI)^{1/2} = 0$

TY 15 – V1 - % ground cover (5%)	SI = 0
V2 - average size of ground cover objects (≤ 1 ft)	SI = 0.2
V3 - structural diversity/interspersion (A)	SI = 0.1
V4 - % canopy cover (40%)	SI = 1.0

$CI = (2V1 \times V2 \times V3)^{1/3} = 0$

$TI = (V1 \times V4)^{1/2} = 0$

$HSI = (CI \times TI)^{1/2} = 0$

TY 30 – V1 - % ground cover (25%)	SI = 1.0
V2 - average size of ground cover objects (2 ft)	SI = 0.8
V3 - structural diversity/interspersion (C)	SI = 1.0
V4 - % canopy cover (75%)	SI = 0.33

$CI = (2V1 \times V2 \times V3)^{1/3} = 1.16\ (1.0)$

$TI = (V1 \times V4)^{1/2} = 0.57$

$HSI = (CI \times TI)^{1/2} = 0.75$

TY 60 – V1 - % ground cover (50%)	SI = 1.0
V2 - average size of ground cover objects (2 ft)	SI = 0.8
V3 - structural diversity/interspersion (C)	SI = 1.0
V4 - % canopy cover (75%)	SI = 0.33

$CI = (2V1 \times V2 \times V3)^{1/3} = 1.16\ (1.0)$

$TI = (V1 \times V4)^{1/2} = 0.57$

$HSI = (CI \times TI)^{1/2} = 0.75$

TY100 - no change from TY 60

PA 1 - Future Without Project (Impact Area)

CHAPARRAL

BOBCAT

TY 0 – Baseline (measured)

V1 - % shrub cover
V2 - % herbaceous cover
V3 - degree of patchiness
V4 – rock outcroppings

$$HSI = \frac{V1 + V2 + V3 + 2V4}{5} = 0.56$$

TY 1 V1 – no change from TY 0
V2 - no change from TY 0
V3 - no change from TY 0
V4 – no change from TY 0

HIS = 0.56

TY 60 V1 – no change from TY 1
V2 - no change from TY 1
V3 - no change from TY 1
V4 – no change from TY 1

HSI = 0.56
TY100 - no change from TY 60

WRENTIT

TY 0 – Baseline (measured)

V1 - % shrub cover
V2 - % shrub cover ≤ 5 feet(19%)
HSI = $(V1 \times V2)^{1/2} = 0.34$

TY 1 V1 – no change from TY 0
V2 - no change from TY 0
HSI = $(V1 \times V2)^{1/2} = 0.34$

TY 60 V1 – no change from TY 1
V2 - no change from TY 1

$HSI = (V1 \times V2)^{½} = 0.34$

TY100 - no change from TY 60

CALIFORNIA THRASHER

TY 0 – Baseline (measured)

V1 – Presence of low shrub openings SI=1.0

V2 - Shrub/seedling cover SI=1.0

$HSI = (V1 \times V2^2)^{½} = 1.0$

TY 1 - V1 – no change from TY 0

V2 - no change from TY 0

TY 60- V1 – no change from TY 1

V2 - no change from TY 1

TY100 - no change from TY 60

PA 2 - Future With Project (Impact Area)

Assume: 1. All vegetation removed from temporary and permanent impact zones in year 1

2. Temporary easement areas will not be replanted with woody vegetation

BOBCAT

TY 0 – Baseline (measured)

V1 - % shrub cover

V2 - % herbaceous cover

V3 - degree of patchiness

V4 – rock outcroppings

$$HSI = \frac{V1 + V2 + V3 + 2V4}{5} = 0.56$$

TY 1

TY 1	V1 – no shrub cover	SI = 0.2
	V2 - no herbaceous cover	SI = 0.2
	V3 – patchiness (1)	SI = 0.2
	V4 – no rock outcroppings	SI = 0.1

$$HSI = \frac{0.2 + 0.2 + 0.2 + 0.2}{5} = 0.16$$

TY 60 V1 – no change from TY 1

V2 - no change from TY 1

V3 - no change from TY 1

V4 – no change from TY 1

HSI = 0.16

TY100 - no change from TY 60

WRENTIT

TY 0 - V1 - % shrub cover
V2 - % shrub cover ≤ 5 feet

$HSI = (V1 \times V2)^{1/2} = 0.34$

TY 1 V1 – no shrub cover SI = 0
V2 - no shrubs SI = 0

$HSI = (0 \times 0)^{1/2} = 0$

TY 60 V1 – ~~no change from TY 1~~
V2 - no change from TY 1

HSI = 0

TY100 - no change from TY 60

CALIFORNIA THRASHER

TY 0 – Baseline (measured)

V1 – Presence of low shrub openings
V2 - Shrub/seedling cover

$HSI = (V1 \times V2^2)^{1/3} = 0.34$

TY 1 - V1 – no shrubs SI = 0
V2 - no shrubs/seedlings SI = 0

$HSI = (0 \times 0^2)^{1/3} = 0$

TY 60- V1 – no change from TY 1
V2 - no change from TY 1

TY100 - no change from TY 60

<u>PA 3 - Future Without Project (Inundation Area)</u>

<u>CHAPARRAL</u>

BOBCAT

TY 0 – Baseline (measured)

V1 - % shrub cover	SI=1.0
V2 - % herbaceous cover	SI=0.98
V3 - degree of patchiness	SI= 0.6
V4 – rock outcroppings	SI=1.0

$$HSI = \frac{V1 + V2 + V3 + 2V4}{5} = 0.72$$

TY 1
V1 – no change from TY 0
V2 - no change from TY 0
V3 - no change from TY 0
V4 – no change from TY 0

HIS = 0.72

TY 60
V1 – no change from TY 1
V2 - no change from TY 1
V3 - ~~no change from TY 1~~
V4 – no change from TY 1

HSI = 0.72

TY100 - no change from TY 60

WRENTIT

TY 0 – Baseline (measured)

V1 - % shrub cover	SI=0.40
V2 - % shrub cover ≤ 5 feet(19%)	SI=0.09

$HSI = (V1 \times V2)^{1/2} = 0.19$

TY 1
V1 – no change from TY 0
V2 - no change from TY 0

$HSI = (V1 \times V2)^{1/2} = 0.19$

TY 60
V1 – no change from TY 1
V2 - no change from TY 1

$HSI = (V1 \times V2)^{1/2} = 0.19$

TY100 - no change from TY 60

CALIFORNIA THRASHER

TY 0 – Baseline (measured)

V1 – Presence of low shrub openings	SI=1.0
V2 - Shrub/seedling cover	SI=1.0

$HSI = (V1 \times V2^2)^{1/3} = 1.0$

TY 1 - V1 – no change from TY 0
V2 - no change from TY 0

TY 60- V1 – no change from TY 1
V2 - no change from TY 1

TY100 - no change from TY 60

PA 4 - Future With Project (Inundation Area)

Assume: 1. All vegetation removed from temporary and permanent impact zones in year 1
2. Temporary easement areas will not be replanted with woody vegetation

BOBCAT

TY 0 – Baseline (measured)

V1 - % shrub cover	SI=1.0
V2 - % herbaceous cover	SI=0.98
V3 - degree of patchiness	SI=0.6
V4 – rock outcroppings	SI=1.0

$$HSI = \frac{V1 + V2 + V3 + 2V4}{5} = 0.72$$

TY 1

V1 – no shrub cover	SI = 0.2
V2 - no herbaceous cover	SI = 0.2
V3 – patchiness (1)	SI = 0.2
V4 – no rock outcroppings	SI = 0.1

$$HSI = \frac{0.2 + 0.2 + 0.2 + 0.2}{5} = 0.16$$

TY 60 V1 – no change from TY 1
V2 - no change from TY 1
V3 - no change from TY 1
V4 – no change from TY 1

HSI = 0.16

TY100 - no change from TY 60

WRENTIT

TY 0 - V1 - % shrub cover
V2 - % shrub cover ≤ 5 feet

HSI = $(V1 \times V2)^{½} = 0.34$

TY 1	V1 – no shrub cover	SI = 0
	V2 - no shrubs	SI = 0

HSI = $(0 \times 0)^{½} = 0$

TY 60 V1 – no change from TY 1
V2 - no change from TY 1

HSI = 0

TY 100 - no change from TY 60

CALIFORNIA THRASHER

TY 0 – Baseline (measured)

V1 – Presence of low shrub openings
V2 - Shrub/seedling cover

HSI = $(V1 \times V2^2)^{⅓} = 1.0$

TY 1 -	V1 – no shrubs	SI = 0
	V2 - no shrubs/seedlings	SI = 0

HSI = $(0 \times 0^2)^{⅓} = 0$

TY 60- V1 – no change from TY 1
V2 - no change from TY 1

TY 100 - no change from TY 60

<u>MP 1 - Management Area - Future Without Project (Compensation Site)</u>

Assume: 1. Annual grassland area selected for conversion to oak woodland.

BOBCAT

TY 0 – Baseline (estimated)

V1 - % shrub cover (no shrubs) SI = 0.2
V2 - % herbaceous cover (100%) SI = 0.8
V3 - degree of patchiness (1) SI = 0.2
V4 – rock outcroppings (no) SI = 0.1

$$HSI = \frac{V1 + V2 + V3 + 2V4}{5} = \frac{0.8 + 0.8 + 0.2 = 0.2}{5} = 0.28$$

TY 1 V1 – no change from TY 0
V2 - no change from TY 0
V3 - no change from TY 0
V4 – no change from TY 0

HSI = 0.28

TY 15 V1 – no change from TY 1
V2 - no change from TY 1
V3 - no change from TY 1
V4 – no change from TY 1

HSI = 0.28

TY 30 V1 – no change from TY 15
V2 - no change from TY 15
V3 - no change from TY 15
V4 – no change from TY 15

HSI = 0.28

TY 100 V1 – no change from TY 30
V2 - no change from TY 30
V3 - no change from TY 30
V4 – no change from TY 30

HSI = 0.28

WRENTIT

TY 0 – Baseline (estimated)

V1 - no shrub cover SI = 0
V2 – no shrubs SI = 0

$HSI = (V1 \times V2)^{1/2} = (0 \times 0)^{1/2} = 0$

TY 1 V1 – no change from TY 0
V2 - no change from TY 0

HSI = 0

TY 15 V1 – no change from TY 1
V2 - no change from TY 1

HSI = 0

TY 30 V1 – no change from TY 15
V2 - no change from TY 15

HSI = 0

TY 100 V1 – no change from TY 30
V2 - no change from TY 30

HSI = 0

CALIFORNIA THRASHER

TY 0 – Baseline (estimated)

V1 – no shrubs SI = 0
V2 – no shrubs/seedlings SI = 0

HSI = $(V1 \times V2^2)^{1/3} = (0 \times 0^2)^{1/3} = 0$

TY 1 - V1 – no change from TY 0
V2 - no change from TY 0

HSI = 0

TY 15 - V1 – no change from TY 1
V2 - no change from TY 1

HSI = 0

TY 30 - V1 – no change from TY 15
V2 - no change from TY 15

HSI = 0

TY 100- V1 – no change from TY 30
V2 - no change from TY 30

HSI = 0

MP 2 - Management Area - Future With Project (Compensation Site)

Assume:
1. Acquire lands (currently annual grasslands)
2. Annual grassland area prepared for planting in TY 1 , provide access and maintenance roads
3. Plant chaparral species at a density of 400 trees/acre and cover crop
4. Watering, weed, pest control for minimum of 3 years and remedial actions as necessary to ensure plant establishment.
5. Develop O&M manual

BOBCAT

TY 0 – Baseline (estimated)

V1 - % shrub cover (no shrubs)	SI = 0.2
V2 - % herbaceous cover (100%)	SI = 0.8
V3 - degree of patchiness (1)	SI = 0.2
V4 – rock outcroppings (no)	SI = 0.1

$$HSI = \frac{V1 + V2 + V3 + 2V4}{5} = \frac{0.8 + 0.8 + 0.2 = 0.2}{5} = 0.28$$

TY 1	V1 – area cleared and planted (1%)	SI = 0.2
	V2 – 100%	SI = 0.8
	V3 - no change from TY 0	SI = 0.2
	V4 – no change from TY 0	SI = 0.1

HSI = 0.28

TY 15	V1 – 30%	SI = 1.0
	V2 – 100%	SI = 0.8
	V3 – 2	SI = 0.6
	V4 – no change from TY 1	SI = 0.1

$$HSI = \frac{1.0 + 0.8 + 0.6 + 0.2}{5} = 0.52$$

TY 30	V1 – 50%	SI = 1.0
	V2 – 100%	SI = 0.8
	V3 – 2	SI = 0.6
	V4 – no change from TY 1	SI = 0.1

$$HSI = \frac{1.0 + 0.8 + 0.6 + 0.2}{5} = 0.52$$

TY 100	V1 – 50%	SI = 1.0
	V2 – 100%	SI = 0.8
	V3 – 2	SI = 0.6
	V4 – no change from TY 1	SI = 0.1

HSI = $\underline{1.0 + 0.8 + 0.6 + 0.2}$ = 0.52

5

WRENTIT

TY 0 – Baseline (estimated)

	V1 - no shrub cover	SI = 0
	V2 – no shrubs	SI = 0
	$HSI = (V1 \times V2)^{1/2} = (0 \times 0)^{1/2} = 0$	
TY 1	V1 – area cleared and planted (1%)	SI = 0
	V2 – area cleared and planted (100%)	SI = 1.0
	$HSI = (V1 \times V2)^{1/2} = (0 \times 1.0)^{1/2} = 0$	
TY 15	V1 – 30%	SI = 0.15
	V2 – 80%	SI = 0.8
	$HSI = (0.15 \times 0.8)^{1/2} = 0.49$	
TY 30	V1 – 50 %	SI = 0.33
	V2 – 80 %	SI = 0.8
	$HSI = (0.33 \times 0.8)^{1/2} = 0.64$	
TY 100	V1 – 50 %	SI = 0.33
	V2 – 80 %	SI = 0.8
	HSI = 0.64	

CALIFORNIA THRASHER

TY 0 – Baseline (estimated)

	V1 – no shrubs	SI = 0
	V2 – no shrubs/seedlings	SI = 0
	$HSI = (V1 \times V2^2)^{1/2} = (0 \times 0^2)^{1/2} = 0$	
TY 1 -	V1 –no	SI= 0
	V2 - 1%	SI= 0
	HSI = 0	
TY 15 -	V1 – yes	SI = 1.0
	V2 - 30%	SI = 0.35
	$HSI = (1.0 \times 0.35^2)^{1/2} = 0.50$	

TY 30 - V1 – yes SI = 1.0
V2 - 50% SI = 1.0

HSI = HSI = $(1.0 \times 1.0^{2})^{1/3} = 1.0$

TY 100- V1 – no change from TY 30
V2 - no change from TY 30

HSI = 1.0

APPENDIX A-2

HSI MODELS

NORTHERN ORIOLE
HABITAT SUITABILITY INDEX MODEL

HABITAT SUITABILITY INDEX MODEL

NORTHERN ORIOLE (*Icterus spurius*)

BREEDING HABITAT, CENTRAL VALLEY

CALIFORNIA

U.S. Fish and Wildlife Service
Ecological Services
Sacramento, California

January 1988

COVER TYPE | LIFE REQUISITE VARIABLES | HABITAT

Valley Woodland (W)

Riparian (R)

Reproduction/ Cover

Average height of deciduous tree canopy (V_1)

Percent deciduous tree Crown cover (V_2)

Stand width (V_3)

FOOD

The diet of the northern oriole is comprised mainly of insects. Fruits, berries, and nectar are also utilized (Bent 1958; Martin et al. 1961). For purposes of this model, it is assumed that if suitable habitat is available for nesting and cover, food resources are not limiting.

Minimum habitat area

Minimum habitat area is defined as the minimum amount of contiguous habitat that is required before an area will be occupied by a species. Based on reported pair densities (Walcheck 1970; Gaines 1974; Pleasant 1979), it is assumed that at least 0.25 acres of suitable habitat must be available for the northern oriole to occupy an area. If less than this amount is present, the HSI is assumed to be zero.

VARIABLE	HABITAT TYPE	SUGGESTED TECHNIQUE
V_1 Average height of deciduous tree canopy	R, W	Range finder and clinometer on belt transect
V_2 Percent deciduous tree crown cover	R, W	Line intercept
V_3 Stand width	R, W	Visual observation, aerial interpretation

HSI Determination

LIFE REQUISITE EQUATION | COVER TYPE

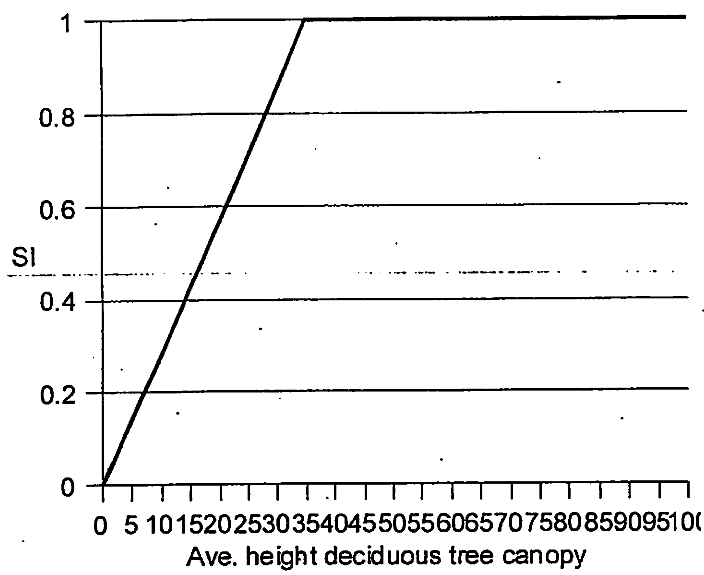
Reproduction R, W

$(V_1 \times V_2 \times V_3)^{1/3}$

The HSI value for the northern oriole is equal to the reproduction/cover value.

Model Applicability
The model applies to breeding habitat of the northern oriole in the Central Valley of California up to 500 feet in elevation.

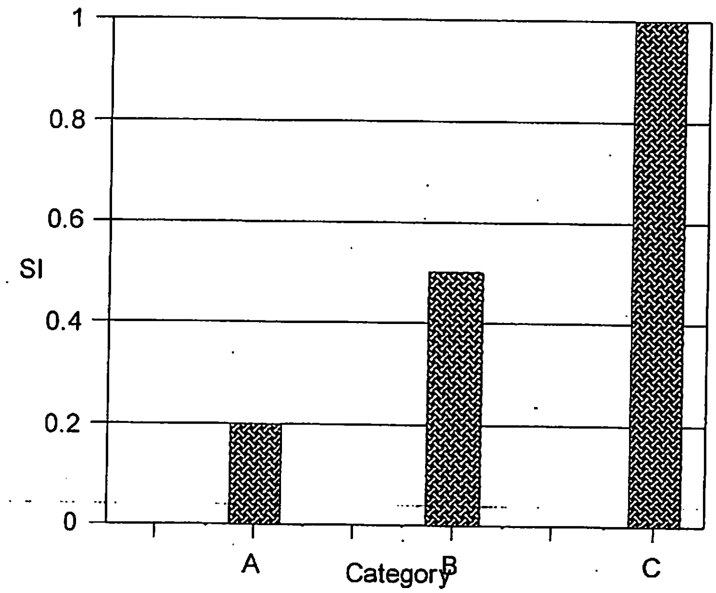
1. Average height of deciduous tree canopy.



Assumption: Orioles nest almost exclusively in large, preferably deciduous, trees (derived from nesting data of Schaefer (1976A)). Tree height of 35 feet or greater is optimum the dominant canopy strata equals those trees comprising 50% of total canopy closure.

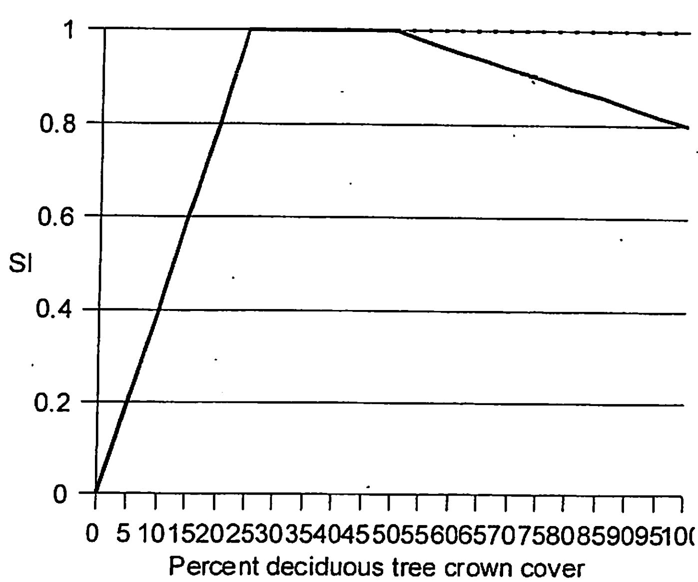
2. Percent deciduous tree crown cover.

Assumption: Orioles prefer open stands of deciduous trees for nesting (Grinnel and Miller 1944). Crown cover of 25-50% is assumed to be optimum.



3. Stand width

Assumption: Orioles prefer large blocks of riparian or oak woodland for nesting (USFWS 1981).



A - Woodland a narrow band comprising the width of one tree.
B - Woodland a strip less than 300 feet wide at its widest point.

C - Woodland greater than 300 feet wide at widest point.

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WESTERN FENCE LIZARD

HABITAT SUITABILITY INDEX MODEL

HABITAT SUITABILITY INDEX MODEL

WESTERN FENCE LIZARD (*Sceloporus occidentalis*)

by
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Sacramento, California

March 1989

INTRODUCTION

The western fence lizard (*Sceloporus occidentalis*) ranges from British Columbia southward through Washington, Oregon and throughout California and the Great Basin to northwestern Baja California (Smith, 1948; Stebbins, 1985). It occupies a wide variety of habitats, excluding extreme desert conditions, from sea level to over 9500 feet in the Sierra Nevada. In California, four subspecies are present (Jennings, 1987). Preferring wooded, rocky areas, it frequents talus and rocky outcrops of hillsides, canyons and along streams. Western fence lizards are attracted to old buildings, woodpiles, fences, telephone poles, woodrat nests and banks with rodent burrows. It requires cover and, except for dispersing females (Jennings, personal communication) is seldom encountered in open fields or extremely barren areas (Stebbins, 1954). It is frequently a colonizer of disturbed habitats (Lillywhite, et. al., 1977).

The western fence lizard can be semi-arboreal (Cunningham, 1955; Davis and Verbeek, 1972). Trees apparently do not constitute a life requisite as was shown by *Sceloporus occidentalis* populations in chaparral (Lillywhite, Friedman and Ford 1972) and at high elevations (Grinnell and Storer, 1924). Trees may simply act as another type of available cover. This indicates the microhabitat plasticity of this species (Rose, 1978).

MODEL APPLICABILITY

This model was designed for use in plant communities found in the Central Valley of California and surrounding foothills up to an elevation of approximately 1500 feet and applies to the subspecies *S. o. occidentalis* and *S.o. biseriatus*. The model is based on both empirical data provided by expert review and information obtained from current literature.

Cover Type	Life Requisite	Habitat Variable
Riparian (R) Oak savannah (O) Oak woodland (W) Scrub (S) Annual Grassland (G)	Cover/Reproduction	Percent ground cover (V_1) Average size of ground cover objects (V_2) Structural diversity/ Interspersion (V_3)
	Thermoregulation	Percent ground cover (V_1) Percent canopy cover (V_4)

Habitat Variable	Cover Type	Suggested Techniques

V_1 - Percent ground cover	R.O.W.S,G	Line intercept, measurement of random points using a 3 feet diameter loop.
V_2 - Average size of ground cover objects	R.O.W.S,G	Line intercept
V_3 - Structural diversity/ interspersion	R.O.W.S,G	Ocular estimate
V_4 - Percent canopy cover	R.O.W.S,G	Spherical densiometer, line intercept, point intercept on aerial photos.

Variable 1. Percent ground cover

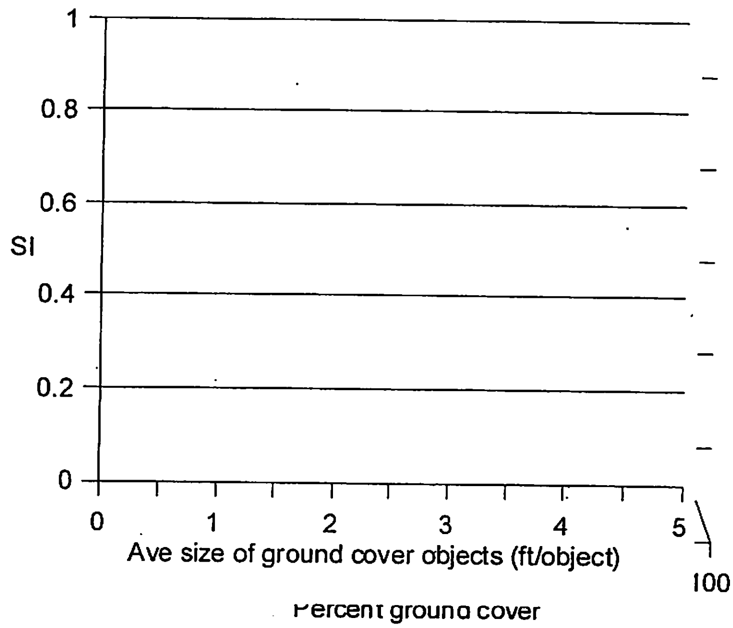
Assumes:

Only those ~~objects less than 8 feet above the ground surface are considered. This includes~~ rocks, logs, branches, tree trunks, fences, wood piles and live vegetation. Western fence lizards exhibit no well-defined habitat preference, but favor areas with logs, trees or other objects upon which they can climb, sun and display (Fitch, 1940). Brush piles and cavities under rocks and logs provide refuge (Marcellini and Mackey, 1979). An amount of ground cover beyond a particular density results in less than optimal conditions as it conceals predators and interferes with movement and the ability to defend a territory (Davis and Ford, 1983). Davis and Verbeek (1972) found that western fence lizards avoided dense grasslands. However, dispersing juveniles will cross dense grasslands and colonize any suitable isolated habitat found (Jennings, personal communication).

In California, western fence lizards centered their territorial activities about logs, fence posts, stumps and exposed boulders from which males display (Carpenter, 1980) and to observe mates or rival males (Fitch, 1940).

Eggs are placed in damp, friable, well-aerated soil from mid-May to mid-July in pits dug by the female and covered with loose soil (Stebbins, 1954) or under rocks and logs (Jennings, personal communication). In non-riparian conditions, nest sites are probably limited to areas within the shade of large cover objects.

Ground cover ranging from 25 to 70 percent is considered optimum for western fence lizards as it provides sufficient cover for maximum use of an area while not being so abundant as to interfere with movement. Western fence lizards undergo hibernation from November to February (Smith, 1946) and require cover for winter survival (Jennings, personal communication).



Variable 2. Average size of ground cover objects.

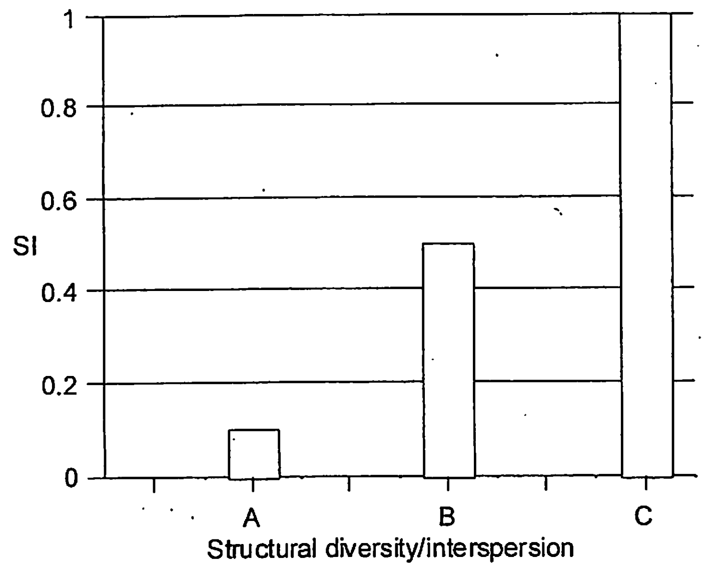
Assumes:

Ground cover objects include tree trunks but no other living material. The objects must be sufficiently large to provide escape cover. Western fence lizards have the habit of running to the opposite side of their perch (rock, log, etc.) when approached (Nussbaum et al., 1983). The objects must also be large enough to provide cover for hibernation, nest building, shade for summer thermoregulation, and to offer vantage points for territorial defense and mating display.

An average ground cover object size of 3.0 feet and larger is considered optimum as it is sufficiently large to provide for escape cover, thermoregulation and reproductive needs.

The average size of ground cover objects greater than 4 inches is diameter are measured in the field using the line intercept method and is determined by the formula:

$$\text{Average size of ground cover objects} = \frac{\text{Total feet of line intercepted}}{\text{Total number of ground cover objects intercepted}}$$



Variable 3. Structural diversity/interspersion

Assumes:

This variable is related to the habitat heterogeneity. The western fence lizard areas have a mixture and sufficient quantity ~~of cover types (rocks, logs, living vegetation, rodent burrows, cracks and~~ crevices) in a semi-open environment with lots of habitat edge allowing for sufficient exposure to the sun (Ruth, personal communication), escape cover and a production base for food organisms (Jennings, personal communication). These areas usually have a significant vertical component in the form of large boulders, trees, fence rows, old buildings or log piles (Nussbaum et al, 1983). Davis and Ford (1983) found optimal habitat was provided by large fallen oaks in various stages of decay or by large, standing oaks from which limbs and branches had fallen to the ground creating massive tangles. Western fence lizards commonly show low distributions in climax communities due to the homogeneity of the habitat(Ruth, personal communication).

A - Low habitat diversity. Ground cover limited to 1 or 2 types (i.e., grassland and bare soil). Site mostly homogeneous with little edge. Cover component mostly one dimensional without a significant vertical element (average less than 1 foot above ground). An exception may be rock talus which can be good (Ruth, communication).

B - Moderate habitat diversity. Two or more major ground cover types occur (i.e., large rocks, logs and woodpiles). A moderate amount of edge and interspersion is present between vegetation types and/or ground cover types. A significant vertical element to the cover component (average 1 -4 feet above ground) is present..

C - High habitat diversity. Three or more major ground cover types are present (i.e., large rocks, logs and woodpiles). Heterogeneity is high with logs of edge between evenly dispersed vegetation and cover types. Overall, habitat has a significant vertical component (average greater than 4 feet above ground). May include rock talus.

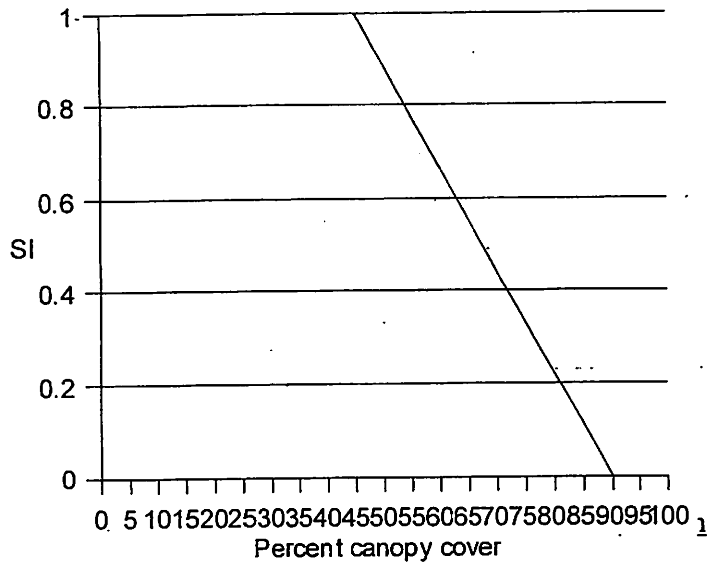
Variable 4. Percent canopy cover

Assumes:

The canopy is defined as standing live vegetation greater than 6 feet above ground. This variable relates directly to the ability of the habitat to provide sufficient exposure so that western fence lizards can thermoregulate.

The ability of a western fence lizard to thermoregulate in an area is a major determinant of its habitat occupancy. The ability of this species to absorb sunlight and warm quickly enables it to inhabit areas from sea level to over 9000 feet in elevation (Tanner and Hopkin, 1972). Western fence lizards typically move from areas of sunlight to shade to maintain their desired body temperature. Davis and Verbeek (1972) found this species shifted from rocks to trees and vice versa according to ambient temperature. Western fence lizards avoid dense, shaded woods (Stebbins, 1959).

A canopy cover ranging from 0 - 45 percent is considered optimum as it provides sufficient sunlight on the ground or ground cover surface for thermoregulation by western fence lizards. An area with a canopy cover greater than 90 percent is considered uninhabitable for western fence lizards due to a lack of sunlight on the ground surface for thermoregulation.



CALCULATIONS

Life Requisite

Cover//Reproduction $\quad$ $_3)^{1/3}$

Thermoregulation $\quad$ R.O.W.S,G $\quad$ $TI = (V_1 \times V_4)^{½}$

HSI Determination $\quad$ $HSI = (CI \times TI)^{½}$

Assumes percent ground cover is the major determining factor due to its importance in reproduction, predator avoidance and thermoregulation.

An HSI value of 1.0 is considered optimum. An HSI value greater than 1.0 achieved through the use of this formula is to be considered 1.0.

ASSUMPTIONS

Feeding

It is assumed that where all necessary habitat components are present, food availability is not a factor limiting the use of an area by western fence lizards. Low availability of insects may be a limiting factor on winter recruitment of juveniles into the adult population (Jennings, personal communication). In arid areas, food can be limiting to adults in late summer (Ruth, personal communication).

The western fence lizard is an opportunistic insectivore which feeds on a variety of insects and other arthropods including leaf hoppers, aphids, beetles, wasps, termites, ants and spiders (Fitch, 1940; Johnson, 1965; Rose, 1976; Stebbins, 1954).

Rose (1976) found the three primary groups in the fence lizard diet to be ants (*Formicidae*), beetles (*Coleoptera*) and termites (*Isoptera*). Johnson (1965) found flies (*Diptera*), beetles and ants to be important prey while Clark (1973) found grasshoppers (*Acrididae*) the most common prey item. Otvos (1977) found moths or butterflies (*Lepidoptera*) the most common prey item in stomachs analyzed. Western fence lizards commonly bask or loaf in the shade and eat whatever arthropod comes close enough to attract their attention (Tanner and Hopkin, 1972). It can therefore be assumed that food availability is not a limiting factor under normal lizard population levels and habitat conditions.

Reproduction

It is assumed that, if ground cover of rocks, logs, trees, woodpiles, etc. of sufficient size and quantity are available for non-reproductive activities, then areas with moist, friable soil necessary for lizard nesting purposes would be present beneath the cover and should not be a limiting factor. Females may travel several hundred feed to find appropriate nesting conditions (Ruth, personal communication).

Water requirements

Considering the wide distribution of this species in all but the most extreme desert regions, it is unlikely that water availability would be a limiting factor to the western fence lizard though densities are often highest where water (seeps, ponds, etc.)are nearby (Ruth, personal communication). This assumes that sufficient ground cover exists for thermoregulation and nesting. This species receives the bulk of its moisture through metabolic water from its prey (Ruth, personal communication). These lizards may lower metabolic rates to compensate for higher body temperatures and water stress during warm seasons (Tsuji, 1985).

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We thank Mark R. Jennings, PhD., Department of Herpetology, California Academy of Sciences, Dixon, California and Stephen B. Ruth, Ph.D., Monterey Peninsula College, Monterey, California for reviewing the draft model and for providing field observations, data and suggestions which aided in establishing field applicability for the model. Their contributions are greatly appreciated.

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FWS/OBS-82/10.27
July 1982

HABITAT SUITABILITY INDEX MODELS: YELLOW WARBLER

by

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PREFACE

This document is part of the Habitat Suitability Index (HSI) Model Series (FWS/OBS-82/10), which provides habitat information useful for impact assessment and habitat management. Several types of habitat information are provided. The Habitat Use Information Section is largely constrained to those data that can be used to derive quantitative relationships between key environmental variables and habitat suitability. The habitat use information provides the foundation for HSI models that follow. In addition, this same information may be useful in the development of other models more appropriate to specific assessment or evaluation needs.

The HSI Model Section documents a habitat model and information pertinent to its application. The model synthesizes the habitat use information into a framework appropriate for field application and is scaled to produce an index value between 0.0 (unsuitable habitat) and 1.0 (optimum habitat). The application information includes descriptions of the geographic ranges and seasonal application of the model, its current verification status, and a listing of model variables with recommended measurement techniques for each variable.

In essence, the model presented herein is a hypothesis of species-habitat relationships and not a statement of proven cause and effect relationships. Results of model performance tests, when available, are referenced. However, models that have demonstrated reliability in specific situations may prove unreliable in others. For this reason, feedback is encouraged from users of this model concerning improvements and other suggestions that may increase the utility and effectiveness of this habitat-based approach to fish and wildlife planning. Please send suggestions to:

Habitat Evaluation Procedures Group
Western Energy and Land Use Team
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2625 Redwing Road
Ft. Collins, CO 80526

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YELLOW WARBLER (*Dendroica petechia*)

HABITAT USE INFORMATION

<u>General</u>

The yellow warbler (*Dendroica petechia*) is a breeding bird throughout the entire United States, with the exception of parts of the Southeast (Robbins et al. 1966). Preferred habitats are wet areas with abundant shrubs or small trees (Bent 1953). Yellow warblers inhabit hedgerows, thickets, marshes, swamp edges (Starling 1978), aspen (*Populus* spp.) groves, and willow (*Salix* spp.) swamps (Salt 1957), as well as residential areas (Morse 1966).

Food

More than 90% of the food of yellow warblers is insects (Bent 1953), taken in proportion to their availability (Busby and Sealy 1979). Foraging in Maine occurred primarily on small limbs in deciduous foliage (Morse 1973).

Water

Dietary water requirements were not mentioned in the literature. Yellow warblers prefer wet habitats (Bent 1953; Morse 1966; Stauffer and Best 1980).

Cover

Cover needs of the yellow warbler are assumed to be the same as reproduction habitat needs are discussed in the following section.

Reproduction

Preferred foraging and nesting habitats in the Northeast are wet areas, partially covered by willows and alders (*Alnus* spp.), ranging in height from 1.5 to 4 m (5 to 13.3 ft) (Morse 1966). It is unusual to find yellow warblers in extensive forests (Hebard 1961) with closed canopies (Morse 1966). Yellow warblers in small islands of mixed coniferous-deciduous growth in Maine utilized deciduous foliage far more frequently than would be expected by chance alone (Morse 1973). Coniferous areas were mostly avoided and areas of low deciduous growth preferred.

Nests are generally placed 0.9 to 2.4 m (3 to 8 ft) above the ground, and nest heights rarely exceed 9.1 to 12.2 m (30 to 40 ft) (Bent 1953). Plants used for nesting include willows, alders, and other hydrophytic shrubs and trees (Bent 1953), including box-elders (*Acer negundo*) and cottonwoods (*Populus* spp.) (Schrantz 1943). In Iowa, dense thickets were frequently occupied by yellow warblers while open thickets with widely spaced shrubs rarely contained nests (Kendeigh 1941).

Males frequently sing from exposed song perches (Kendeigh 1941; Ficken and Ficken 1965), although yellow warblers will nest in areas without elevated perches (Morse 1966).

A number of Breeding Bird Census reports (Van Velzen 1981) were summarized to determine nesting habitat needs of the yellow warbler, and a clear pattern of habitat preferences emerged. Yellow warblers nested in less than 5% of census areas comprised of extensive upland forested cover types (deciduous or coniferous) across the entire country. Approximately two-thirds of all census areas with deciduous shrub-dominated cover types were utilized, while shrub wetlands types received 100% use. Wetlands dominated by shrubs had the highest average breeding densities of all cover types [2.04 males per ha (2.5 acre)]. Approximately two-thirds of the census areas comprised of forested draws and riparian forests of the western United States were used, but average densities were low [0.5 males per ha (2.5 acre)].

Interspersion

Yellow warblers in Iowa have been reported to prefer edge habitats (Kendeigh 1941); Stauffer and Best 1980). Territory size has been reported as 0.16 ha (0.4 acre) (Kendeigh 1941) and 0.15 ha (0.37 acre) (Kammeraad 1964).

Special Considerations

The yellow warbler has been on the Audubon Society's Blue List of declining birds for 9 of the last 10 years (Tate 1981).

HABITAT SUITABILITY INDEX (HSI) MODEL

Model Applicability

Geographic area. This model has been developed for application within the breeding range of the yellow warbler.

Season. This model was developed to evaluate the breeding season habitat needs of the yellow warbler.

Cover types. This model was developed to evaluate habitat in the dominant cover types used by the yellow warbler. Deciduous Shrubland (DS) and Deciduous Scrub/Shrub Wetland (DSW) (terminology follows that of U.S. Fish and Wildlife Service 1981). Yellow warblers only occasionally utilize forested habitats and reported populated densities in forests are low. The habitat requirements in forested habitats are not well documented in the literature. For these reasons, this model does not consider forested cover types.

Minimum habitat area. Minimum habitat area is defined as the minimum amount of contiguous that is required before an area will be occupied by a species. Information on the minimum habitat area for the yellow warbler was not located in the literature. Based on reported territory sizes, it is assumed that at least 0.15 ha (0.37 acre) of suitable habitat must be available for the yellow warbler to occupy an area. If less than this amount is present, the HSI is assumed to be 0.0.

Verification level. Previous drafts of the yellow warbler habitat model were reviewed by Douglass H. Morse and specific comments were incorporated into the current model (Morse, pers. comm.).

Model Description

Overview. This model considers the quality of the reproduction (nesting) habitat needs of the yellow warbler to determine overall habitat suitability. Food, cover, and water requirements are assumed to be met by nesting needs.

The relationship between habitat variables, life requisites, cover types, and the HSI for the yellow warbler is illustrated in Figure 1.

The following sections provide a written documentation of the logic and assumptions used to interpret the habitat information for the yellow warbler and to explain and justify and variable and equations that are used in the HSI model. Specifically, these sections cover the following: (1) identification of variables that will be used in the model; (2) definition and justification of the suitability levels of each variable; and (3) description of the assumed relationship between variables.

Reproduction component. Optimal nesting habitat for the yellow warbler is provided in wet areas with dense, moderately tall stands of hydrophytic deciduous shrubs. Upland shrub habitats on dry sites will provide only marginal suitability.

It is assumed that optimal habitats contain 100% hydrophytic deciduous shrubs and that habitats with no hydrophytic shrubs will provide marginal suitability. Shrub densities between 60 and 80% crown cover are assumed to be optimal. As shrub densities approach zero cover, suitability also approaches zero.

Figure 1. Relationship between habitat variables, life requisites, cover types, and the HSI for the yellow warbler.

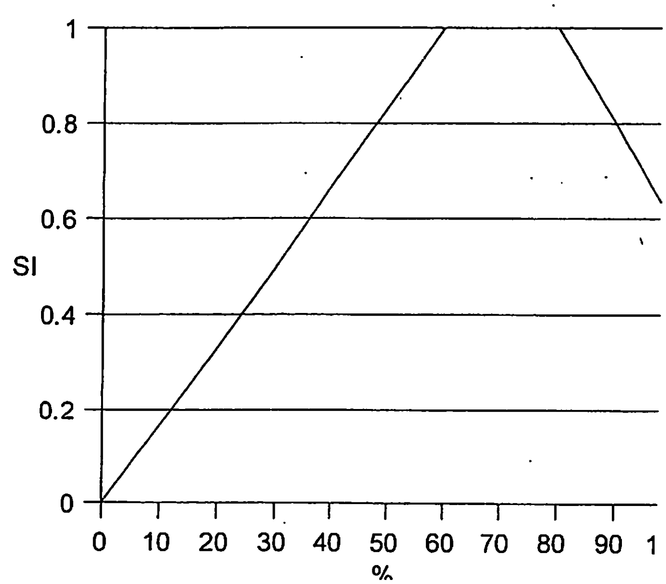
Habitat variable	Life requisite	Cover types	
Percent deciduous shrub crown cover Average height of deciduous shrub canopy Percent of shrub canopy comprised of hydrophytic shrubs	Reproduction	Deciduous Shrubland Deciduous Scrub/ Shrub Wetland	HSI

Totally closed shrub canopies are assumed to be of only moderate suitability, due to the probable restrictions on movement of the warblers in those conditions. Shrub heights of 2 m (6.6 ft) or greater are assumed to be optimal, and suitability will decrease as heights decrease to zero.

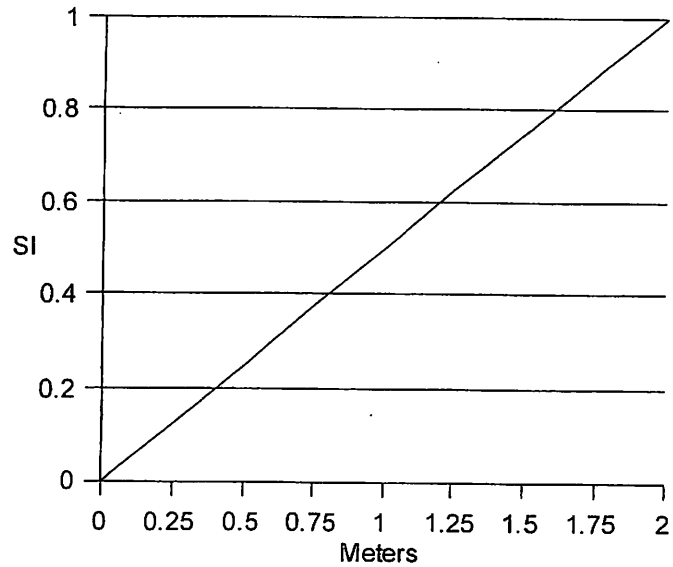
Each of these habitat variables exert a major influence in determining overall habitat quality for the yellow warbler. A habitat must contain optimal levels of all variables to have maximum suitability. Low values of any one variable may be partially offset by higher values of the remaining variables. Habitats with low values for two or more variables will provide low overall suitability levels.

Model Relationships

Suitability Index (SI) graphs for habitat variables. This section contains suitability index graphs that illustrate the habitat relationships described in the previous section.

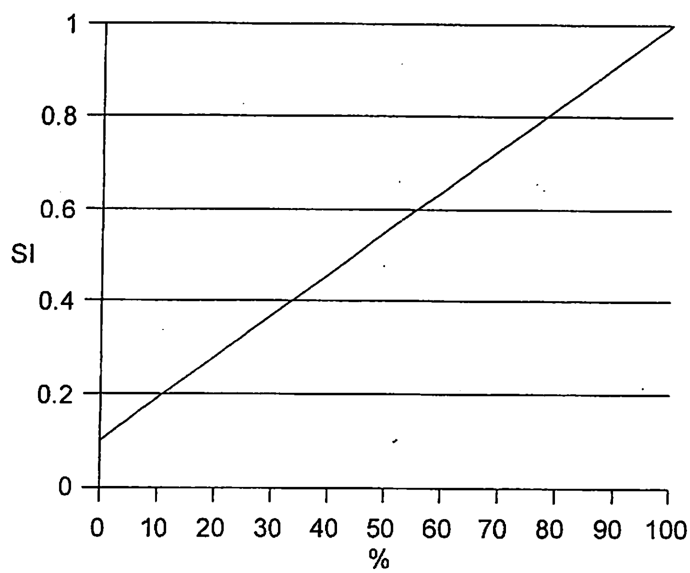


Cover-type Variable
DS,DSW V_1
Percent deciduous shrub crown cover.



DS,DSW V_2
Average height of deciduous shrub canopy.

DS, DSW V_3
Percent of deciduous shrub canopy comprised of hydrophytic shrubs.



Equations. In order to obtain life requisite values for the yellow warbler, the SI values for appropriate variables must be combined with the use of equations. A discussion and explanation of the assumed relationship between variables was included under Model Description, and the specific equation in this model was chosen to mimic these perceived biological relationships as closely as possible. The suggested equation for obtaining a reproduction value is presented below.

Life requisite	Cover type	Equation
Reproduction	DS,DSW	$(V_1 \times V_2 \times V_3)^{1/2}$

HSI determination. The HSI value for the yellow warbler is equal to the reproduction value.

Application of the Model

Definitions of variables and suggested field measurement techniques (Hays et al. 1981) are provided in Figure 2.

Figure 2. Definitions of variables and suggested measurement techniques.

Variable (definition)	Cover types	Suggested techniques
V_1 Percent deciduous shrub crown cover (the percent of the ground that is shaded by a vertical projection of the canopies of woody deciduous vegetation which are less than 5 m (16.5 ft) in height).	DS,DSW	Line intercept
V_2 Average height of deciduous shrub canopy (the average height from the ground surface to the top of those shrubs which comprise the uppermost	DW,DSW	Graduated rod

shrub canopy).

V_3 Percent of deciduous shrub canopy comprised of hydrophytic shrubs (the relative percent of the amount of hydrophytic shrubs compared to all shrubs, based on canopy cover).	DW.DSW	Line Intercept

SOURCES OF OTHER MODELS

No other habitat models for the yellow warbler were located.

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HABITAT SUITABILITY INDEX MODELS: RED-WINGED BLACKBIRD

by

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PREFACE

This document is part of the Habitat Suitability Index (HSI) Model Series [Biological Report 82(10)] which provides habitat information useful for impact assessment and habitat management. Several types of habitat information are data that can be used to derive quantification relationships between key environmental variables and habitat suitability. This information provides the foundation for the HSI model and may be useful in the development of other models more appropriate to specific assessment or evaluation needs.

The HSI Model Section documents the habitat and includes information pertinent to its application. The model synthesizes the habitat use information into a framework appropriate for field application and is scaled to produce an index value between 0.0 (unsuitable habitat) and 1.0 (optimum habitat). The HSI Model Section includes information about the geographic range and seasonal application of the model, its current verification status, and a list of the model variables with recommended measurement techniques for each variable.

The model is a formalized synthesis of biological and habitat information published in the scientific literature and may include unpublished information reflecting the opinions of identified experts. Habitat information about wildlife species frequently is represented by scattered data sets collected during different seasons and years and from different sites throughout the range of a species. The model presents this broad data base in a formal, logical, and simplified manner. The assumptions necessary for organizing and synthesizing the species-habitat information into the model are discussed. The model should be regarded as a hypothesis of species-habitat relationships and not as a statement of proven cause and effect relationships. The model may have merit in planning wildlife habitat research studies about species, as well as in providing an estimate of the relative quality of habitat for that species.

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I gratefully acknowledge Dr. Gordon H. Orians, Department of Zoology, University of Washington, Seattle, for his review of this red-winged blackbird model . The cover of this document was illustrated by Jennifer Shoemaker. Word processing was provided by Carolyn Gulzow, Dora Ibarra, and Elizabeth Graf.

RED-WINGED BLACKBIRD (*Agelaius phoeniceus L.*)

HABITAT USE INFORMATION

General

The red-winged blackbird (*Agelaius phoeniceus L*) nests in fresh-water and brackish herbaceous wetlands, bushes and small trees along watercourses, and certain upland cover types from (American Ornithologists' Union 1983:723):

> ... east-central, south-coastal and southern Alaska..., southern Yukon west-central and southern Mackenzie, northwestern and central Saskatchewan, central Manitoba, central Ontario, southern Quebec..., New Brunswick, Prince Edward Island, Nova Scotia and southwestern Newfoundland south to northern Baja California, through Mexico... and along both coasts of Central America to Nicaragua and northern Costa Rica .... and to southern Texas, the Gulf coast and southern Florida. [This blackbird winters] from southern British Columbia, Idaho, Colorado, Kansas, Iowa, the southern Great Lakes region, southern Ontario and New England... south throughout the remainder of the breeding range, with the southwestern and most of Middle American populations being sedentary.

The red-winged blackbird traditionally was considered to be a wetland nesting bird. It has adapted, within the last century, to habitat changes brought about by man; it now commonly nests in hayfields, along roadsides and ditches, and in other upland sites (Dolbeer 1980).

Food

Red-winged blackbirds vary their diet throughout the year, presumably in response to the nutritive demands of reproduction. The percent of waste grain and seeds in the diet of male blackbirds in one study in Ontario, Canada, was at least 80 to 87% in March and April, 46% in May, only 10% in July, and 85% in late July to October (McNicol et al. 1982). Insects amounted to 51 to 84% of the diet during May and July. The diet of female red-winged blackbirds varied between 67 and 79% insect parts in May and July but was only 15% insectivorous in late July-October, after fledging had occurred.

Water

References describing the dependency of the red-winged blackbird on surface water for drinking and bathing were not found in the literature. Nesting occurs in herbaceous wetlands and upland habitat near surface water and in suitable vegetation distant from free water. Red-winged blackbirds seem to prefer habitats near wetlands for foraging. Communal roosting, which occurs after fledging is completed, is either in herbaceous wetlands or dense communities of young trees with thick canopies growing on moist sites (Micacchion and Townsend 1983).

Cover

The red-winged blackbird nests in a variety of habitats. Blackbirds in southern Michigan prefer old and new hay fields, pastures, old fields, and wetlands with robust vegetation capable of supporting nests and dense cover that provides protection for nests (Albers 1978). They avoid cut or fallow fields, woodlots, agricultural croplands, open water, and tilled soil.

Areas with tall, dense, herbaceous vegetation seem to provide preferred nest sites. Blackbirds that nest early in the breeding season select tall, dense, old-growth herbaceous vegetation while blackbirds that nest late in the breeding season select tall, dense, new-growth herbaceous vegetation (Albers 1978). Upland nest sites of red-winged blackbirds in Ontario were in plant communities commonly dominated by goldenrod (*Solidago* spp.), alfalfa (*Medicago sativa*), fleabane (*Erigeron* spp.), clover (*Trifolium* spp.), various thistles (*Cirsium* spp.), and similar herbaceous weeds (Joyner 1978). Blackbirds in fresh water sites selected old- and new-growth of broad-leaved monocots, like cattails (*Typha* spp.) and broad-leaved sedges (*Carex* spp.), and commonly rejected old- and new-growth of narrow-leaved monocots and forbs (Albers 1978). Woody species, such as hightide bush (*Iva* frutescens) and groundselbush (*Baccharis halimifolia*), and robust herbaceous plants, like cattails, supported the most nests in tidal herbaceous wetlands (Meanley and Webb 1963).

The density of preferred plant cover is not adequately described either in the literature or in this model. The height of preferred plant cover is inferred, below, from descriptions of nest sites.

Red-winged blackbirds frequently use scattered trees and fence posts near their breeding territories as observation posts. Blackbirds use both herbaceous wetlands and trees for communal roosts after fledging is completed. Roost trees characteristically are young, occur at high densities, provide thick canopies, and are adapted to moist sites (Micacchion and Townsend 1983).

Reproduction

Red-winged blackbirds are migratory in the northern portion of their range. Males migrate to or congregate at future nesting habitats in late winter, and females arrive at the territories in early spring (Case and Hewitt 1963). In areas with resident populations, individuals of both sexes may remain near breeding territories throughout the year, even though the areas are not actively defended or used in winter except, perhaps, as roosting sites (Orians pers. comm.). Males are polygynous, and up to six females commonly nest within a male's territory (Holm 1973). Harem size was larger in herbaceous wetlands with open stands of cattails than in herbaceous wetlands dominated by bulrushes (*Scirpus* spp.) or by closed stands of cattails (Holm 1973). Harem size has sometimes been observed to exceed 10 to 12 females and, in one instance, numbered 32 females (Orians pers. comm.).

Males do not participate in nest building, incubation, or feeding of the incubating female (Orians pers. comm.). Males may help feed nestlings and are likely to help feed fledglings. The timing of breeding varies throughout the range of the red-winged blackbird. Nesting frequently begins in March or April and is completed by mid-July in the more temperate habitats. Most young in North America are fledged by late July.

Herbaceous wetlands dominated by cattails generally seem to be the most productive habitats for red-wing blackbirds in terms of nests/ha or number of young fledged/ha (Robertson 1972). Favorable herbaceous wetland sites produce more suitable food per unit area and have higher nest densities, highly synchronous nesting, higher nest survival rates. and lower nest predation rates than do upland nest sites.

Nests of red-winged blackbirds are placed on the edges of cattail clumps that border areas of open water (Wiens 1965). Herbaceous wetlands that are dominated by cattails and have open, permanent water have the optimum number of available nest sites. Early nests are placed in the old growth vegetation remaining from past growing seasons, while late nests may be built on new growth. Nest success in one herbaceous wetland habitat seemed related to: (1) increased depth of permanent water (up to 50 cm or more), which apparently reduced mammalian predation on nests; (2) nest placement close to water (greater nest success was observed for nests 20 cm above water than nests 100 cm above water), (3) nest placement in herbaceous wetland vegetation interspersed with open water, rather than in herbaceous wetland vegetation where no open water was present; and (4) nest placement in marsh grass and loosestrife (*Decadon verticillatus*), rather than in sweet gale (*Myrica gale*) and sedges (Weatherhead and Robertson 1977). Other studies have indicated that nests placed at 1.2 m heights were more successful than nests placed at 0.6 m heights in tidal herbaceous wetlands on Chesapeake Bay (Meanley and Webb 1963) and that nest success was higher when permanent water levels were greater than 25 cm (Robertson 1972).

Nests of red-winged blackbirds in upland sites typically are wound between and attached to stalks of herbaceous vegetation (Bent 1958). Early nests are entwined with old growth stems and late nests with the sturdiest stems of the new growth. Activities, such as intensive livestock grazing, mowing, and burning of old growth stubble, make herbaceous uplands unavailable for early nest placement. Mowing hayfields during the nesting season disrupts nesting success on upland sites (Albers 1978). Red-winged blackbirds seem to prefer areas with the densest, tallest herbaceous vegetation for nest placement. Vegetation that restricted visibility was more important than the number of plant stems and leaves per unit area. Trees greater than 5.0 m in height were in most territories (Albers 1978). The mean height of nest placement was 15 cm in monotypic stands of reed canarygrass (*Phalaris arundinacea*) 58 cm high (Joyner 1978). Nest sites often are close to open water (Joyner 1978), although no specific descriptions of acceptable distances of upland nest sites from open water were found in the literature.

Interspersion

The red-winged blackbird seems to be closely associated with the presence of standing water (Bent 1958) and certain types of dense herbaceous vegetation for nest placement. Herbaceous wetlands or sloughs I with extensive cattails, bulrushes, sedges, reeds (*Phragmites* spp.), or tules (*Scirpus* spp.), historically have provided important nesting habitat for the blackbird (Bent 1958). However, blackbirds also nest in dense herbaceous cover in hayfields, along roadsides and ditches, and in other upland sites (Dolbeer 1980). Red-winged blackbirds forage for insects in understory, midstory, and overstory canopies (Snelling 1968) during the nesting season.

The blackbird is primarily a seed eater, except during fledging. The species sometimes forms large communal flocks in wetland herbaceous habitats or in trees and brushlands and these birds may forage on agricultural crops or understory seed sources (Mott et al. 1972; Johnson and Caslick 1982). After the autumn migration from the northern portion of their range, red-winged blackbirds frequently roost in herbaceous wetland habitats, trees, or shrubs and feed on seeds within understory vegetation.

Special Consideration

Red-winged blackbirds shift from a dispersed insectivorous feeding behavior during the nesting season to a communal granivorous feeding habit after fledging has occurred. They frequently move into agricultural areas at this time. Costs related to their consumption of grain can become high and may exceed the benefits of insect control related to their foraging habits during fledging (Bendell et al. 1981). Damage to ripening corn (*Zea mays*) occurs during August and September (Somers et al. 1981; Stehn and de Becker 1982), when blackbirds often congregate at night in herbaceous wetlands or in roosts in young deciduous trees in great concentrations (perhaps up to 1 million birds) (Stehn and de Becker 1982). The distance from these autumn roosts to corn fields and the proximity of corn fields to traditional flightlines strongly influences the amount of damage inflicted on individual corn fields. Bird damage to crops in Ohio diminished consistently as distances from communal roosts increased from 3.2 to 8 km, and the level of damage remained constant and low at distances of 8 to 19.2 km (Dolbeer 1980).

HABITAT SUITABILITY INDEX (HSI) MODEL

Model Applicability

Geographic area. This model will produce an HSI for nesting habitats of the red-winged blackbird. The breeding range and the year-round range of the blackbird occur throughout the contiguous 48 States.

Season. The model will produce an HSI for nesting habitat throughout the nesting seasons, which generally occurs from March to late July.

Cover types. This model was developed to evaluate habitat in herbaceous wetlands (HW) and upland herbaceous cover types, such as pasture and hayland (P/H), forbland (F), and grassland (G) (terminology follows that of U.S. Fish and Wildlife Service 1981).

Minimum habitat area. Minimum habitat area is defined as the minimum amount of contiguous habitat that is required before a species will live and reproduce in an area. Specific information on minimum areas required for red-winged blackbirds was not found in the literature. It is assumed, however, that a wetland area must contain at least 0.10 ha in emergent herbaceous vegetation, like cattails, to be considered nesting habitat for the blackbird. Several studies have described the minimum territory for male red-winged blackbirds as 0.02 ha (Weatherhead and Robertson 1977; Orians 1980). A 0.10 ha area of emergent herbaceous vegetation might, therefore, potentially provide territories for up to five male blackbirds. Territories in upland habitats are much larger than those in wetland habitats. It is assumed that a block of upland and habitat must be at least 1.0 ha in area to provide adequate breeding habitat for red-winged blackbirds.

Verification level. This model was developed from descriptive information about nesting cover and species-habitat relationships identified in the literature. The HSI derived from the use of this model describes the potential of an area for providing nesting habitat for the red-winged blackbird. The model is designed to rank the suitability of nesting habitat as would a biologist with expert knowledge about the reproductive requirements of the blackbird. The model should not be expected to rank habitats in the same way as population data because many nonhabitat-related criteria can significantly impact populations of wildlife species.

Model Description

Overview. The red-winged blackbird uses a variety of habitat layers throughout the year. Tall, dense, herbaceous vegetation seems to satisfy nesting, foraging, and cover requirements. The red-winged blackbird readily uses midstory and overstory layers of habitat at times but does not seem to be dependent on the presence of these layers.

The red-winged blackbird typically nests in tall (over 0.5 m), dense (undefined) herbaceous vegetation, although it occasionally nests in shrubs and trees. This nest site requirement is best met in herbaceous wetland habitats where nest sites are available in sturdy cattails over open, permanent water. Nesting requirements also can be met by suitable herbaceous vegetation in upland sites. Tall, sturdy, herbaceous stems or midstory or overstory components are used as display perches or observation posts. Red-winged blackbirds nesting in herbaceous wetland habitats may feed on insects associated with shrub, tree canopy, or herbaceous vegetation within the wetland or on insects associated with midstory and overstory canopies or in the grass understory outside the wetland boundary (Snelling 1968). Birds nesting in upland sites typically forage for insects in understory vegetation near the nest site.

This model attempts to evaluate the ability of a habitat to meet the food and reproductive needs of the red-winged blackbird during the nesting season. The logic used in this species-habitat model is described in Figure 1. The following sections document this logic and the assumptions used to translate habitat information for the red-winged blackbird into the variables selected for the HSI model. These sections also describe the assumptions inherent in the model, identify the variables used in the model, define and justify the suitability level of each variable, and describe the assumed relationships between variables.

FIGURE 1

Food and reproductive components (herbaceous wetland cover types). There are three conditions (A, B, and C) included in Figure 1. Condition A wetlands, with a minimum of 0.10 ha in emergent herbaceous vegetation, can be very productive nesting habitats for red-winged blackbirds if water is present throughout the year, water chemistry is favorable for photosynthesis, and abundant, persistent, emergent vegetation suitable for nest placement is present. The quality of such a wetland as nesting habitat for red-winged blackbirds can be estimated with the following five habitat variables.

Variable 1 (V1) refers to the type of emergent herbaceous vegetation available in the wetland.

V1 = 1.0 if emergent herbaceous vegetation is predominantly old or new growth of broad-leaved monocots, like cattails.

V1 = 0.1 if emergent herbaceous vegetation is predominantly narrow-leaved monocots or other herbaceous materials.

Variable 2 (V2) considers the water regime of the wetlands. The suitability index of V2 is 1.0 if the wetland is permanently flooded or intermittently exposed with water usually present throughout the year. This is a desirable condition because permanent water is necessary to support persistent populations of invertebrates that overwinter in various larval instars, maximizing the production of aquatic insects that emerge throughout the next spring and early summer. These insects seem to be the favored food source for blackbirds nesting in herbaceous wetlands (Orians 1980). The presence of permanent water within the wetland may reduce mammalian predation on nests of red-winged blackbirds (Robertson 1972).

V2 = 1.0 if water usually is present in the wetland throughout the year.

V2 = 0.1 if the wetland usually is dry during some portion of the year.

Variable 3 (V3) pertains to the abundance of carp (*Cyprinus carpio*) within the wetlands. Carp disturb submergent vegetation within the wetlands, which may destroy habitat for emergent aquatic insects (like Odonates) and reduce wetland food sources for blackbirds.

V3 = 1.0 if carp are absent from the wetland.

V3 = 0.1 if carp are present within the wetland.

Variable 4 (V4) in the model measures the abundance of larvae of emergent aquatic insects. The adult form of these species provides a potentially important food source for red-winged blackbirds nesting in wetland habitats. The biomass of these benthic invertebrates is variable within a herbaceous wetland at any one time, as well as between sampling periods (Hynes 1972). This biomass should not be regarded as a direct measure of productivity because production, in terms of both numbers and weight, is many times larger than that present at any one sample periods, and the assessment of numbers or biomass per unit of area presents formidable, perhaps insurmountable, difficulties (Hynes 1972). The presence or absence of suitable benthic invertebrates can be determined by sampling with a sieve net (Needham and Needham 1970) along the edge of clumps of emergent vegetation. Sampling is more likely to be accurate than inferences about the presence of benthic invertebrates based on measures of water chemistry that may inadequately consider pollutants that impact aquatic food chains. Inferences about the presence of benthic invertebrates based on the appearance of aquatic vegetation also are less accurate than sampling (Orians pers. comm.). Therefore, sampling to determine the presence or absence of important benthic invertebrates is the preferred assessment technique.

V4 = 1.0 if larvae of damselflies and dragonflies (Order Odonata) are present in the wetland.

V4 = 0.1 if larvae of damselflies and dragonflies are not present in the wetland.

Dense stands of emergent vegetation in wetlands prevent sunlight from penetrating to the water surface, which reduces aquatic productivity. A mat of vegetation can form a wetland "floor", which reduces the availability of arthropods to red-winged blackbirds and may result in increased nest predation. Open water, interspersed throughout the emergent herbaceous vegetation, supports submergent vegetation within the wetland boundary that can be used by aquatic insects as food and cover. The openings also provide an interface between emergent vegetation and open water, which increases the vegetation surface area available to emerging insects and foraging red-winged blackbirds and may increase the presence of potential nest sites. Blackbirds frequently nest on the edge of cattail clumps that border open water (Wiens 1965). They are highly territorial, and the number of territories in a wetland is assumed to be dependent on the quantity of edge between emergent vegetation and open water that is available for nest sites. An exact measure of the amount of edge within a wetland can be difficult and unreliable because of the highly dynamic nature of the herbaceous vegetation, resulting from water level fluctuations, life cycles of the vegetation, and activities of animals like muskrats (*Ondatra zibethica*). Measures of the patchiness of emergent herbaceous vegetation and open water within a wetland is represented by variable 5 (V5) in the model.

Blackbirds prefer patchy stands of cattails interspersed with areas of open water over dense homogeneous stands of cattails (Robertson 1972). Variable 5 is assumed to have a suitability index of 1.0 when the quantity of open water and emergent vegetation is about even (about 40% to 60%). Robertson (1972) found a nesting density of about 96 nests/ha in herbaceous wetland habitat when patchy vegetation was about 41% of the total wetland area. Wetlands with large areas of emergent vegetation and small areas of open water receive relatively low SIs because of the small quantity of suitable nest sites. Case and Hewitt (1963) described the Inlet Valley Marsh in New York as a small, closed herbaceous wetland with upland trees and shrubs immediately adjacent for nesting and foraging sites. The red-winged blackbird nesting density in this herbaceous wetland was about 33/ha. Variable 5 is assigned an SI of 0.3 when a wetland is completely covered with emergent herbaceous vegetation, as described above.

Conditions where there are small areas of emergent vegetation and large areas of open water also receive a low SI because of the reduced availability of niche spaces. Moulton (1980) found red-winged blackbirds nesting in emergent vegetation along ditch banks that surrounded large areas of open water in rice (*Oryza sativa*) paddies in northern Minnesota. Nest densities averaged about 2.5 nests/ha of total wetland habitat, presumably because both nests and emergent vegetation were restricted to long, narrow strips of edge. The territorial behavior of red-winged blackbirds may have restricted the nest density along the ditch banks. An SI of 0.1 is assigned to V5 for wetland habitats with a limited amount of emergent herbaceous cover. The SI's for wetlands with different amounts of emergent herbaceous vegetation are listed below. User's can interpolate between listed values as needed.

V5 = 1.0 if the wetland area contains about an equal mix of emergent herbaceous vegetation and open water.

V5 = 0.3 if the wetland area is covered by a dense stand of emergent herbaceous vegetation.

V5 = 0.1 if the wetland area contains a few patches of emergent herbaceous vegetation and extensive areas of open water.

Condition B wetlands are wetlands that are likely to be dry sometime during the year or that do not have an aquatic insect resource. These wetlands may still provide some habitat for nesting red-winged blackbirds. Blackbirds will tend to use the available emergent vegetation as nest sites and rely on vegetation surrounding the wetland as a foraging substrate. The distance that red-winged blackbirds will fly from wetlands to forage on insects in upland habitats is not known. In this model, only foraging sites within 200 m of wetlands that contain nest sites are assumed to be useful to blackbirds. The quality of a wetland without permanent water or an aquatic insect resource is assumed to be no better than the quality of available foraging sites outside the wetland (V6). Wetlands that only have upland habitats with understory vegetation (such as old fields, pastures, or hay fields) available as foraging substrates are given an SI of 0.1. Wetlands near uplands that have a deciduous midstory or tree canopy as a foraging substrate are assumed to have an SI of 0. 4. Red-winged blackbirds nesting in one herbaceous wetland will forage on insects in other, close-by, herbaceous wetlands (Holm 1973). Condition B wetlands situated within 200 m of a condition A herbaceous wetland that has an emergent aquatic insect fauna (Odonates) and undefended foraging areas are given an SI of 0.9.

V6 = 0.1 if the only suitable foraging substrate is an understory layer.

V6 = 0.4 if the suitable foraging substrates include a midstory and/or an overstory layer.

V6 = 0.9 if the suitable foraging area is a condition A wetland.

Food and reproductive components (upland cover types). Upland habitats (Fig. 1; condition C) frequently are less productive than are wetland habitats. The number of young red-winged blackbirds fledged per territory may be as large in upland sites as in some wetland habitats (Dolbeer 1976). The number of young fledged/ha in upland sites, however, frequently is less than 10% of the number fledged/ha in good quality wetland habitat. For example, Robertson (1972) reported 133 young fledged/ha in one wetland study area, while only 5 young fledged/ha in nearby upland sites. The nesting density in the wetland habitat, with patches of emergent, herbaceous vegetation interspersed with patches of open water, was about 10 times higher than in upland habitats. Robertson found about 100 red-winged blackbird nests/ha in suitable wetland habitat, 2 to 13 nests/ha in hay fields, and 0.1 nests/ha in a Christmas tree plantation.

Robertson's (1972) data on the numbers of nests/ha and young fledged/ha suggest that, if the best wetland habitats have an HSI of 1.0, the best upland sites may have an HSI of about 0.1. Graber and Graber (1963) determined that summer populations of red-winged blackbirds (number/40 ha) in Illinois from 1958 to 1959 were 301 birds in herbaceous wetlands (whether condition A or B is unknown), 342 birds in edge shrubs, 204 birds in sweet clover, 158 birds along drainage ditches, 134 birds in mixed hay, 89 birds in red clover (*Trifolium pratense*), 65 birds in oat (*Avena sativa*) fields, 64 birds in ungrazed grasslands, 58 birds in alfalfa, 30 birds in wheat (*Triticum aestivum*), 27 birds in fallow fields, 24 birds in pastureland, 23 birds in shrub-grown areas, 5 birds in corn fields, and 3 birds in soybeans (Glycine max). The observed nest densities would not exceed the values measured by Robertson (1972) for upland habitats even if all of the birds in each of these different habitat types were nesting females.

The type of upland cover available as nest sites for the red-winged blackbird is represented by V7 in the model. Red-winged blackbirds nest in a wide variety of upland sites. For example, blackbirds nested in hay fields and old fields, but not in tilled and fallow fields, in southern Michigan (Albers 1978). Important characteristics of upland nest sites include the presence of dense, tall, herbaceous vegetation, the availability of fence posts and other structures that serve as display perches for males and as observation posts for both males and females, and a proximity to open water (Joyner 1978). Specific information on the preferred proximity of nest sites in upland habitats to open water were not found in the literature.

Variable 7 (V7) describes the availability of dense, sturdy herbaceous vegetation in forbland, grassland, and pasture/hayland upland sites. Variable 7 has a habitat suitability index of 0.1 if the herbaceous vegetation is dense and tall, like sweet clover (Melilotus spp.), mixed hay, alfalfa, and coarse weeds, which provide suitable nest sites and protective cover. Variable 7 has a suitability index of 0.0 if the habitat site has some other surface cover, such as cut or fallow fields, agricultural fields, woodlots, or tilled soils.

V7 = 0.1 if upland habitat provides dense, tall, herbaceous vegetation.
V7 = 0.0 if upland habitat has some other surface cover.

Early nests of red-winged blackbirds in upland sites are more productive than are late nests (Dolbeer 1976). Early nests are placed in robust, dense, old herbaceous growth. Activities that are destructive to this vegetation, such as mowing, heavy grazing pressure, or burning, reduce habitat suitability for red-winged blackbirds. The occurrence of disturbances that might impact nesting success in upland cover types is included as V8 in the model.

V8 = 0.1 if disturbances, such as mowing, heavy grazing, or burning, do not occur to the potential habitat site in most years.

V8 = 0.0 disturbances occur to the potential habitat site in most years.

HSI determination. Three types of habitat conditions (A, B, and C) are described in Figure 1. Condition A represents a wetland that contains the preferred vegetative structure for nest placement, permanent water that supports a population of emergent aquatic insects that are available as food, the absence of carp, and the interspersion of open water within emergent herbaceous vegetation. The equation combining the SIs for VI to VS to estimate an HSI for condition A wetlands is:

$$HSI = (V1 \times V2 \times V3 \times V4 \times V5)$$

Condition B habitats (Fig. 1) are wetlands where the emergent herbaceous vegetation does not have the preferred structure, there is no permanent water, carp are present, or benthic invertebrates are absent. Condition B habitats have a basic SI of 0.1, determined by the 0.1 SI for the unsuitable conditions of V1, V2, V3, or V4. The basic SI of 0.1 can be increased if suitable foraging substrate is available outside the boundary of the wetland. Food sources are considered more limiting if only an understory layer is available than if deciduous midstory and/or overstory layers also are available as foraging surfaces. A condition B habitat may be of highest value to red-winged blackbirds if the birds can readily feed on emergent aquatic insects in a nearby condition A herbaceous wetland habitat. The equation for estimating the HSI for condition B habitats is:

$$HSI = (0.1 \times V6)^{1/2}$$

Condition C habitats are upland sites, like grass, forb, and pasture/hayland cover types. Their HSI'S, which will be either 0.1 or 0, are described by the following equation:

$$HSI = (V7 \times V8)^{1/2}$$

The measure of habitat quality represented by the HSI actually reflects an estimate of the quantity of niche space available to the blackbird. Habitats with higher HSIs are assumed to contain more niche space than habitats with lower HSI'S. More niche space in a habitat frequently means that more individuals will occur in that habitat.

Application of the Model

Summary of model variables. This model can be applied by interpreting a recent, good quality, aerial photograph of the assessment area and making selected field measurements. The habitat to be evaluated is outlined on the aerial photograph. Each wetland within the assessment area is identified and a 200 m zone drawn around its perimeter. The wetlands within the assessment area are evaluated, on a per ha basis, with field observations and measurements that determine: (1) the type of emergent vegetation present; (2) the probable permanency of the water; (3) the presence or absence of carp; (4) the presence or absence of larval stages of emergent aquatic insects; (5) the mix of open water and emergent herbaceous vegetation; and (6) the nature of vegetative cover within 200 m surrounding the wetland (Fig. 2). The proportion of open water and emergent herbaceous vegetation within the wetland is estimated from a map made after boating or wading through the wetland. The presence of benthic invertebrates is determined from field sampling. Upland habitats within the assessment area are evaluated by ground truthing to determine cover types and land-use practices. Habitat conditions, like the presence of dense, tall herbaceous cover and the probability that disturbances such as grazing, burning, mowing, and tilling will occur during the March to July nesting season, are noted.

Definitions of variables and suggested field measurement techniques are provided in Figure 3.

Model assumptions. I have assumed that it is possible to synthesize results from many studies conducted in different seasons of the year different locations in North America into a model years, and a wide variety of nest sites throughout North America into a model describing the relative quality of breeding habitat for the red-winged blackbird. My basic assumptions about habitat criteria important to red-winged blackbirds are based on descriptive and correlative relationships expressed in the literature. My descriptors of habitat quality will obviously be in error if authors made incorrect judgements or measurements or if I have emphasized the wrong data sets or misinterpreted the meaning of published data.

I have assumed that the quality of some wetland habitats exceeds the quality of best upland habitats. This assumption was based largely on quality of the blackbirds fledged per hectare of wetland and upland habitats. I compiled and analyzed characteristics of wetland habitats that seemed to distinguish habitats where varying numbers of red-winged blackbirds were fledged. I assumed that I could meaningfully bound the size of study areas to be evaluated as nesting habitat as $\geq$ 0.1 ha for wetland sites and $\exists$ 1.0 ha for suitable upland sites. I arbitrarily selected distances (200 m) that blackbirds might fly from their nests in wetlands to forage on insects and seeds in surrounding vegetative cover. I assumed that the presence of dense, tall, herbaceous cover reasonably close to water, coupled with a strong probability that the dense cover would remain relatively undisturbed during the breeding season, would adequately indicate the value of upland habitats as nest sites for the red-winged blackbird.

The values for Variables 1 through 8 are estimates. The ecological information available does not seem sufficient to suggest: (1) other pertinent variables; (2) more appropriate values for the present variables; or (3) more definitive interrelationships between the variables. Finally, I have assumed that the multiplicative relationship described in the model is appropriate summary statement to provide a Habitat Suitability Index that reflects the relative importance of different habitats as nest sites for the red-winged blackbird.

Figure 3. Definitions of variables and suggested measurement techniques.

Variable (definition)		Cover type	Suggested technique
VI	Type of emergent	HW	Identify the dominant species of emergent herbaceous vegetation in the wetland. Determine if the dominant species is a broad-leaved monocot.
V2	Water regime	HW	Determine whether or not water will be retained in the wetland throughout the year in most years; use, if possible, indicators like muskrat houses and fish. Evaluate records describing permanence and level of water in wetland. Determine the classification type of wetland if the wetland has been classified.
V3	Abundance of carp within the wetland.	HW	Determine presence of carp by seining, using local data about presence of carp within wetland or observations to see if water is clear or generally murky, as it is when carp are feeding.

V4	Abundance of larval	HW	Collect insect larvae by dragging astages of emergent aquatic sieve net along water bottom near edge insects(Order Odonata) of clumps of emergent herbaceous within the wetland. vegetation. Sampling is done for some fixed time period. A second sampling procedure involves kicking up the substratum at the edge of clumps of emergent herbaceous vegetation in front of the mouth of a net in some standardized manner (Hynes 1972:240). The collected invertebrates are sorted and identified by comparison with illustrations in an appropriate manual (like Needham and Needham 1970) to determine the presence of damselfly and dragonfly larvae (Order Odonata).
V5	Percent emergent	HW	Determine the mix of open water and herbaceous canopy emergent herbaceous vegetation within the wetland study area. Estimate the mix from a map prepared after wading, walking, or boating through the wetland or from a map made from a recent, high quality, aerial photograph
V6	Types of foraging sites	HW	Use map measurer (Hays et al. 1981) available outside the wetland. to determine if another wetland with an emergent aquatic insect population occurs within 200 m of nest sites within the wetland being evaluated. Map vegetation within 200 m of the wetland and determine, using a dot grid (Hays et al. 1981) or a planimeter, if deciduous midstory and overstory layers comprise at least 10% cover when projected to the ground surface. If midstory and/or overstory do not provide at least 10% cover, and a condition. A wetland does not occur within 200 m of the wetland being evaluated assume only the understory layer is available as a foraging substrate.
V7	Presence of dense, sturdy	F,G,P/H	Interpret the aerial photograph or a herbaceous vegetation Vegetation on-site map prepared from the aerial photograph to determine areas of upland herbaceous vegetation. Ground truth to determine types of herbaceous vegetation occurring in the upland within the assessment

			area and determine if tall, dense, herbaceous cover covers at least 10% of the surface area.
V8	Occurrence of disturbances	F,G,P/H	Ground truth to predict past and future like grazing, mowing, burning, land-use practices (types of and tilling on potential uplanddisturbances that may impact nesting nest sites. success).

SOURCES OF OTHER MODELS

Weatherhead and Robertson (1977) identified and quantified some parameters that affected the nesting success of red-winged blackbirds in wetland habitats in Ontario, Canada. They determined that nesting success, as judged by numbers of young fledged per female, was positively correlated with territory quality scores based on nest placement. Nesting success seemed to be related to four parameters: (1) water depth within the wetland; (2) height of nest above the herbaceous wetland floor; (3) relative openness of nesting cover within the wetland; and (4) the identity of the support vegetation holding the nest. Two of these variables are represented in the present model of habitat suitability for the red-winged blackbird: (1) presence or absence of permanent water; and (2) the relative openness of vegetation within flooded herbaceous wetlands. No other models for use in predicting the quality of nesting habitat for red-winged blackbirds were found in the literature.

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HABITAT SUITABILITY INDEX MODELS: GREAT EGRET

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PREFACE

The habitat suitability index (HSI) model for the great egret presented in this report is intended for use in the habitat evaluation procedures (HEP) developed by the U.S. Fish and Wildlife Service (1980) for impact assessment and habitat management. The model was developed from a review and synthesis of existing information and is scaled to produce an index of habitat suitability between 0 (unsuitable habitat) and 1.0 (optimally suitable habitat). Assumptions used to develop the HSI model and guidelines for model applications, including methods for measuring model variables, are described.

This model is a hypothesis of species-habitat relations, not a statement of proven cause and effect. The model has not been field tested, but it has been applied to three hypothetical data sets that are presented and discussed. The U.S. Fish and Wildlife Service encourages model users to convey comments and suggestions that may help increase the utility and effectiveness of this habitat-based approach to fish and wildlife management. Please send any comments or suggestions you may have on the great egret HSI model to the following address.

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Earlier versions of the habitat suitability index model and narrative for the great egret were reviewed by Dr. R. Douglas Slack and Jochen H. Wiese. The model's structure and functional relationships were thoroughly evaluated by personnel of the U.S. Fish and Wildlife Service's (FWS) National Coastal Ecosystems Team. Model and narrative reviews were also provided by FWS Regional personnel.

GREAT EGRET (*Casmerodius albus*)

INTRODUCTION

The great egret, also called common egret or American egret, is a large white heron in the order Ciconiiformes, family Ardeidae. Great egrets stand 37-41 inches tall and have a wing spread to 55 inches (Terres 1980). The species is associated with streams, ponds, lakes, mud flats, swamps, and freshwater and salt marshes. The birds feed in shallow water on fishes, amphibians, reptiles, crustaceans and insects (Terrés 1980).

Distribution

The great egret is a common breeding species in all coastal areas south from southern Oregon on the Pacific coast and from Maine on the Atlantic coast; in riverine, palustrine and estuarine habitats along the coast of the Gulf of Mexico; and in the Eastern-Central United States (Palmer 1962; Erwin and Korschgen 1979; American Ornithologists' Union 1983). The great egret undergoes an extensive postbreeding dispersal that extends the range of the species to most of the United States exclusive of the arid Southwest (Byrd1978). Young birds hatched in Gulf coast colonies tend to move northward for a short period (Byrd 1978; Ogden 1978). However, with the onset of colder weather most great egrets and other herons migrate south and many winter along the gulf coast in Texas, Louisiana, and Florida (Lowery 1974; Oberholser and Kincaid 1974; Byrd 1978). Analysis of banding data indicates that many birds winter in Cuba, the Bahamas, the Greater and Lesser Antilles, Mexico, and Central America (Coffey 1948). Lowery (1974) suggested that during severe winters, a higher proportion of the population winters farther south.

Life History Overview

Great egrets nest in mixed-species colonies that number from a few pairs to thousands of individuals. A colony may include other species of herons, spoonbills, ibises, cormorants, anhingas, and pelicans. Colony and nest-site selections begin as early as December along the gulf coast, but most great egrets do not initiate nesting activities until mid-February or early March (Bent 1926; Oberholser and Kincaid 1974; Chaney et al. 1978; Morrison and Shanley 1978). Eggs have been recorded from March through early August, and young have been observed in nests from mid-May through late August (Oberholser and Kincaid 1974; Chaney et al. 1978). Clutch size varies from one to six eggs per nest, but three to four eggs is most common (Bent 1926). Incubation period in a Texas colony ranged from 23 to 27 days (Morrison and Shanley 1978). The first flights of young have been noted about 42 days after hatching (Terres 1980).

SPECIFIC HABITAT REQUIREMENTS

Food and Foraging Habitat

Fish constitute up to 83% of the great egret's diet (Hoffman 1978). Most fish taken by great egrets are minnow-sized 3.9 inches, but fish up to 14 inches can be captured and swallowed (Willard 1977; Sehlorff 1978). Other major food items include insects, crustaceans, frogs, and snakes, while small mammals, small birds, salamanders, turtles, snails, and plant seeds are occasionally taken (Baynard 1912; Bent 1926; Hunsaker 1959; Palmer 1962; Genelly 1964; Kushlan 1978b).

Little specific information exists on the food habits of various age classes of great egrets. An adult great egret weighing 32.3 ounces (oz) (Palmer 1962) may require approximately 3.9 oz of food per day (estimated by using the wading bird weight-daily food requirement model proposed by Kushlan 1978b). Daily food requirements are undoubtedly higher during the nesting season when adults are feeding young (Kushlan 1978b).

Great egrets usually forage in open, calm, shallow water areas near the margins of wetlands. They show no preference for fresh-, brackish, or saltwater habitat. Custer and Osborn (1978a,b) found that feeding habitat selection in coastal areas of North Carolina varied daily with the tidal cycle. During low tide, great egrets fed in estuarine seagrass beds. During high tide, freshwater ponds and the margins of *Spartina* marshes were used. Inland, great egrets feed near the banks of rivers or lakes, in drainage ditches, marshlands, rain pools (Bent 1926; Dusi et al. 1971; Kushlan 1976b), and occasionally in grassy areas (Weise and Crawford 1974). Feeding sites are generally not turbid and are fairly open with no vegetative canopy and few emergent shoots (Thompson 1979b).

Great egrets forage singly, in single-species groups, and in mixed-species associations (Kushlan 1978b). Great egrets generally fly alone to feeding sites (Custer and Osborn 1978a,b) and may use the same feeding site repeatedly. The density and abundance of fish at a given location in estuarine habitats may vary with season, time of day, tidal stage, turbidity, and other factors. If feeding success is low, great egrets may move to other areas (Cypert 1958; Schlorff 1978) and join other conspecifics in good feeding habitats (Custer and Osborn 1978a,b). Most instances of group feeding have been observed during specific environmental conditions, such as lowered water levels, that tend to concentrate prey (Kushlan 1976a,b; Schlorff 1978).

Meyerriecks (1960, 1962) and Kushian (1976a, 1978a, b) provided detailed information on hunting techniques employed by great egrets. The "stand-and-wait" and "slow-wade" methods are used most frequently. Because of their long legs, great egrets can forage in somewhat deeper water than most other herons. In New Jersey, foraging depths ranged from 0 (standing on the bank while fishing) to 11 inches, but depths ranging from 4 to 9 inches were most commonly used (Willard 1977). In North Carolina, great egrets fed in water with a mean depth of 25.1 cm (9.8 inches) in *Spartina* habitat and of 6.8 inches in non-*Spartina* habitat (Custer and Osborn 1978b). Mean water depth was 7.9 inches for foraging great egrets in California (Hom 1983). In addition to wading, great egrets can feed by alighting on the surface of deep waters to catch prey, a method rarely employed (Reese 1973; Rodgers 1974, 1975).

Although recent declines of great egret populations in the central coastal region of Texas occurred simultaneously with declines in coastal marine and estuarine fish populations (Chapman 1980), no causal relationship has been proven. At present there are no known management practices that provide suitable food alternatives for piscivorous species, such as the great egret, during periods of fish population decline. Known fish nursery and feeding areas need protection from destruction or habitat alteration to ensure adequate prey populations for fish-eating birds.

Water

The physiologic water requirement of great egrets is probably met during feeding activities in aquatic habitats (Dusi et al . 1971). Water depth affects the quantity, variety, and distribution of food and cover; great egret food and cover needs are generally met between the shoreline and water 1.6 feet deep (Willard 1977).

Interspersion

Suitable habitat for the great egret must include (1) extensive shallow, open water habitat from 4 to 9 inches deep (Willard 1977); (2) food species present in sufficient quantity (Custer and Osborn 1977); and (3) adequate nesting or roosting habitat close to feeding habitat. Most great egrets at a colony in North Carolina flew less than 2.5 miles from nesting colonies (and presumably, from roosting sites) to feeding areas (Custer and Osborn 1978a), but flight distances of up to 22.4 miles have been recorded in the floodplain of the Upper Mississippi River (Thompson 1979b).

Several heronries may be close together. Great egrets from one colony may fly over or near an adjacent colony, but rarely feed in the same areas as conspecifics from the adjacent colony (Thompson 1979b).

HABITAT SUITABILITY INDEX (HSI) MODELS

Model Applicability

Geographic area. The habitat suitability index (HSI) models in this report were developed for application in coastal wetland habitats in Texas and Louisiana. Because there are few differences in habitat requirements along the Atlantic coast, the remainder of the gulf coast, and inland sites in the Southeastern United States, the HSI models may also be used to evaluate potential habitat in those areas.

Season. This model will produce an HSI values based upon habitat requirements of great egrets during the breeding season (February to August). Because there is no apparent seasonal difference in feeding habitat preference and because winter nocturnal roosts are similar to nesting sites, the HSI models may also be used to evaluate winter habitat for the great egret.

Cover types. Great egrets nest on upland islands and in the following cover types of Cowardin et al. (1979): Estuarine Intertidal Scrub-Shrub wetland (E2SS), Estuarine Intertidal Forested wetland (E2FO), Palustrine Scrub-Shrub wetland (PSS) (including deciduous and evergreen subclasses), and Palustrine Forested wetland (PFO) (including deciduous and evergreen subclasses). Great egrets may also feed in these wooded wetlands, but preferred feeding areas may be any one of a wide variety of wetland cover types.

Minimum habitat area. Minimum habitat area is defined as the minimum amount of contiguous suitable habitat required before an area can be occupied by a particular species. Specific information on minimum areas required by great egrets was not found in the literature. If local information is available to define the minimum habitat area, and less than this amount of area is available, the HSI for the species will be zero.

Verification level. The output of these HSI models is an index between 0 and 1.0 that is believed to reflect habitat potential for great egrets. Two biologists reviewed and evaluated the great egret HSI model throughout its development: Dr. R. Douglas -Slack, Texas A&M University, College Station, and Jochen H. Wiese, Environmental Science and Engineering Company, Gainesville, Florida. Their recommendations were incorporated into the model-building effort. The authors, however, are responsible for the final version of the models. The models have not been field-tested.

Model Descriptions

Feeding HSI model. Great egret feeding habitat suitability is related to prey availability. Habitat suitability is optimal when two conditions are met: (1) the populations of minnow-sized fish are high; and (2) shallow open water (necessary for successful prey capture), aquatic vegetation (necessary for prey survival and reproduction), and deeper water are present in a ratio that maximizes prey density and minimizes hunting interference. Use of this model assumes that deep or permanent water environments are not limiting in coastal habitats and that fish populations are distributed uniformly. Because great egrets hunt a variety of species in many different habitat types, a general approach to modeling feeding habitat suitability is presented. Suitability of all wetland cover types for feeding is determined by integrating two factors: (1) the abundance of prey and (2) the accessibility of prey.

The abundance of prey is determined by the ability of the habitat to support the major prey species, especially minnow-sized fish. It is assumed that the abundance of major prey species is related to the primary and secondary productivity of the aquatic habitat; however, few field studies have documented this relationship. The model assumes that prey abundance is not limiting in coastal habitats. Therefore, the accessibility of prey is used as the indicator of feeding habitat suitability.

The accessibility of prey is determined by water depth and percentage cover of aquatic vegetation. A wetland with 100% of its area covered by water 4-9 inches deep is assumed to be optimal for feeding by great egrets (V_1). Although an absence of submerged or emergent vegetation would render fish species most vulnerable to capture, it is unlikely that many prey species would use such an area because it totally lacks cover. The model assumes, therefore, that optimal conditions for both the occurrence and susceptibility to capture of prey species exist when 40%-60% of the wetland substrate is covered by submerged or emergent vegetation (V_2). When such vegetation is lacking, the habitat has a low value for feeding great egrets because small fish may use unvegetated water that is too shallow for their larger aquatic predators.

	Habitat variable	Component
V_1	Percentage of area with water 10-23 cm deep.	

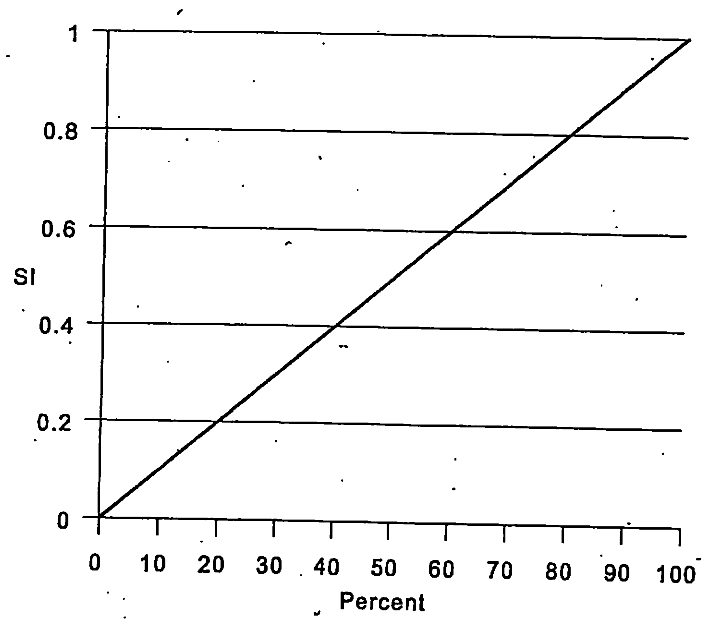
		Food	HSI (Feeding)
V_2	Percentage of submerged or emergent vegetation cover in zone 10-23 cm deep.		

Suitability Index (SI) Graphs for Model Variables

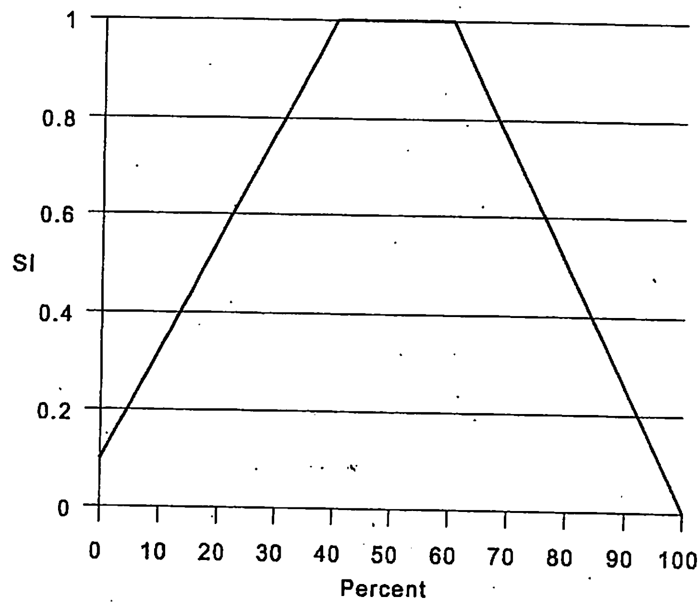
This section provides graphic representation of the relationship between habitat variables and habitat suitability for the great egret in wetland (see Table 2 for abbreviations) and upland (U) cover types. The SI values are read directly from the graph (1.0 = optimal suitability, 0.0 = no suitability) for each variable.

The SI graphs are based on the assumption that the suitability of a particular variable can be represented by a two-dimensional linear response surface. Although there may be interdependencies and correlations between many habitat variables, the model assumes that each variable operates independently over the range of other variables under consideration.

V_1 Percentage of study area with water 4-9 inches deep. In tidal areas, use depth at mean low tide. In nontidal areas, use average summer conditions.



V_2 Percentage of substrate in zone 4-9 inches deep covered by submerged or emergent vegetation.



Feeding HSI.

$$HSI = \frac{V_1 + V_2}{2}$$

Data representing three hypothetical study areas for great egret were used to calculate sample HSI values The HSI values obtained are believed to reflect the potential of the areas to support feeding or nesting great egrets.

Field Use of Models

The level of detail needed for application of these models will depend on time, money, and accuracy constraints. Detailed field sampling of all variables will provide the most reliable and replicable HSI values. Any or all variables can be estimated to reduce the amount of time or money required to apply the models. Increased use of the subjective estimates decreases reliability and replicability, and these estimates should be accompanied by appropriate documentation to insure that decision makers understand both the method of HSI determination and quality of data used in the model. Techniques for measuring habitat variables included in the great egret HSI models are suggested in Table 5.

A project area may contain both potential feeding and nesting habitat. To decrease the cost and time necessary to evaluate the area, assume that food is not limiting and apply only the nesting HSI model. This recommendation is based upon the following assumptions: (1) in most coastal areas of Texas and Louisiana, aquatic habitats suitable for feeding are abundant and are, therefore, less of a limiting factor to great egrets than are suitable nesting sites; and (2) nesting value is easier and more accurately estimated by using subjective methods than is food value. The variables used to measure food use of past colony sites, and (2) the enhancement of a site by the presence of other herons. These two factors are usually, but not always, interrelated. Great egrets tend to use the same colony site in successive years until the site is degraded, and the site may include great blue herons. When applying the HSI model , the user should be aware that an area known to be used by great egrets (or great blue herons) is more likely to be used in future years than an area with an equal HSI value not known to have a history as a colony site.

Table 5. Suggested measurement techniques for habitat variables used in the great egret HSI models.

Variable	Suggested technique
V_1	The percentage of the area with water 4-9 inches deep can be determined by line transect sampling of water depth.
V_2	The percentage of substrate in the 4-9 inches water depth zone covered by submerged or emergent vegetation can be determined from available cover maps, aerial photographs, or by line transect sampling.

HABITAT SUITABILITY INDEX MODEL

CALIFORNIA VOLE (*Microtus californicus*)

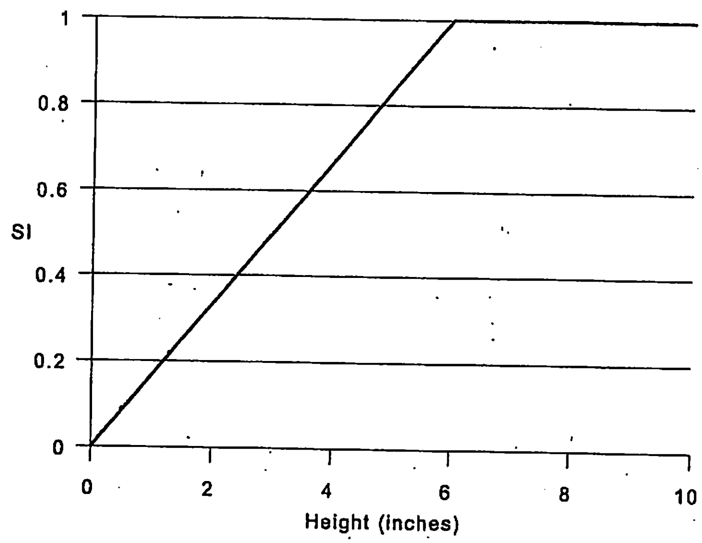
U.S. Fish and Wildlife Service
Division of Ecological Services
Sacramento, California

Cover-Type	Life Requisite	Habitat Variable
Annual Grassland Seasonal Wetland	Food/Cover Reproduction	Height of herbaceous vegetation (V1) Percent cover of herbaceous vegetation (V2) Soil Type (V3)
Riparian Woodland Oak Woodland	Reproduction Food/Cover	Height of herbaceous vegetation (V1) Percent cover herbaceous vegetation (V2) Soil Type (V3) Presence of logs and other types of cover (V4)

Variable	Cover-Type	Sampling Technique
V1 - Height of herbaceous	Annual Grassland Oak Woodland Riparian Woodland Seasonal Wetland	Average vegetation height in 1 m^2 quadrat
V2 - Percent cover of herbaceous vegetation	Annual Grassland Seasonal Wetland Oak Woodland Riparian Woodland	1 m^2 quadrat
V3 - Soil Type	Annual Grassland Seasonal Wetland Oak Woodland Riparian Woodland	Site inspection County Soil Survey
V4 - Presence of logs and other types of cover	Annual Grassland Seasonal Wetland Oak Woodland Riparian Woodland	Visual inspections Sample point

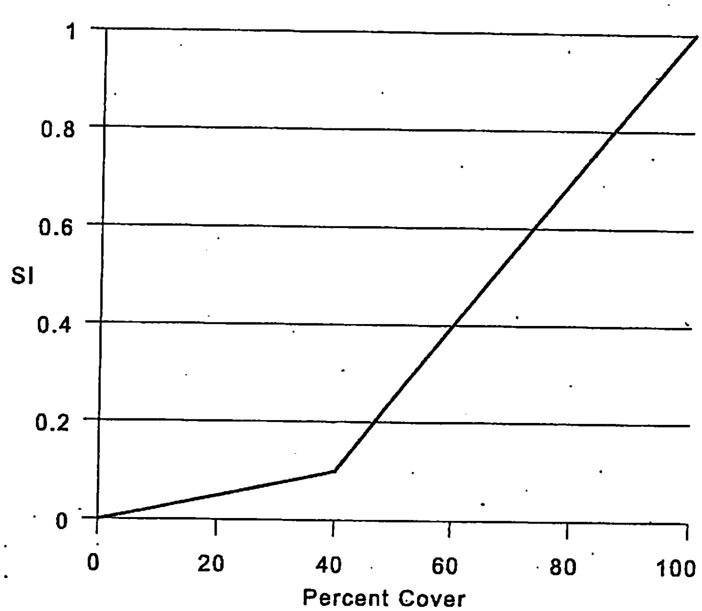
Variable 1: Height of herbaceous vegetation.

Assumes: California voles require relatively tall herbaceous vegetation for both food (Gill 1977. Batzil 1986) and cover (Ingles 1965). Herbaceous vegetation ≥ 6 in tall is considered optimum.



Variable 2: Percent cover of herbaceous vegetation.

Assumes: Relatively dense herbaceous vegetation is needed for cover percent cover ≥ 100 percent is considered optimum (CDFG undated).



Variable 3: Soil type

Assumes: Friable soils such as silts and loams are optimum because voles can dig their burrows (Ingles 1965). Soils such as sands and clays are not optimum.

Suitability Index (SI)

SI = 1.0 if soil type is silty or loamy and friable.

SI = 0.5 if soil type is not silty or loamy and is moderately friable

SI = 0.2 if soil type is not silty or loamy and is not friable.

Variable 4: Presence of logs and other cover types within the sample area.

Assumes: California voles will use logs, brush piles, and rocks for cover in addition to their burrows (California Department of Fish and Game). These sources of cover are more important in woodland habitats than grassland and wetland habitats.

SI = 1.0 logs, brush piles, and rocks are abundant and well distributed throughout the sample site (e.g., ≥ 4 per sample site).

SI = 0.7 if logs, brush piles, and rocks are moderate abundant and distributed throughout the sample site (e.g., 2-4 per sample site).

SI = 0.4 logs, brush piles, and rocks are absent or sparsely distributed throughout the sample site (≤ 1 per sample site).

SI = 0.1 if logs, brush piles, matted vegetation, and/or rocks are absent From sample area.

HSI Determination

For annual grasslands and seasonal wetlands:

$$HSI = \frac{V_1 + V_2 + V_3}{3}$$

For oak woodlands and riparian woodlands:

$$HSI = \frac{V_1 + V_2 + V_3 + V_4}{4}$$

All variables are assumed to contribute equally to the availability of a given habitat type for the California vole. Water is assumed not be a limiting factor and is represented by the herbaceous vegetation variables.

Model Applicability

This model is a hypothesis of the relationships between various attributes of grassland, wetland, and oak riparian woodland habitats and the suitability of these habitats to California voles. The model is designed for use in the Central Valley of California up to 2,500 feet in elevation. California voles are permanent year-round residents, and this model can be applied to these habitats at all times of the year.

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HABITAT SUITABILITY INDEX MODEL
Plain Titmouse (*Parus inornatus*)

by
Michael Long and Daniel Strait
U.S. Fish and Wildlife Service
Division of Ecological Services
Sacramento, California

June 1989

Habitat Use Information

General
The plain titmouse inhabits oak and piñon-juniper woodlands from Oregon south and west to Texas. It is a year-round resident, and maintains a territory throughout the year. The species is generally a secondary cavity nester, although it may occasionally excavate its own hole.

Food
As a group, titmice take a wide variety of foods, but they are considered insectivorous during the summer, and consumers of fruit, seeds, and some insects in the winter (Ferrins 1979). Root (1967 - cited by Verner 1979), found that a large proportion of their food consisted of plant material and arthropods living on the bark of trees. Wagner (1981) found the plain titmouse took a great variety of arthropod taxa.

The titmouse is primarily a bark forager, although it also forages on tree foliage and occasionally on the ground (Hertz et. al. 1976). Most foraging by this species is done between 0-30 feet (0-9 m) of the ground (Wagner 1981; Hertz et. al. 1976). Hertz et al. found that plain titmice showed a preference for foraging in blue oaks (*Quercus douglasii*) over coast live oaks (*Q. agrifolia*). Hertz et. al. (1976) attributed the avoidance of live oaks to their smooth bark which is poor habitat for arthropods. Block and Morrison (1986) also found the titmouse to use blue oaks more than valley oaks (*Q. lobata*), black oak (*Q. kelloggii*), and canyon live oak (*Q. chrysolepis*) for foraging at Tejon Ranch, California. The plain titmouse will forage extensively in live oaks however, especially when other oak species are not present (Dixon 1964).

Reproduction
The plain titmouse is a secondary cavity nester, nesting in natural cavities, old woodpecker holes, or nest boxes. It prefers natural cavities over excavated cavities (Wilson, pers. comm.). Bent (1946) reported nests from 3-32 feet (1-10 m) above the ground. Bent, citing Dawson (1923), reported the titmouse to occasionally excavate its own nest cavity in blue oaks. The plain titmouse prefers wooded areas with intermediate to high percentage canopy coverage dominated by blue, live and valley oaks (Verner and Boss 1980).

Cover
Cover is provided by the oak woodlands and riparian areas in which the plain titmouse lives. Roost sites are provided by natural cavities, old woodpecker holes, or by dense foliage which simulates a cavity (Dixon 1949).

Interspersion
Plain titmice maintain year-round territories. Three territories observed by Hertz et. al. (1976) averaged 2.0 acres (0.8 ha) in California oak woodland. Dixon (1949) found 12 territories ranged located primarily in live oak woodland. These territories ranged in size from 3.3-12.5 acres (1.3-5.1 ha) with an average size of 6.3 acres (2.6 ha). According to Dixon (1956) 2.5 acres (1.0 ha) would probably be close to an absolute minimum size for a territory.

Water Requirements
In a study by Williams and Koenig (1980), the plain titmouse was classified as an occasional drinker.

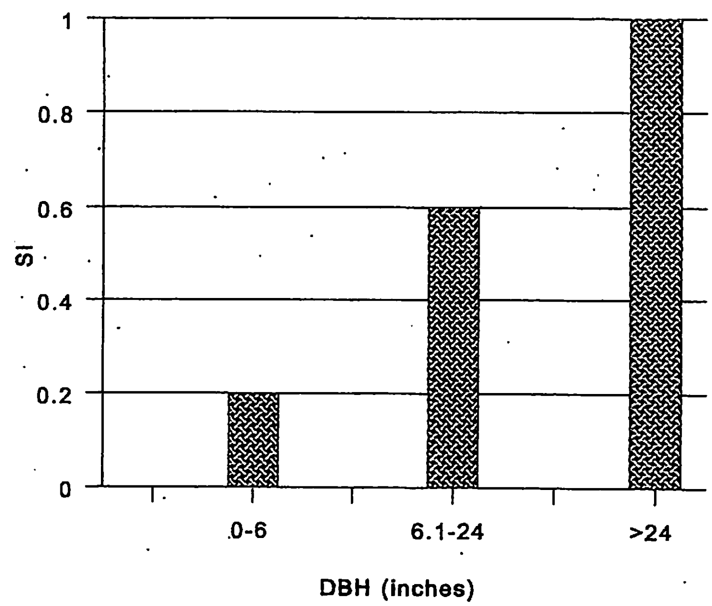
Model Applicability
This model was developed for use in evaluating habitat suitability of oak savannah, oak woodland, and riparian woodland in Merced, Fresno, Stanislaus, and San Benito Counties in California from 500 - 2,500 ft in elevation. The basic assumptions for using the model are that meeting the reproductive needs of the plain titmouse will take care of its cover and food needs throughout the year. This assumption seems warranted. Verner (1979) believes that proper management for oaks for breeding birds should also provide the habitat needs for species that use oaks at other times of the year. In addition, it is assumed that water is not a limiting factor. It is assumed that the model is valid for use in riparian areas as well as the oak woodlands despite the fact that the model was initially developed for oak woodlands.

Model Description

Little quantitative data were found on the habitat needs of the plain titmouse. The most useful information was the information on habitat factors related to breeding for the species presented by Ohmann and Mayer (1986). Using data from the California Wildlife Habitat Relationships data base and the Forest Inventory and Analysis Research Unit inventory, Ohmann and Mayer developed a habitat suitability index model for the plain titmouse from which Variable 1 was derived.

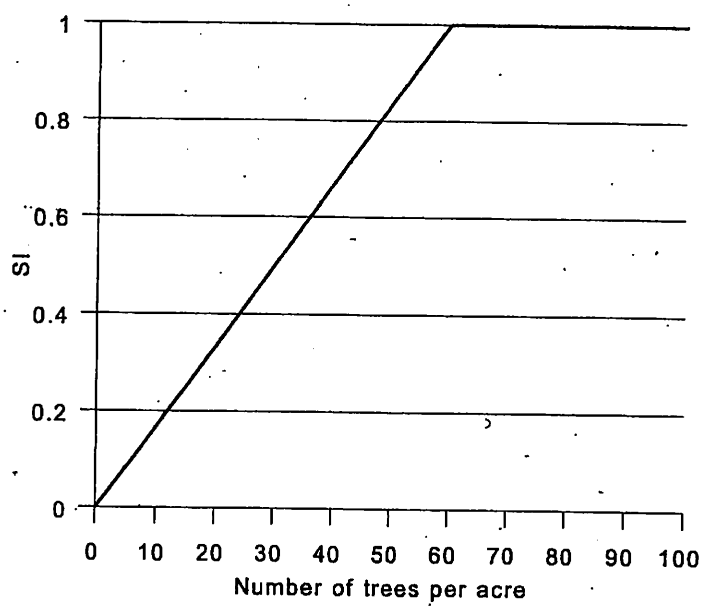
Variable 1. Tree diameter. (A tree is defined as a woody plant species 16 feet high or greater)

Ohmann and Mayer found tree size and percent canopy closure to be the major variables determining suitability of a habitat for the plain titmouse. Our model will assume that the diameter of a tree and the size of the canopy are correlated to the extent that they can be considered a single variable to be represented in this model by diameter at breast height (DBH). Presumably this variable best represents older trees with more cavities for nesting and greater bark surface which supports a greater prey base.



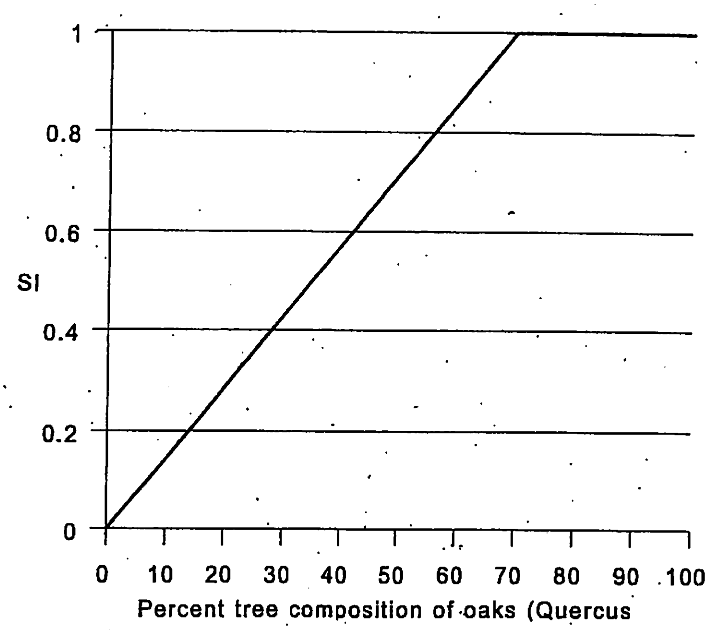
Variable 2. Trees per acre.

Plain titmouse abundance was found to increase as the number of trees increased (Wilson, pers. comm.). This may be particularly important in areas of low to moderate canopy cover. Studies at the Hopland, California field station found titmouse abundances to peak in areas with 60 trees/acre.



Both Variables 1 and 2 relate directly to the extent of a stand's canopy closure such that the importance placed on canopy closure by Ohmann and Mayer is incorporated into this model through the use of Variables 1 and 2.

Variable 3. Percent composition of tree species that are oaks (*Quercus*).
Verner and Boss (1980) stated that the plain titmouse prefers stands dominated by blue, live and valley oaks. We have been unable to find and studies documenting the presence of the plain titmouse in an area without a major proportion of oaks. For the sake of this model then, we will consider the presence of oaks to be a life requisite such that the optimum titmouse habitat is one dominated by oaks.



HSI Determination

In each sample area, tree diameter is measured along with the number of trees per acre and the percentage of those trees that are oaks. The Habitat Suitability Index for the sample site is then determined using the following formula:

$$HSI = \frac{V1 + V2 + V3}{3}$$

Suggestions for Applying the Model

1. The tree diameter classes for calculating Variable 1 (DBH) were not specified by Ohmann and Mayer. Therefore, all trees within the sample plot should be included in the DBH determination.

2. If no trees, 4-inch DBH or greater, are found in the sample plot, the HSI for the sample plot is 0.0. A 4-inch DBH tree is probably about the smallest tree that could have a cavity of sufficient size for the titmouse.

3. Ideally, all tree species in the study area should be fully leafed out when applying the model. Therefore, the best time for sampling is spring and summer.

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HABITAT SUITABILITY INDEX MODEL

BOBCAT (*Felis rufus*)

Pacific Gas and Electric Company

1986

Geographic Area: This HSI Model was developed for use on the west slope of the Sierra Nevada in Fresno County, California.

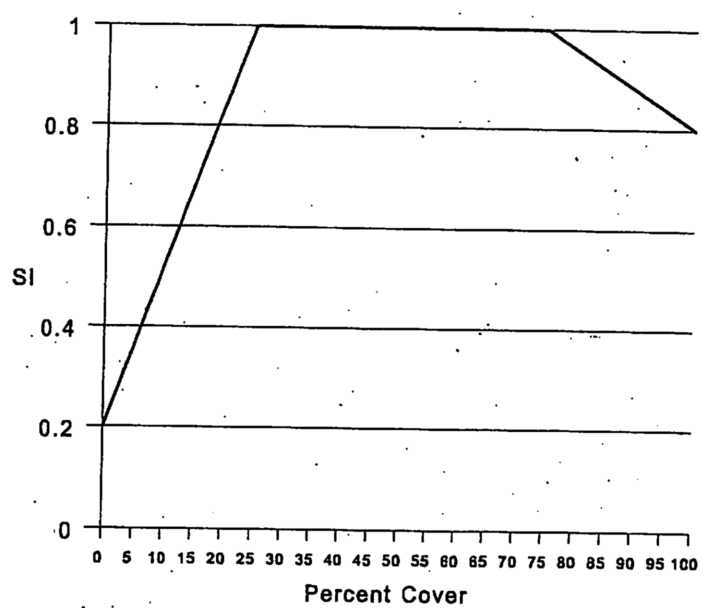
Season: This model was developed to evaluate year-round habitat suitability for the bobcat *(Felis rufus)*.

Cover Types: This model was designed to evaluate habitat suitability for the bobcat in the Chaparral cover type (terminology follows that of Verner and Boss 1980).

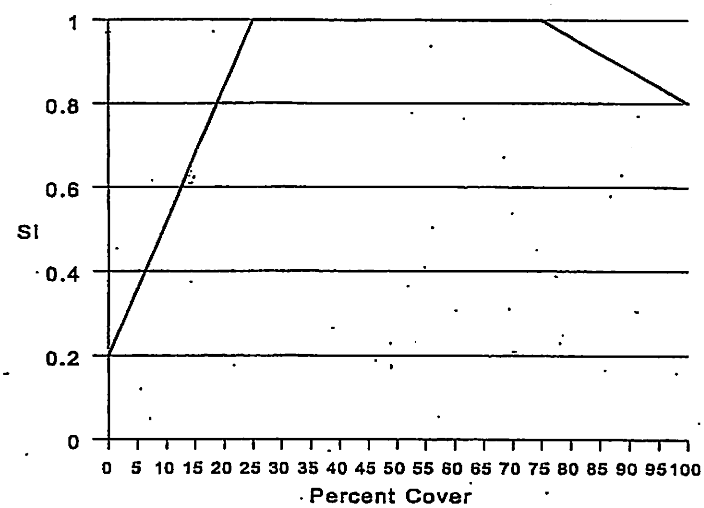
Guild:	Feeding	Breeding
	Surface	Subsurface

Equation: $$HSI = \frac{(V_1 + V_2 + V_3 + V_4)}{5}$$

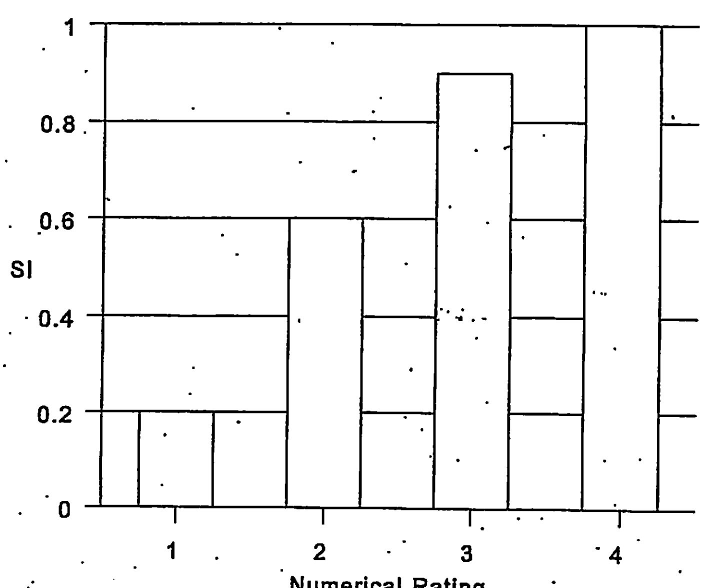
V1 - Percent Shrub Cover



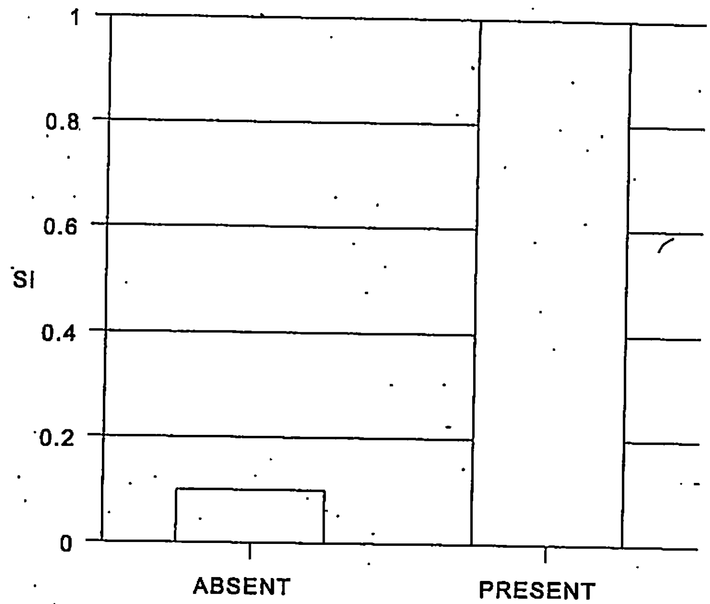
V2 - Herbaceous Cover



V3 - Degree of Patchiness



V4 - Rock Outcroppings



FISH AND WILDLIFE HABITAT CAPABILITY MODELS

AND

SPECIAL HABITAT CRITERIA

FOR THE NORTHEAST ZONE NATIONAL FORESTS

LASSEN NATIONAL FOREST
MENDOCINO NATIONAL FOREST
MODOC NATIONAL FOREST
PLUMAS NATIONAL FOREST

Karen Shimamoto and Daniel Airola (editors)

JANUARY 15, 1981

INTRODUCTION

by Hal Salwasser and Karen Shimamoto

Under National Forest Management Act (NFMA) planning regulations (36 CFR 219), fish and wildlife management indicator species are selected by each Forest for planning and management attention. These species will help guide land allocations and shape multiple-resource prescriptions in meeting legal requirements and local resource demand. To support this role each species must have a documented description of the habitat conditions needed to sustain it at different population levels. The minimum habitat conditions necessary for sustaining population viability are also required. The development of prescriptions to favor certain management indicator species also requires a description of habitat conditions associated with high population levels of each species. The descriptions of habitat conditions associated with different population levels are called Habitat Capability Models (HCM).

NFMA regulations mandate that each Forest maintain habitat conditions to support wildlife and fish populations at or above the abundance and distribution needed for long-term population viability. However, neither managers nor scientists fully know what kinds, amounts, and distribution of habitats are necessary to maintain population viability. Therefore, existing knowledge of species ecology and habitat needs must serve to describe the habitat conditions needed. Models (standards and criteria) must be formulated to describe in quantitative and qualitative terms the habitat conditions by which to judge existing and projected habitat resources.

Most of the HCMs address the habitat conditions required by individual reproductive units within wildlife and fish populations. This is because land management projects usually affect small part of populations such as a breeding pair, a family unit, a small group of breeding pairs, or a small group of family units before whole population changes are noticed. Total population abundance and distribution on the Forest can be projected by aggregating and mapping those land areas that provide capable, available, and suitable habitat for reproductive units of populations.

The HCMs do not address some aspects of population viability. Minimum to optimum distances between reproductive units and population size are two important attributes of viability that must be addressed for relevant species outside the HCMs.

Special Habitat Criteria were first developed by biologists on the Stanislaus National Forest as an extension of the HCM concept (Hurley et al 1981). While HCMs describe habitat conditions for individual management indicator species, the information in the Special Habitat Criteria models describes conditions necessary to maintain or optimize populations of fish and wildlife species closely associated with special habitats (riparian, aspen, snags, etc.).

HABITAT CAPABILITY MODELS

The following format was used in the construction of each habitat capability model.

Model Applicability

Life Stage(s) - Identify the appropriate life stages covered by the model e.g. egg, larval, fry, juvenile, adult, all

Season(s) - Identify the appropriate season(s) e.g. fall, winter, spring, summer

Geographic Area - The model may apply to the species' entire range. However, if regional differences in habitat use and preference occur, separate models may be appropriate.

Intended Application - Most models will be formulated with Forest planning in mind. Some models, however, may be detailed enough to apply to project work. Provide a clear statement of the intended use.

Expected Reliability - The following hierarchy was used:

Level 1 - Model predicts existing carrying capacity density with acceptable variance, i.e. 10-20%

Level 2 - Model habitat capability ratings directly correlate with density estimates

Level 3 - Model habitat capability ratings directly correlate with ratings of the same sites by species authorities

Level 4 – Model structure and outputs appear reasonable to species authorities

Level 5 – Model structure and outputs meet technical standards and appear reasonable to author(s), editor(s), and users.

Verification Status – The purpose of verification is to ensure that the model meets the expected reliability criteria and that it faithfully provides the intended outputs. Each step in verification depends on the expected reliability of the model. The following hierarchy was used:

1) Model is in draft.

2) Model reviewed by editor (the editor should check for conformance with model quality standards, sufficiency of documentation, and understandability).

3) Model reviewed by editor and users.

4) Model reviewed by species authority.

5) Model evaluated with sample data – apply the model with sample data sets which mimic various habitat conditions, e.g. high, medium, and low habitat capability. Evaluate model outputs as to how well they give a reasonable prediction of habitat conditions.

6) Model tested with field data - field data must be available to provide measurements of both habitat variables and indicators of habitat capability. The latter can range from ratings of habitat capability by species authorities to density estimates to actual densities. Statistical and sampling expertise is required to design and perform these tests.

Model variables were restricted to physical, chemical, or biological characteristics of habitats. Species population variables, such as birth rates and sex ratios, are not suitable due to high cost of measurement, difficulty of prediction, and dependency on other factors beyond habitat. The critical question answered was, "what environmental variable, when changed, will affect the capability of an area to support a management indicator species?"

Each of the identified habitat variables were combined with the others to produce a habitat capability model. Each variable has values with different implications for habitat capability. For example, the variable average tree canopy cover has a high habitat value for goshawks when it is between 40-60%. Each of the variables and its respective values were ranked according to habitat capability:

High: the values are related to the highest densities of the species; the values are preferred over other values;

Medium: the values are related to moderate densities of the species; the values are required for the long-term viability of the population or reproductive unit of the population:

Low: the values are related to the lowest densities of the species; the values are denote marginal habitat capability for the species and would not be capable of supporting a viable population.

The variables were organized according to their importance in determining habitat capability and arrayed in rows under the headings high, medium, and low. An attempt was made to reduce redundant variables, retaining only those variables that are most practical to measure.

Documentation

As in model reliability and verification status, documentation for each model is in varying stages of completion. The levels of documentation are:

Level 1 – Literature references, written or personal communication, and the author's judgement are cited.

Level 2 – A narrative accompanies the model, summarizing why each variable was selected, how each variable is related to the species' habitat needs, and how habitat capability values were determined. This level also includes Level 1.

Level 3 – A narrative accompanies the model with documentation on the species ecology and habitat use. This information is related to the habitat variables in the model. It involves preparing a species note with the following information:

I. Distribution, Abundance, and Seasonality

II. Specific Habitat Requirements

A. Feeding
B. Cover
C. Water
D. Reproduction
E. Pattern

III. Species Life History

A. Activity Patterns
B. Seasonal Movements/Migration
C. Home Range/Territory
D. Reproduction
E. Niche

This level also includes Levels 1 and 2.

Level 4 - The habitat variables are aggregated to develop a mathematical formulation of the model (U.S. Fish and Wildlife Service 1980). Assumptions and limitations to be used when applying the model are provided and the necessary steps to correctly use the mathematical model is documented. The latter includes how to collect data on model variables, how to treat that data as model inputs, and how to interpret habitat capability based on the data. This level includes levels 1, 2, and 3.

Because many initial species models will be developed from scant data, modelers will rely on experiential evidence and intuition to establish the model variables and relationships. Such models will have level 1 or 2 documentation. As model application and verification improve, habitat relationships can be more accurately represented and the models made more quantitative. Models with level 3 or 4 documentation are examples of species where more information is known and the models have been "calibrated" with real data.

Vegetation Types and Successional Stages

The vegetation types and successional stages used in the habitat capability models are consistent with the California Wildlife Habitat Relationships Program for the Northeast Interior Zone (Laudenslayer in prep), the Western Sierra Zone (Verner and Boss 1980) and the North Coast-Cascades Zone (Marcot 1979). For convenience, the codes used for successional stages are defined in Table 1.

Rating Overall Habitat Capability

For any given area of land, habitat capability ratings (high, medium, low) will be different for each habitat variable. This makes rating the overall habitat capability difficult. Models for spotted owl and mule deer, have been developed to include a mathematical calculation of habitat capability where different ratings are quantitatively assessed and an overall capability index is mathematically calculated. The method for rating overall habitat capability for the other models, however, must be done using subjective biological judgement.

For such cases, the simplest approach is to assess the overall habitat capability rating in terms of a simple majority of variable ratings. For example, if three variables were rated as medium and one variable as high for bald eagle habitat, the overall rating could be considered medium.

In other situations, experience may justify identifying one or more variables as more important or possibly overriding other variables. Biologists should then weight these variables accordingly when determining overall habitat capability.

Table 1. Successional stage codes

Code	Definition
1	Barren/grass/forbs
2	Shrub/seedling/sapling; tree saplings <11" DBH
2a	<40% tree canopy closure
2b	40-70% tree canopy closure
2c	>70% tree canopy closure
3	Small sawtimber; 11-24" DBH
3a	<40% overstory canopy closure
3b	40-70% overstory canopy closure
3c	>70% overstory canopy closure
4	Medium to large sawtimber; >24" DBH
4a	<40% overstory canopy closure
4b	40-70% overstory canopy closure
4c	>70% overstory canopy closure
5	Two-storied stand; scattered overstory over a well-stocked understory (4a over 2c or 3c)

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DRAFT

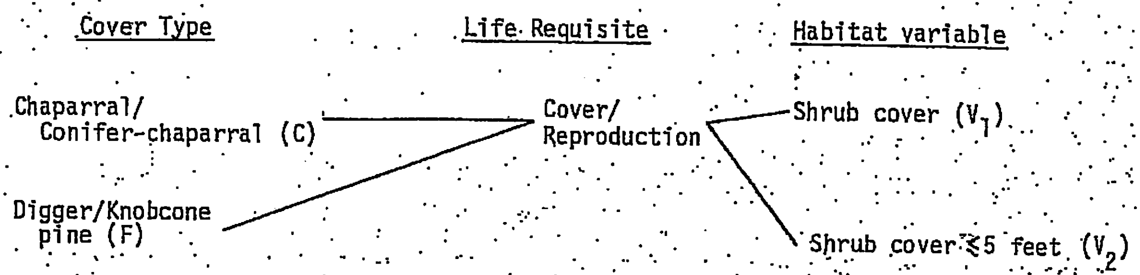
HABITAT SUITABILITY INDEX MODEL
WRENTIT (*Chamaea fasciata*)

U.S. Fish and Wildlife Service
Division of Ecological Services
Sacramento, California

September 1984

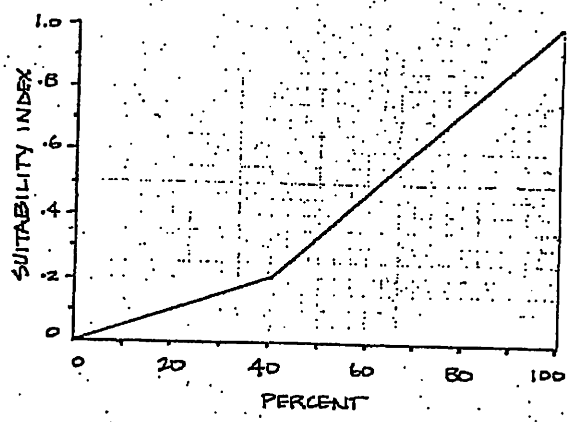
VARIABLE		COVER TYPES	SUGGESTED TECHNIQUE
(V_1)	Shrub cover - % of ground shaded by a vertical projection of the shrub canopy	C,F	Line intercept
(V_2)	Shrub cover $\leqslant$5 feet	C,F	Belt transect, graduated rod

2


Cover Type
Life Requisite
Habitat variable
Chaparral/ Conifer-chaparral (C)
Digger/Knobcone pine (F)
Cover/ Reproduction
Shrub cover (V_1)
Shrub cover ≤5 feet (V_2)

3

Variable 1. Shrub cover - % of ground shaded by a vertical projection of the shrub canopy

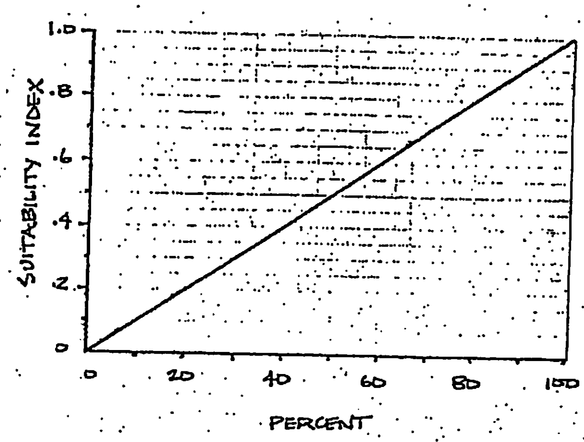


Assumes: 1) Dense stands of chaparral needed for optimum conditions.

2) Sample size should include an area of at least 2.0 acres

3) 40 percent canopy provides marginal quality and that 100 percent is optimum

Variable 2. Shrub cover ≤5 feet



Assumes: 1) Most nests are located within 1-4 feet from the ground.

2) Some additional height is needed for overhead protection.

Equation Used to Calculate Suitability Indices

Cover/Reproduction: $V_1 \times V_2$

HSI determination

Cover/reproduction was the only life requisite considered in this model, and the HSI for the wrentit is equal to the life requisite value for cover/reproduction.

General Assumptions

Overview

This model uses the reproductive habitat needs of the wrentit to determine overall habitat quality. It is assumed that cover needs are met by reproductive habitat needs and that neither food nor water will be more limiting than the wrentit's cover/reproductive needs. All of the life requirements of the wrentit can be provided in chaparral and other dense brush.

Cover/ reproduction component

Optimal nesting habitat for the wrentit is provided in moderately tall, dense stand of chaparral (Bent 1968, Small 1974). Dense stands of chaparral provides maximum protection for feeding and nesting. As such, it is assumed that optimal habitat contains 100 percent or greater of shrub crown canopy. Studies indicate that most of the nesting occurs between 1 and 4 feet off the ground and only occasionally have nests been found up to 7 feet from the ground (Bent 1968). Most of the wrentit's existence is spent beneath the crown foliage of brush not more than 5 feet from the ground (Bent 1968). Studies indicate that most of the life requisites of the wrentit are provided within an area ranging in size from 0.2 to 1.2 ha (0.5 to 3.0 acres) (Cogswell 1962, Bent 1968, Erickson 1938).

Literature Cited

Bent, A.C. 1948. Life histories of North American nuthatches, wrens, thrashers, and their allies. U.S. Natl. Mus. Bull. 196. 475 pp.

Cogswell, H.L. 1962. Territory size in three species of chaparral birds in relation to vegetation density and structure. PhD. Thesis, Univ. California, Berkeley. 567 pp.

Erickson, M.M. 1938. Territory, annual cycle, and numbers in a population of wrentits (Chamaea fasciata). Univ. California Publ. Zool. 42: 247-334

Harrison, H.H. 1979. A field guide to western birds nests, Houghton-Mifflin Co. Boston.

Small, A. 1974. The Birds of California. Collier Macmillan Pub. Co., New York

Williams, P.L., and W.D. Koenig. 1980. Water dependence of birds in a temperate oak woodland. Auk 97: 339-350.

Shasta C

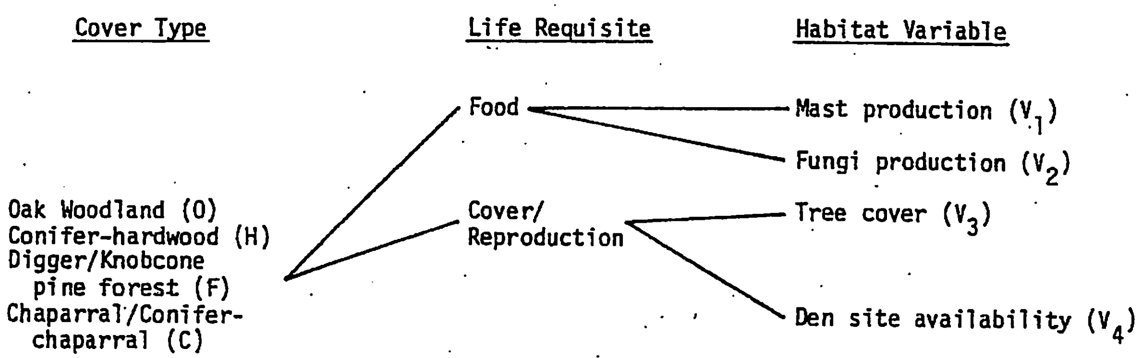
DRAFT HABITAT SUITABILITY INDEX MODEL
WESTERN GRAY SQUIRREL (*Sciurus griseus*)

U.S. Fish and Wildlife Service
Division of Ecological Services
Sacramento, CA

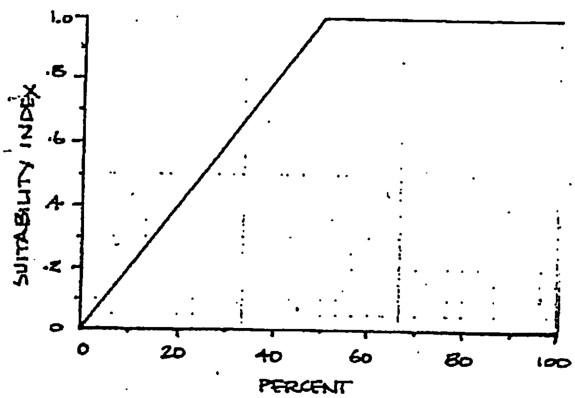
September 1984

squirrel

VARIABLE	COVER TYPES	SUGGESTED TECHNIQUE
(V_1) Mast production - % canopy closure of trees > 5 m (16.5 ft) tall and shrubs that produce hard mast	O,H,F,C	Line intercept
(V_2) Fungi production - estimate of density of leaf litter layer	O,H,F,C	Ocular estimate along line intercept
(V_3) Tree cover - % of ground surface shaded canopies of all woody vegetation > 5 m (16.5 ft) in height	O,H,F,C	Line intercept
(V_4) Den site availability - number of trees per acre with dbh ≥38.1 cm (15 in).	O,H,F,C	Belt transect, diameter tape



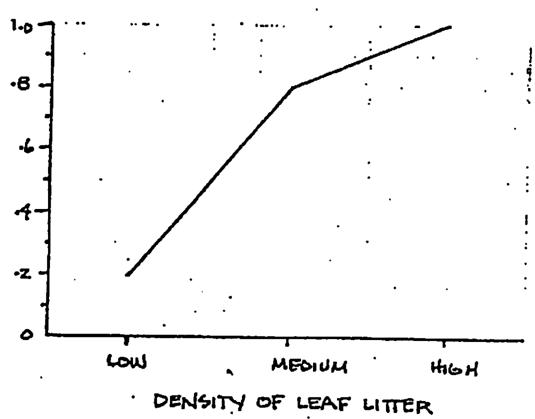
Variable 1. Hard mast production - % canopy closure of trees ⩾ 5 m (16.5 ft) tall and shrubs that produce hard mast (e.g. oaks and conifers).



Assumes: 1) Optimum density of hard mast trees is between 40 - 100% canopy closure (derived from Shimamoto and Airola, 1981).

2) Trees ⩽ 5 m (16.5 ft) tall will not produce significant mast (Allen, 1982).

Variable 2. Fungi production - an estimate of the density of the leaf litter layer.



Assumes: 1) Hypogeous fungi is a major component of the western gray squirrel diet (Stienecker, 1977).

2) Fungi is related to the amount of organic material (represented by leaf litter) in the uppermost soil layers (SCS, 1980).

Density of Leaf Litter (from SCS, 1980):

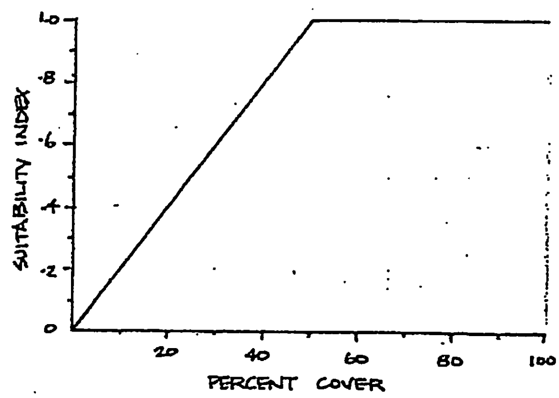
High - leaf litter is abundant with thick identifiable layers of leaves over mulch.

Medium - leaf litter is moderately abundant with low to moderate separation of leaf-mulch layers.

Low - leaf litter scarce with very thin leaf - mulch layer; little or no separation.

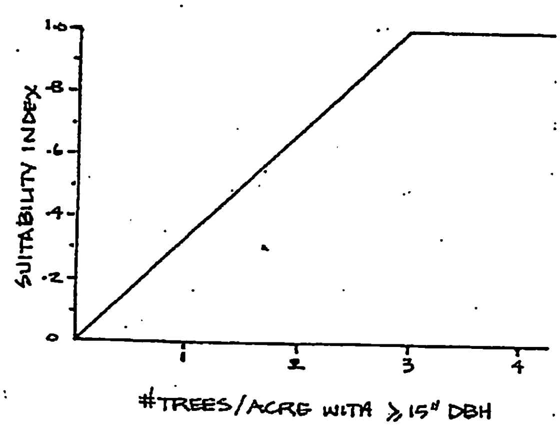
Squirrel

Variable 3. Tree cover - % of ground surface shaded by vertical projection of canopies of all woody vegetation ≥5 m (16 ft.) tall



Assumes: 1) Optimum conditions occur when tree cover ranges from 40 to 100% (derived from Shimamoto and Airola, 1981).

Variable 4. Den site availability - number of trees per acre with dbh ≥ 38.1 cm (15 in)



Assumes: 1) Western gray squirrels most often utilize oak, cottonwoods, maples, conifers, and sycamores for den sites (Ingles, 1947).

2) Optimum den sites are provided by trees having an average dbh of 15 inches (Shimamoto and Airola, 1981).

5

Equations Used to Calculate Suitability Indices

a) Food:

Cover Type	Equation
O,H,F,C	$(V_1 \times V_2)^{\frac{1}{2}}$

b) Cover/Reproduction:

Cover Type	Equation
O,H,F,C	$(V_3 \times V_4)^{\frac{1}{2}}$

HSI Determination:

1) The minimum habitat area equals the mean minimum home range. If habitat area is less than one acre, the HSI value equals zero. (Ingles, 1947).

2) The HSI for the western gray squirrel will equal the lowest of the values for the food and cover/reproduction component.

Literature Cited

Allen, A.W. 1982. Habitat Suitability index models. Gray squirrel. FWS/OBS (WELUT) - 82/10.19. 11 pp.

Ingles, L.G. 1947. Ecology and life history of the California gray squirrel. Calif. Fish and Game 33(3):139-158.

Shimamoto, K. and D. Airola. 1981. Fish and wildlife habitat capability models and special habitat criteria for the northeast zone national forests. U.S. Forest Service publ. 260 pp.

Soil Conservation Service. 1980. Draft habitat suitability index model - western gray squirrel - Ecoregion 2610 - Central Valley. 15 pp.

Steinecker, W.F. 1977. Supplemental data on the food habits of the western gray squirrel. Calif. Fish and Game 56(1):36-48.

ENCLOSURE 3

FEDERAL ENDANGERED AND THREATENED SPECIES LIST

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
FEDERAL BUILDING, 2800 COTTAGE WAY, ROOM W-2605
SACRAMENTO, CA 95825
PHONE: (916)414-6600 FAX: (916)414-6713

Consultation Code: 08ESMF00-2017-SLI-0128
Event Code: 08ESMF00-2017-E-00198
Project Name: Folsom Dam Raise

October 19, 2016

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under the jurisdiction of the U.S. Fish and Wildlife Service (Service) that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Please follow the link below to see if your proposed project has the potential to affect other species or their habitats under the jurisdiction of the National Marine Fisheries Service:

http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm;
http://www.towerkill.com; and
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Folsom Dam Raise

Official Species List

Provided by:

Sacramento Fish and Wildlife Office
FEDERAL BUILDING
2800 COTTAGE WAY, ROOM W-2605
SACRAMENTO, CA 95825
(916) 414-6600

Consultation Code: 08ESMF00-2017-SLI-0128
Event Code: 08ESMF00-2017-E-00198

Project Type: DAM

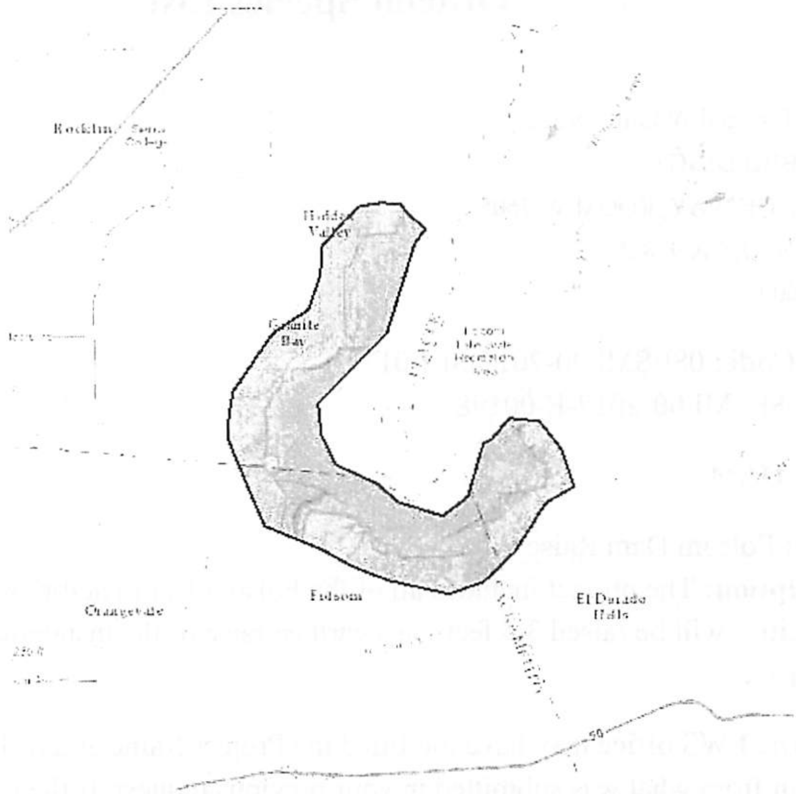
Project Name: Folsom Dam Raise
Project Description: The project includes all of the Folsom Dam Facilities surrounding Folsom Lake. The facilities will be raised 3.5 feet via a earthen raise or the installation of floodwalls. Is a multi-year project.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

United States Department of Interior
Fish and Wildlife Service

Project name: Folsom Dam Raise

Project Location Map:



Project Coordinates: The coordinates are too numerous to display here.

Project Counties: El Dorado, CA | Placer, CA | Sacramento, CA

United States Department of Interior
Fish and Wildlife Service

Project name: Folsom Dam Raise

Endangered Species Act Species List

There are a total of 15 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Amphibians	**Status**	**Has Critical Habitat**	**Condition(s)**
California red-legged frog *(Rana draytonii)* Population: Wherever found	Threatened	Final designated	
California tiger Salamander *(Ambystoma californiense)* Population: U.S.A. (Central CA DPS)	Threatened	Final designated	
Crustaceans			
Conservancy fairy shrimp *(Branchinecta conservatio)* Population: Wherever found	Endangered	Final designated	
Vernal Pool fairy shrimp *(Branchinecta lynchi)* Population: Wherever found	Threatened	Final designated	
Vernal Pool tadpole shrimp *(Lepidurus packardi)* Population: Wherever found	Endangered	Final designated	
Fishes			
Delta smelt *(Hypomesus*	Threatened	Final designated	

transpacificus) Population: Wherever found			
steelhead *(Oncorhynchus (=salmo) mykiss)* Population: Northern California DPS	Threatened		
Flowering Plants			
El Dorado bedstraw *(Galium californicum ssp. sierrae)* Population: Wherever found	Endangered		
Layne's butterweed *(Senecio layneae)* Population: Wherever found	Threatened		
Pine Hill ceanothus *(Ceanothus roderickii)* Population: Wherever found	Endangered		
Pine Hill flannelbush *(Fremontodendron californicum ssp. decumbens)* Population: Wherever found	Endangered		
Sacramento Orcutt grass *(Orcuttia viscida)* Population: Wherever found	Endangered	Final designated	
Stebbins' morning-glory *(Calystegia stebbinsii)* Population: Wherever found	Endangered		
Insects			
Valley Elderberry Longhorn beetle *(Desmocerus californicus dimorphus)* Population: Wherever found	Threatened	Final designated	

Reptiles			
Giant Garter snake *(Thamnophis gigas)* Population: Wherever found	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

ENCLOSURE 4

ENDANGERED SPECIES CONSULTATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-
2017-F-0043

OCT 13 2016

Mark T. Ziminske
Chief, Environmental Resources Branch
Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814-2922

Subject: Reinitiation of Formal Consultation on the Folsom Dam Safety/Flood Damage Reduction Project, Sacramento, El Dorado, and Placer Counties, California

Dear Mr. Ziminske:

This letter is in response to the U.S. Army Corps of Engineers (Corps), September 2, 2016, request for reinitiation of formal consultation with the U.S. Fish and Wildlife Service (Service) on the Folsom Dam Modification Project (project) in Sacramento County, California. Your reinitiation request was received by the Service on September 6, 2016. At issue are effects of the project on the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle). This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

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 Corps, Bureau of Reclamation (Reclamation), the State of California Central Valley Flood Protection Board, and the Sacramento Area Flood Control Agency. The Folsom JFP is designed to improve the dam safety, security, and flood damage reduction features at Folsom Dam and associated facilities (collectively known as the Folsom Facilities), including the construction of a gated auxiliary spillway southeast of the main dam.

The Service appended the Folsom JFP to the *Programmatic Formal Consultation Permitting Projects with Relatively Small Effects on the Valley Elderberry Longhorn Beetle Within the Jurisdiction of the Sacramento Field Office, California* (programmatic consultation) (Service File 1-1-96-F-66) on November 1, 2012, and was subsequently amended in reinitiation on: September 23, 2013; December 24, 2013; March 31, 2014; June 10, 2014; October 9, 2014; April 22, 2015; and July 26, 2016. This consultation is a reinitiation of the overall Folsom JFP; however, this reinitiation will serve as a stand-alone document with a new reference number since it is specific to raising the dam and its facilities, and was not fully described in the original consultation or subsequent reinitiations.

The Federal action we are consulting on is the construction of the Folsom Dam Raise portion of the Folsom JFP, which includes: refinements to the main dam's tainter gates, structural alterations to the main dam, raising the existing earthen embankment dikes and the Mormon Island Auxiliary Dam

(MIAD), and the construction of floodwalls at the left and right wind dams at Folsom Lake. Pursuant to 50 CFR 402.12(j), you submitted a biological assessment for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed project may affect, and is likely to adversely affect the beetle. The proposed project is not within designated or proposed critical habitat for any federally-listed species.

In considering your request, we based our evaluation on the following: (1) your letter reinitiating consultation; (2) the undated *Folsom Dam Raise: Potential Project Impacts to Federally Listed Species* (biological assessment), prepared by the Corps; (3) email and telephone correspondence between the Service and the Corps; and (4) other information available to the Service.

Consultation History

April 9, 2014:	The Service, Corps, Reclamation, and the Department of Water Resources conducted an elderberry shrub survey of the proposed project footprint.
September 6, 2016:	The Service received the September 6, 2016, letter from the Corps requesting reinitiation of formal consultation with the undated biological assessment enclosed.

BIOLOGICAL OPINION

Description of the Action

The proposed project was designed to remediate all of the dam safety deficiencies that are significant risk factors at the Folsom Facilities. Important refinements and the remediation measures are planned for all of the Folsom Facilities. These refinements and measures can be grouped into three main categories: refinements to the main dam's tainter gates and related structural alterations at the main dam; raising the crest elevation of Dikes 1 through 8 and MIAD (the "earthen raise" elements of the project); and raising the effective crest elevation of the left and right wind dams through the addition of floodwalls (the "concrete floodwall" elements of the project).

Tainter Gate Refinements

The existing main dam has a total of eight tainter gates, with five of the gates designated as "service gates" and the remaining three gates designated as "emergency gates" (see Enclosure, Figure 1). Tainter gates are simply a type of flood gate and in the case of the main dam, the tainter gates are located near the crest (top) of the dam. These tainter gates are opened to release water stored in Folsom Lake in order to create adequate flood storage upstream of the main dam. The main dam also releases water via outlet tubes near the bottom of the main dam, but these tubes do not provide sufficient discharge capacity to restore flood storage. The five service gates are typically opened to drain water from Folsom Lake, while the three emergency gates are generally left closed as long as possible to help minimize the velocity of discharges and the possible destruction of some of the dam's downstream features.

The proposed project will include replacing most of the components of the three emergency tainter gates and reinforcing the five service tainter gates. The "tainter gate refinements" element of the proposed project will also include a variety of other structural changes/refinements to the main dam. These will include, but not be limited to:

- Constructing new "top seal" bulkheads to prevent overtopping of the tainter gates during a major flood event. These hydraulic steel structures will be positioned immediately above the tainter gates at their closed position, and will run horizontally, connecting to the dam's concrete piers. The top of the bulkheads will be at elevation 486.34 feet NAVD88, which is the elevation of the Probable Maximum Flood (PMF) (483.34 feet NAVD88) with an additional 3 feet of freeboard. The top seal bulkheads will also increase the height of the flood pool upstream of the dam that can be retained before the emergency tainter gates must be opened.

- Constructing vertical concrete extensions to the nine existing concrete piers (see Enclosure Figure 1) in order to provide the necessary elevated platform for a new hoist system for the tainter gates. The new top seal bulkheads will mount to and seal against the pier extensions.

- Installing a new hoist system to raise and lower the modified tainter gates. The new system will be installed to handle increased hydrostatic PMF loads, as well as the slightly heavier gates.

As shown in Figure 2 in the Enclosure, general construction access to the tainter gates will follow a path beginning at the existing Gate 1 construction entry to the ongoing Folsom JFP off of Folsom Lake Crossing and will terminate at the intersection of the southern portion of Folsom Dam Road and Folsom-Auburn Road. An alternate egress route for construction traffic may include the northern portion of Folsom Dam Road, which also eventually terminates at Folsom-Auburn Road. The construction access route will follow existing roadways and will not require construction of new roads.

The main construction staging area will be located near the east end of the left wing dam (LWD) in an area referred to as the Overlook Area (see Enclosure, Figure 2). The main staging area will occupy approximately 6.6 acres within this area, which is heavily disturbed and has been used as a construction staging site for the Folsom JFP for many years. An optional staging area, located within Reclamation's work yard just north of Reclamation's Central California Area Office (CCAO) facilities, may also be used if necessary. As depicted in Figure 2 in the Enclosure, this optional staging area could encompass as much as 13 acres; however if this optional staging site is used at all, it is unlikely the entire 13 acres will be utilized. Land within the boundaries of the optional staging area has been previously cleared and is heavily disturbed by past and ongoing usage by Reclamation. Should the optional staging area be used for the tainter gate refinement project, the few existing native trees and shrubs that remain will be preserved to the degree practicable.

Earthen Raise Elements

The current crest elevations of Dikes 1 through 8, the right wing dam (RWD), LWD, and MIAD do not provide sufficient freeboard to meet Corps design criteria for resisting wave height and run-up. Therefore, increasing the height of all the reservoir dikes and embankment dams will be required.

The current crest elevations of Dikes 1 through 8 and MIAD will be raised by approximately 3.5 feet using engineered fill material similar to the existing composition of these features, thereby allowing seepage and pore pressure to be maintained through the interface between the existing embankment material and the new material. The side slopes and crest widths will conform to Corps standards while maintaining Reclamation's requirements for security and maintenance. Preliminary typical cross-sections for the proposed modifications to Dikes 1 through 8 and MIAD are provided in the following figures in the Enclosure: Figure 3 (Dike 1), Figure 4 (Dikes 2 and 3), Figure 5 (Dikes 4, 5, and 6), Figure 6 (Dikes 7 and 8), and Figure 7 (MIAD).

Modifications to Dike 1 will primarily affect the dike's existing crest and landward side slope of the dike through the removal of existing materials (ex. riprap, earthen materials, roadway pavement) and the addition of new materials (ex. engineered fill, riprap, roadway). Modifications to certain segments of Dike 1 not previously modified by Reclamation will affect the dike's crest and both the landward side slope and lake-side side slope in a similar manor. Park Road intersects Dike 1 near its southern end before it runs along the dike's crest. A portion of the western leg of this road will need to be raised to meet the new dike crest elevation. A park horse trail also extends eastward from the dike near the Park Road intersection and a small segment of this trail will need to be raised to merge with the new dike crest.

Modifications to Dikes 2 and 3 will primarily affect each dike's existing crest and landward side slope in manner similar to the modifications to Dike 1. Limited extensions will be required to both Dikes 2 and 3 in order for the new crest elevation to merge with adjacent existing topography that is higher than the new crest elevation.

As with Dikes 1, 2, and 3, the proposed modifications to Dikes 4, 5, and 6 will also primarily affect the existing crest and landward side slopes of these dikes through the removal of existing materials (ex. riprap, earthen materials, roadway pavement, roadway gravel) and the addition of new materials (ex. engineered fill, riprap, pavement). An existing gravel road/trail currently extends from the south end of Dike 4 to the north end of Dike 5. A significant portion of this road will be raised to the same elevation as the proposed raised crest elevation of the adjacent dikes because the affected road segments are presently lower than the necessary dike elevation. Gravel maintenance roads currently run along the landward side toe of the slope at Dikes 4, 5, and 6. Portions of these maintenance roadways will be relocated in a manner that mimics their current alignments to accommodate changes in the side slopes of the dikes.

The proposed modifications to Dikes 7 and 8 will be very similar to one another, as shown in Figure 6 in the Enclosure. The existing dike crests and landward side slopes will be degraded slightly. New engineered embankment fill will then be added to the top of the dikes and to the landward side slopes of the dikes. Aggregate base maintenance roads will be established on the crest of each dike to replace the existing gravel roads on these dikes.

Work necessary to raise the elevation of MIAD will involve limited removal of existing materials (embankment fill, aggregate roadway) along the existing crest of this dam. Additional engineered fill will then be added to the crest of the dam along with aggregate base to replace the existing maintenance road/shared use trail that runs the length of the dam and riprap will be added along the water-side of the dam adjacent to the raised area.

Construction access to Dikes 1 and 2 will be from the north at the east end of Twin Rocks Road (see Enclosure, Figure 8). From this point, the construction access/haul road will continue south along an existing maintenance road to the north end of Park Road. The western leg of Park Road will be used to access the top of Dike 1. A new haul road will continue south from Park Road, roughly parallel to the east side of Dike 1, and will connect to the north end of Dike 2. The haul road will then continue along the crest of Dike 2. Construction access to Dike 3 will be from Douglas Boulevard south of the southern end of Dike 3 and also via the haul road/access routes discussed for Dikes 1 and 2. The construction access/haul road on the southern end of Dike 3 will likely follow Park Road northward, then jog slightly east near the south end of Dike 3 before turning northward to run along the dike itself.

Various construction staging areas will be used while raising the elevation of Dikes 1, 2, and 3. These will largely be situated in disturbed uplands near the water-side of the dikes, although some staging areas will be at or near the ends of the dikes as shown in Figure 8 in the Enclosure.

The main construction access to Dikes 4, 5, and 6 will be from Auburn-Folsom Road near the north end of Dike 5 (see Enclosure, Figure 9). A secondary construction access from Auburn-Folsom Road along the existing Beals Point roadway near the south end of Dike 6 may also be utilized to access these three dikes. Construction haul roads for the three dikes will mainly follow existing maintenance roads that run along the landward side of the dikes and connect the dikes (see Enclosure, Figure 9).

Construction staging areas will be established adjacent to the landward sides of the dikes. Approximate limits of these staging areas are depicted in Figure 9 in the Enclosure. Some construction staging areas were previously established and used by Reclamation on the water-side of Dikes 4, 5, and 6, as illustrated in Figure 9 in the Enclosure. Portions of these areas may also be used as staging areas when building the proposed project. Large areas of the two water-side staging areas are below the ordinary high water (OHW) elevation of Folsom Lake, which is elevation 466 feet NAVD88. Construction staging for the proposed project will only happen in areas below the lake's OHW when such areas are not inundated or saturated by lake surface water. In no case will fuels or other hazardous materials be stored in the water-side staging areas.

The main construction access to Dike 7 will be at Folsom Lake Crossing, using the north access point shown in Figure 10 in the Enclosure. From this point, the construction access/haul road will follow an existing road and haul road that have been used during the construction of the Folsom JFP. The construction access to Dike 8 may include the same construction access used for Dike 7; however, it may also include Folsom Point Road where it intersects with East Natoma Street (see Enclosure, Figure 10). The construction haul road at this location will follow a segment of Folsom Point Road before turning northwest to follow an existing maintenance road that runs to the southeast corner of Dike 8. If the access route to Dike 7 is also used for construction access to Dike 8, the construction haul road will generally follow the Operations & Maintenance (O&M) Bench road that will have been established as part of the final phase (Phase V, restoration phase) of the Folsom JFP. This future maintenance road runs through areas that were previously disturbed by the Folsom JFP.

There will be two different ways for construction vehicles and equipment to access MIAD and its associated construction staging areas. One route will use the Folsom Point Road access to Dike 8, then it will follow the O&M Bench road extending from Dike 8 to near the western boundary of the primary MIAD area (aka MIAD East), then will continue east to the west end of MIAD to its southern construction staging area (see Enclosure, Figure 11). The other construction access route will begin at the intersection of Access Road and Sophia Parkway with Green Valley Road (see Enclosure, Figure 11). From this point, construction traffic will follow Access Road northward to the east end of MIAD and its southern construction staging area. The existing maintenance road/shared use trail along the crest of MIAD will also be used as a construction access/haul road.

Construction staging areas for the proposed work on Dike 7 will include the existing "Dike 7 Office Complex" area immediately south of the dike, plus previously disturbed land along the north side of the dike (see Enclosure, Figure 10). Both of these areas have been previously used as staging areas during various Folsom JFP construction phases. The main construction staging area for Dike 8 will likely be a previously disturbed area immediately adjacent to the north side of this dike (see Enclosure, Figure 10), but the Dike 7 Office Complex area may also be used.

The main construction staging areas for the proposed work on MIAD will be an extensive area of previously disturbed land on the landward side of MIAD (see Enclosure, Figure 11). Immediately west of MIAD, referred to as the "MIAD West" area, is an area previously used for construction staging and disposal purposes during phases of the Folsom JFP. This area (see Enclosure, Figure 11) may also be used as an ancillary construction staging area for the proposed work on MIAD.

Concrete Floodwall Elements

In combination with the earthen dam raises on the dikes and MIAD, the proposed project will also include construction of a new reinforced concrete floodwall on the top of the LWD and RWD. The floodwall for the RWD will run the length of the dam, tying into the existing grade at the RWD's northern end and terminating at the west end of the main concrete dam and the RWD's eastern end. The floodwall for the LWD will also run the length of the dam, beginning at the east end of the main concrete dam and continuing to the east end of the LWD. Just beyond the east end of the LWD, the new floodwall will turn southward and connect to the top of the existing auxiliary spillway control structure at its northern end. A separate segment of new floodwall will begin at the southern end of the auxiliary spillway control structure, then run in a southeastern direction for roughly 580 feet (parallel to Folsom Lake Crossing), before terminating at the existing roadway that leads to the main dam.

Both the LWD and RWD floodwalls will be installed adjacent to the existing access/maintenance road that runs along the crest of the two dams, on the water-side. Floodwall construction will include degrading a portion of the existing crest of the two dams, as well as a portion of the water-side slopes of both dams. After construction of the floodwalls, the degraded areas adjacent to the floodwalls will be backfilled with compacted fill and, on the water-side slopes of the floodwalls, riprap. Portions of the access/maintenance road affected by construction will be restored (see Enclosure, Figure 12).

There will be two construction access points for work on the RWD (see Enclosure, Figure 9). One will be off Auburn-Folsom Road at the Beals Point roadway (e.g. the same access point used to access the southern end of Dike 6). The other access point will be off Folsom-Auburn Road at Folsom Dam Road. The construction access/haul route from this access point will follow established roads within Reclamation's CCAO facilities. The main construction access point for work on the LWD will be off Folsom Lake Crossing at the existing Gate 1 construction access (see Enclosure, Figure 10). The construction access/haul route from this access point will follow an existing haul road before passing over the control structure of the new auxiliary spillway. During construction work on the LWD and RWD, one lane of the existing road that runs from the LWD to the main dam and then to the RWD (e.g. Folsom Dam Road) will be open to traffic.

Two construction staging areas will be utilized during the construction of the RWD floodwall (see Enclosure, Figure 9). One will be located at the north end of the dam on the water-side within an area that has been previously cleared and disturbed. The other staging area will be located along the southern leg of the RWD on its landward side. This large staging area will occupy various disturbed areas within Reclamation's CCAO facilities.

Three construction staging areas will be used during the construction of the LWD floodwall (see Enclosure, Figure 10). The main staging area will be located in the Overlook Area which is the same disturbed area that will be used for staging associated with the proposed refinements to the tainter gates at the main concrete dam. Another small staging area will be situated adjacent to the Gate 1 access point in an area previously disturbed by Folsom JFP construction activities. The third staging area will be located in a previously disturbed area near the north end of the RWD on its landward side.

Other Project Construction Details

A significant portion of the materials removed from the eight dikes and MIAD during the initial stages of project construction (i.e. excavated fill, rock riprap) will also be utilized in constructing the raised dike areas, the raised MIAD area, and the floodwalls at the LWD and RWD. With one exception, all the other materials required will be obtained from off-site commercial sources. The exception pertains to rock riprap. Riprap placed during prior phases of the Folsom JFP is currently being removed from what is referred to as the Haul Road Restoration Area. This 58 acre area is located east of the LWD and new auxiliary spillway adjacent to Folsom Lake. Most of the riprap removed is being temporarily stockpiled in the MIAD east area as part of Phase V of the Folsom JFP. The stockpiled riprap will be used as needed to provide riprap called for in the proposed construction of the dike and MIAD raises.

All the materials necessary to construct the tainter gate refinements will be obtained from off-site commercial sources. The construction debris generated during the course of the overall proposed project will be removed from the project site and disposed of in licensed disposal facilities located near the project site. Most of the construction staging areas will be restored following completion of the main construction activities. This restoration will typically include restoring the topography to mimic the topography present prior to construction and then planting the disturbed areas with native grass and forb seeds.

Project Schedule

The proposed project will be constructed in phases over time. Table 1 below depicts the currently estimated schedule for the four main phases comprising the overall project.

Table 1. Estimated construction schedule for the Folsom Dam Raise Project

Project Phase	Project Activity	Starting Year	Ending Year	Phase Duration
1	Main Dam Tainter Gates – tainter gate refinements	2017	2021	4 years
2	Dikes 4, 5, & 6 – earthen embankment raise	2017	2019	2 years
3	Dikes 1, 2, & 3 – earthen embankment raise	2018	2020	2 years
4	Dikes 7 & 8 plus MIAD, LWD, & RWD – earthen embankment raise for dikes and MIAD, floodwall additions for LWD and RWD	2019	2021	2 years

Even though Table 1 indicates that Phase 1 and Phase 2 will both begin in 2017, construction of Phase 1 (main dam tainter gate refinements) will likely commence several months prior to construction of Phase 2.

Conservation Measures

A total of 34 elderberry shrubs having at least one stem with a diameter of 1 inch or greater, as measured at ground level, have been documented within or near the proposed project. Table 2 lists each of these shrubs and their approximate locations are shown in Figures 13 and 14 in the Enclosure. It is anticipated that three shrubs will be directly impacted by project construction and while further designs for each of the various project phases are being completed, the Corps will strive to avoid designs that result in direct impacts to additional elderberry shrubs to the degree practicable. To minimize the potential take of the beetle, the following measures will be incorporated into the project:

1. Construction personnel will receive Service-approved worker environmental awareness training to ensure that workers recognize elderberry shrubs and the beetle. The training will include: the protected status of beetle and their host plant, the elderberry shrub; the need to avoid adversely affecting elderberry shrubs; elderberry shrub avoidance areas (protective buffers/exclusion zones); measures to be taken by workers during construction to protect elderberry shrubs; possible penalties that could be imposed for not complying with requirements established for the protection of the beetle and its host plant; and key contacts with the Corps and construction contractor pertaining to environmental issues.

2. Where practicable, a minimum setback (buffer) of 100 feet from the drip-line of all elderberry shrubs containing stems measuring 1.0 inch or greater in diameter at ground level will be established. There may be instances where a 100-foot buffer is not practicable due to various constraints. In such cases, a buffer of at least 20 feet from the dripline of such elderberry shrubs will be established if feasible. The Corps will consult with the Service prior to establishing any elderberry shrub buffer zones (setbacks) that extend less than 100 feet from the drip-line of a particular shrub. Such buffer zones will not be established without first obtaining approval from the Service.

3. Prior to construction activities near elderberry shrubs to be preserved as part of the project, protective barriers will be installed along the limits of elderberry shrub buffer zones (exclusion areas). These barriers will typically be orange-mesh fencing, but could also include other barriers such as wooden fencing, staked ropes with flagging, or K-rails (Jersey barriers). The protective barriers will be maintained throughout the duration of project construction and/or restoration activities. No construction activities or similar disturbances will be allowed within the elderberry shrub buffer zones unless authorized in advance by the Corps and Service.

   Regardless of the preceding, there could be situations where elderberry shrubs to be preserved are located in areas near a proposed project phase where no construction work will occur within 100 feet of the shrubs and existing landscape conditions (ex. steep terrain, intervening roadways, etc.) are such that it will be highly improbable that construction work could inadvertently damage such shrubs. In such cases, protective barriers will not be installed if approved in advance by the Service.

4. Signs will be placed approximately every 50 feet along the edge of the elderberry shrub buffer zones (e.g. along the protective barriers discussed above). The signs will include the following text: "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 will be readable from a distance of 20 feet and will be maintained during project construction. If protective barriers are not required to be installed along limits of elderberry shrub buffer zones, no signs will be provided along these buffer zones.

5. Any damage done within elderberry shrub buffer zones during the course of project construction will be remediated shortly following the discovery of such damage. Remediation work may include installing erosion control measures, seeding disturbed areas with appropriate native plant seeds, etc.

6. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used in elderberry shrub buffer zones, or within 100 feet of any elderberry shrub with one or more stems measuring 1.0 inch or greater in diameter at ground level.

7. If mowing of vegetation is deemed necessary to reduce fire hazard, mowing will be performed within elderberry shrub buffer zones but only during the period from July through April. No mowing will be allowed within 5 feet of elderberry shrub stems, and all mowing will be done in a manner that avoids damaging elderberry plants.

8. During project construction and/or restoration activities that involve earthwork, measures will be employed to suppress generation of dust. Such measures will include frequent watering of project haul roads, earthen stockpile areas, and similar exposed soil surfaces.

9. Designs for the various phases of the Folsom Dam Raise project are in the process of development. While generating these plans, the Corps will attempt to avoid designs that necessitate direct construction impacts to existing elderberry shrubs having one or more stems that have a diameter of one inch or greater as measured at ground level (e.g. avoid the need to remove such elderberry shrubs).

10. There may be cases where it is not practicable to avoid direct construction impacts to elderberry shrubs meeting the stem diameter requirements stated above. In such cases, the Corps will purchase an appropriate number of credits from a Service-approved conservation bank. The determination of the number of conservation credits required will be based on methodologies prescribed in the Service's 1999 conservation guidelines (Guidelines) for the beetle (Service 1999) and in direct coordination with Service staff. The Corps will also transplant the affected elderberry shrub(s) from the project site to the conservation bank. The affected shrubs will be transplanted during the elderberry's dormant season (roughly November through the first 2 weeks in February), if feasible. The conservation bank will be required to follow the transplanting procedure set forth in the Guidelines and Corps staff will monitor the removal of the shrubs from the project site.

    Although most of the phases of the proposed project are still being designed, it is anticipated the proposed project will result in direct impacts to three shrubs in the project footprint. These shrubs are located either between Dikes 5 and 6, or directly adjacent to Dike 6. The anticipated amount of compensation if these three shrubs are directly impacted is shown in

Table 2. As the proposed project's construction plans are refined, potential impacts will be re-assessed.

Table 2. Proposed compensation for the anticipated impacts to the beetle from the Folsom Dam Raise Project

Location	Stem Diameter	Number of Stems Impacted	Exit Holes Present on Shrub (Y/N)	Elderberry Seedling Ratio	Elderberry Seedling Plantings	Associated Native Plant Ratio	Associated Native Plantings
Riparian	≥ 1"& ≤ 3"	3	No	2:1	6	1:1	6
	> 3"- < 5"	2	No	3:1	6	1:1	6
	≥ 5"	0	No	4:1	0	1:1	0
Total		5			12		12
24/10=2.4 basins (credits) * 1800 = .099 acre							

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed project, the action area encompasses Dikes 1 through 8, MIAD, the LWD, the RWD, the main dam, and all areas used for construction access and staging. In addition, the action area includes all areas temporarily impacted by dust and noise during project activities.

Analytical Framework for the Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the beetle's range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the beetle in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the beetle; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the beetle; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the beetle. In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the beetle's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of beetle and the role of the action area in the survival and recovery of the beetle as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

For the most recent comprehensive assessment of the range-wide status of the beetle, please refer to the *Withdrawal of the Proposed Rule to Remove the Valley Elderberry Longhorn Beetle From the Federal List of Endangered and Threatened Wildlife* (Service 2014). Threats discussed in the withdrawal continue to act on the beetle, with loss of habitat being the most significant effect. While there continue to be losses of beetle habitat throughout its range, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the beetle.

Environmental Baseline

The three elderberry shrubs directly impacted within the action area represent a small proportion of shrubs throughout the full range of the beetle. There are two known occurrences of the beetle within the action area and five known occurrences within 5 miles of the action area (CNDDB 2016). Exit holes were not identified on any of the 34 elderberry shrubs within the action area.

Effects of the Action

Construction activities will result in the permanent loss of three elderberry shrubs with five stems 1 inch or greater in diameter at ground level. The shrubs will be removed due to construction activities. Any beetle larvae occupying the shrubs could be killed when the shrubs are transplanted. As noted previously in the Description of the Action, the Corps has proposed a set of conservation measures, including the commitment to provide compensatory habitat as a condition of the action. This compensatory habitat is intended to minimize the effect on the species of the proposed project's anticipated incidental take, resulting from the loss of habitat described above. The compensatory habitat proposed includes purchasing 2.4 beetle conservation credits at a Service-approved conservation bank with a service area that covers the proposed project.

This component of the action will have the effect of protecting and managing lands for the beetle's conservation in perpetuity. The compensatory lands will provide suitable habitat for breeding, feeding, or sheltering commensurate with or better than the habitat lost as a result of the proposed project. Providing this compensatory habitat as part of a relatively large, contiguous block of conserved land may contribute to other recovery efforts for the species.

The proposed project will also include instances where elderberry shrubs will be preserved at their existing locations and a protective buffer will be provided and maintained during project construction. Short-term affects to elderberry shrubs protected in place includes vibration and dust generated by nearby construction equipment, which could disturb the beetle. These effects will be minimized through the implementation of the avoidance and minimization measures discussed in the Description of the action.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. During this consultation, the Service did not identify any future non-federal actions that are reasonably certain to occur in the action area of the proposed project.

Conclusion

After reviewing the current status of the beetle, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the Folsom Dam Raise, as proposed, is not likely to jeopardize the continued existence of the beetle. The Service reached this conclusion because the project-related effects to the species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species. The effects to the beetle are small and discrete, relative to the range of the species, and although the loss of habitat will contribute to the overall reduction of habitat, the conservation measures will contribute to the long-term preservation and management of beetle habitat. The proposed project will contribute to the conservation of the beetle by preserving habitat at a conservation bank that will manage a large contiguous section of habitat for the benefit of the species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

The incidental take of the beetle anticipated for the proposed project will result from the direct effects to the three elderberry shrubs with five stems 1 inch or greater in diameter at ground level that will be transplanted. The life stage affected will be beetle larvae living within the stems of the elderberry shrubs. The life cycle of the beetle takes one or two years to complete, during which it spends most of its life in the larval stage. Due to the fact that it is not possible to know how many beetle larvae are in the stems of any elderberry shrub, the Service cannot quantify the total number of beetle that we anticipate will be taken as a result of the proposed project. In instances in which the total number of individuals anticipated to be taken cannot be determined, the Service may use the amount of habitat impacted as a surrogate. Since the anticipated take of individuals will result from the removal of elderberry shrubs, the quantification of suitable habitat serves as a direct surrogate for the beetles that will be lost. Therefore, the Service anticipates take incidental to the proposed project as the three elderberry shrubs with five stems 1 inch or greater in diameter at ground level that will be transplanted.

Upon implementation of the following reasonable and prudent measures, incidental take of the beetle associated with the proposed project will become exempt from the prohibitions described in section 9 of the Act. No other forms of take are exempted under this opinion.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measure

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the beetle:

1. All conservation measures, as described in the biological assessment and restated here in the Description of the Action section of this biological opinion, will be fully implemented and adhered to. Further, this reasonable and prudent measure shall be supplemented by the terms and conditions below.

Term and Condition

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must ensure compliance with the following term and condition, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. The Corps shall include full implementation and adherence to the conservation measures described in the biological assessment and restated in this biological opinion as a condition of any permit or contract issued for the project.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the Folsom Dam Raise project in Sacramento, El Dorado, and Placer Counties, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (a) If the amount or extent of taking specified in the incidental take statement is exceeded; (b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Amber Aguilera (amber_aguilera@fws.gov), Fish and Wildlife Biologist, at (916) 414-6577, or Doug Weinrich (douglas_weinrich@fws.gov), Assistant Field Supervisor, at (916) 414-6563.

Sincerely,

Doug Weinrich

for Jennifer M. Norris
Field Supervisor

Enclosure:

cc:
Clay Carithers, Army Corps of Engineers, Sacramento, California

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California Natural Diversity Data Base (CNDDB). 2016. California Department of Fish and Wildlife. RAREFIND. Natural Heritage Division, Sacramento, California. Accessed October 6, 2016.

U.S. Fish and Wildlife Service (Service). 2014. Withdrawal of the Proposed Rule to Remove the Valley Elderberry Longhorn Beetle From the Federal List of Endangered and Threatened Wildlife. Federal Register 79:55874-55917. September 17, 2014.

Enclosure

Figures 1-14
(Figures provided by the Corps)

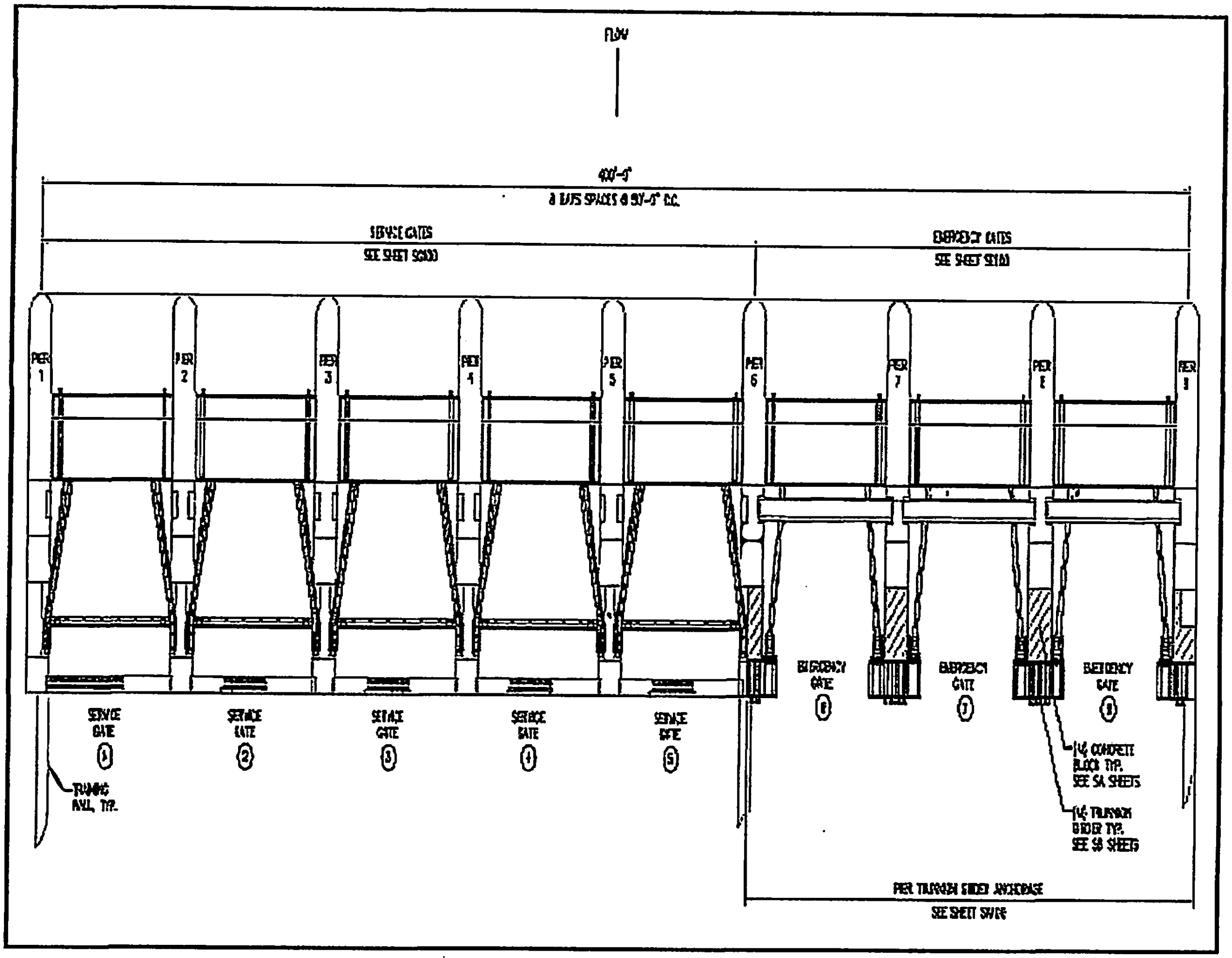

Figure 1. Depiction of main dam tainter gates and associated piers. View from downstream side of dam looking upstream toward dam itself.

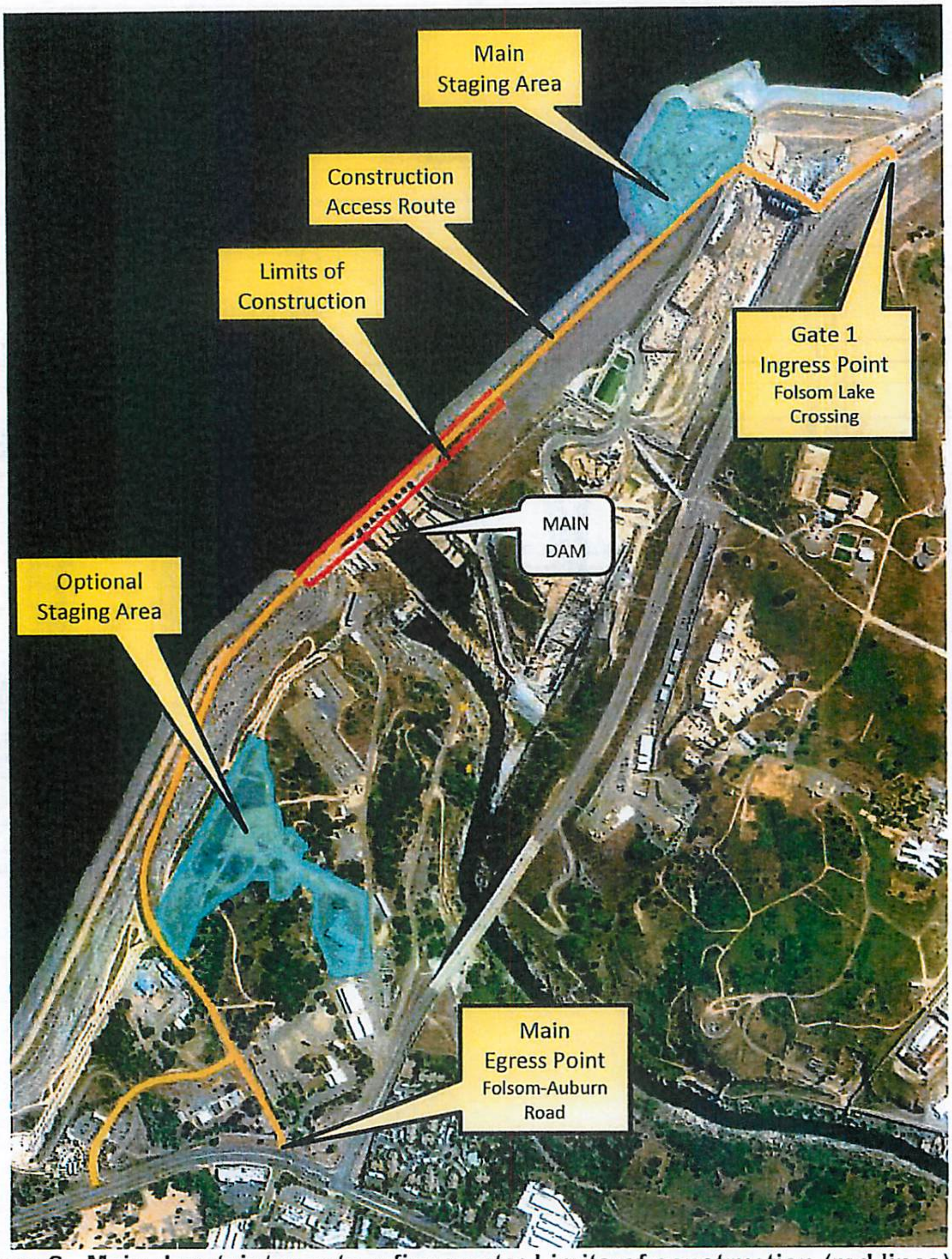

Figure 2. Main dam tainter gate refinements: Limits of construction (red lines), construction staging areas (blue lines), and construction access route (orange lines).

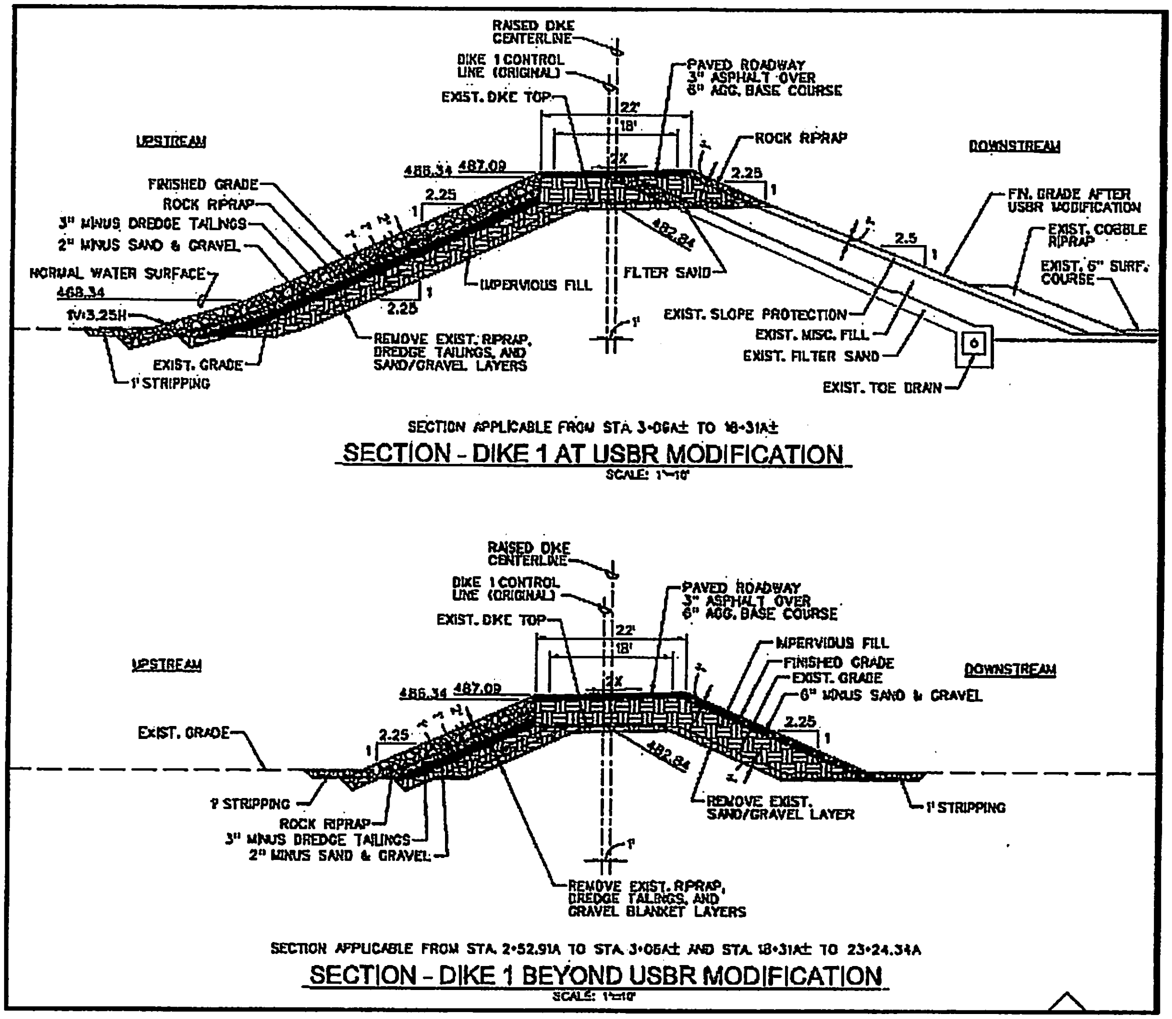

Figure 3. Preliminary typical cross section for 3.5-foot raise at Dike 1.

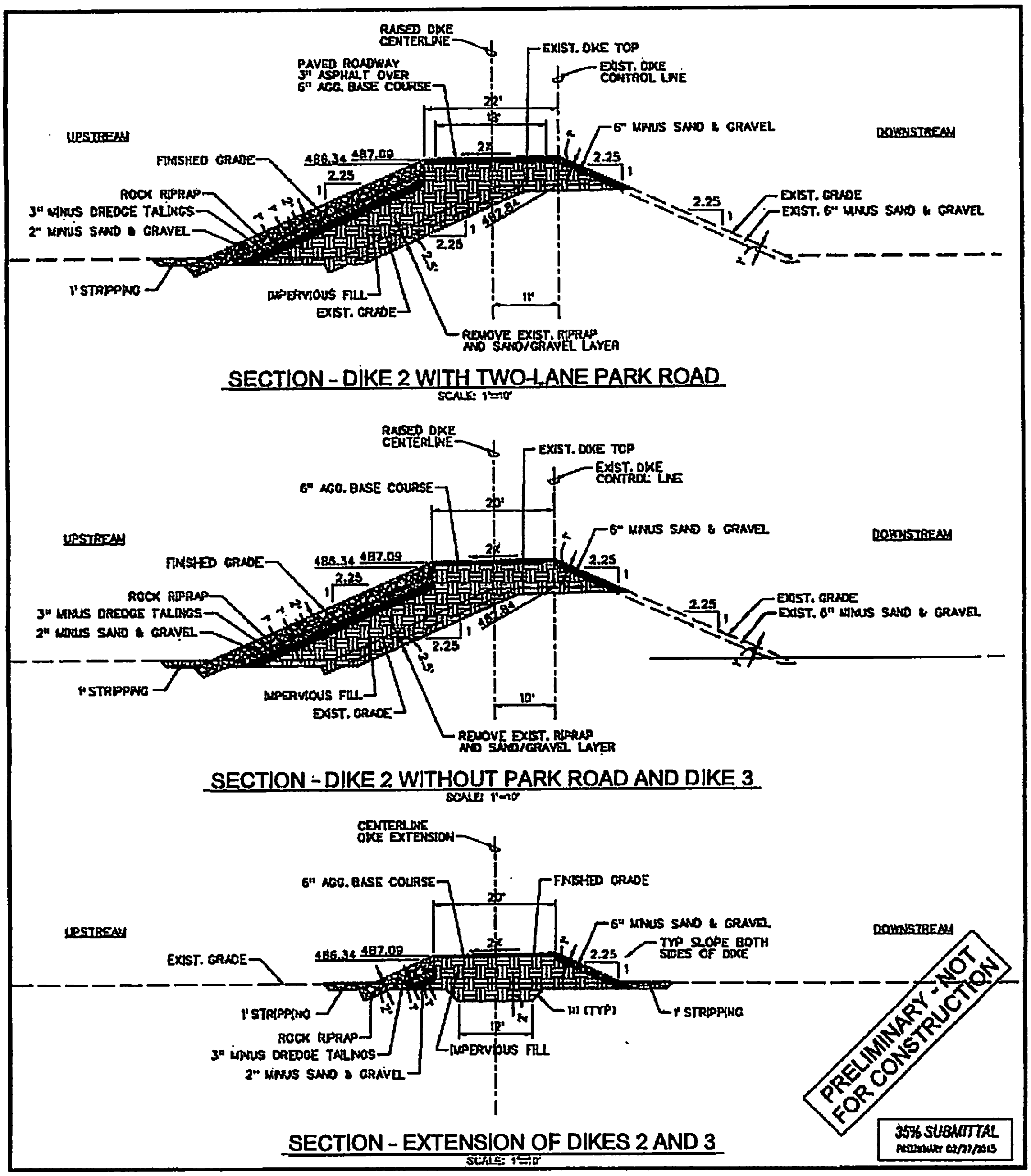

Figure 4. Preliminary typical cross sections for 3.5-foot raise at Dike 2 and Dike 3.

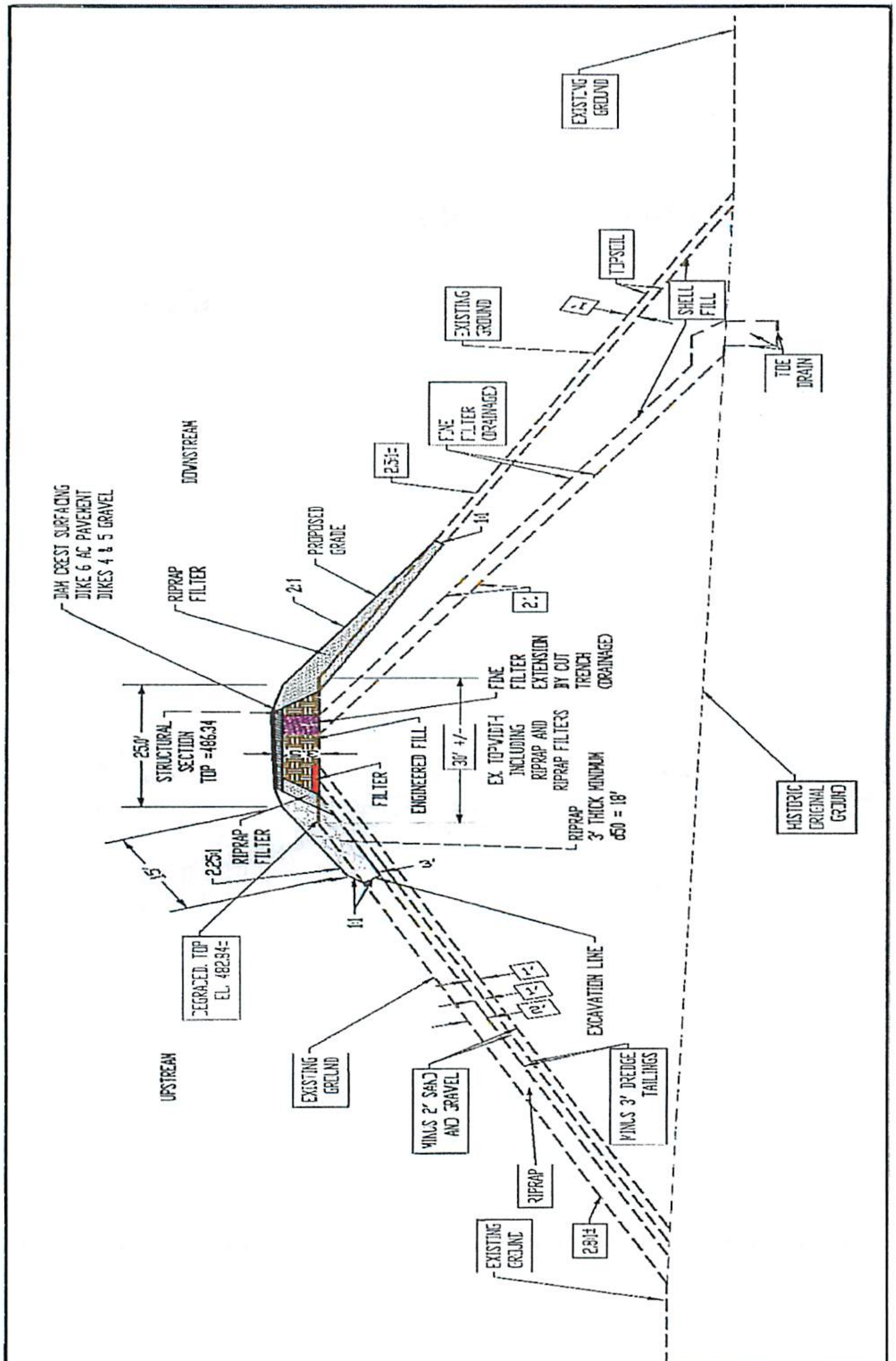

Figure 5. Preliminary typical cross section for 3.5-foot raise at Dikes 4, 5, and 6.

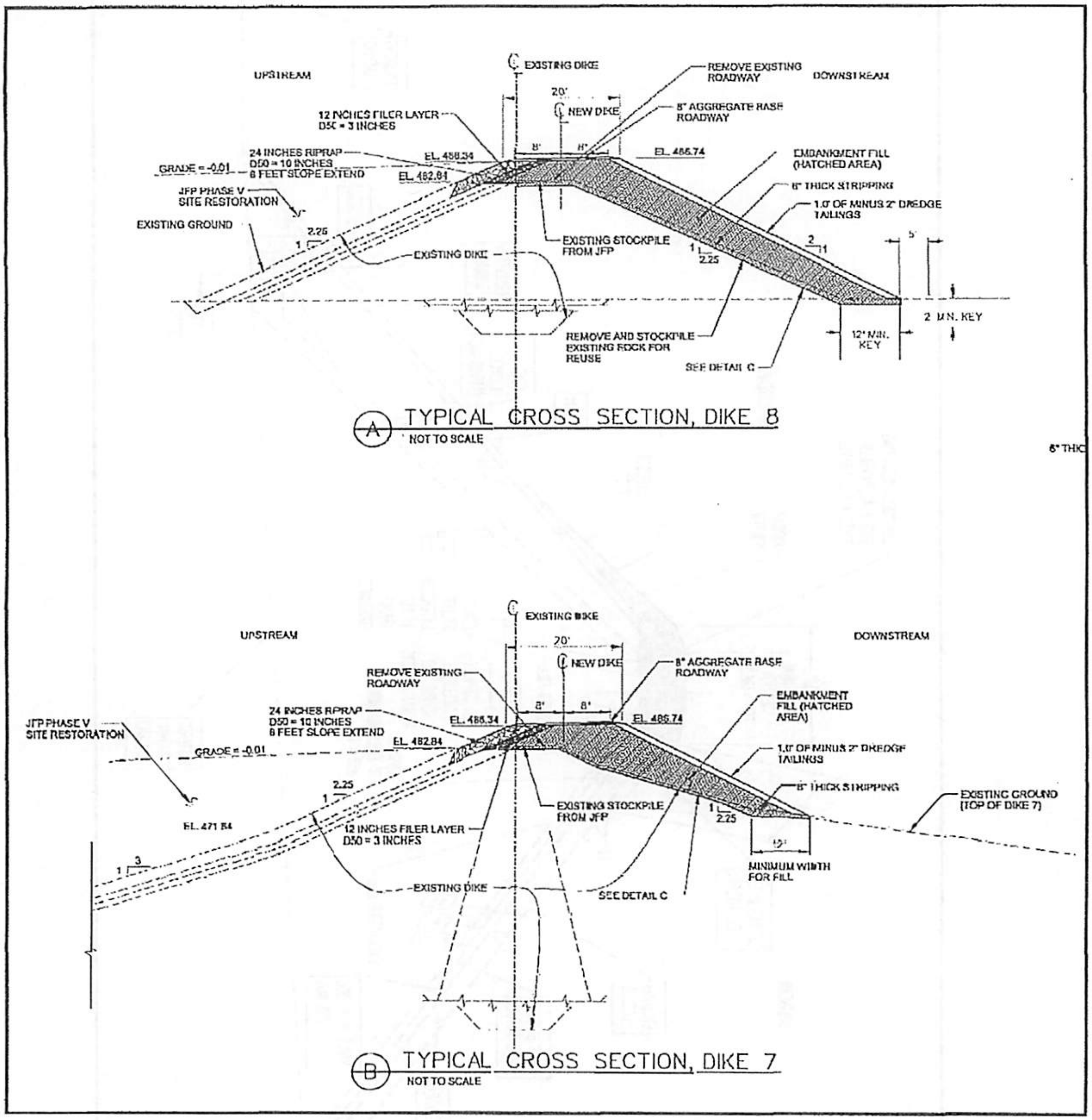

Figure 6. Preliminary typical cross sections for 3.5-foot raise of Dike 7and Dike 8.

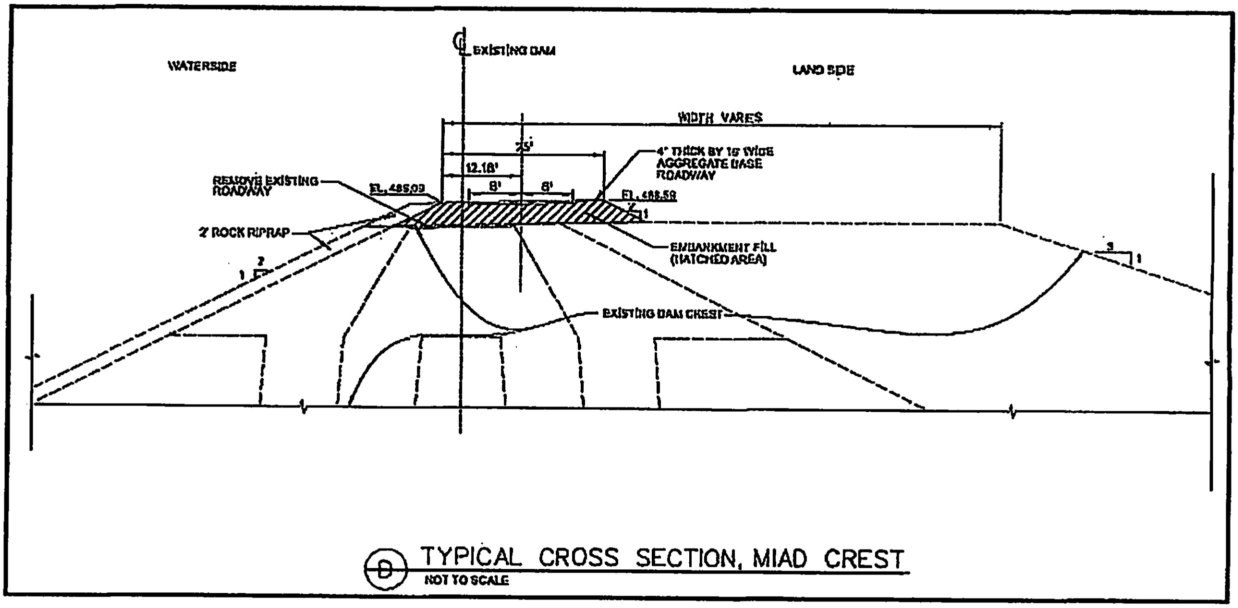

Figure 7. Preliminary typical cross section for 3.5-foot raise at Mormon Island Auxiliary Dam (MIAD).

Figure 8. Staging areas, access points, and haul routes associated with Dikes 1, 2, and 3.

Figure 9. Staging areas, access points, and haul roads associated with Dikes 4, 5, and 6, as well as Right Wing Dam.

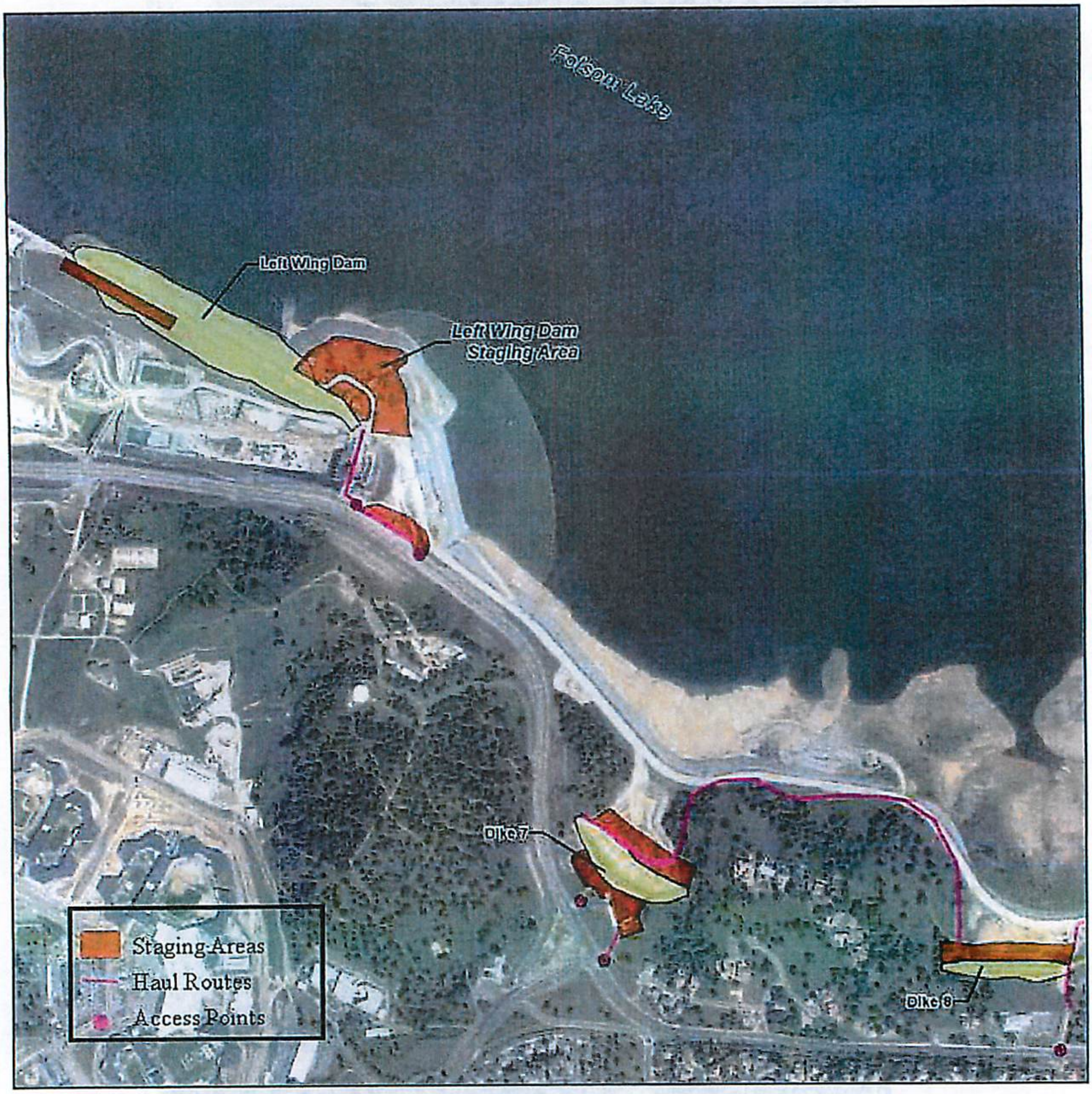

Figure 10. Staging areas, access points, and haul roads associated with Dikes 7 and 8, as well as the Left Wing Dam.

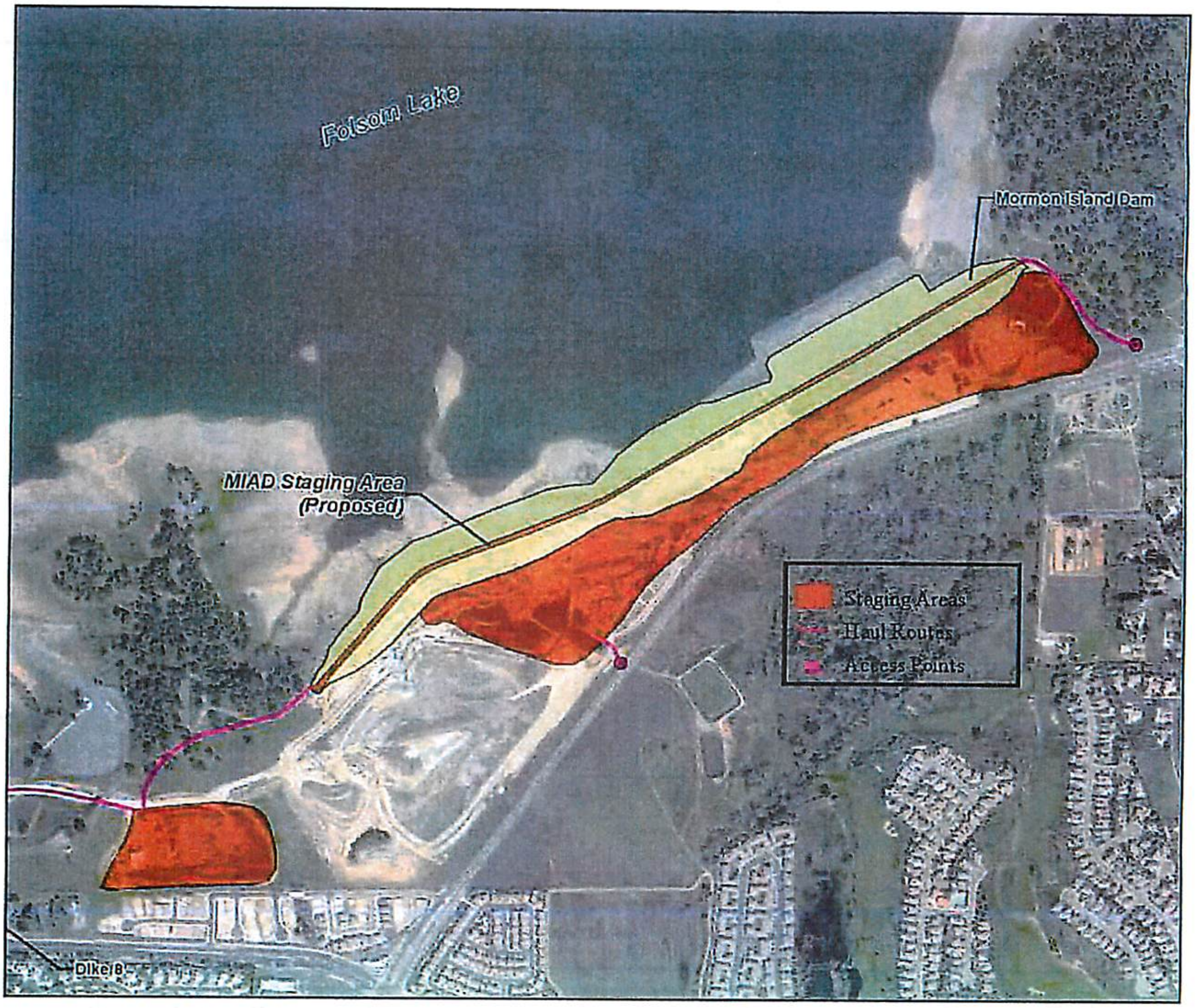

Figure 11. Staging areas, access points, and haul roads associated with Mormon Island Auxiliary Dam (MIAD).

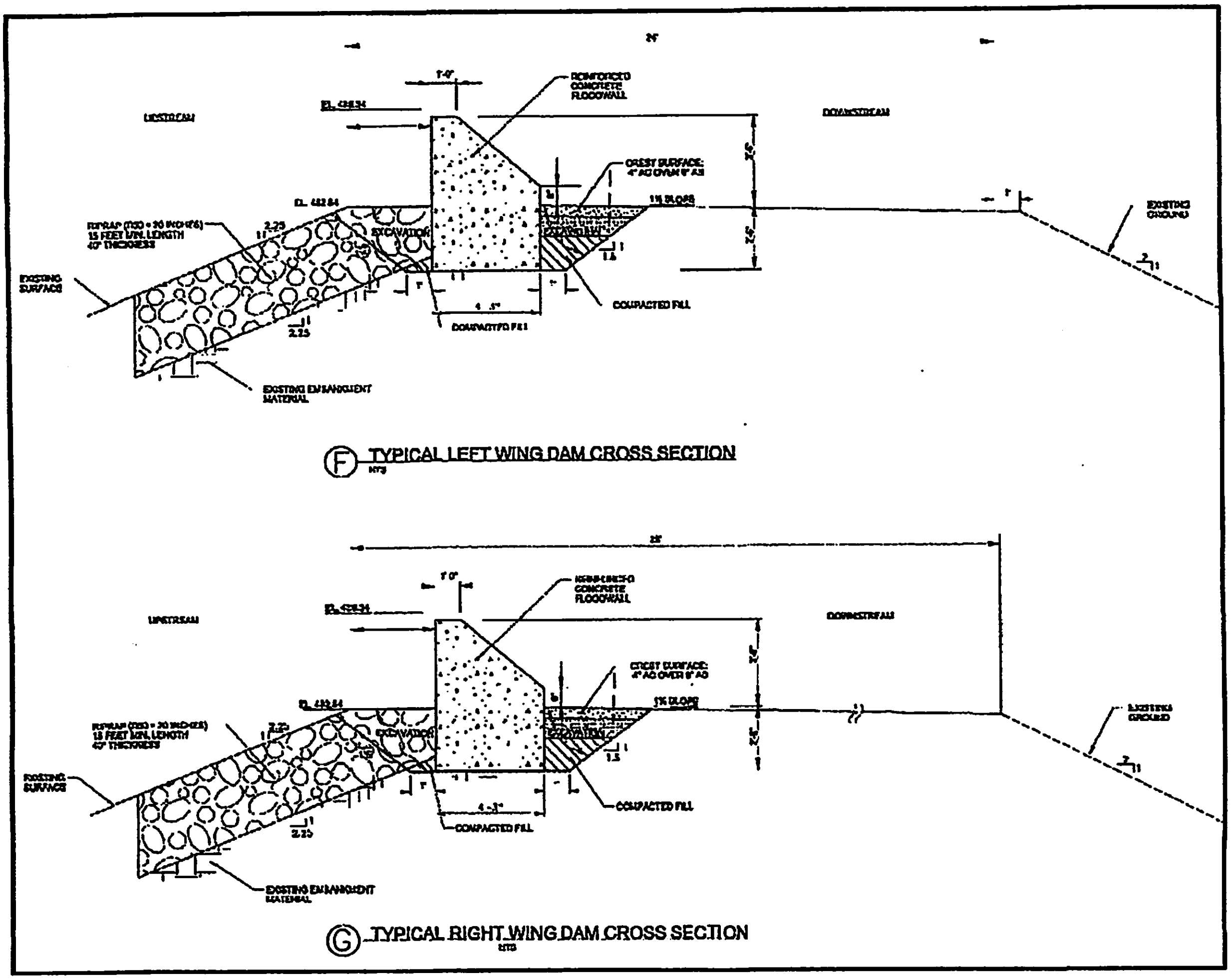

Figure 12. Preliminary typical cross sections for new floodwalls at the Left Wing Dam and the Right Wing Dam.

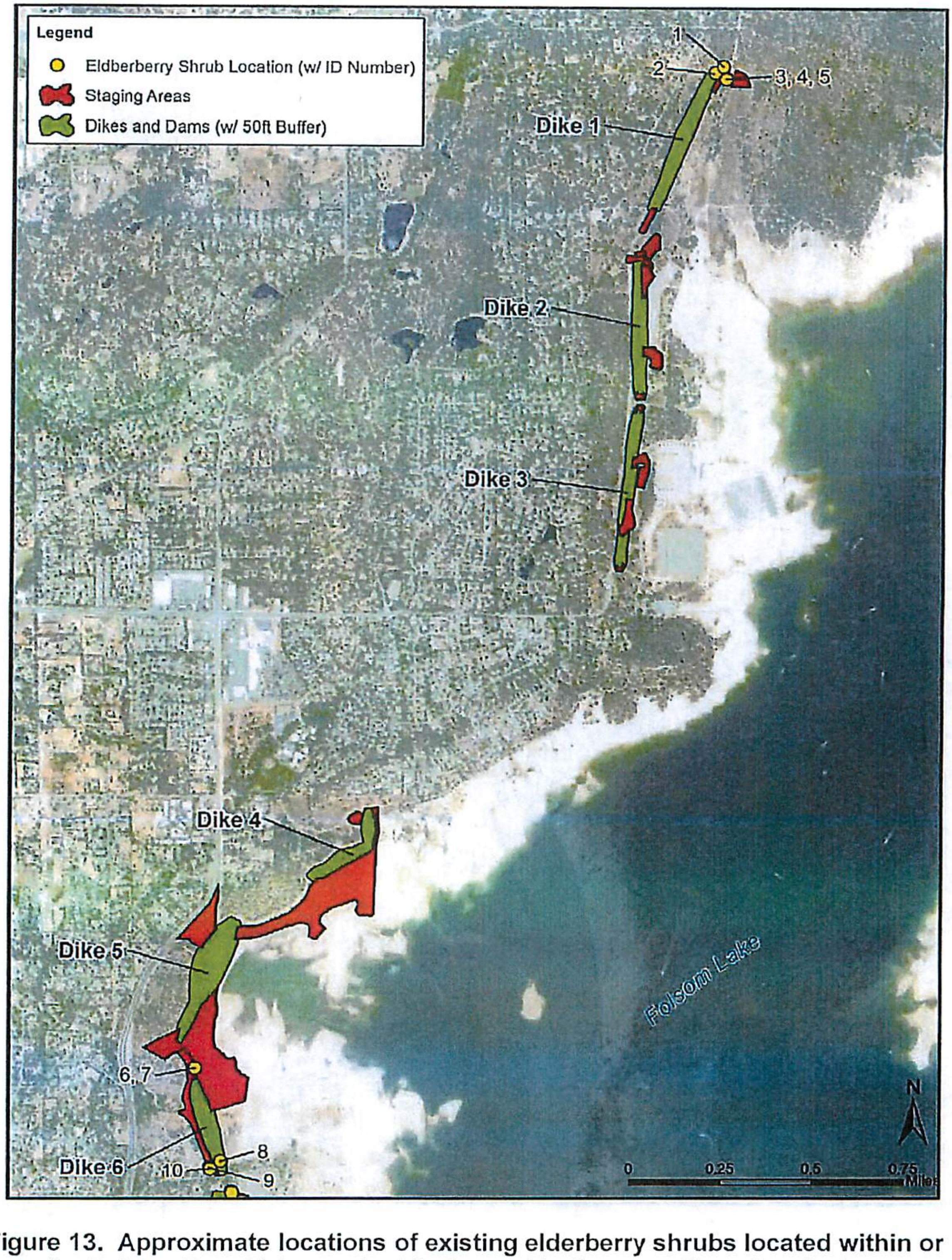

Figure 13. Approximate locations of existing elderberry shrubs located within or near the Folsom Dam Raise project features. Northern portion of project.

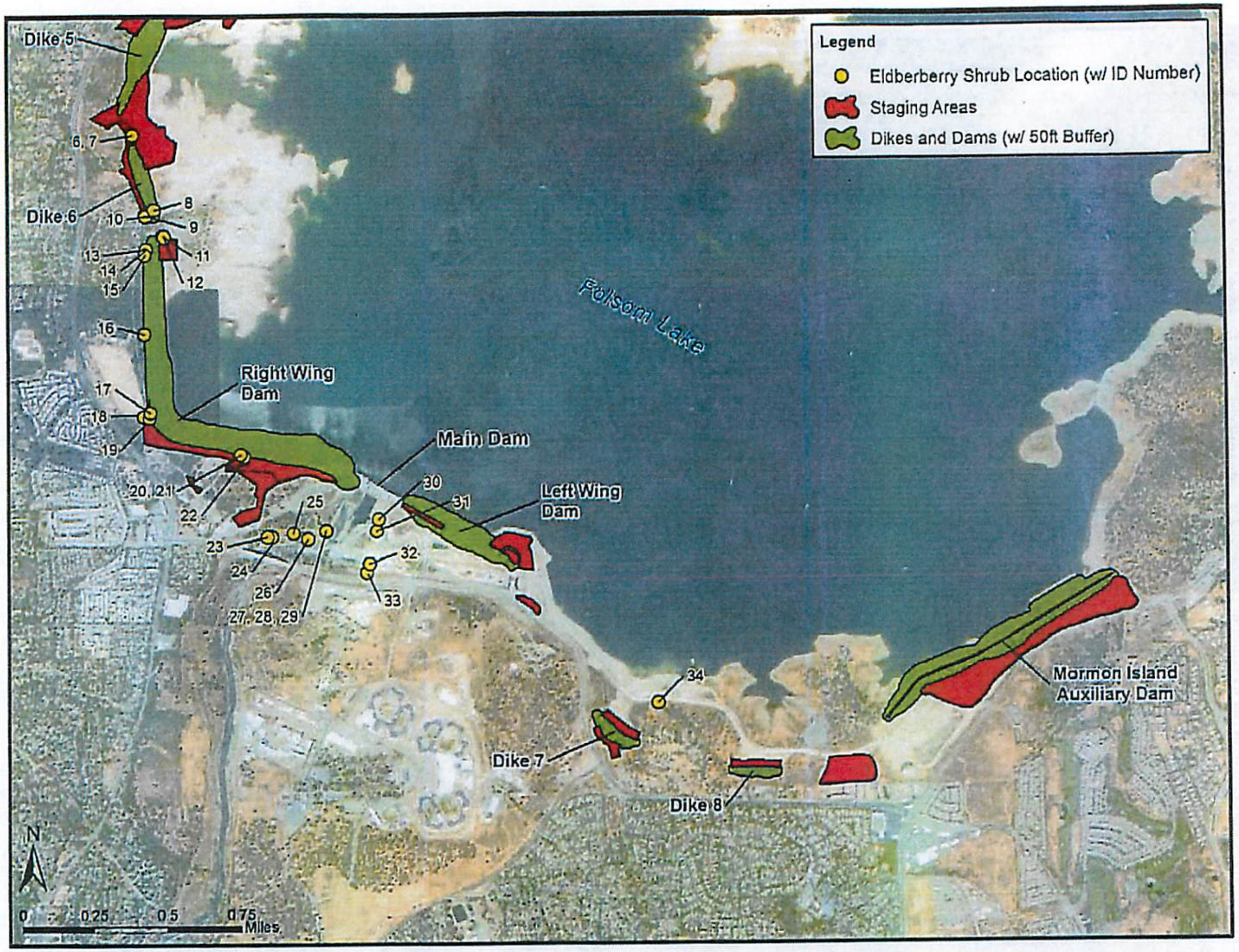

Figure 14. Approximate locations of existing elderberry shrubs located within or near the Folsom Dam Raise project features. Southern portion of project.

APPENDIX C

USFWS AND CNDDB SPECIAL STATUS SPECIES LISTS

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the CLARKSVILLE (511A) U.S.G.S. 7 1/2 Minute Quad

Report Date: January 21, 2015

Listed Species

Invertebrates

Branchinecta lynchi
vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
valley elderberry longhorn beetle (T)

Lepidurus packardi
vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus
delta smelt (T)

Oncorhynchus mykiss
Central Valley steelhead (T) (NMFS)

Oncorhynchus tshawytscha
Central Valley spring-run chinook salmon (T) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)

Rana draytonii
California red-legged frog (T)

Reptiles

Thamnophis gigas
giant garter snake (T)

Plants

Calystegia stebbinsii
Stebbins's morning-glory (E)

Ceanothus roderickii
Pine Hill ceanothus (E)

Fremontodendron californicum ssp. decumbens
Pine Hill flannelbush (E)

Galium californicum ssp. sierrae
El Dorado bedstraw (E)

Senecio layneae
Layne's butterweed (=ragwort) (T)

Key:

- (E) Endangered - Listed as being in danger of extinction.
- (T) Threatened - Listed as likely to become endangered within the foreseeable future.
- (P) Proposed - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- Critical Habitat - Area essential to the conservation of a species.
- (PX) Proposed Critical Habitat - The species is already listed. Critical habitat is being proposed for it.
- (C) Candidate - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) Critical Habitat designated for this species

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office
Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the FOLSOM (511B) U.S.G.S. 7 1/2 Minute Quad

Report Date: January 21, 2015

Listed Species

Invertebrates

Branchinecta conservatio
Conservancy fairy shrimp (E)

Branchinecta lynchi
vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
valley elderberry longhorn beetle (T)

Lepidurus packardi
vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus
delta smelt (T)

Oncorhynchus mykiss
Central Valley steelhead (T) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha
Central Valley spring-run chinook salmon (T) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)

Rana draytonii
California red-legged frog (T)

Reptiles

Thamnophis gigas
giant garter snake (T)

Plants

Orcuttia viscida
Critical habitat, Sacramento Orcutt grass (X)
Sacramento Orcutt grass (E)

Key:

- (E) Endangered - Listed as being in danger of extinction.
- (T) Threatened - Listed as likely to become endangered within the foreseeable future.
- (P) Proposed - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- Critical Habitat - Area essential to the conservation of a species.
- (PX) Proposed Critical Habitat - The species is already listed. Critical habitat is being proposed for it.
- (C) Candidate - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) Critical Habitat designated for this species

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office
Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the ROCKLIN (527C) U.S.G.S. 7 1/2 Minute Quad

Report Date: January 21, 2015

Listed Species

Invertebrates

Branchinecta lynchi
vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
valley elderberry longhorn beetle (T)

Lepidurus packardi
vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus
delta smelt (T)

Oncorhynchus mykiss
Central Valley steelhead (T) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha
Central Valley spring-run chinook salmon (T) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Rana draytonii
California red-legged frog (T)

Reptiles

Thamnophis gigas
giant garter snake (T)

Key:

- (E) Endangered - Listed as being in danger of extinction.
- (T) Threatened - Listed as likely to become endangered within the foreseeable future.
- (P) Proposed - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- Critical Habitat - Area essential to the conservation of a species.
- (PX) Proposed Critical Habitat - The species is already listed. Critical habitat is being proposed for it.
- (C) Candidate - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) Critical Habitat designated for this species

Selected Elements by Common Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad is (Folsom (3812162) or Rocklin (3812172) or Clarksville (3812161))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
bald eagle *Haliaeetus leucocephalus*	ABNKC10010	Delisted	Endangered	G5	S2	FP
Bisbee Peak rush-rose *Crocanthemum suffrutescens*	PDCIS020F0	None	None	G2Q	S2	3.2
Blennosperma vernal pool andrenid bee *Andrena blennospermatis*	IIHYM35030	None	None	G2	S2	
Boggs Lake hedge-hyssop *Gratiola heterosepala*	PDSCR0R060	None	Endangered	G2	S2	1B.2
Brandegee's clarkia *Clarkia biloba ssp. brandegeeae*	PDONA05053	None	None	G4G5T4	S4	4.2
burrowing owl *Athene cunicularia*	ABNSB10010	None	None	G4	S3	SSC
California black rail *Laterallus jamaicensis coturniculus*	ABNME03041	None	Threatened	G3G4T1	S1	FP
California linderiella *Linderiella occidentalis*	ICBRA06010	None	None	G2G3	S2S3	
California red-legged frog *Rana draytonii*	AAABH01022	Threatened	None	G2G3	S2S3	SSC
Cooper's hawk *Accipiter cooperii*	ABNKC12040	None	None	G5	S4	WL
double-crested cormorant *Phalacrocorax auritus*	ABNFD01020	None	None	G5	S4	WL
dwarf downingia *Downingia pusilla*	PDCAM060C0	None	None	GU	S2	2B.2
El Dorado bedstraw *Galium californicum ssp. sierrae*	PDRUB0N0E7	Endangered	Rare	G5T1	S1	1B.2
El Dorado County mule ears *Wyethia reticulata*	PDAST9X0D0	None	None	G2	S2	1B.2
golden eagle *Aquila chrysaetos*	ABNKC22010	None	None	G5	S3	FP
great blue heron *Ardea herodias*	ABNGA04010	None	None	G5	S4	
great egret *Ardea alba*	ABNGA04040	None	None	G5	S4	
Layne's ragwort *Packera layneae*	PDAST8H1V0	Threatened	Rare	G2	S2	1B.2
merlin *Falco columbarius*	ABNKD06030	None	None	G5	S3S4	WL
Northern Hardpan Vernal Pool *Northern Hardpan Vernal Pool*	CTT44110CA	None	None	G3	S3.1	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Northern Volcanic Mud Flow Vernal Pool *Northern Volcanic Mud Flow Vernal Pool*	CTT44132CA	None	None	G1	S1.1	
osprey *Pandion haliaetus*	ABNKC01010	None	None	G5	S4	WL
pallid bat *Antrozous pallidus*	AMACC10010	None	None	G5	S3	SSC
pincushion navarretia *Navarretia myersii ssp. myersii*	PDPLM0C0X1	None	None	G1T1	S1	1B.1
Pine Hill ceanothus *Ceanothus roderickii*	PDRHA04190	Endangered	Rare	G1	S1	1B.2
Pine Hill flannelbush *Fremontodendron decumbens*	PDSTE03030	Endangered	Rare	G1	S1	1B.2
purple martin *Progne subis*	ABPAU01010	None	None	G5	S3	SSC
Red Hills soaproot *Chlorogalum grandiflorum*	PMLIL0G020	None	None	G3	S3	1B.2
Ricksecker's water scavenger beetle *Hydrochara rickseckeri*	IICOL5V010	None	None	G2?	S2?	
Sacramento Orcutt grass *Orcuttia viscida*	PMPOA4G070	Endangered	Endangered	G1	S1	1B.1
Sanford's arrowhead *Sagittaria sanfordii*	PMALI040Q0	None	None	G3	S3	1B.2
silver-haired bat *Lasionycteris noctivagans*	AMACC02010	None	None	G5	S3S4	
steelhead - Central Valley DPS *Oncorhynchus mykiss irideus*	AFCHA0209K	Threatened	None	G5T2Q	S2	
Swainson's hawk *Buteo swainsoni*	ABNKC19070	None	Threatened	G5	S3	
tricolored blackbird *Agelaius tricolor*	ABPBXB0020	None	Endangered	G2G3	S1S2	SSC
valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	IICOL48011	Threatened	None	G3T2	S2	
Valley Needlegrass Grassland *Valley Needlegrass Grassland*	CTT42110CA	None	None	G3	S3.1	
vernal pool fairy shrimp *Branchinecta lynchi*	ICBRA03030	Threatened	None	G3	S2S3	
western pond turtle *Emys marmorata*	ARAAD02030	None	None	G3G4	S3	SSC
western spadefoot *Spea hammondii*	AAABF02020	None	None	G3	S3	SSC
white-tailed kite *Elanus leucurus*	ABNKC06010	None	None	G5	S3S4	FP

Record Count: 41

APPENDIX D

ENDANGERED SPECIES ACT CONSULTATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-
2017-F-0043

OCT 13 2016

Mark T. Ziminske
Chief, Environmental Resources Branch
Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814-2922

Subject: Reinitiation of Formal Consultation on the Folsom Dam Safety/Flood Damage Reduction Project, Sacramento, El Dorado, and Placer Counties, California

Dear Mr. Ziminske:

This letter is in response to the U.S. Army Corps of Engineers (Corps), September 2, 2016, request for reinitiation of formal consultation with the U.S. Fish and Wildlife Service (Service) on the Folsom Dam Modification Project (project) in Sacramento County, California. Your reinitiation request was received by the Service on September 6, 2016. At issue are effects of the project on the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle). This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

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 Corps, Bureau of Reclamation (Reclamation), the State of California Central Valley Flood Protection Board, and the Sacramento Area Flood Control Agency. The Folsom JFP is designed to improve the dam safety, security, and flood damage reduction features at Folsom Dam and associated facilities (collectively known as the Folsom Facilities), including the construction of a gated auxiliary spillway southeast of the main dam.

The Service appended the Folsom JFP to the *Programmatic Formal Consultation Permitting Projects with Relatively Small Effects on the Valley Elderberry Longhorn Beetle Within the Jurisdiction of the Sacramento Field Office, California* (programmatic consultation) (Service File 1-1-96-F-66) on November 1, 2012, and was subsequently amended in reinitiation on: September 23, 2013; December 24, 2013; March 31, 2014; June 10, 2014; October 9, 2014; April 22, 2015; and July 26, 2016. This consultation is a reinitiation of the overall Folsom JFP; however, this reinitiation will serve as a stand-alone document with a new reference number since it is specific to raising the dam and its facilities, and was not fully described in the original consultation or subsequent reinitiations.

The Federal action we are consulting on is the construction of the Folsom Dam Raise portion of the Folsom JFP, which includes: refinements to the main dam's tainter gates, structural alterations to the main dam, raising the existing earthen embankment dikes and the Mormon Island Auxiliary Dam

(MIAD), and the construction of floodwalls at the left and right wind dams at Folsom Lake. Pursuant to 50 CFR 402.12(j), you submitted a biological assessment for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed project may affect, and is likely to adversely affect the beetle. The proposed project is not within designated or proposed critical habitat for any federally-listed species.

In considering your request, we based our evaluation on the following: (1) your letter reinitiating consultation; (2) the undated *Folsom Dam Raise: Potential Project Impacts to Federally Listed Species* (biological assessment), prepared by the Corps; (3) email and telephone correspondence between the Service and the Corps; and (4) other information available to the Service.

Consultation History

April 9, 2014: The Service, Corps, Reclamation, and the Department of Water Resources conducted an elderberry shrub survey of the proposed project footprint.

September 6, 2016: The Service received the September 6, 2016, letter from the Corps requesting reinitiation of formal consultation with the undated biological assessment enclosed.

BIOLOGICAL OPINION

Description of the Action

The proposed project was designed to remediate all of the dam safety deficiencies that are significant risk factors at the Folsom Facilities. Important refinements and the remediation measures are planned for all of the Folsom Facilities. These refinements and measures can be grouped into three main categories: refinements to the main dam's tainter gates and related structural alterations at the main dam; raising the crest elevation of Dikes 1 through 8 and MIAD (the "earthen raise" elements of the project); and raising the effective crest elevation of the left and right wind dams through the addition of floodwalls (the "concrete floodwall" elements of the project).

Tainter Gate Refinements

The existing main dam has a total of eight tainter gates, with five of the gates designated as "service gates" and the remaining three gates designated as "emergency gates" (see Enclosure, Figure 1). Tainter gates are simply a type of flood gate and in the case of the main dam, the tainter gates are located near the crest (top) of the dam. These tainter gates are opened to release water stored in Folsom Lake in order to create adequate flood storage upstream of the main dam. The main dam also releases water via outlet tubes near the bottom of the main dam, but these tubes do not provide sufficient discharge capacity to restore flood storage. The five service gates are typically opened to drain water from Folsom Lake, while the three emergency gates are generally left closed as long as possible to help minimize the velocity of discharges and the possible destruction of some of the dam's downstream features.

The proposed project will include replacing most of the components of the three emergency tainter gates and reinforcing the five service tainter gates. The "tainter gate refinements" element of the proposed project will also include a variety of other structural changes/refinements to the main dam. These will include, but not be limited to:

- Constructing new "top seal" bulkheads to prevent overtopping of the tainter gates during a major flood event. These hydraulic steel structures will be positioned immediately above the tainter gates at their closed position, and will run horizontally, connecting to the dam's concrete piers. The top of the bulkheads will be at elevation 486.34 feet NAVD88, which is the elevation of the Probable Maximum Flood (PMF) (483.34 feet NAVD88) with an additional 3 feet of freeboard. The top seal bulkheads will also increase the height of the flood pool upstream of the dam that can be retained before the emergency tainter gates must be opened.

- Constructing vertical concrete extensions to the nine existing concrete piers (see Enclosure Figure 1) in order to provide the necessary elevated platform for a new hoist system for the tainter gates. The new top seal bulkheads will mount to and seal against the pier extensions.

- Installing a new hoist system to raise and lower the modified tainter gates. The new system will be installed to handle increased hydrostatic PMF loads, as well as the slightly heavier gates.

As shown in Figure 2 in the Enclosure, general construction access to the tainter gates will follow a path beginning at the existing Gate 1 construction entry to the ongoing Folsom JFP off of Folsom Lake Crossing and will terminate at the intersection of the southern portion of Folsom Dam Road and Folsom-Auburn Road. An alternate egress route for construction traffic may include the northern portion of Folsom Dam Road, which also eventually terminates at Folsom-Auburn Road. The construction access route will follow existing roadways and will not require construction of new roads.

The main construction staging area will be located near the east end of the left wing dam (LWD) in an area referred to as the Overlook Area (see Enclosure, Figure 2). The main staging area will occupy approximately 6.6 acres within this area, which is heavily disturbed and has been used as a construction staging site for the Folsom JFP for many years. An optional staging area, located within Reclamation's work yard just north of Reclamation's Central California Area Office (CCAO) facilities, may also be used if necessary. As depicted in Figure 2 in the Enclosure, this optional staging area could encompass as much as 13 acres; however if this optional staging site is used at all, it is unlikely the entire 13 acres will be utilized. Land within the boundaries of the optional staging area has been previously cleared and is heavily disturbed by past and ongoing usage by Reclamation. Should the optional staging area be used for the tainter gate refinement project, the few existing native trees and shrubs that remain will be preserved to the degree practicable.

Earthen Raise Elements

The current crest elevations of Dikes 1 through 8, the right wing dam (RWD), LWD, and MIAD do not provide sufficient freeboard to meet Corps design criteria for resisting wave height and run-up. Therefore, increasing the height of all the reservoir dikes and embankment dams will be required.

The current crest elevations of Dikes 1 through 8 and MIAD will be raised by approximately 3.5 feet using engineered fill material similar to the existing composition of these features, thereby allowing seepage and pore pressure to be maintained through the interface between the existing embankment material and the new material. The side slopes and crest widths will conform to Corps standards while maintaining Reclamation's requirements for security and maintenance. Preliminary typical cross-sections for the proposed modifications to Dikes 1 through 8 and MIAD are provided in the following figures in the Enclosure: Figure 3 (Dike 1), Figure 4 (Dikes 2 and 3), Figure 5 (Dikes 4, 5, and 6), Figure 6 (Dikes 7 and 8), and Figure 7 (MIAD).

Modifications to Dike 1 will primarily affect the dike's existing crest and landward side slope of the dike through the removal of existing materials (ex. riprap, earthen materials, roadway pavement) and the addition of new materials (ex. engineered fill, riprap, roadway). Modifications to certain segments of Dike 1 not previously modified by Reclamation will affect the dike's crest and both the landward side slope and lake-side side slope in a similar manor. Park Road intersects Dike 1 near its southern end before it runs along the dike's crest. A portion of the western leg of this road will need to be raised to meet the new dike crest elevation. A park horse trail also extends eastward from the dike near the Park Road intersection and a small segment of this trail will need to be raised to merge with the new dike crest.

Modifications to Dikes 2 and 3 will primarily affect each dike's existing crest and landward side slope in manner similar to the modifications to Dike 1. Limited extensions will be required to both Dikes 2 and 3 in order for the new crest elevation to merge with adjacent existing topography that is higher than the new crest elevation.

As with Dikes 1, 2, and 3, the proposed modifications to Dikes 4, 5, and 6 will also primarily affect the existing crest and landward side slopes of these dikes through the removal of existing materials (ex. riprap, earthen materials, roadway pavement, roadway gravel) and the addition of new materials (ex. engineered fill, riprap, pavement). An existing gravel road/trail currently extends from the south end of Dike 4 to the north end of Dike 5. A significant portion of this road will be raised to the same elevation as the proposed raised crest elevation of the adjacent dikes because the affected road segments are presently lower than the necessary dike elevation. Gravel maintenance roads currently run along the landward side toe of the slope at Dikes 4, 5, and 6. Portions of these maintenance roadways will be relocated in a manner that mimics their current alignments to accommodate changes in the side slopes of the dikes.

The proposed modifications to Dikes 7 and 8 will be very similar to one another, as shown in Figure 6 in the Enclosure. The existing dike crests and landward side slopes will be degraded slightly. New engineered embankment fill will then be added to the top of the dikes and to the landward side slopes of the dikes. Aggregate base maintenance roads will be established on the crest of each dike to replace the existing gravel roads on these dikes.

Work necessary to raise the elevation of MIAD will involve limited removal of existing materials (embankment fill, aggregate roadway) along the existing crest of this dam. Additional engineered fill will then be added to the crest of the dam along with aggregate base to replace the existing maintenance road/shared use trail that runs the length of the dam and riprap will be added along the water-side of the dam adjacent to the raised area.

Construction access to Dikes 1 and 2 will be from the north at the east end of Twin Rocks Road (see Enclosure, Figure 8). From this point, the construction access/haul road will continue south along an existing maintenance road to the north end of Park Road. The western leg of Park Road will be used to access the top of Dike 1. A new haul road will continue south from Park Road, roughly parallel to the east side of Dike 1, and will connect to the north end of Dike 2. The haul road will then continue along the crest of Dike 2. Construction access to Dike 3 will be from Douglas Boulevard south of the southern end of Dike 3 and also via the haul road/access routes discussed for Dikes 1 and 2. The construction access/haul road on the southern end of Dike 3 will likely follow Park Road northward, then jog slightly east near the south end of Dike 3 before turning northward to run along the dike itself.

Various construction staging areas will be used while raising the elevation of Dikes 1, 2, and 3. These will largely be situated in disturbed uplands near the water-side of the dikes, although some staging areas will be at or near the ends of the dikes as shown in Figure 8 in the Enclosure.

The main construction access to Dikes 4, 5, and 6 will be from Auburn-Folsom Road near the north end of Dike 5 (see Enclosure, Figure 9). A secondary construction access from Auburn-Folsom Road along the existing Beals Point roadway near the south end of Dike 6 may also be utilized to access these three dikes. Construction haul roads for the three dikes will mainly follow existing maintenance roads that run along the landward side of the dikes and connect the dikes (see Enclosure, Figure 9).

Construction staging areas will be established adjacent to the landward sides of the dikes. Approximate limits of these staging areas are depicted in Figure 9 in the Enclosure. Some construction staging areas were previously established and used by Reclamation on the water-side of Dikes 4, 5, and 6, as illustrated in Figure 9 in the Enclosure. Portions of these areas may also be used as staging areas when building the proposed project. Large areas of the two water-side staging areas are below the ordinary high water (OHW) elevation of Folsom Lake, which is elevation 466 feet NAVD88. Construction staging for the proposed project will only happen in areas below the lake's OHW when such areas are not inundated or saturated by lake surface water. In no case will fuels or other hazardous materials be stored in the water-side staging areas.

The main construction access to Dike 7 will be at Folsom Lake Crossing, using the north access point shown in Figure 10 in the Enclosure. From this point, the construction access/haul road will follow an existing road and haul road that have been used during the construction of the Folsom JFP. The construction access to Dike 8 may include the same construction access used for Dike 7; however, it may also include Folsom Point Road where it intersects with East Natoma Street (see Enclosure, Figure 10). The construction haul road at this location will follow a segment of Folsom Point Road before turning northwest to follow an existing maintenance road that runs to the southeast corner of Dike 8. If the access route to Dike 7 is also used for construction access to Dike 8, the construction haul road will generally follow the Operations & Maintenance (O&M) Bench road that will have been established as part of the final phase (Phase V, restoration phase) of the Folsom JFP. This future maintenance road runs through areas that were previously disturbed by the Folsom JFP.

There will be two different ways for construction vehicles and equipment to access MIAD and its associated construction staging areas. One route will use the Folsom Point Road access to Dike 8, then it will follow the O&M Bench road extending from Dike 8 to near the western boundary of the primary MIAD area (aka MIAD East), then will continue east to the west end of MIAD to its southern construction staging area (see Enclosure, Figure 11). The other construction access route will begin at the intersection of Access Road and Sophia Parkway with Green Valley Road (see Enclosure, Figure 11). From this point, construction traffic will follow Access Road northward to the east end of MIAD and its southern construction staging area. The existing maintenance road/shared use trail along the crest of MIAD will also be used as a construction access/haul road.

Construction staging areas for the proposed work on Dike 7 will include the existing "Dike 7 Office Complex" area immediately south of the dike, plus previously disturbed land along the north side of the dike (see Enclosure, Figure 10). Both of these areas have been previously used as staging areas during various Folsom JFP construction phases. The main construction staging area for Dike 8 will likely be a previously disturbed area immediately adjacent to the north side of this dike (see Enclosure, Figure 10), but the Dike 7 Office Complex area may also be used.

The main construction staging areas for the proposed work on MIAD will be an extensive area of previously disturbed land on the landward side of MIAD (see Enclosure, Figure 11). Immediately west of MIAD, referred to as the "MIAD West" area, is an area previously used for construction staging and disposal purposes during phases of the Folsom JFP. This area (see Enclosure, Figure 11) may also be used as an ancillary construction staging area for the proposed work on MIAD.

Concrete Floodwall Elements

In combination with the earthen dam raises on the dikes and MIAD, the proposed project will also include construction of a new reinforced concrete floodwall on the top of the LWD and RWD. The floodwall for the RWD will run the length of the dam, tying into the existing grade at the RWD's northern end and terminating at the west end of the main concrete dam and the RWD's eastern end. The floodwall for the LWD will also run the length of the dam, beginning at the east end of the main concrete dam and continuing to the east end of the LWD. Just beyond the east end of the LWD, the new floodwall will turn southward and connect to the top of the existing auxiliary spillway control structure at its northern end. A separate segment of new floodwall will begin at the southern end of the auxiliary spillway control structure, then run in a southeastern direction for roughly 580 feet (parallel to Folsom Lake Crossing), before terminating at the existing roadway that leads to the main dam.

Both the LWD and RWD floodwalls will be installed adjacent to the existing access/maintenance road that runs along the crest of the two dams, on the water-side. Floodwall construction will include degrading a portion of the existing crest of the two dams, as well as a portion of the water-side slopes of both dams. After construction of the floodwalls, the degraded areas adjacent to the floodwalls will be backfilled with compacted fill and, on the water-side slopes of the floodwalls, riprap. Portions of the access/maintenance road affected by construction will be restored (see Enclosure, Figure 12).

There will be two construction access points for work on the RWD (see Enclosure, Figure 9). One will be off Auburn-Folsom Road at the Beals Point roadway (e.g. the same access point used to access the southern end of Dike 6). The other access point will be off Folsom-Auburn Road at Folsom Dam Road. The construction access/haul route from this access point will follow established roads within Reclamation's CCAO facilities. The main construction access point for work on the LWD will be off Folsom Lake Crossing at the existing Gate 1 construction access (see Enclosure, Figure 10). The construction access/haul route from this access point will follow an existing haul road before passing over the control structure of the new auxiliary spillway. During construction work on the LWD and RWD, one lane of the existing road that runs from the LWD to the main dam and then to the RWD (e.g. Folsom Dam Road) will be open to traffic.

Two construction staging areas will be utilized during the construction of the RWD floodwall (see Enclosure, Figure 9). One will be located at the north end of the dam on the water-side within an area that has been previously cleared and disturbed. The other staging area will be located along the southern leg of the RWD on its landward side. This large staging area will occupy various disturbed areas within Reclamation's CCAO facilities.

Three construction staging areas will be used during the construction of the LWD floodwall (see Enclosure, Figure 10). The main staging area will be located in the Overlook Area which is the same disturbed area that will be used for staging associated with the proposed refinements to the tainter gates at the main concrete dam. Another small staging area will be situated adjacent to the Gate 1 access point in an area previously disturbed by Folsom JFP construction activities. The third staging area will be located in a previously disturbed area near the north end of the RWD on its landward side.

Other Project Construction Details

A significant portion of the materials removed from the eight dikes and MIAD during the initial stages of project construction (i.e. excavated fill, rock riprap) will also be utilized in constructing the raised dike areas, the raised MIAD area, and the floodwalls at the LWD and RWD. With one exception, all the other materials required will be obtained from off-site commercial sources. The exception pertains to rock riprap. Riprap placed during prior phases of the Folsom JFP is currently being removed from what is referred to as the Haul Road Restoration Area. This 58 acre area is located east of the LWD and new auxiliary spillway adjacent to Folsom Lake. Most of the riprap removed is being temporarily stockpiled in the MIAD east area as part of Phase V of the Folsom JFP. The stockpiled riprap will be used as needed to provide riprap called for in the proposed construction of the dike and MIAD raises.

All the materials necessary to construct the tainter gate refinements will be obtained from off-site commercial sources. The construction debris generated during the course of the overall proposed project will be removed from the project site and disposed of in licensed disposal facilities located near the project site. Most of the construction staging areas will be restored following completion of the main construction activities. This restoration will typically include restoring the topography to mimic the topography present prior to construction and then planting the disturbed areas with native grass and forb seeds.

Project Schedule

The proposed project will be constructed in phases over time. Table 1 below depicts the currently estimated schedule for the four main phases comprising the overall project.

Table 1. Estimated construction schedule for the Folsom Dam Raise Project

Project Phase	Project Activity	Starting Year	Ending Year	Phase Duration
1	Main Dam Tainter Gates – tainter gate refinements	2017	2021	4 years
2	Dikes 4, 5, & 6 – earthen embankment raise	2017	2019	2 years
3	Dikes 1, 2, & 3 – earthen embankment raise	2018	2020	2 years
4	Dikes 7 & 8 plus MIAD, LWD, & RWD – earthen embankment raise for dikes and MIAD, floodwall additions for LWD and RWD	2019	2021	2 years

Even though Table 1 indicates that Phase 1 and Phase 2 will both begin in 2017, construction of Phase 1 (main dam tainter gate refinements) will likely commence several months prior to construction of Phase 2.

Conservation Measures

A total of 34 elderberry shrubs having at least one stem with a diameter of 1 inch or greater, as measured at ground level, have been documented within or near the proposed project. Table 2 lists each of these shrubs and their approximate locations are shown in Figures 13 and 14 in the Enclosure. It is anticipated that three shrubs will be directly impacted by project construction and while further designs for each of the various project phases are being completed, the Corps will strive to avoid designs that result in direct impacts to additional elderberry shrubs to the degree practicable. To minimize the potential take of the beetle, the following measures will be incorporated into the project:

1. Construction personnel will receive Service-approved worker environmental awareness training to ensure that workers recognize elderberry shrubs and the beetle. The training will include: the protected status of beetle and their host plant, the elderberry shrub; the need to avoid adversely affecting elderberry shrubs; elderberry shrub avoidance areas (protective buffers/exclusion zones); measures to be taken by workers during construction to protect elderberry shrubs; possible penalties that could be imposed for not complying with requirements established for the protection of the beetle and its host plant; and key contacts with the Corps and construction contractor pertaining to environmental issues.

2. Where practicable, a minimum setback (buffer) of 100 feet from the drip-line of all elderberry shrubs containing stems measuring 1.0 inch or greater in diameter at ground level will be established. There may be instances where a 100-foot buffer is not practicable due to various constraints. In such cases, a buffer of at least 20 feet from the dripline of such elderberry shrubs will be established if feasible. The Corps will consult with the Service prior to establishing any elderberry shrub buffer zones (setbacks) that extend less than 100 feet from the drip-line of a particular shrub. Such buffer zones will not be established without first obtaining approval from the Service.

3. Prior to construction activities near elderberry shrubs to be preserved as part of the project, protective barriers will be installed along the limits of elderberry shrub buffer zones (exclusion areas). These barriers will typically be orange-mesh fencing, but could also include other barriers such as wooden fencing, staked ropes with flagging, or K-rails (Jersey barriers). The protective barriers will be maintained throughout the duration of project construction and/or restoration activities. No construction activities or similar disturbances will be allowed within the elderberry shrub buffer zones unless authorized in advance by the Corps and Service.

   Regardless of the preceding, there could be situations where elderberry shrubs to be preserved are located in areas near a proposed project phase where no construction work will occur within 100 feet of the shrubs and existing landscape conditions (ex. steep terrain, intervening roadways, etc.) are such that it will be highly improbable that construction work could inadvertently damage such shrubs. In such cases, protective barriers will not be installed if approved in advance by the Service.

4. Signs will be placed approximately every 50 feet along the edge of the elderberry shrub buffer zones (e.g. along the protective barriers discussed above). The signs will include the following text: "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 will be readable from a distance of 20 feet and will be maintained during project construction. If protective barriers are not required to be installed along limits of elderberry shrub buffer zones, no signs will be provided along these buffer zones.

5. Any damage done within elderberry shrub buffer zones during the course of project construction will be remediated shortly following the discovery of such damage. Remediation work may include installing erosion control measures, seeding disturbed areas with appropriate native plant seeds, etc.

6. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used in elderberry shrub buffer zones, or within 100 feet of any elderberry shrub with one or more stems measuring 1.0 inch or greater in diameter at ground level.

7. If mowing of vegetation is deemed necessary to reduce fire hazard, mowing will be performed within elderberry shrub buffer zones but only during the period from July through April. No mowing will be allowed within 5 feet of elderberry shrub stems, and all mowing will be done in a manner that avoids damaging elderberry plants.

8. During project construction and/or restoration activities that involve earthwork, measures will be employed to suppress generation of dust. Such measures will include frequent watering of project haul roads, earthen stockpile areas, and similar exposed soil surfaces.

9. Designs for the various phases of the Folsom Dam Raise project are in the process of development. While generating these plans, the Corps will attempt to avoid designs that necessitate direct construction impacts to existing elderberry shrubs having one or more stems that have a diameter of one inch or greater as measured at ground level (e.g. avoid the need to remove such elderberry shrubs).

10. There may be cases where it is not practicable to avoid direct construction impacts to elderberry shrubs meeting the stem diameter requirements stated above. In such cases, the Corps will purchase an appropriate number of credits from a Service-approved conservation bank. The determination of the number of conservation credits required will be based on methodologies prescribed in the Service's 1999 conservation guidelines (Guidelines) for the beetle (Service 1999) and in direct coordination with Service staff. The Corps will also transplant the affected elderberry shrub(s) from the project site to the conservation bank. The affected shrubs will be transplanted during the elderberry's dormant season (roughly November through the first 2 weeks in February), if feasible. The conservation bank will be required to follow the transplanting procedure set forth in the Guidelines and Corps staff will monitor the removal of the shrubs from the project site.

    Although most of the phases of the proposed project are still being designed, it is anticipated the proposed project will result in direct impacts to three shrubs in the project footprint. These shrubs are located either between Dikes 5 and 6, or directly adjacent to Dike 6. The anticipated amount of compensation if these three shrubs are directly impacted is shown in

Table 2. As the proposed project's construction plans are refined, potential impacts will be re-assessed.

Table 2. Proposed compensation for the anticipated impacts to the beetle from the Folsom Dam Raise Project

Location	Stem Diameter	Number of Stems Impacted	Exit Holes Present on Shrub (Y/N)	Elderberry Seedling Ratio	Elderberry Seedling Plantings	Associated Native Plant Ratio	Associated Native Plantings
Riparian	≥ 1"& ≤ 3"	3	No	2:1	6	1:1	6
	> 3"- < 5"	2	No	3:1	6	1:1	6
	≥ 5"	0	No	4:1	0	1:1	0
Total		**5**			**12**		**12**
24/10=2.4 basins (credits) * 1800 = .099 acre							

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed project, the action area encompasses Dikes 1 through 8, MIAD, the LWD, the RWD, the main dam, and all areas used for construction access and staging. In addition, the action area includes all areas temporarily impacted by dust and noise during project activities.

Analytical Framework for the Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the beetle's range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the beetle in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the beetle; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the beetle; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the beetle. In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the beetle's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of beetle and the role of the action area in the survival and recovery of the beetle as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

For the most recent comprehensive assessment of the range-wide status of the beetle, please refer to the *Withdrawal of the Proposed Rule to Remove the Valley Elderberry Longhorn Beetle From the Federal List of Endangered and Threatened Wildlife* (Service 2014). Threats discussed in the withdrawal continue to act on the beetle, with loss of habitat being the most significant effect. While there continue to be losses of beetle habitat throughout its range, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the beetle.

Environmental Baseline

The three elderberry shrubs directly impacted within the action area represent a small proportion of shrubs throughout the full range of the beetle. There are two known occurrences of the beetle within the action area and five known occurrences within 5 miles of the action area (CNDDB 2016). Exit holes were not identified on any of the 34 elderberry shrubs within the action area.

Effects of the Action

Construction activities will result in the permanent loss of three elderberry shrubs with five stems 1 inch or greater in diameter at ground level. The shrubs will be removed due to construction activities. Any beetle larvae occupying the shrubs could be killed when the shrubs are transplanted. As noted previously in the Description of the Action, the Corps has proposed a set of conservation measures, including the commitment to provide compensatory habitat as a condition of the action. This compensatory habitat is intended to minimize the effect on the species of the proposed project's anticipated incidental take, resulting from the loss of habitat described above. The compensatory habitat proposed includes purchasing 2.4 beetle conservation credits at a Service-approved conservation bank with a service area that covers the proposed project.

This component of the action will have the effect of protecting and managing lands for the beetle's conservation in perpetuity. The compensatory lands will provide suitable habitat for breeding, feeding, or sheltering commensurate with or better than the habitat lost as a result of the proposed project. Providing this compensatory habitat as part of a relatively large, contiguous block of conserved land may contribute to other recovery efforts for the species.

The proposed project will also include instances where elderberry shrubs will be preserved at their existing locations and a protective buffer will be provided and maintained during project construction. Short-term affects to elderberry shrubs protected in place includes vibration and dust generated by nearby construction equipment, which could disturb the beetle. These effects will be minimized through the implementation of the avoidance and minimization measures discussed in the Description of the action.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. During this consultation, the Service did not identify any future non-federal actions that are reasonably certain to occur in the action area of the proposed project.

Conclusion

After reviewing the current status of the beetle, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the Folsom Dam Raise, as proposed, is not likely to jeopardize the continued existence of the beetle. The Service reached this conclusion because the project-related effects to the species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species. The effects to the beetle are small and discrete, relative to the range of the species, and although the loss of habitat will contribute to the overall reduction of habitat, the conservation measures will contribute to the long-term preservation and management of beetle habitat. The proposed project will contribute to the conservation of the beetle by preserving habitat at a conservation bank that will manage a large contiguous section of habitat for the benefit of the species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

The incidental take of the beetle anticipated for the proposed project will result from the direct effects to the three elderberry shrubs with five stems 1 inch or greater in diameter at ground level that will be transplanted. The life stage affected will be beetle larvae living within the stems of the elderberry shrubs. The life cycle of the beetle takes one or two years to complete, during which it spends most of its life in the larval stage. Due to the fact that it is not possible to know how many beetle larvae are in the stems of any elderberry shrub, the Service cannot quantify the total number of beetle that we anticipate will be taken as a result of the proposed project. In instances in which the total number of individuals anticipated to be taken cannot be determined, the Service may use the amount of habitat impacted as a surrogate. Since the anticipated take of individuals will result from the removal of elderberry shrubs, the quantification of suitable habitat serves as a direct surrogate for the beetles that will be lost. Therefore, the Service anticipates take incidental to the proposed project as the three elderberry shrubs with five stems 1 inch or greater in diameter at ground level that will be transplanted.

Upon implementation of the following reasonable and prudent measures, incidental take of the beetle associated with the proposed project will become exempt from the prohibitions described in section 9 of the Act. No other forms of take are exempted under this opinion.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measure

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the beetle:

1. All conservation measures, as described in the biological assessment and restated here in the Description of the Action section of this biological opinion, will be fully implemented and adhered to. Further, this reasonable and prudent measure shall be supplemented by the terms and conditions below.

Term and Condition

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must ensure compliance with the following term and condition, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. The Corps shall include full implementation and adherence to the conservation measures described in the biological assessment and restated in this biological opinion as a condition of any permit or contract issued for the project.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the Folsom Dam Raise project in Sacramento, El Dorado, and Placer Counties, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (a) If the amount or extent of taking specified in the incidental take statement is exceeded; (b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Amber Aguilera (amber_aguilera@fws.gov), Fish and Wildlife Biologist, at (916) 414-6577, or Doug Weinrich (douglas_weinrich@fws.gov), Assistant Field Supervisor, at (916) 414-6563.

Sincerely,

Doug Weinrich

Jennifer M. Norris
Field Supervisor

Enclosure:

cc:
Clay Carithers, Army Corps of Engineers, Sacramento, California

LITERATURE CITED

California Natural Diversity Data Base (CNDDB). 2016. California Department of Fish and Wildlife. RAREFIND. Natural Heritage Division, Sacramento, California. Accessed October 6, 2016.

U.S. Fish and Wildlife Service (Service). 2014. Withdrawal of the Proposed Rule to Remove the Valley Elderberry Longhorn Beetle From the Federal List of Endangered and Threatened Wildlife. Federal Register 79:55874-55917. September 17, 2014.

Enclosure

Figures 1-14
(Figures provided by the Corps)

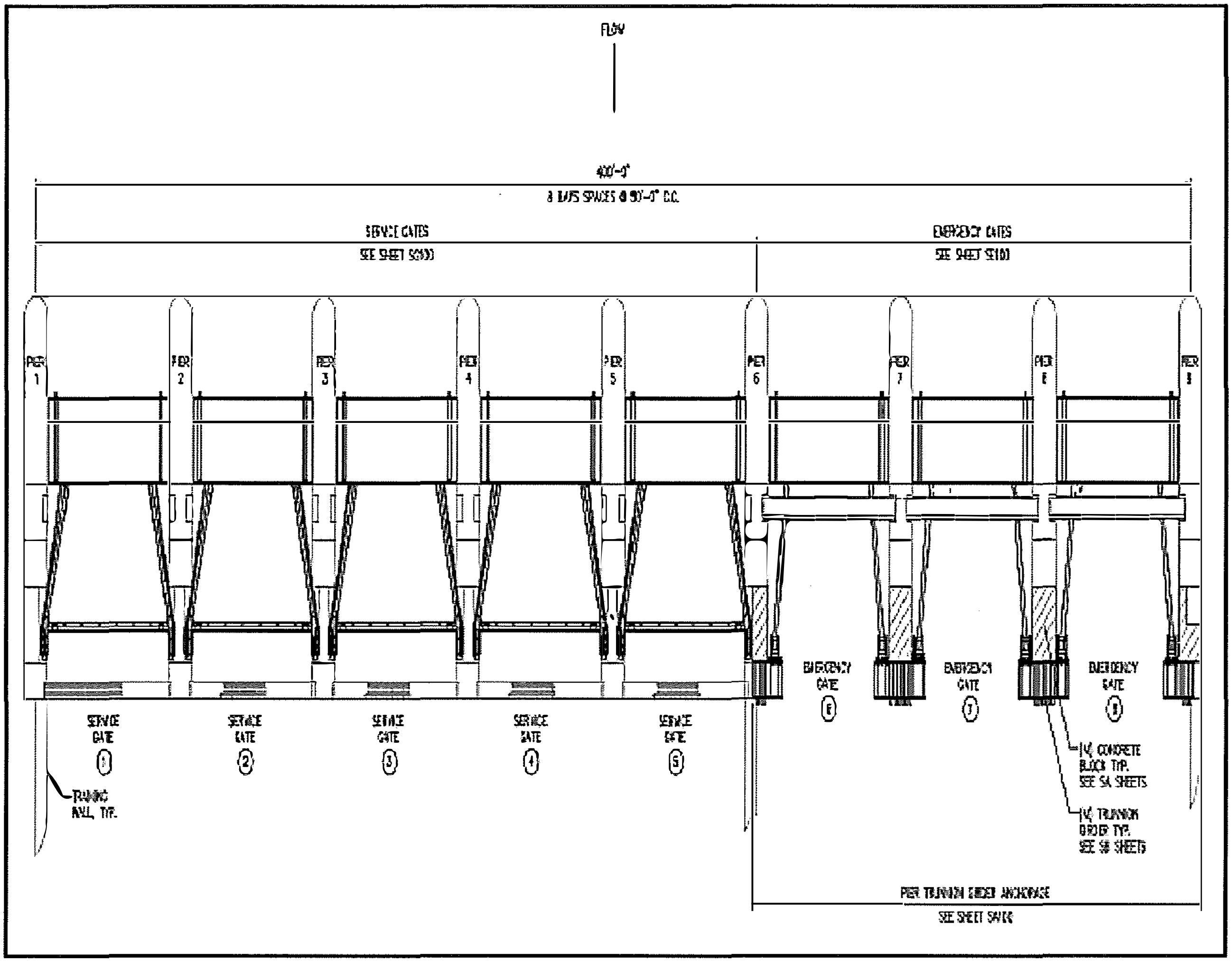

Figure 1. Depiction of main dam tainter gates and associated piers. View from downstream side of dam looking upstream toward dam itself.

Figure 2. Main dam tainter gate refinements: Limits of construction (red lines), construction staging areas (blue lines), and construction access route (orange lines).

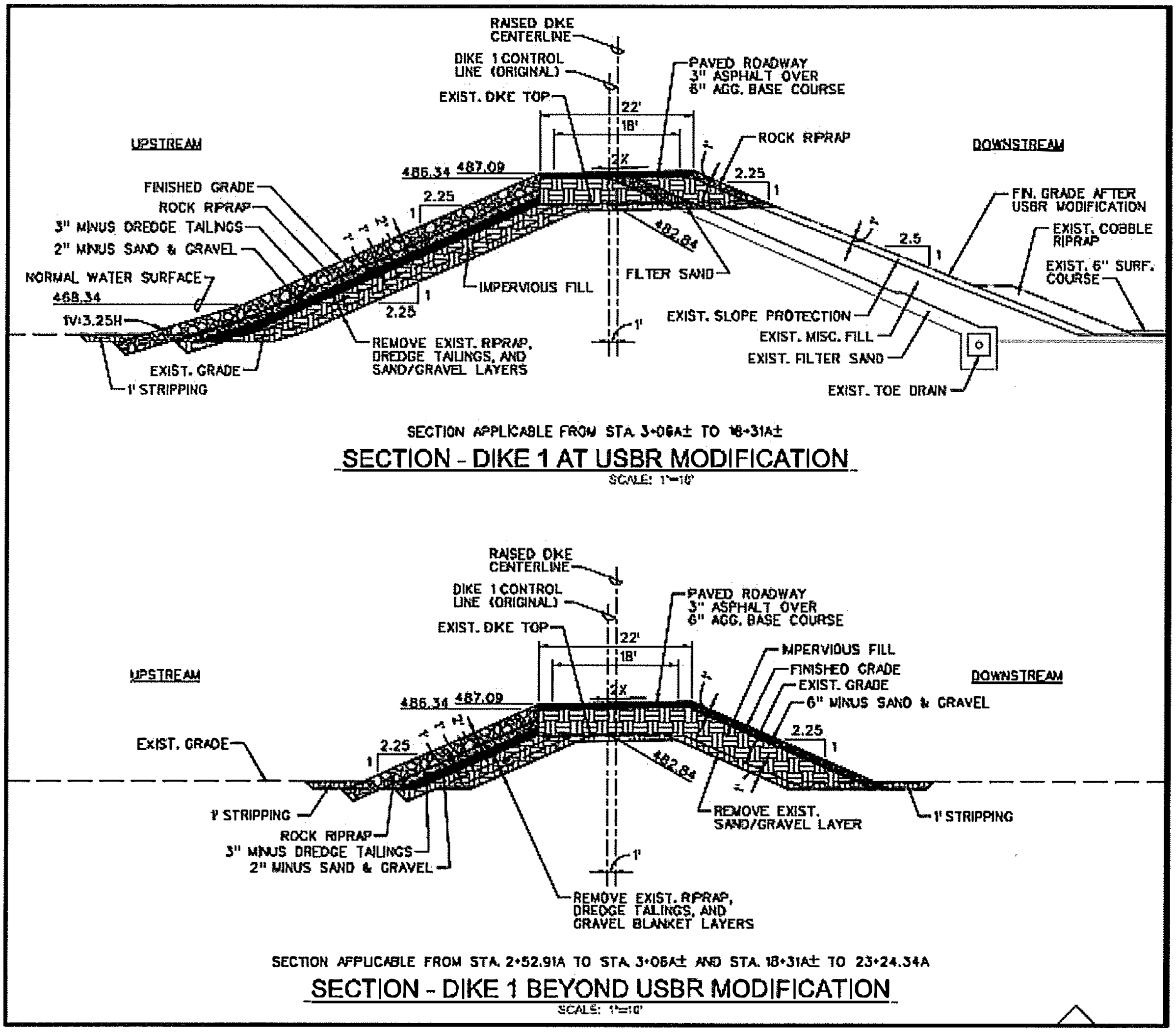

Figure 3. Preliminary typical cross section for 3.5-foot raise at Dike 1.

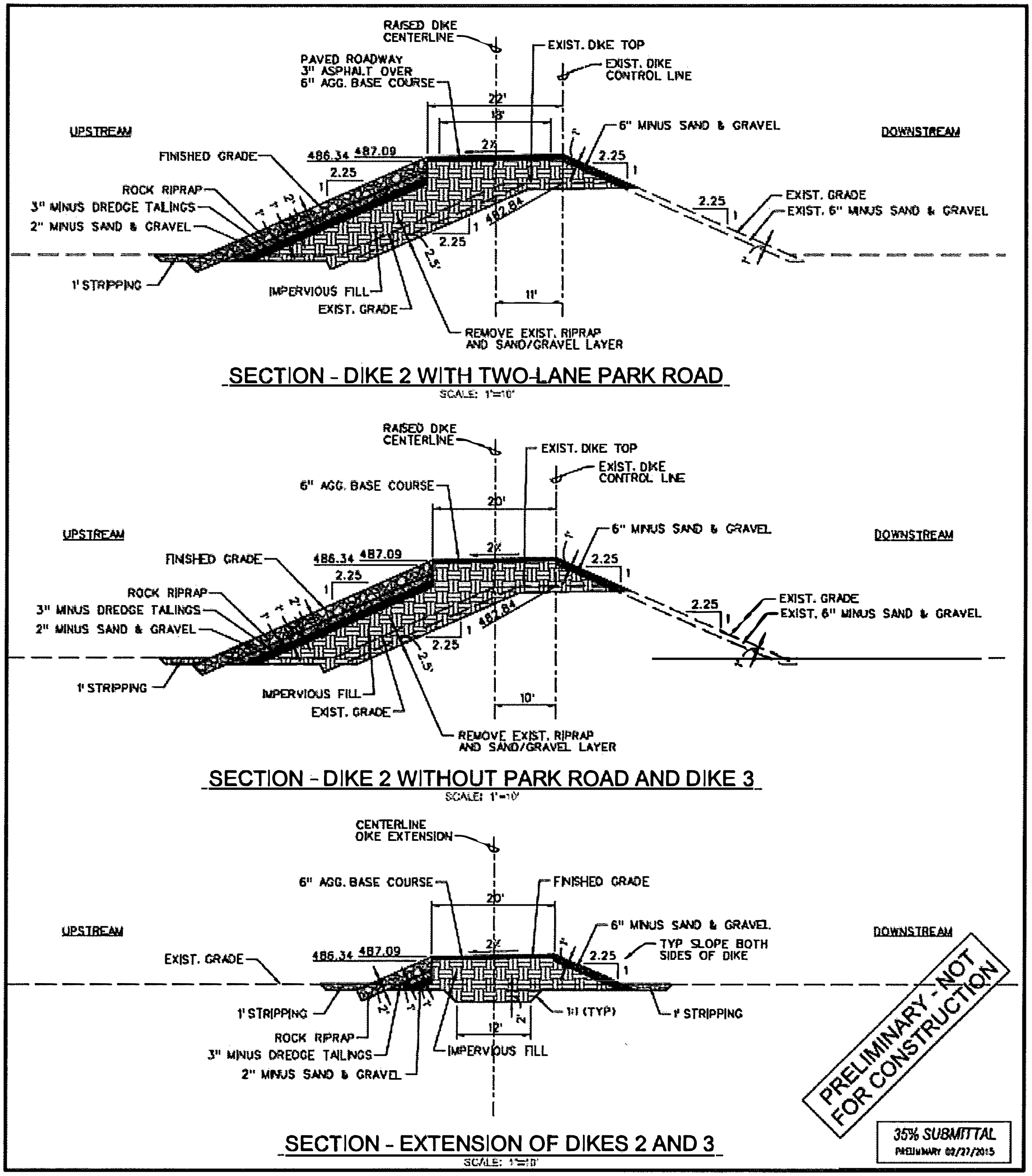

Figure 4. Preliminary typical cross sections for 3.5-foot raise at Dike 2 and Dike 3.

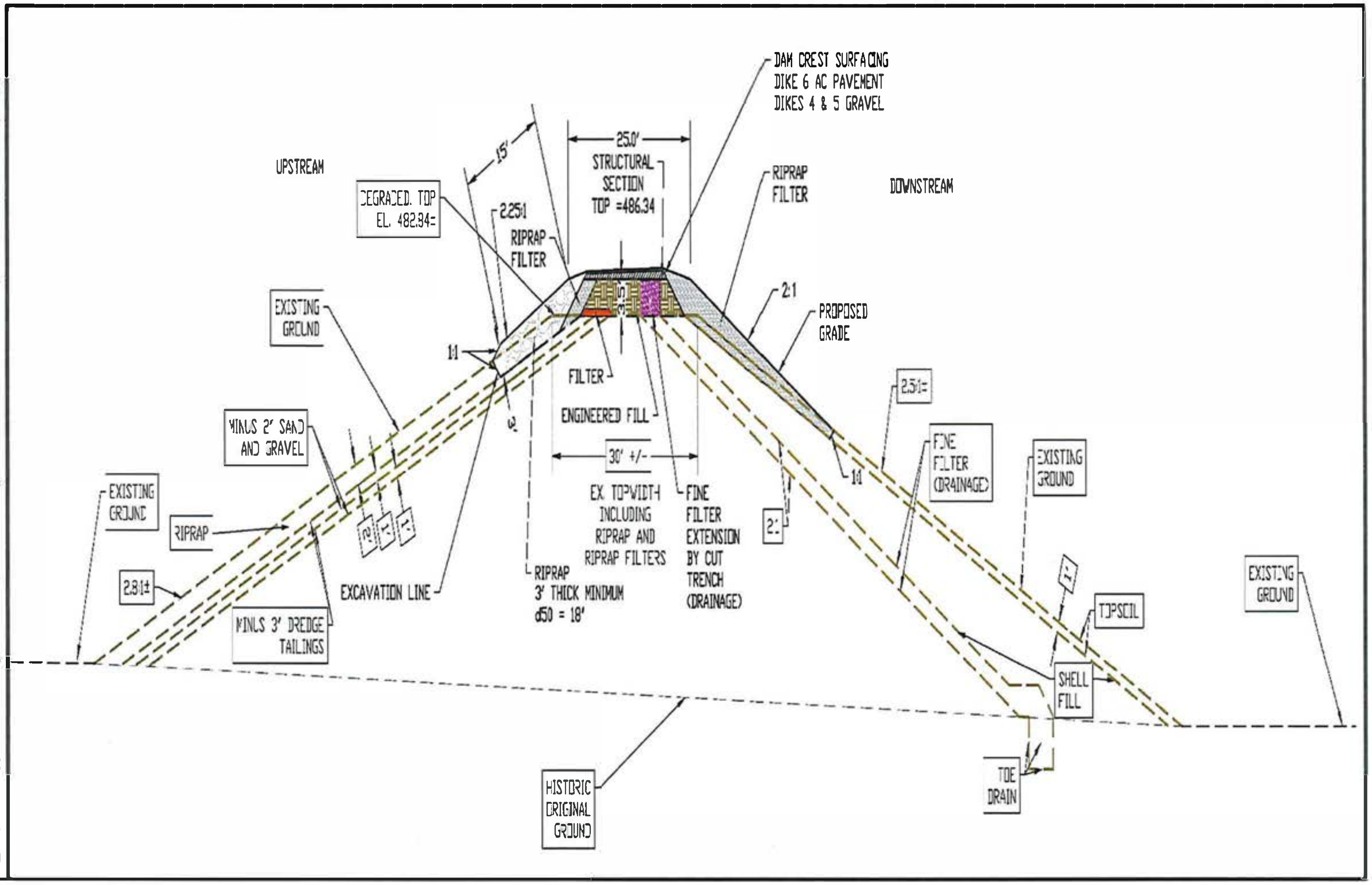

Figure 5. Preliminary typical cross section for 3.5-foot raise at Dikes 4, 5, and 6.

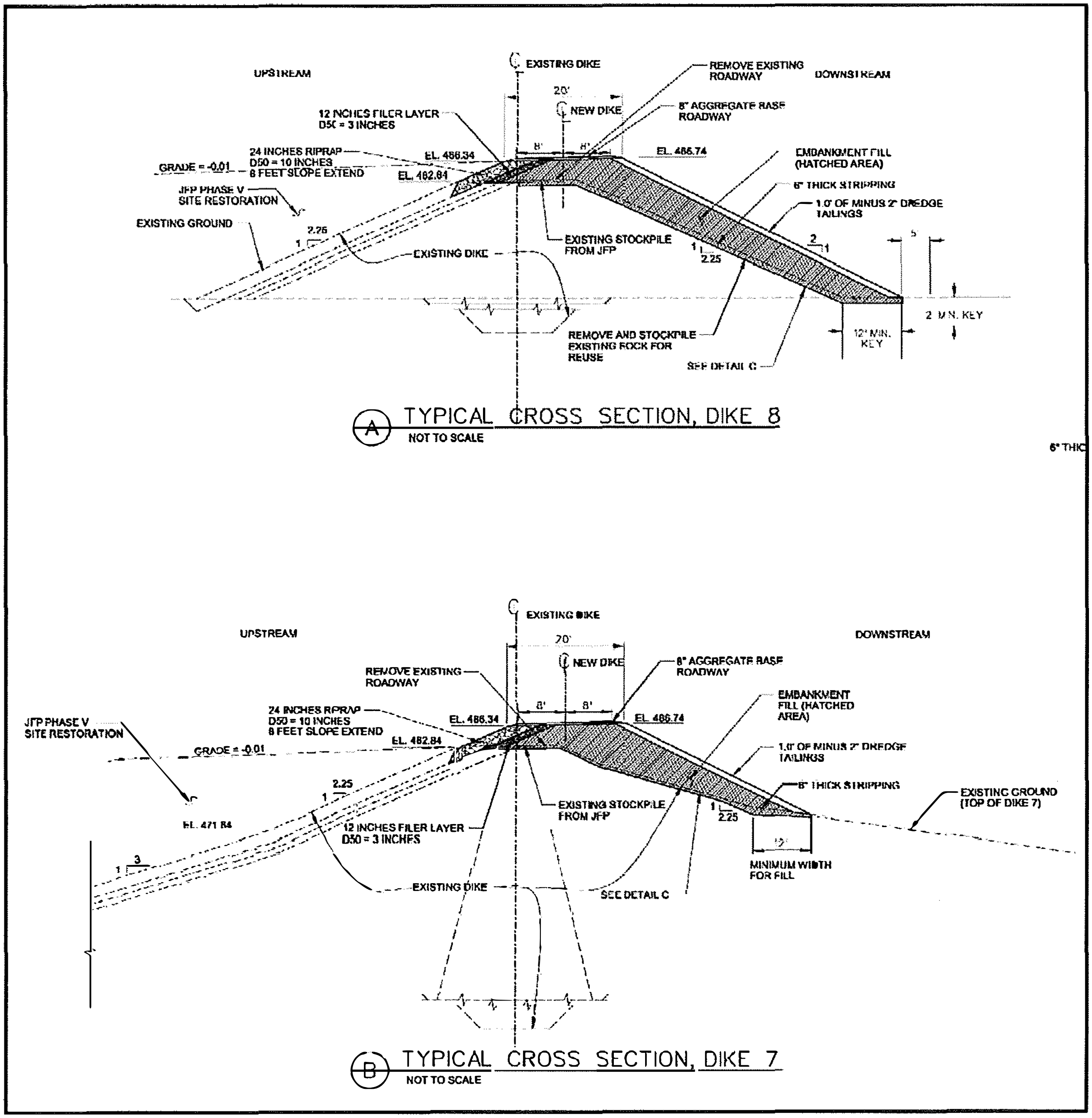

Figure 6. Preliminary typical cross sections for 3.5-foot raise of Dike 7and Dike 8.

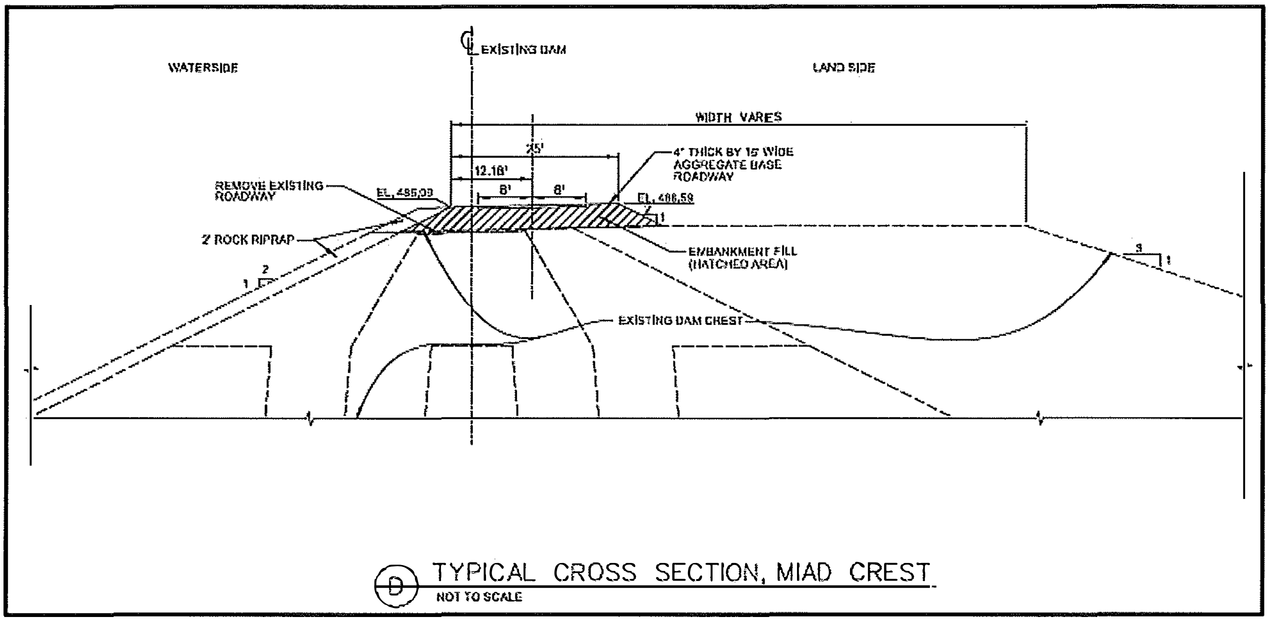

Figure 7. Preliminary typical cross section for 3.5-foot raise at Mormon Island Auxiliary Dam (MIAD).

Figure 8. Staging areas, access points, and haul routes associated with Dikes 1, 2, and 3.

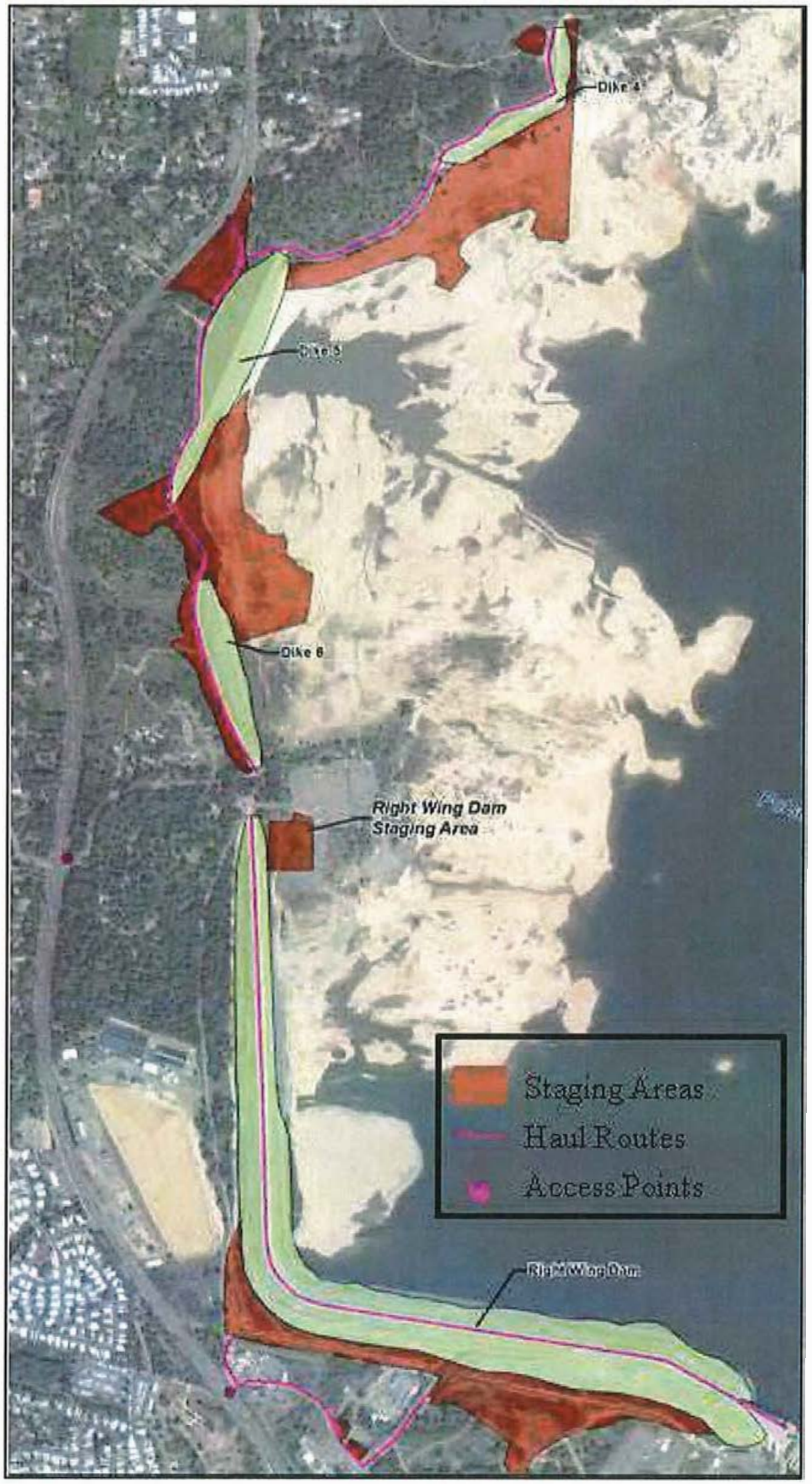

Figure 9. Staging areas, access points, and haul roads associated with Dikes 4, 5, and 6, as well as Right Wing Dam.

Figure 10. Staging areas, access points, and haul roads associated with Dikes 7 and 8, as well as the Left Wing Dam.

Figure 11. Staging areas, access points, and haul roads associated with Mormon Island Auxiliary Dam (MIAD).

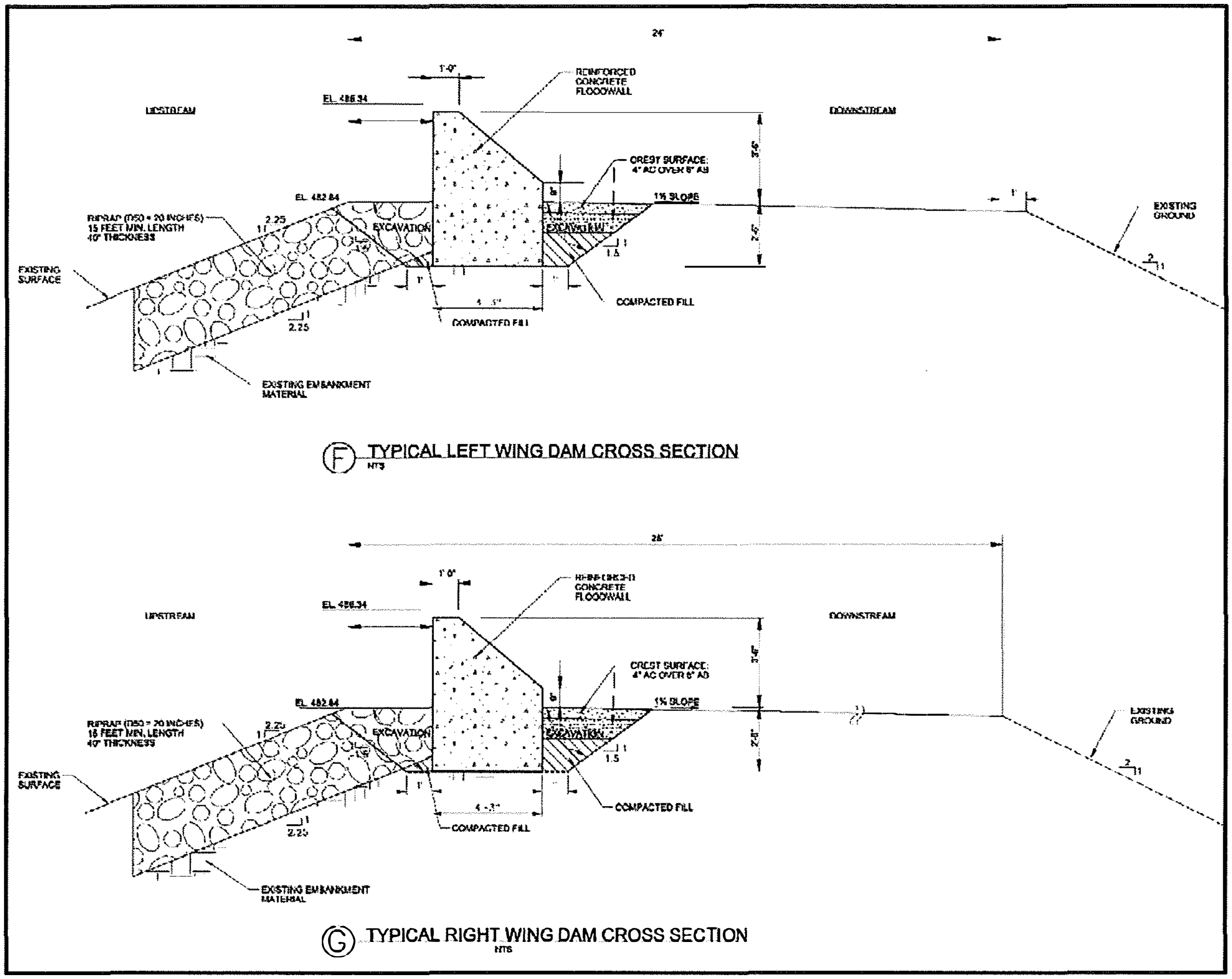

Figure 12. Preliminary typical cross sections for new floodwalls at the Left Wing Dam and the Right Wing Dam.

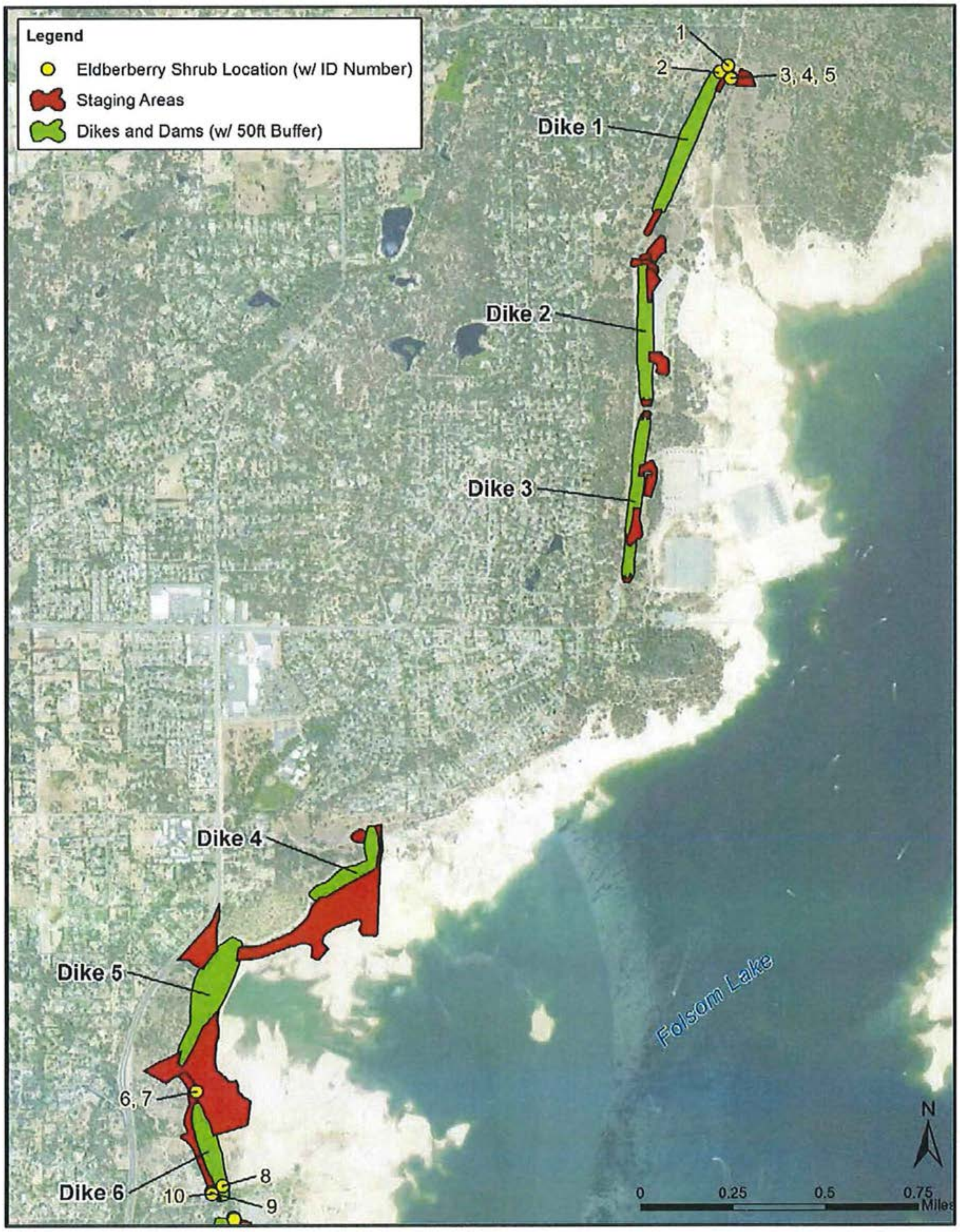

Figure 13. Approximate locations of existing elderberry shrubs located within or near the Folsom Dam Raise project features. Northern portion of project.

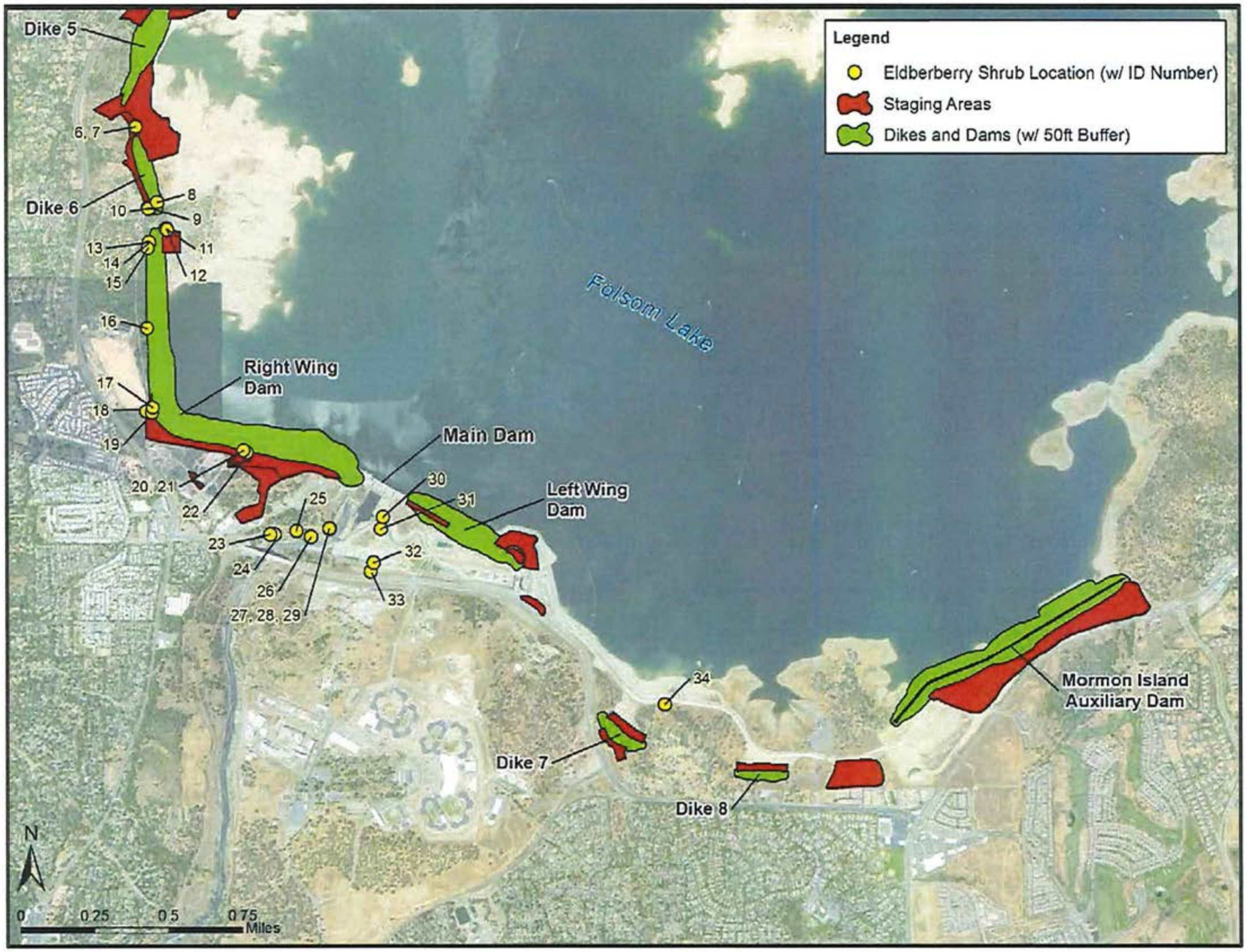

Figure 14. Approximate locations of existing elderberry shrubs located within or near the Folsom Dam Raise project features. Southern portion of project.

APPENDIX E

AIR QUALITY EMISSIONS

APPENDIX E

PART 1

AIR QUALITY EMISSIONS ESTIMATES WITHOUT MITIGATION

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 8.1.0

Tainter Gate Refinements: Emissions Without Mitigation

Daily Emission Estimates for -> Tainter Gates WITHOUT MITIGATION

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	2.76	15.22	33.45	16.46	1.46	15.00	4.40	1.28	3.12	0.05	5,158.03	0.80	0.09	5,205.36
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	2.76	15.22	33.45	16.46	1.46	15.00	4.40	1.28	3.12	0.05	5,158.03	0.80	0.09	5,205.36
Total (tons/construction project)	1.72	9.50	20.87	10.27	0.91	9.36	2.75	0.80	1.95	0.03	3,218.61	0.50	0.06	3,248.14

Notes:	
Project Start Year ->	2017
Project Length (months) ->	48
Total Project Area (acres) ->	23
Maximum Area Disturbed/Day (acres) ->	2
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	0	0	0	0	0	0
Grading/Excavation	0	0	480	0	480	13
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0
Paving	0	0	0	0	0	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Tainter Gates WITHOUT MITIGATION

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	1.72	9.50	20.87	10.27	0.91	9.36	2.75	0.80	1.95	0.03	3,218.61	0.50	0.06	2,946.70
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	1.72	9.50	20.87	10.27	0.91	9.36	2.75	0.80	1.95	0.03	3218.61	0.50	0.06	2,946.70
Total (tons/construction project)	1.72	9.50	20.87	10.27	0.91	9.36	2.75	0.80	1.95	0.03	3218.61	0.50	0.06	2,946.70

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 8.1.0

Dikes 4, 5, & 6 (WP1): Emissions Without Mitigation

Daily Emission Estimates for -> Dikes 4, 5, & 6 (WP1) WITHOUT MITIGATION

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	1.64	12.48	21.69	30.87	0.87	30.00	6.97	0.73	6.24	0.04	4,194.06	0.69	0.08	4,236.51
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	1.64	12.48	21.69	30.87	0.87	30.00	6.97	0.73	6.24	0.04	4,194.06	0.69	0.08	4,236.51
Total (tons/construction project)	0.51	3.89	6.77	9.63	0.27	9.36	2.18	0.23	1.95	0.01	1,308.55	0.22	0.03	1,321.79

Notes:

Project Start Year ->	2017
Project Length (months) ->	24
Total Project Area (acres) ->	29
Maximum Area Disturbed/Day (acres) ->	3
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	0	0	0	0	0	0
Grading/Excavation	146	0	480	0	180	28
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0
Paving	0	0	0	0	0	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Dikes 4, 5, & 6 (WP1) WITHOUT MITIGATION

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	0.51	3.89	6.77	9.63	0.27	9.36	2.18	0.23	1.95	0.01	1,308.55	0.22	0.03	1,199.12
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	0.51	3.89	6.77	9.63	0.27	9.36	2.18	0.23	1.95	0.01	1308.55	0.22	0.03	1,199.12
Total (tons/construction project)	0.51	3.89	6.77	9.63	0.27	9.36	2.18	0.23	1.95	0.01	1308.55	0.22	0.03	1,199.12

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 8.1.0

LWD, RWD, Dikes 7 & 8, MIAD (WP2): Emissions Without Mitigation

Daily Emission Estimates for -> LWD, RWD, Dikes 7 & 8, MIAD (WP 2) WITHOUT MITIGATION Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	10.06	60.53	103.36	138.80	3.80	135.00	31.42	3.34	28.08	0.23	22,800.90	6.01	0.30	23,041.49
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	10.06	60.53	103.36	138.80	3.80	135.00	31.42	3.34	28.08	0.23	22,800.90	6.01	0.30	23,041.49
Total (tons/construction project)	3.14	18.88	32.25	43.31	1.19	42.12	9.80	1.04	8.76	0.07	7,113.88	1.87	0.09	7,188.94

Notes:

Project Start Year ->	2019
Project Length (months) ->	24
Total Project Area (acres) ->	143
Maximum Area Disturbed/Day (acres) ->	14
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	0	0	0	0	0	0
Grading/Excavation	329	0	1,020	0	420	67
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0
Paving	0	0	0	0	0	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> LWD, RWD, Dikes 7 & 8, MIAD (WP 2) WITHOUT MITIGATION Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	3.14	18.88	32.25	43.31	1.19	42.12	9.80	1.04	8.76	0.07	7,113.88	1.87	0.09	6,521.77
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	3.14	18.88	32.25	43.31	1.19	42.12	9.80	1.04	8.76	0.07	7113.88	1.87	0.09	6,521.77
Total (tons/construction project)	3.14	18.88	32.25	43.31	1.19	42.12	9.80	1.04	8.76	0.07	7113.88	1.87	0.09	6,521.77

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 8.1.0

Dikes 1, 2, & 3 (WP3): Emissions Without Mitigation

Daily Emission Estimates for -> Dikes 1, 2, & 3 (WP3) WITHOUT MITIGATION Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	1.34	9.24	18.88	30.69	0.69	30.00	6.78	0.54	6.24	0.04	4,481.84	0.58	0.10	4,527.06
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	1.34	9.24	18.88	30.69	0.69	30.00	6.78	0.54	6.24	0.04	4,481.84	0.58	0.10	4,527.06
Total (tons/construction project)	0.42	2.88	5.89	9.58	0.22	9.36	2.12	0.17	1.95	0.01	1,398.33	0.18	0.03	1,412.44

Notes: Project Start Year -> 2018
Project Length (months) -> 24
Total Project Area (acres) -> 31
Maximum Area Disturbed/Day (acres) -> 3
Water Truck Used? -> Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	0	0	0	0	0	0
Grading/Excavation	209	0	660	0	240	27
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0
Paving	0	0	0	0	0	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Dikes 1, 2, & 3 (WP3) WITHOUT MITIGATION Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	0.42	2.88	5.89	9.58	0.22	9.36	2.12	0.17	1.95	0.01	1,398.33	0.18	0.03	1,281.36
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	0.42	2.88	5.89	9.58	0.22	9.36	2.12	0.17	1.95	0.01	1398.33	0.18	0.03	1,281.36
Total (tons/construction project)	0.42	2.88	5.89	9.58	0.22	9.36	2.12	0.17	1.95	0.01	1398.33	0.18	0.03	1,281.36

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

APPENDIX E

PART 2

AIR QUALITY EMISSIONS WITH MITIGATION

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 8.1.0

Tainter Gate Refinements: With Mitigation

Daily Emission Estimates for -> Tainter Gates WITH MITIGATION Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	1.05	18.53	3.54	15.25	0.25	15.00	3.27	0.15	3.12	0.05	5,085.83	0.79	0.09	5,131.89
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	1.05	18.53	3.54	15.25	0.25	15.00	3.27	0.15	3.12	0.05	5,085.83	0.79	0.09	5,131.89
Total (tons/construction project)	0.65	11.56	2.21	9.52	0.16	9.36	2.04	0.09	1.95	0.03	3,173.56	0.50	0.05	3,202.30

Notes:
Project Start Year -> 2017
Project Length (months) -> 48
Total Project Area (acres) -> 23
Maximum Area Disturbed/Day (acres) -> 2
Water Truck Used? -> Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	0	0	0	0	0	0
Grading/Excavation	0	0	480	0	480	13
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0
Paving	0	0	0	0	0	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Tainter Gates WITH MITIGATION Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	0.65	11.56	2.21	9.52	0.16	9.36	2.04	0.09	1.95	0.03	3,173.56	0.50	0.05	2,905.11
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	0.65	11.56	2.21	9.52	0.16	9.36	2.04	0.09	1.95	0.03	3173.56	0.50	0.05	2,905.11
Total (tons/construction project)	0.65	11.56	2.21	9.52	0.16	9.36	2.04	0.09	1.95	0.03	3173.56	0.50	0.05	2,905.11

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 8.1.0

Dikes 4, 5, & 6 (WP1): With Mitigation

Daily Emission Estimates for -> Dikes 4, 5, & 6 (WP1) WITH MITIGATION Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	0.77	15.20	3.08	30.20	0.20	30.00	6.35	0.11	6.24	0.04	4,112.10	0.69	0.08	4,153.16
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	0.77	15.20	3.08	30.20	0.20	30.00	6.35	0.11	6.24	0.04	4,112.10	0.69	0.08	4,153.16
Total (tons/construction project)	0.24	4.74	0.96	9.42	0.06	9.36	1.98	0.04	1.95	0.01	1,282.97	0.21	0.02	1,295.78

Notes:
Project Start Year -> 2017
Project Length (months) -> 24
Total Project Area (acres) -> 29
Maximum Area Disturbed/Day (acres) -> 3
Water Truck Used? -> Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	0	0	0	0	0	0
Grading/Excavation	146	0	480	0	180	28
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0
Paving	0	0	0	0	0	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Dikes 4, 5, & 6 (WP1) WITH MITIGATION Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	0.24	4.74	0.96	9.42	0.06	9.36	1.98	0.04	1.95	0.01	1,282.97	0.21	0.02	1,175.53
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	0.24	4.74	0.96	9.42	0.06	9.36	1.98	0.04	1.95	0.01	1282.97	0.21	0.02	1,175.53
Total (tons/construction project)	0.24	4.74	0.96	9.42	0.06	9.36	1.98	0.04	1.95	0.01	1282.97	0.21	0.02	1,175.53

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 8.1.0

LWD, RWD, Dikes 7 & 8, MIAD (WP2): With Mitigation

Daily Emission Estimates for -> LWD, RWD, Dikes 7 & 8, MIAD (WP2) WITH MITIGATION

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	6.07	104.86	15.32	135.87	0.87	135.00	28.73	0.65	28.08	0.23	22,658.06	6.00	0.30	22,895.99
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	6.07	104.86	15.32	135.87	0.87	135.00	28.73	0.65	28.08	0.23	22,658.06	6.00	0.30	22,895.99
Total (tons/construction project)	1.89	32.72	4.78	42.39	0.27	42.12	8.96	0.20	8.76	0.07	7,069.31	1.87	0.09	7,143.55

Notes:
Project Start Year -> 2019
Project Length (months) -> 24
Total Project Area (acres) -> 143
Maximum Area Disturbed/Day (acres) -> 14
Water Truck Used? -> Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	0	0	0	0	0	0
Grading/Excavation	329	0	1,020	0	420	67
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0
Paving	0	0	0	0	0	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> LWD, RWD, Dikes 7 & 8, MIAD (WP2) WITH MITIGATION

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	1.89	32.72	4.78	42.39	0.27	42.12	8.96	0.20	8.76	0.07	7,069.31	1.87	0.09	6,480.59
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	1.89	32.72	4.78	42.39	0.27	42.12	8.96	0.20	8.76	0.07	7069.31	1.87	0.09	6,480.59
Total (tons/construction project)	1.89	32.72	4.78	42.39	0.27	42.12	8.96	0.20	8.76	0.07	7069.31	1.87	0.09	6,480.59

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 8.1.0

Dikes 1, 2, & 3 (WP3): With Mitigation

Daily Emission Estimates for -> Dikes 1, 2, & 3 (WP3) WITH MITIGATION

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	0.69	11.70	3.42	30.24	0.24	30.00	6.36	0.12	6.24	0.04	4,377.73	0.57	0.10	4,421.14
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	0.69	11.70	3.42	30.24	0.24	30.00	6.36	0.12	6.24	0.04	4,377.73	0.57	0.10	4,421.14
Total (tons/construction project)	0.22	3.65	1.07	9.43	0.07	9.36	1.99	0.04	1.95	0.01	1,365.85	0.18	0.03	1,379.40

Notes:

Project Start Year ->	2018
Project Length (months) ->	24
Total Project Area (acres) ->	31
Maximum Area Disturbed/Day (acres) ->	3
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	0	0	0	0	0	0
Grading/Excavation	209	0	660	0	240	27
Drainage/Utilities/Sub-Grade	0	0	0	0	0	0
Paving	0	0	0	0	0	0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Dikes 1, 2, & 3 (WP3) WITH MITIGATION

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	0.22	3.65	1.07	9.43	0.07	9.36	1.99	0.04	1.95	0.01	1,365.85	0.18	0.03	1,251.38
Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	0.22	3.65	1.07	9.43	0.07	9.36	1.99	0.04	1.95	0.01	1365.85	0.18	0.03	1,251.38
Total (tons/construction project)	0.22	3.65	1.07	9.43	0.07	9.36	1.99	0.04	1.95	0.01	1365.85	0.18	0.03	1,251.38

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

APPENDIX F

LOCAL NOISE STANDARDS

City of Folsom, Sacramento County, Placer County, and El Dorado County

Table A. City of Folsom Noise Ordinance Standards.*

		Noise Levels not to be Exceeded in Residential Zone (dBA)**	
Maximum Time of Exposure	**Noise Metric**	**7 a.m. to 10 p.m. (daytime)**	**10 p.m. to 7 a.m. (nighttime)**
Exterior Noise Standards			
30 Minutes/Hour	L50	50	45
15 Minutes/Hour	L25	55	50
5 Minutes/Hour	L8.3	60	55
1 Minute/Hour	L1.7	65	60
Any period of time	Lmax	70	65
Interior Noise Standards			
5 Minutes/Hour	L8.3	45	35
1 Minute/Hour	L1.7	50	40
Any period of time	Lmax	55	45

*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, Table 8.42.040

Table B. Sacramento County Noise Ordinance Standards.

		Noise Levels Not to Be Exceeded in Residential Zone (dBA)**	
Maximum Time of Exposure	**Noise Metric**	**7am to 10pm (daytime)**	**10pm to 7am (nighttime)**
Exterior Noise Standards			
30 Minutes/Hour	L_{50}	55	50
15 Minutes/Hour	L_{25}	60	55
5 Minutes/Hour	$L_{8.3}$	65	60
1 Minute/Hour	$L_{1.7}$	70	65
Any period of time	L_{max}	75	75
Interior Noise Standards			
5 Minutes/Hour	$L_{8.3}$	-	-
1 Minute/Hour	$L_{1.7}$	-	-
Any period of time	L_{max}	-	-

*Construction Noise Exemption Times: 6:00 a.m. - 8:00 p.m. Weekdays
7:00 a.m. - 8:00 p.m. Weekends
** dBA reduction for impact noise during non-exempt times
Source: Sacramento County Municipal Code, Chapter 6.68.070

Table C. Placer County Noise Ordinance Standards.*

	Noise Levels not to be Exceeded in Residential Zone (dBA)**	
Sound Level Descriptor	**7 a.m. to 10 p.m. (daytime)**	**10 p.m. to 7 a.m. (nighttime)**
Hourly Leq	55	45
Any Period of Time (L_{max})	70	65

*Construction Noise Exemption Times: 6:00 a.m. – 8:00 p.m. Weekdays
8:00 a.m. – 8:00 p.m. Weekends

**5 dBA reduction for impact noise during non-exempt times
SOURCE: Placer County Code, Chapter 9.36.

Table D. Summary of Maximum Allowable Exterior Noise Standards (Non-Transportation Sources) Noise Standards in the Relevant Jurisdictions.

Noise Element Jurisdiction	Maximum Allowable Exterior Noise Levels (Lmax dB)
City of Folsom	Daytime (7am-10pm) = 70 Nighttime (10pm-7am) = 65
Sacramento County	*For Residential Areas:* Daytime (7am-10pm) = 75 Nighttime (10pm-7am) = 70
El Dorado County	*For Rural Residential Areas:* Daytime (7am-7pm) = 75 Evening (7pm-10pm) = 65 Nighttime (10pm-7am) = 55 *For Non-Rural Residential Areas:* Daytime (7am-7pm) = 75 Evening (7pm-10pm) = 65 Nighttime (10pm-7am) = 60
Placer County including Granite Bay Community	Daytime (7am-10pm) = 70 Nighttime (10pm-7am) = 65

Sources:
County of Sacramento General Plan Noise Element (December 1993, amended 1998)
City of Folsom Municipal Code, Chapter 8.42 Noise Control
El Dorado County General Plan, Public Health, Safety and Noise Element (July 2004)
Placer County General Plan Update, Section 9 Noise (August 1994)
Granite Bay Community Plan Noise Element (Amended 1996, Updated 2012)

APPENDIX G

CULTURAL RESOURCES

Folsom Dam Raise Project Section 106 Consultation Record with Native American Tribes and Interested Parties*

***May not include all communication for project.**

Date	Type of Contact	Organization	Person Contacted	Contents of Communication
1/29/2014	Outgoing Email	United Auburn Indian Community (UAIC)	Marcos Guerrero	Requested that if the UAIC is interested in meeting to discuss a Programmatic Agreement for future Corps Section 106 undertakings at Folsom Dam and Lake to send three available dates in February.
1/29/2014	Incoming Email	UAIC	Marcos Guerrero	In response to email above, proposed February 12, 14, or 21.
1/29/2014	Outgoing Email	UAIC	Marcos Guerrero	Response to Mr. Guerrero's proposed dates for a meeting to discuss Programmatic Agreement for future Corps Section 106 undertakings at Folsom, asked who UAIC would like to attend (other tribes or individuals) and who at the Corps should attend.
1/29/2014	Incoming Email	UAIC	Marcos Guerrero	In response to email above asking about who should attend meeting to discuss Programmatic Agreement, will ask the committee and reply back on 1/30/14.
1/30/2014	Outgoing Email	UAIC, Shingle Springs Band of Miwok Indians (SSBMI), Tsi-Akim Maidu (TAM), Wilton Rancheria (WR)	Marcos Guerrero, Jason Camp, Andrew Godsey, Daniel Fonseca, Steven Hutchason, Grayson Coney	Provided public meeting letter with dates, times, and locations of the Folsom Dam Raise public meetings on 2/19/14 and 2/24/14.
2/21/2014	Outgoing Email	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Andrew Godsey, Daniel Fonseca, Steven Hutchason, Grayson Coney	Proposed meeting dates in March on 3/19, 3/25, or 3/31 for meeting to discuss the Corps' Section 106 undertakings at Folsom: Water Control Manual, Dam Raise. Proposed general agenda to provide information on the projects, project schedules, the Corps' plan to comply with Section 106, and hear the tribes' concerns, areas of interest, how they want to be involved.
2/24/2014	Incoming Email	UAIC	Marcos Guerrero	Response from Mr. Guerrero that 3/31/14 would be best for a meeting with the UAIC, but all dates presently available.
2/24/2014	Outgoing Email	UAIC	Marcos Guerrero	Acknowledgement of email received 2/24/14, will follow up once additional information and responses received.
2/26/2014	Outgoing Email	SSBMI, TAM, WR	Andrew Godsey, Daniel Fonseca, Steven Hutchason, Grayson Coney	Follow up to email sent 2/24/14 to ask tribes who have not responded for their availability on 3/19, 3/25, or 3/31. Asked for a response in order to schedule a meeting by the end of the week (2/28/14).

Date	Type of Contact	Organization	Person Contacted	Contents of Communication
2/28/2014	Outgoing Meeting Invitation	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Andrew Godsey, Daniel Fonseca, Steven Hutchason, Grayson Coney	Meeting invitation sent to tribes to request a meeting on 3/19/14 at DWR offices to discuss Corps Section 106 undertakings at Folsom (Water Control Manual and Dam Raise).
2/28/2014	Incoming Email	UAIC	Marcos Guerrero	Mr. Guerrero accepted meeting invitation for 3/19/14.
3/4/2014	Incoming Email	UAIC	Melodi McAdams	Ms. McAdams accepted meeting invitation for 3/19/14.
3/13/2014	Outgoing Meeting Invitation	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Andrew Godsey, Daniel Fonseca, Steven Hutchason, Grayson Coney	Meeting update for meeting invitation sent 2/28/14, stating that United Auburn has RSVPed, and that if other tribal representatives are not available to get in touch with Melissa Montag to schedule another date and time for a meeting.
3/13/2014	Incoming Email	SSBMI	Andrew Godsey	Mr. Godsey accepted meeting invitation for 3/19/14.
3/19/2014	Incoming Email	WR	Steven Hutchason	Mr. Hutchason accepted meeting invitation for 3/19/14.
3/19/2014	Meeting	UIAC, SSBMI, WR	Marcos Guerrero, Jason Camp, Andrew Godsey, Kara Perry, Steven Hutchason	Meeting held with Native American tribal representatives, the Bureau of Reclamation, California Department of Water Resources to discuss the Corps' Section 106 undertakings at Folsom (Water Control Manual and Dam Raise).
3/20/2014	Outgoing Email	UIAC, SSBMI, WR	Marcos Guerrero, Jason Camp, Andrew Godsey, Kara Perry, Steven Hutchason	Forwarded Reclamation Sedimentation Survey from 2005 for Folsom Lake and Dam, as requested during 3/19/14 meeting.
7/22/2014	Incoming Email	UAIC	Marcos Guerrero	Email from Mr. Guerrero with subject line "Folsom Dam Safety Project" indicated the UAIC is "under the impression the that project will definitely have an adverse effect on historic properties, human remains, and funerary objects." Referenced a July 16 letter for the supplemental V EA/DEIR and asked about the progress of the proposed PA.

Date	Type of Contact	Organization	Person Contacted	Contents of Communication
7/22/2014	Outgoing Email	UAIC	Marcos Guerrero, Jason Camp	Response to 7/22/14 email from Mr. Guerrero asking if he is referring to the JFP Phase IV project and asking if UAIC believes historic properties will be adversely affect by the JFP that UAIC identify which historic properties within the JFP APE and how UAIC has determined the JFP will be adversely affecting those historic properties. Due to the many projects at Folsom, Ms. Montag responded to try and clarify which project Mr. Guerrero is referring to. Ms. Montag clarified that Dam Safety is specifically Reclamation's authority at Folsom and that a PA for the Dam Raise and Water Control Manual projects is still in progress and that UAIC's interest is known and they will be re-engaged with when there is additional information to provide. Offered to discuss by phone if there are further questions.

Date	Type of Contact	Organization	Person Contacted	Contents of Communication
1/13/2015	Outgoing Letter	Strawberry Valley Rancheria (SVR), California Valley Miwok Tribe, Ione Band of Miwok Indians (IBMI), UAIC, Yocha Dehe Wintun Nation, Tsi-Akim Maidu, Colfax-Todds Consolidated Tribe, Jackson Rancheria Band of Miwuk Indians, Mechoopda Indian Tribe of Chico Rancheria (Mechoopda), El Dorado Miwok Tribe, SSBMI, WR, Buena Vista Rancheria (BVR), Cachil DeHe Band of Wintun Indians of the Colusa Indian Community of the Colusa Rancheria, Enterprise Rancheria of Maidu Indians (ERMI), Mooretown Rancheria of Maidu Indians, Nashville-El Dorado Miwok, Cortina Wintun Environmental Protection Agency	Cathy Bishop, Silvia Burley, Anthony Burris, Jason Camp, Cynthia Clarke, Grayson Coney, Pamela Cubbler, Adam Dalton, Michael DeSpain, Rose Enos, Kesner Flores, Nicholas Fonseca, Daniel Fonseca, Andrew Franklin, Reno Franklin, Andrew Godsey, Marcos Guerrero, Steven Hutchason, Leland Kinter, Roselynn Lwenya, Judith Marks, Marshall McKay, Yvonne Miller, Ambar Mohammed, Eileen Moon, Glenda Nelson, April Wallace Moore, Rhonda Pope, Dennis Ramirez, Don Ryberg, Guy Taylor, Cosme Valdez, Gene Whitehouse, Charlie Wright, Randy Yonemura	Letters sent to Native American Tribes invited them to open forum meetings scheduled for 1/26/15 and 2/2/15 at locations in downtown Sacramento and Folsom. Letters included project descriptions for Folsom Dam Raise and Water Control Manual Update projects, information on partners on project, project purpose and description, maps of preliminary APEs.

Date	Type of Contact	Organization	Person Contacted	Contents of Communication
1/14/2015	Outgoing Email	SVR, UAIC, TAM, Mechoopda, IBMI, SSBMI, ERMI, WR, BVR	Cathy Bishop, Jason Camp, Grayson Coney, Michael DeSpain, Randy Yonemura, Kesner Flores, Yvonne Miller, Daniel Fonseca, Andrew Godsey, Kara Perry, Cynthia Franco, Reno Franklin, Marcos Guerrero, Steven Hutchason, Roselynn Lwenya, Rhonda Pope	Email transmittal to available email addresses of 1/13/15 letter.
1/14/2015	Incoming Email		Kesner Flores, IBMI	Emails to Mr. Flores and IBMI main email address were returned as undeliverable.
1/16/2015	Incoming Voice Mail	Mechoopda	Mike DeSpain	Left message to refer comments on the projects to UAIC, SSBMI, and BVR.
1/23/2015	Outgoing Email	Mechoopda	Mike DeSpain	In reply to voice message left on 1/16/15, acknowledged that the Corps has also sent information on the projects to UAIC, SSBMI, and BVR and that the tribe has referred comments on those projects to those tribes.
1/26/2015	Open Forum for Tribes	UAIC	Marcos Guerrero, Jason Camp, Donald Rey	Open forum included maps and project information, staff from Department of Water Resources, Bureau of Reclamation, Corps environmental and cultural resources. Three representatives from UAIC were present. They asked questions about the project scope, expressed concerns that the Corps had begun survey and inventory efforts without consulting or notifying the tribes, that the Corps was not operating in a way that was reasonable and in good faith, and expressed concerns that there could be areas of concern within the project and survey areas. Ms. Melissa Montag stated that surveys were undertaken as part of efforts to begin identification of historic properties, that the Corps will continue to work with the tribes within efforts to comply with Section 106, proposed a meeting in the field in March.

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1/28/2015	Incoming Email	UAIC	Marcos Guerrero	Mr. Guerrero reiterated UAIC's concerns about the survey and inventory undertaken without consulting or notifying the tribe, asked for availability for a follow up meeting, asked if it was necessary for the Corps to obtain an ARPA permit, asked how the survey would be reported, and requested contact information for the archeologist conducting the survey at Folsom.
1/29/2015	Outgoing Email	UAIC	Marcos Guerrero, Mark Gilfillan, Donald Rey, Jason Camp, John Williams	In response to 1/28/15 email, proposed three possible dates in March for a site visit to see project area, learn about areas of concern to the tribe, and of any sacred sites or traditional cultural areas. Stated that the Corps is committed to working together with Reclamation, DWR, and tribes on the project and will convey information when it is appropriate. Responded that an ARPA permit was not necessary and the inventory report will be provided when it is completed, a date for which is unknown at this time. Stated that the survey efforts are being conducted by an archeologist meeting the required qualifications and the Corps is not able to provided resume or cell phone as this is private information though the tribe may submit a FOIA request. Asked that questions or information be provided to Ms. Montag or Ms. Jane Rinck.
1/29/2015	Incoming Email	UAIC	Marcos Guerrero	In response to Ms. Montag's email on 1/29/15, Mr. Guerrero stated that it is standard ethical practice to include resumes and qualifications statements in all survey reports, and that most ethical archeologists do not have a problem sharing this information. Unsolicited Mr. Guerrero also included his resume and chart of current projects. Mr. Guerrero further stated that UAIC feels it would be better to wait for the site visit until after the tribe has reviewed the report, requested to know when the report would be completed. He also stated that UAIC considers "these places" (none specifically identified) as significant and eligible for listing in the NRHP, and that operations of Folsom Lake continue to adversely effect the integrity of the resources.

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1/30/2015	Outgoing Email	UAIC	Marcos Guerrero, Mark Gilfillan, Donald Rey, Jason Camp, John Williams	In response to Mr. Guerrero's email on 1/29/15, Ms. Montag stated that if it is UAIC's preference to wait until after the survey report is completed that is acceptable, but if UAIC would like to provide any information for the Corps to consider for inclusion into the survey report (information on sites, prehistoric context, ethnographic context) those would be topics that can be discussed at a meeting in March. The estimated completion date for the survey report is presently late March or early April. Suggested March 3, 4, or 18 to meet.
1/30/2015	Incoming Email	UAIC	Marcos Guerrero	Mr. Guerrero stated he would discuss the invitation from the Corps to provide information into the Corps' survey report with the tribal preservation committee and the UAIC THPO. Further stated: "Per previous discussions, since it would still be possible to have the draft survey updated to include the information we provide, it would probably be best to wait for this time to be sure that our comments and potential areas of concern get included into the final report." Suggested to have the site visit on March 3 to meet the archoelogist for the project and get a project update.
2/2/2015	Outgoing Email	UAIC	Marcos Guerrero, Mark Gilfillan, Donald Rey, Jason Camp, John Williams	In response to Mr. Guerrero's email on 1/30/15, Ms. Montag suggested the tenative March 3rd at 10AM time to meet, and to meet at Beals Point area. Stated that access to Dikes 1-6 would be possible, but if UAIC would like to see wing dams, Dikes 7-8, or MIAD that additional notice would be needed due to active construction and security concerns. Asked if there are additional Corps staff or other members of tribes to invite that UAIC let Ms. Montag know in order to coordinate with them.
2/2/2015	Open Forum for Tribes	None	None	Open forum included maps and project information, staff from Department of Water Resources, Bureau of Reclamation, Corps environmental and cultural resources. There were no attendees from tribes.
2/3/2015	Incoming Email	UAIC	Marcos Guerrero	Asked for confirmation of areas currently under construction.

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2/3/2015	Outgoing Email	UAIC	Marcos Guerrero	Clarified that areas under construction are for the Corps' JFP construction project and provided a map of the current APE where construction activities could be occurring. Also explained that areas around the right and left wing dams are considered high security and require an escort. Provided the information that archeologist who conducted survey for Folsom Dam Raise won't be back in March as planned but suggested still having site visit on March 3rd as planned to hear the tribe's concerns about the project, or the meeting could be deferred to April if the tribe would like to discuss more specifics of the survey. Asked the tribe to respond with their preference.
2/3/2015	Returned Letter	El Dorado Miwok Tribe		Returned 1/13/15 letter as "Unable to forward. Forward expired 2+ years ago."
2/5/2015	Outgoing Meeting Invitation	UAIC	Marcos Guerrero, Jason Camp	Meeting invitation sent to UAIC to meet at Beals Point on 3/3/15, included information that Dikes 1-6 can be visited, update on project will be provided, the Corps is interested in hearing about sites of concern, sacred sites, TCPs.
2/5/2015	Incoming Meeting Acceptance	UAIC	Jason Camp	Accepted 3/3/15 meeting invitation.
2/5/2015	Incoming Meeting Acceptance	UAIC	Marcos Guerrero	Accepted 3/3/15 meeting invitation.
2/5/2015	Returned Letter	Colfax-Todds Valley Consolidated Tribe	Pamela Cubbler	Returned 1/13/15 letter as "Not deliverable as addressed--unable to forward."
2/9/2015	Returned Letter		Kesner Flores	Returned 1/13/15 letter as "Not deliverable as addressed--unable to forward."
3/2/2015	Outgoing Email	UAIC	Marcos Guerrero, Jason Camp	Sent email to remind parties about field visit on 3/3/15.
3/2/2015	Incoming Email	UAIC	Marcos Guerrero	Asked if the archeologist would be present at site visit and if inventory report would be done.

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3/2/2015	Outgoing Email	UAIC	Marcos Guerrero, Jason Camp	In reply to Mr. Guerrero's 3/2/15 email, reiterated from email sent 2/3/15 that due to scheduling conflicts the archeologist who completed the survey will not be able to be present, Corps and Reclamation archeologists will be. Since the tribe has previously stated there are sites of concern, the site visit is an opportunity for the Corps to get information on those sites so they may be considered for inclusion in the survey report, which is not yet completed.
3/2/2015	Incoming Email	UAIC	Marcos Guerrero	In reply to 3/2/15, stated that the UAIC THPO, Jason Camp, would prefer to wait to have the site visit until after reviewing the draft inventory report. Asked if it would be possible for the archeologist who conducted survey to be present at site visit and when report might be complete. Further stated that the tribe is well aware of sites within the Corps' project area, that those properties listed in the tribe's inventory are considered eligible, and that ongoing activities at the reservoir are resulting in adverse effects.
3/3/2015	Outgoing Email	UAIC	Marcos Guerrero, Jason Camp, Mark Gilfillan	Cancelling site visit at the tribe's request, to be rescheduled when the inventory and survey report is complete. Stated that the Corps is not able to provide draft reports for review outside the Corps and that the Corps has been attempting to consult to UAIC to identofy historic properties the Corps should consider for the Dam Raise Project and to include that information in the inventory report. Reiterated that the tribe has expressed they are aware of locations of cultural sites in the project area but is choosing at this time not to participate in the Corps identification efforts. Stated the inventory report will likely be completed mid to late April and the Corps will consult with tribes and SHPO on the findings of the report at that time, and Ms. Montag will be back in touch then to schedule the site visit. Stated again the Corps is interested in information UAIC is willing to share to be considered in the Section 106 process. Stated that the ongoing reservoir opertions and the potential effects to historic properties are under Reclamation authority.

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3/3/2015	Outgoing Letters	UAIC, SSBMI, WR, TAM	Gene Whitehouse, Marcos Guerrero, Jason Camp, Nicholas Fonseca, Daniel Fonseca, Andrew Godsey, Andrew Franklin, Steven Hutchason, Dan Ryberg, Grayson Coney, Eileen Moon	Letters sent to Native American Tribes within project area for Folsom Dam Raise with project description for the Corps' Folsom Dam Project, maps of the preliminarily defined APE, invites consultion from tribe on the project, requests comments on the APE, and any information the tribe may be willing to share to assist the Corps with identifying historic properties.
3/3/2015	Incoming Email	UAIC	Marcos Guerrero, Jason Camp, Mark Gilfillan	In response to email sent 3/3/15, Mr. Guerrero responded that UAIC hopes the Corps would consider effects of the operation of Folsom Dam as negative to cultural resources, and that he recommends Folsom Lake as an archaeological district that should be evaluated as such. Stated he will discuss with UAIC committee how to disclose TCPs for evaluation and asked for a time to discuss this. Further started UAIC has been participating in consultation and that the Corps chose to complete surveys without consulting with the tribe who had expressed an interest to participate. Asked if UAIC would not be able to comment on the survey report. Stated that once the Corps has completed the survey report UAIC can compate locations with the UAIC inventory. Suggested that the Corps is not senstive to handling information on sacred sites and asked if since the project is on federal land if NAGPRA applies. Also stated that UAIC would welcome the Corps' tribal liaison to come and see the tribe's database if USACE needs to confirm information.
3/5/2015	Outgoing Email	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Daniel Fonseca, Andrew Godsey, Kara Perry, Steven Hutchason, Grayson Coney	Email transmittal to available email addressed of 3/3/15 letter. Asked tribe to contact Ms. Montag if they would like to schedule a consultation meeting or have any questions.
3/5/2015	Returned Letter	TAM	Eileen Moon, Don Ryberg	Letters dated 3/3/15 to Ms. Moon and Mr. Ryberg were returned as "Unclaimed Unable to Forward."
3/5/2015	Outgoing Email	TAM	Grayson Coney	Sent an email to Mr. Coney to ask if he has updated addresses for Ms. Moon and Mr. Ryberg to send the returned letters to.

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3/6/2015	Outgoing Email	UAIC	Marcos Guerrero, Jason Camp, Mark Gilfillan	In response to Mr. Guerrero's 3/3/15 email, replied that the Corps will consider comments from his email and suggested meeting to discuss locations of TCPs for consideration for the project. Asked for availability the week of March 16th and 23rd. Stated the Corps welcomes the opportunity for Mark to look at the UAIC database.
3/9/2015	Incoming Email	UAIC	Marcos Guerrero	In response to 3/6/15 email, proposed 3/23/15 at UAIC at 1PM to meet.
3/9/2015	Incoming Email	UAIC	Marcos Guerrero	In reply to 3/5/15 email, Mr. Guerrero stated that UAIC is aware of burials, arch sites and traditional cultural properties within the Corps' work areas. Asked for a copy of complete survey report.
3/10/2015	Outgoing Email	UAIC	Marcos Guerrero, Jason Camp, Mark Gilfillan	In reply to 3/9/15 email, confirmed 3/23/15 at UAIC at 1PM to meet would work. Asked that Mr. Guerrero let the Corps know if they would like other technical staff present.
3/10/2015	Incoming Email	UAIC	Marcos Guerrero	In reply to 3/10/15 email, Mr. Guerrero asked to meet when Mark Gilfillan is available in order to have time to include the committee.
3/10/2015	Outgoing Email	UAIC	Marcos Guerrero, Jason Camp, Melodi McAdams, Mark Gilfillan	In reply to 3/10/15 email, Ms. Montag stated meeting will attempt to be scheduled when Mark Gilfillan is available to attend in person or by phone. Asked Mark for his availability the week or March 30th or April 6th.
3/16/2015	Outgoing Email	UAIC	Marcos Guerrero, Jason Camp	In reply to 3/9/15 email, Ms. Montag stated the survey report is not complete yet and UAIC will be notified when the report is available.
3/16/2015	Incoming Email	UAIC	Marcos Guerrero	In reply to 3/16/15 email, Mr. Guerrero stated that once UAIC receives the survey report they will be able to review and comment based on the tribe's previous inventories of the project area. Further stated that usually the tribe would have provided this information prior to identification and survey effort but because they have not been involved UAIC will wait until the survey report has been distributed. After they have reviewed the results UAIC would like to schedule a field visit.
4/21/2015	Incoming Email	UAIC	Marcos Guerrero	Reiterated UAIC's interest in the project, their wish to meet to discuss the survey report, requested a burial and treatment plan.
7/16/2015	Incoming Email	UAIC	Marcos Guerrero	Asked if the survey report has been completed and if UAIC could review the finds from the survey.
7/21/2015	Outgoing Email	UAIC	Marcos Guerrero, Jason Camp	In response to 7/16/15 email, Ms. Montag stated that the survey report is not yet complete but should be done in a few weeks. The survey identified one site, site forms are being finalized and will be provided as soon as they are available.

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3/4/2016	Outgoing Email	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Kara Perry, Cynthia Franco, Daniel Fonseca, Steven Hutchason, Antonio Ruiz, Grayson Coney, TAM main email	Provided information about review of cultural resources inventory report for Folsom Dam Raise Project, that report would be available through AMRDEC for 14 days and comments are requested by COB 4/4/16. Requested any information the tribes are willing to share about sites within the project APE of importance to the tribes so it may be considered for the final survey report and upcoming draft EIS.
3/4/2016	Incoming Email	TAM	TAM main email	Email to the main TAM email (akimmaidu@att.net) failed to deliver.
3/4/2016	File Pick Up	SSBMI	Kara Perry	Ms. Perry downloaded the Folsom Dam Raise inventory report via AMRDEC.
3/7/2016	Incoming Email	UAIC	Marcos Guerrero	Mr. Guerrero asked if it would be possible to set up a working group meeting to discuss the report and project.
3/7/2016	File Pick Up	UAIC	Marcos Guerrero	Mr. Guerrero downloaded the Folsom Dam Raise inventory report via AMRDEC.
3/7/2016	Outgoing Email	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Kara Perry, Cynthia Franco, Daniel Fonseca, Steven Hutchason, Antonio Ruiz, Grayson Coney, TAM main email	In response to 3/7/16 email from Mr. Guerrero, Ms. Montag stated the Corps would be willing to meet with the tribes regarding the project and report. Requested information on what they envision the meeting would be in terms of meeting attendees, agenda topics, logistics. Also stated that as the details for the meeting get worked out the Corps is looking forward to receiving comments from the tribe by 4/4/16.
3/7/2016	Incoming Email	UAIC	Marcos Guerrero	In response to Ms. Montag's email on 3/7/16, Mr. Guerrero suggested a consultation meeting could address topics of concern to the tribes and should include the tribes in the email chain. He also suggested someone should take notes so the notes can be included in the official record.
3/10/2016	Outgoing Email	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Kara Perry, Cynthia Franco, Daniel Fonseca, Steven Hutchason, Antonio Ruiz, Grayson Coney, TAM main email	Ms. Montag asked tribes (per Mr. Guerrero's email) to please respond by 3/18/16 with their interest in attending a consultation meeting as suggested, specific agenda topics, and availability to meet the weeks of March 28th and April 4th.

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4/12/2016	Outgoing Email	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Kara Perry, Cynthia Franco, Daniel Fonseca, Steven Hutchason, Antonio Ruiz, Grayson Coney, TAM main email	Follow up to 3/4/16 and 3/10/16 emails extending review period of inventory report to 5PM 4/18/16 and asking the tribes to notify Ms. Montag if there is interest in scheduling a consultation meeting on the report or project.
4/22/2016	Incoming Email	UAIC	Marcos Guerrero	In reply to 4/12/16 email, Mr. Guerrero asked about results from cultural survey completed a few years ago and who to ask for results, as well as if a FOIA request is needed. Suggested a face-to-face meeting as appropriate, that tribes have interest in the project but little effort to consult with government or staff is occurring.
4/22/2016	Incoming Email	UAIC	Marcos Guerrero	Requested an electronic version of the report mentioned in 4/12/16 email and UAIC requested an extension on the comment review period.
4/22/2016	Outgoing Email	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Kara Perry, Cynthia Franco, Daniel Fonseca, Steven Hutchason, Antonio Ruiz, Grayson Coney, TAM main email	In response to 4/22/16 email requesting electronic version of the report, Ms. Montag noted the report was uploaded and downloaded by Mr. Guerrero on 3/7/16 and asked if he needed it uploading again. Report is too large to send by email but can be uploaded for those who request it. Ms. Montag also requested the date UAIC is requesting to extend their review period to and stated the Corps would consider the request.
4/22/2016	Incoming Email	UAIC	Marcos Guerrero	In reply to 4/22/16 email, Mr. Guerrero request the report be sent again to the group on the email.

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4/22/2016	Outgoing Email	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Kara Perry, Cynthia Franco, Daniel Fonseca, Steven Hutchason, Antonio Ruiz, Grayson Coney, TAM main email	In response to 4/22/16 email asking about survey results and if a FOIA request is needed, Ms. Montag asked for clarification on what survey results UAIC feels it has not received. Ms. Montag stated that all survey results have been provided in draft form in the draft report submitted to tribes for review on 3/4/16 and that the draft is being provided to give tribes the opportunity to comment before the document is finalized and before decisions are made. Letter correspondence has not occurred recently as these are draft documents provided to tribes to review. Ms. Montag stated a FOIA request may be submitted but any documents the tribe requests that the Corps is able to legally provide will be provided, but further clarification on what the tribe is looking for is needed. Further, the Corps is open to holding a meeting and has made several attempts to schedule a meeting but has not heard back from tribes. Ms. Montag requested available dates between May 26-June 10 to schedule a meeting.
4/22/2016	File Pick Up	SSBMI	Kara Perry	Ms. Perry downloaded the Folsom Dam Raise inventory report via AMRDEC.
4/22/2016	Incoming Email	SSBMI	Kara Perry	In reply to uploaded inventory report, Ms. Perry stated at that time the only concern the tribe has is the isolated find and further discussion can occur at the future meeting.
5/3/2016	Incoming Email	UAIC	Marcos Guerrero	UAIC provided availability for a meeting later in May. Expressed concern that there was little to no evidence of Native American occupation as this is contrary to information UAIC has on file. Requested copies of surveyer's resumes. Also stated the project is subject to NAGPRA and asked how the Corps will deal with this.
5/11/2016	Outgoing Email	UAIC, SSBMI, WR, TAM	Marcos Guerrero, Jason Camp, Kara Perry, Cynthia Franco, Daniel Fonseca, Steven Hutchason, Antonio Ruiz, Grayson Coney, TAM main email	Requested availability from tribes to meet the week of June 13th, and to reply to Jane Rinck by May 27th with availability. In reply to Mr. Guerrero's request for resumes, Ms. Montag stated it is Corps policy not to release resumes and that all individuals completing work meet the Secretary of the Interior's professional qualifications standards for their technical area.
5/12/2016	Incoming Email	UAIC	Marcos Guerrero	In response to 5/11/16 email, Mr. Guerrero stated UAIC is available June 13-16.

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5/12/2016	Outgoing Meeting Invitation	UAIC	Marcos Guerrero, Melodi McAdams, Matthew Moore	Jane Rinck sent meeting request for June 14th to discuss the Corps' Folsom Dam Raise Project to UAIC staff.
5/23/2016	Incoming Email	Wilton Rancheria	Antonio Ruiz	Mr. Ruiz stated Wilton Rancheria is unavailable to meet the week or June 13th but asked to be kept appraised of what occurs at the meeting, future site visits, and electronic/hard copies of documents provided at the meeting, sign in sheet, and meeting minutes.
6/6/2016	Outgoing Meeting Invitation	SSBMI, TAM	Cynthia Franco, Kara Perry, Daniel Fonseca, Grayson Coney	Ms. Montag forwarded 6/14/16 meeting request to SSBMI and TAM, stated that if that meeting date does not work for the tribes and they would like to meet separately to contact Ms. Montag.
6/9/2016	Incoming Email	UAIC	Marcos Guerrero	Mr. Guerrero request GIS shapefiles of the APE to prepare for meeting on 6/14/16.
6/10/2016	Outgoing Email	UAIC	Marcos Guerrero, Melodi McAdams, Matthew Moore	In reply to 6/9/16 email, Ms. Montag provided the GIS shapefiles for the APE to include recreation trails, haul roads, dikes and 50 foot buffer, and staging areas.
6/14/2016	Consultation Meeting	DWR, Reclamation, Corps, UAIC	Jacqueline Wait, David Martasian, Laureen Perry, Scott Williams, Melissa Montag, Jane Rinck, Mariah Brumbaugh	As requested by UAIC, this meeting was scheduled for 6/14/16 and invitations sent 5/12/16. No representatives from UAIC attended the meeting and no notification of cancellation was received prior to the meeting.
6/14/2016	Incoming Email	UAIC	Marcos Guerrero	Mr. Guerrero responded in an email to Ms. Rinck several hours after the scheduled meeting time that the meeting fell off his calendar but that was perhaps better since other tribes had not been available. He asked about rescheduling the meeting.
6/15/2016	Outgoing Email	UAIC, SSBMI, WR, TAM, DWR, Reclamation	Marcos Guerrero, Melodi McAdams, Matthew Moore, Cynthia Franco, Kara Perry, Daniel Fonseca, Grayson Coney, Antonio Ruiz, Steven Hutchason, Jacqueline Wait, David Martasian, Laureen Perry, Scott Williams	In response to Mr. Guerrero's 6/14/16 email, Ms. Rinck stated that in consideration of everyone's time and in light of agency heads being available to attend a meeting the tribes did not, that it would be best to wait on scheduling a meeting until specific comments on the survey report are submitted. Updated APE maps were provided, and comments requested by 7/1/16, at which point the Corps will finalize the report. Ms. Rinck also stated that 36 CFR 800.13 will be followed in the event of previously unknown historic properties, and NAGPRA in the event of items subject to that law. Provided information that the draft EIS will be released in late June and tribes will receive the document for review and comment.

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6/30/2016	Incoming Email	UAIC	Melodi McAdams	Ms. McAdams forwarded an ethnohistory written as part of work completed in Old Folsom. In a separate email Ms. McAdams provided sensivity maps of the Folsom Dam Raise Project APE and areas of sensitivity as well as "known cultural resources," some of which overlap with the Corps' APE. Ms. McAdams also provided a brief list of several sites known to the tribe and stated they are significant, but no further elaboration was provided regarding the specifics of why sites are important, simply that they exist within or near the APE.
7/5/2016	Incoming Email	UAIC	Marcos Guerrero	In reference to a Reclamation trail restoration project, Mr. Guerrero included Ms. Montag on an email stating the tribe would like to set up a site visit in conjunction with a site visit UAIC is trying to set up for the "folsom dam levee raise project."
7/5/2016	Incoming Email	Reclamation	John Fogerty	In reply to Mr. Guerrero's 7/5/16 email, Mr. Fogerty stated he would be happy to meet with UAIC around a site visit for the Corps project.
7/6/2016	Outgoing Email	UAIC	Marcos Guerrero, Melodi McAdams, Matthew Moore, Jane Rinck	In reply to Ms. McAdams' email on 6/30/16, Ms. Montag requested additional specific information on the sites identified by the tribe in order to make National Register determinations and in order to evaluate possible effects to historic properties as a result of the Corps' project. Also requested to be allowed to share information sent by UAIC with Reclamation and DWR, and asked for clarification on if a buffer area was applied around the sites noted by UAIC on their sensitivity maps. Requested information be provided by 7/22/16 for consideration in the Section 106 compliance process.
7/6/2016	Outgoing Email	UAIC	Marcos Guerrero, Matthew Moore, Laureen Perry, John Fogerty, Scott Williams	In reply to 7/5/16 emails, Ms. Montag stated although scheduling a meeting for the Corps project is not something she is aware of occuring, the Corps is not opposed to meeting. Suggested including Scott Williams as the Reclamation contact person, and that UAIC propose some dates for a meeting.
7/26/2016	Incoming Email	EMRI	Creig Marcus	In reference to the Folsom Dam Raise EIS, Mr. Marcus stated that after reviewing the tribe's records that the project is not within the aboriginal territory of the Estom Yumeka Maidu tribe.
9/14/2016	Incoming Email	UAIC	Marcos Guerrero	Mr. Guerrero asked how information provided will be incorporated into the project, suggested meeting to further discuss.

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9/15/2016	Outgoing Email	UAIC	Marcos Guerrero, Melodi McAdams, Matthew Moore, Jane Rinck	Ms. Montag referenced her email of 7/6/16 which requested additional clarification information on what the tribe provided previously. Asked for clarification on how UAIC would like information incorporated. Said would follow up with possible meeting dates in October.
9/19/2016	Outgoing Email	UAIC	Marcos Guerrero, Melodi McAdams, Matthew Moore, Jane Rinck	In follow up to 9/15/16 email, Ms. Montag proposed either 10/17/16 or 10/18/16 as possible meeting dates, stated would invite DWR and Reclamation to attend unless UAIC objects. Asked for a response by COB Wednesday, 9/21/16.
9/19/2016	Incoming Email	UAIC	Marcos Guerrero	Mr. Guerrero responded that both 10/17/16 and 10/18/16 are available for a site visit.
9/19/2016	Outgoing Email	UAIC	Marcos Guerrero, Melodi McAdams, Matthew Moore, Jane Rinck	In reply to 9/19/16 email, Ms. Montag suggested 10/18/16 and suggested general agenda topics, asked for any topics UAIC would like added. Stated a meeting request would be sent.
9/19/2016	Incoming Email	UAIC	Marcos Guerrero	Mr. Guerrero acknowledged Ms. Montag's 9/19/16 email regarding the site visit date.
9/19/2016	Outgoing Meeting Invitation	UAIC, Reclamation, DWR	Marcos Guerrero, Melodi McAdams, Matthew Moore, Scott Williams, David Martasian, Jackie Wait, Joe Griffin, Jane Rinck	Meeting request and general agenda topics for 10/18/16 site visit.
9/26/2016	Incoming Meeting Acceptance	UAIC	Marcos Guerrero	Accepted 9/19/16 meeting request.
10/11/2016	Outgoing Email	UAIC	Marcos Guerrero, Melodi McAdams, Matthew Moore	Forwarded APE map to UAIC and asked them to identify if there is a particular location they would like to meet at on 10/18/16. Requested a response by COB 10/13/16.
10/14/2016	Outgoing Meeting Invitation	UAIC, Reclamation, DWR	Marcos Guerrero, Melodi McAdams, Matthew Moore, Scott Williams, David Martasian, Jackie Wait, Joe Griffin, Jane Rinck	Updated 10/18/16 meeting invitation to include meeting point at Beal's Point in Folsom.
10/15/2016	Incoming Email	UAIC	Marcos Guerrero	Accepted updated meeting invitation for 10/18/16.

Date	Type of Contact	Organization	Person Contacted	Contents of Communication
10/18/2016	Tribal Consultation Meeting	UAIC, Reclamation, DWR	Marcos Guerrero, Matthew Moore, Scott Williams, Beth Dyer, David Martasian, Jackie Wait, Joe Griffin	On site meeting with UAIC regarding Folsom Dam Raise Project. Attendees visited the project construction and staging areas for Dikes 1-6 and walked the majority of the project APE. Near Dike 4 a site located within the APE (previously it was mapped outside the APE) was relocated and the Corps committed to modifying the APE to avoid the site. UAIC representatives did not indicate further concerns regarding the project.
10/24/2016	Outgoing Email	UAIC	Marcos Guerrero, Melodi McAdams, Matthew Moore	In a follow up to email sent 7/6/16, Ms. Montag asked Ms. McAdams for clarification on how UAIC would like ethnohistory information considered for incoporation into the final EIS. Asked for clarification or discussion during the current week since the EIS must be finalized by the end of the month.
1/26/2017	Outgoing Letters	UAIC, SSMBI, TAM, WR	Marcos Guerrero, Melodi McAdams, Matthew Moore, Kara Perry, Daniel Fonseca, Grayson Coney, Raymond Hitchcock, Antonio Ruiz, Steven Hutchason, Laureen Perry, Scott Williams	Finding of effect letters for the Dam Raise Project, including transmittal of the revised APE, results of inventory efforts, finding of No Adverse Effects for the overall project. Included information that meetings with tribes identified need to revise site boundary and APE, which the Corps did. Requested comments within 30 days.
2/16/2017	Incoming Email	UAIC	Marcos Guerrero	In reply to 1/26/17 letter, Mr. Guerrero asked if the DPR forms for the revised sites near the APE had been done, and if the APE was revised.
2/16/2017	Outgoing Email	UAIC	Marcos Guerrero, Matthew Moore	Ms. Montag replied to Mr. Guerrero that the revised DPR forms for the sites near the APE have not been completed, but the APE was revised to eliminate the site boundaries from the project, so the Corps has no further considerations for the sites as part of the project. Included the revised APE with staging area near sites removed and a copy of the 1/26/17 letter.
2/16/2017	Outgoing Email	WR	Raymond Hitchcock, Antonio Ruiz, Steven Hutchason	As a follow up to the 1/26/17 letter, Ms. Montag forwarded an electronic copy of the letter with a reminder that the review period ends 2/27/17 and if there are any comments or concerns regarding the finding of effect to provide them to the Corps.
2/16/2017	Outgoing Email	TAM	Grayson Coney	As a follow up to the 1/26/17 letter, Ms. Montag forwarded an electronic copy of the letter with a reminder that the review period ends 2/27/17 and if there are any comments or concerns regarding the finding of effect to provide them to the Corps. Note: Mr. Coney's email is the only available email for the TAM.

Date	Type of Contact	Organization	Person Contacted	Contents of Communication
2/16/2017	Outgoing Email	SSBMI	Nicholas Fonseca, Daniel Fonseca, Kara Perry	As a follow up to the 1/26/17 letter, Ms. Montag forwarded an electronic copy of the letter with a reminder that the review period ends 2/27/17 and if there are any comments or concerns regarding the finding of effect to provide them to the Corps.
2/16/2017	Incoming Email	WR	Raymond Hitchcock	Requested clarification on the end of the review period for the project.
2/17/2017	Outgoing Email	WR	Raymond Hitchcock, Antonio Ruiz, Steven Hutchason	Since incorrect date was given in 2/16/17 email, Ms. Montag clarified the review period ends on 2/27/17.
2/17/2017	Outgoing Email	TAM	Grayson Coney	Since incorrect date was given in 2/16/17 email, Ms. Montag clarified the review period ends on 2/27/17.
2/17/2017	Outgoing Email	SSBMI	Nicholas Fonseca, Daniel Fonseca, Kara Perry	Since incorrect date was given in 2/16/17 email, Ms. Montag clarified the review period ends on 2/27/17.

Folsom Dam Raise Project Section 106 Consultation Record with SHPO*

***May not include all communication for project.**

Date	Type of Contact	Organization	Person Contacted	Contents of Communication
3/3/2015	Outgoing Letter	SHPO	Jessica Tudor	Initial letter identifying the area of potential effects (APE) for project and requesting comments. Provided project description, proposed identification efforts, any comments.
3/6/2015	Incoming Email	SHPO	Jessica Tudor	Responded that 3/3/15 letter has been received and SHPO will wait to comment until the Corps has submitted a document that fully addresses the identification efforts and results.
3/16/2015	Outgoing Email	SHPO	Jessica Tudor	In response to 3/6/15 letter, Ms. Montag replied that the letter was to provide the SHPO the opportunity to comment on the APE and description of identification efforts, there is no issue if the SHPO chooses not to comment on those at this time. The results of identification efforts should be complete in a month or so and will be followed up with SHPO at that time.
1/26/2017	Outgoing Letter	SHPO	Julianne Polanco	Submittal of inventory efforts, consultation with tribes, and finding of No Adverse Effects for the overall project.
2/16/2017	Ougoing Email	SHPO	Jessica Tudor	As a follow up to 1/26/17 letter, Ms. Montag inquired if Ms. Tudor has any questions regarding the submitted letter, inventory, and finding of effects.
2/17/2017	Incoming Email	SHPO	Jessica Tudor	Ms. Tudor noted the transmittal was logged 2/1/17 and that she is still completing her review. No concerns were noted from Kathleen Forest, who reviews historic and architectural aspects of projects.
2/27/2017	Outgoing Email	SHPO	Anmarie Medin	Geneva Kraus sent an inquiry to the Deputy SHPO to inquire about the status of the review.
2/28/2017	Outgoing Email	SHPO	Anmarie Medin, Jessica Tudor	Ms. Montag followed up Ms. Karus' email with information from email discussion with Ms. Tudor and acknowledging the 2/1/17 receipt of transmittal to OHP.
3/2/2017	Incoming Letter	SHPO	Julianne Polanco	In reply to 1/26/17, the SHPO concurred with the Corps' finding of No Adverse Effects for the overall project.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch

JAN 13 2015

TO NATIVE AMERICAN TRIBES:

The U.S. Army Corps of Engineers, Sacramento District (Corps) and the Central Valley Flood Protection Board (CVFPB) will be holding two open forums to provide information on the Folsom Dam Raise (Dam Raise) and Folsom Dam Water Control Manual Update (Manual Update) and to solicit input from the Native American tribes. The Dam Raise was most recently authorized in the 2004 Energy and Water Development Appropriations Act, Public Law (PL) 108-137, and the Manual Update was authorized in the Water Resources Development Act of 1999, PL 106-53. The Corps and CVFPB are preparing two separate draft Supplemental Environmental Impact Statement/ Environmental Impact Reports (SEIS/SEIR), one for the Dam Raise and one for the Manual Update, to evaluate potential impacts as a result of the independent projects. The Corps will serve as lead agency for compliance with the National Environmental Policy Act (NEPA) and the National Historic Preservation Act of 1966, as amended (NHPA), and CVFPB will serve as lead agency for compliance with the California Environmental Quality Act (CEQA). For the Dam Raise the U.S. Bureau of Reclamation (Reclamation) is an involved party and for the Manual Update Reclamation is a cooperating agency. The Sacramento Area Flood Control Agency is a responsible agency for both projects.

Pursuant to 36 CFR § 800.3(f)(2), the implementing regulations of Section 106 of the NHPA, the Corps has identified you as a Native American tribe that may be interested in consulting on the Dam Raise and the Manual Update. These forums will only be open to Native American tribes.

Folsom Dam and Lake is a multipurpose project operated by Reclamation as a part of the Central Valley Project. The Corps is responsible for prescribing operations pertaining to use of the storage allocated for flood risk management. The dam provides flood risk management benefits to the city of Sacramento and its surrounding areas by regulating runoff from approximately 1,860 square miles of drainage area.

The purpose of the Dam Raise is flood risk management and ecosystem restoration. The Dam Raise is authorized for 4 components: 1) emergency spillway gate modifications; 2) raising the right and left wings of the main dam, Mormon Island Auxiliary Dam (MIAD), and the reservoir dikes (1-8) by 3.5 feet; 3) temperature control shutter automation and reconfiguration; and 4) downstream ecosystem restoration of Bushy Lake and Woodlake. The current Dam Raise analysis will address the flood damage reduction components, the emergency spillway gate modifications and the 3.5 foot raise, which are being prioritized for construction. The Dam Raise project will address the proposed structural modifications to the Folsom Dam, MIAD, and the dikes only. Any changes in operation as a result of the construction of these projects, downstream ecosystem restoration, temperature control shutter automation, and reconfiguration components of the Dam Raise will be addressed in the future. A preliminary area of potential effects (APE) for the Dam Raise is shown in Enclosure 1.

The Folsom Dam Joint Federal Project, currently under construction, consists of a new auxiliary spillway with a crest elevation 50 feet lower in elevation than the current gated spillways on the main dam. In order to fully realize the benefits of the new auxiliary spillway, the current Folsom Dam and Lake Water Control Manual must be updated. The Manual Update will identify, evaluate, and recommend changes to the flood management operation rules of Folsom Dam and Lake to reduce flood risk to the Sacramento area by utilizing the new auxiliary spillway and by incorporating an improved understanding of the American River watershed upstream of Folsom Dam. The findings 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 Manual Update will not cover operational activities of Folsom Dam and Lake that Reclamation is responsible for. A preliminary APE for the Manual Update is shown in Enclosure 2.

In accordance with Section 106 of the NHPA, the Corps is required to take into account the effects of their undertakings on historic properties. This includes the identification of historic properties, finding of effect, and the resolution of adverse effects through the process identified in 36 CFR § 800. As part of our efforts to identify historic properties and consider the views of Native American tribes, we are inviting you to attend the open forums and consult on the Dam Raise and Manual Update projects. Your input on the above topics and any associated items that are important to you will be used to:

- Further determine the scope of the analysis in the SEIS/SEIR documents and in the efforts to identify historic properties.

- Provide input on the range of alternatives to be evaluated in the SEIS/SEIR.

- Obtain local knowledge or information to assist in the environmental analysis and assessment of adverse effects on historic properties.

Project team staff will be on hand to accept comments and address questions regarding the projects. You will be given the opportunity to provide written and verbal comments at the open forums.

Written comments and suggestions about the Dam Raise and Manual Update may be submitted to Melissa Montag, Corps Cultural, Recreational, & Social Assessment Section. For e-mailed comments, please include "Folsom Dam Raise" or "Folsom Manual Update" in the subject line, attach comments in MS Word format, and include the commenter's U.S. Postal Service mailing address. Questions about the projects and the SEIS/SEIR should be addressed to:

Melissa Montag,
CESPK-PD-RC
1325 J St, Sacramento,
CA 95814
Phone: 916-557-7907
Fax: 916-557-7856
e-mail: Melissa.L.Montag@usace.army.mil

The open forums will be held at the following locations:

Sacramento Library Galleria
828 I Street, Sacramento, CA
January 26th, 2015
5pm to 7pm

Folsom Community Center
52 Natoma Street, Folsom, CA
February 2nd, 2015
5pm to 7pm

For more information please visit the Folsom Dam Raise website at http://www.spk.usace.army.mil/Missions/CivilWorks/FolsomDamRaise.aspx or the Folsom Dam Manual Update website at http://www.spk.usace.army.mil/Missions/CivilWorks/FolsomWaterControlManualUpdate.aspx.

Sincerely,

for
Alicia E. Kirchner
Chief, Planning Division

cc: (w/enclosures)
Cathy Bishop, Chairperson, Strawberry Valley Rancheria, 1540 Strader Avenue, Sacramento, CA 95815
Silvia Burley, Chairperson, California Valley Miwok Tribe, 10601 N. Escondido PL, Stockton, CA 95212-9231

Anthony Burris, Ione Band of Miwok Indians, P.O. Box 699, Plymouth, CA 95699
Jason Camp, Tribal Historic Preservation Officer, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, CA 95603
Cynthia Clarke, Yocha Dehe Wintun Nation, P.O. Box 18, Brooks, CA 95606
Grayson Coney, Tsi-Akim Maidu, P.O. Box 1316, Colfax, CA 95713
Pamela Cubbler, Colfax-Todds Valley Consolidated Tribe, P.O. Box 734, Foresthill, CA 95631
Adam Dalton, Chairperson, Jackson Rancheria Band of Miwuk Indians, P.O. Box 1090, Jackson, CA 95642
Michael D. DeSpain, Director of OEPP, Mechoopda Indian Tribe of Chico Rancheria, 125 Mission Ranch Boulevard, Chico, CA 95926
El Dorado Miwok Tribe, P.O. Box 711, El Dorado, CA 95623
Rose Enos, 15310 Bancroft Road, Auburn, CA 95603
Kesner Flores, P.O. Box 1047, Wheatland, CA 95692
Nicolas Fonseca, Chairperson, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, CA 95682-1340
Daniel Fonseca, Tribal Historic Preservation Officer, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, CA 95682
Andrew Franklin, Chairperson, Wilton Rancheria, 9728 Kent Street, Elk Grove, CA 95624
Reno Franklin, Tribal Historic Preservation Officer, Enterprise Rancheria of Maidu Indians, 2133 Monte Vista Avenue, Oroville, CA 95966
Andrew Godsey, Assistant Director, Cultural Resources Department, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, CA 95682
Marcos Guerrero, Cultural Resources Manager, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, CA 95603
Steven Hutchason, Executive Director of Environmental Resources, Wilton Rancheria, 9728 Kent Street, Elk Grove, CA 95624
Leland Kinter, Yocha Dehe Wintun Nation, P.O. Box 18, Brooks, CA 95606
Roselynn Lwenya, Tribal Historic Preservation Officer, Buena Vista Rancheria, 1418 20th Street, Suite 200, Sacramento, CA 95811
Judith Marks, Colfax-Todds Valley Consolidated Tribe, 1068 Silverton Circle, Lincoln, CA 95648
Marshall McKay, Yocha Dehe Wintun Nation, P.O. Box 18, Brooks, CA 95606
Yvonne Miller, Chairperson, Ione Band of Miwok Indians, P.O. Box 699, Plymouth, CA 95669-0699
Ambar Mohammed, Cachil DeHe Band of Wintun Indians of the Colusa Indian Community of the Colusa Rancheria, 3730 State Highway 45 # B, Colusa, CA 95932
Eileen Moon, Vice Chairperson, Tsi-Akim Maidu, 1239 East Main Street, Grass Valley, CA 95945

Glenda Nelson, Chairperson, Enterprise Rancheria of Maidu Indians, 2133 Monte Vista Avenue, Oroville, CA 95966

April Wallace Moore, 19630 Placer Hills Road, Colfax, CA 95713

Rhonda Morningstar Pope, Chairperson, Buena Vista Rancheria, 1418 20th Street, Suite 200, Sacramento, CA 95811

Dennis Ramirez, Chairperson, Mechoopda Indian Tribe of Chico Rancheria, 125 Mission Ranch Boulevard, Chico, CA 95926

Don Ryberg, Chairman, Tsi-Akim Maidu, 1239 East Main Street, Grass Valley, CA 95945

Guy Taylor, Representative, Mooretown Rancheria of Maidu Indians, 31 Alverde Drive, Oroville, CA 95966

Cosme Valdez, Interim Chief Executive Officer, Nashville-El Dorado Miwok, P.O. Box 580986, Elk Grove, CA 95758

Gene Whitehouse, Chairperson, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, CA 95603

Charlie Wright, Chairperson, Cortina Wintun Environmental Protection Agency, P.O. Box 1630, Williams, CA 95987

Randy Yonemura, 4305 39th Avenue, Sacramento, CA 95824

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch

Mr. Gene Whitehouse, Chairperson
United Auburn Indian Community of the Auburn Rancheria
10720 Indian Hill Road
Auburn, CA 95603

Dear Mr. Whitehouse:

We are writing with regard to the proposed Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the U.S. Bureau of Reclamation (USBR), Central Valley Flood Protection Board, and the Sacramento Area Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits while also resolving certain dam safety issues associated with passing the probable maximum flood. The Dam Raise FRM Project was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that were based on findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report.

We would like to invite your consultation under Section 106 of the National Historic Preservation Act of 1966, as amended. The area of potential effects (APE) for the Dam Raise FRM Project is located at the Folsom Dam Left and Right Wing Dam embankments, Dikes 1-8, and Mormon Island Auxiliary Dam (MIAD) around Folsom Lake in Sacramento, Placer, and El Dorado Counties. The project is located on the Folsom, Rocklin, and Clarkeville, California, 7.5-minute U.S.G.S. topographic maps. A preliminary APE for the Dam Raise FRM Project is shown in the enclosure. The APE includes a 50-foot buffer area around where construction activities may occur at the wing dams, dikes, and MIAD, as well as areas for staging of equipment during construction. Access to these locations will be by existing paved roads around Folsom Lake.

Raising the wing dams, dikes, and MIAD by 3.5 feet would allow for holding discharges longer at 160,000 cubic feet per second, the downstream constraint, by creating additional surcharge space (temporary water storage space utilized during rare flood events) in the reservoir. The authorized top of flood pool would remain at reservoir water surface elevation 468.34 feet NAVD 88. The Section 106 undertaking for the current Dam Raise FRM Project addresses the proposed structural modifications to the wing dams, MIAD, and dikes only. Construction of any of the proposed actions would not substantially alter current overall operations of Folsom Dam, MIAD, and Dikes

1-8. The Dam Raise FRM Project is a construction project that includes emergency spillway gate modifications, and raising the right and left wings of the main dam, MIAD, and the reservoir dikes (1-8) by 3.5 feet.

We have preliminarily determined that the APE includes those areas highlighted and outlined in the enclosure. We have completed a records and literature search at the North Central Information Center at California State University, Sacramento as well as a search of surveys and sites within USBR's records. The only known cultural resources within the APE for the Dam Raise FRM Project are Folsom Dam (CA-SAC-937H), Dikes 1-8 (CA-SAC-1103H), MIAD (CA-ELD-2868H), and CA-SAC-659, a large granite boulder with bedrock mortar cupules. Since the previous surveys for the JFP were conducted in 2006 and 2007 we have begun to conduct updated pedestrian surveys of the APE.

We are sensitive toward the protection of traditional cultural properties and sacred sites, and make every effort to avoid them. If you have comments on the APE, our efforts to identify historic properties, or if you have knowledge of locations of archaeological sites, sacred sites, or areas of traditional cultural value or concern in or near the Dam Raise FRM Project APE, we request that you contact us. Correspondence may be sent to Ms. Melissa Montag, U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922. If you have any questions or would like additional information, please contact Ms. Montag at (916) 557-7907 or by email at: Melissa.L.Montag@usace.army.mil.

Sincerely,

Alicia E. Kirchner
Chief, Planning Division

Enclosure

cc:
Jason Camp, Tribal Historic Preservation Officer, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, California 95603
Marcos Guerrero, Cultural Resources Manager, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, California 95603

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch

MAR 0 3 2015

Mr. Nicolas Fonseca, Chairperson
Shingle Springs Band of Miwok Indians
P.O. Box 1340
Shingle Springs, CA 95682-1340

Dear Mr. Fonseca:

We are writing with regard to the proposed Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the U.S. Bureau of Reclamation (USBR), Central Valley Flood Protection Board, and the Sacramento Area Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits while also resolving certain dam safety issues associated with passing the probable maximum flood. The Dam Raise FRM Project was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that were based on findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report.

We would like to invite your consultation under Section 106 of the National Historic Preservation Act of 1966, as amended. The area of potential effects (APE) for the Dam Raise FRM Project is located at the Folsom Dam Left and Right Wing Dam embankments, Dikes 1-8, and Mormon Island Auxiliary Dam (MIAD) around Folsom Lake in Sacramento, Placer, and El Dorado Counties. The project is located on the Folsom, Rocklin, and Clarkeville, California, 7.5-minute U.S.G.S. topographic maps. A preliminary APE for the Dam Raise FRM Project is shown in the enclosure. The APE includes a 50-foot buffer area around where construction activities may occur at the wing dams, dikes, and MIAD, as well as areas for staging of equipment during construction. Access to these locations will be by existing paved roads around Folsom Lake.

Raising the wing dams, dikes, and MIAD by 3.5 feet would allow for holding discharges longer at 160,000 cubic feet per second, the downstream constraint, by creating additional surcharge space (temporary water storage space utilized during rare flood events) in the reservoir. The authorized top of flood pool would remain at reservoir water surface elevation 468.34 feet NAVD 88. The Section 106 undertaking for the current Dam Raise FRM Project addresses the proposed structural modifications to the wing dams, MIAD, and dikes only. Construction of any of the proposed actions would not substantially alter current overall operations of Folsom Dam, MIAD, and Dikes

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We have preliminarily determined that the APE includes those areas highlighted and outlined in the enclosure. We have completed a records and literature search at the North Central Information Center at California State University, Sacramento as well as a search of surveys and sites within USBR's records. The only known cultural resources within the APE for the Dam Raise FRM Project are Folsom Dam (CA-SAC-937H), Dikes 1-8 (CA-SAC-1103H), MIAD (CA-ELD-2868H), and CA-SAC-659, a large granite boulder with bedrock mortar cupules. Since the previous surveys for the JFP were conducted in 2006 and 2007 we have begun to conduct updated pedestrian surveys of the APE.

We are sensitive toward the protection of traditional cultural properties and sacred sites, and make every effort to avoid them. If you have comments on the APE, our efforts to identify historic properties, or if you have knowledge of locations of archaeological sites, sacred sites, or areas of traditional cultural value or concern in or near the Dam Raise FRM Project APE, we request that you contact us. Correspondence may be sent to Ms. Melissa Montag, U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922. If you have any questions or would like additional information, please contact Ms. Montag at (916) 557-7907 or by email at: Melissa.L.Montag@usace.army.mil.

Sincerely,

Alicia E. Kirchner
Chief, Planning Division

Enclosure

cc:
Daniel Fonseca, Tribal Historic Preservation Officer, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, CA 95682
Andrew Godsey, Assistant Director, Cultural Resources Department, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, CA 95682

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch

MAR 03 2015

Mr. Don Ryberg, Chairman
1239 East Main Street
Grass Valley, California 95945

Dear Mr. Ryberg:

We are writing with regard to the proposed Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the U.S. Bureau of Reclamation (USBR), Central Valley Flood Protection Board, and the Sacramento Area Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits while also resolving certain dam safety issues associated with passing the probable maximum flood. The Dam Raise FRM Project was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that were based on findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report.

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Sincerely,

Alicia E Kirchner

Alicia E. Kirchner
Chief, Planning Division

Enclosure

cc:
Grayson Coney, Tsi-Akim Maidu, P.O. Box 1316, Colfax, California 95713
Eileen Moon, Vice Chairperson, 1239 East Main Street, Grass Valley, California 95945

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch MAR 03 2015

Mr. Gene Whitehouse, Chairperson
United Auburn Indian Community of the Auburn Rancheria
10720 Indian Hill Road
Auburn, CA 95603

Dear Mr. Whitehouse:

We are writing with regard to the proposed Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the U.S. Bureau of Reclamation (USBR), Central Valley Flood Protection Board, and the Sacramento Area Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits while also resolving certain dam safety issues associated with passing the probable maximum flood. The Dam Raise FRM Project was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that were based on findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report.

We would like to invite your consultation under Section 106 of the National Historic Preservation Act of 1966, as amended. The area of potential effects (APE) for the Dam Raise FRM Project is located at the Folsom Dam Left and Right Wing Dam embankments, Dikes 1-8, and Mormon Island Auxiliary Dam (MIAD) around Folsom Lake in Sacramento, Placer, and El Dorado Counties. The project is located on the Folsom, Rocklin, and Clarkeville, California, 7.5-minute U.S.G.S. topographic maps. A preliminary APE for the Dam Raise FRM Project is shown in the enclosure. The APE includes a 50-foot buffer area around where construction activities may occur at the wing dams, dikes, and MIAD, as well as areas for staging of equipment during construction. Access to these locations will be by existing paved roads around Folsom Lake.

Raising the wing dams, dikes, and MIAD by 3.5 feet would allow for holding discharges longer at 160,000 cubic feet per second, the downstream constraint, by creating additional surcharge space (temporary water storage space utilized during rare flood events) in the reservoir. The authorized top of flood pool would remain at reservoir water surface elevation 468.34 feet NAVD 88. The Section 106 undertaking for the current Dam Raise FRM Project addresses the proposed structural modifications to the wing dams, MIAD, and dikes only. Construction of any of the proposed actions would not substantially alter current overall operations of Folsom Dam, MIAD, and Dikes

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We are sensitive toward the protection of traditional cultural properties and sacred sites, and make every effort to avoid them. If you have comments on the APE, our efforts to identify historic properties, or if you have knowledge of locations of archaeological sites, sacred sites, or areas of traditional cultural value or concern in or near the Dam Raise FRM Project APE, we request that you contact us. Correspondence may be sent to Ms. Melissa Montag, U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922. If you have any questions or would like additional information, please contact Ms. Montag at (916) 557-7907 or by email at: Melissa.L.Montag@usace.army.mil.

Sincerely,

Alicia E. Kirchner
Chief, Planning Division

Enclosure

cc:
Jason Camp, Tribal Historic Preservation Officer, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, California 95603
Marcos Guerrero, Cultural Resources Manager, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, California 95603

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U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
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REPLY TO
ATTENTION OF

Environmental Resources Branch

MAR 03 2015

Mr. Andrew Franklin, Chairperson
Wilton Rancheria
9728 Kent Street
Elk Grove, California 95642

Dear Mr. Franklin:

We are writing with regard to the proposed Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the U.S. Bureau of Reclamation (USBR), Central Valley Flood Protection Board, and the Sacramento Area Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits while also resolving certain dam safety issues associated with passing the probable maximum flood. The Dam Raise FRM Project was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that were based on findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report.

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Alicia E. Kirchner
Chief, Planning Division

Enclosure

cc:
Stevenson, Hutchason, Executive Director of Environmental Resources, Wilton Rancheria, 9728 Kent Street, Elk Grove, California 95642

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U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
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Environmental Resources Branch MAR 03 2015

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REPLY TO
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Environmental Resources Branch

MAR 0 3 2015

Mr. Don Ryberg, Chairman
1239 East Main Street
Grass Valley, California 95945

Dear Mr. Ryberg:

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1325 J STREET
SACRAMENTO CA 95814-2922

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Environmental Resources Branch

MAR 0 3 2015

Mr. Nicolas Fonseca, Chairperson
Shingle Springs Band of Miwok Indians
P.O. Box 1340
Shingle Springs, CA 95682-1340

Dear Mr. Fonseca:

We are writing with regard to the proposed Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the U.S. Bureau of Reclamation (USBR), Central Valley Flood Protection Board, and the Sacramento Area Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits while also resolving certain dam safety issues associated with passing the probable maximum flood. The Dam Raise FRM Project was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that were based on findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report.

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Sincerely,

Alicia E. Kirchner
Chief, Planning Division

Enclosure

cc:
Daniel Fonseca, Tribal Historic Preservation Officer, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, CA 95682
Andrew Godsey, Assistant Director, Cultural Resources Department, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, CA 95682

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch

MAR 0 3 2015

Dr. Carol Roland-Nawi
State Historic Preservation Officer
Department of Parks and Recreation
Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, CA 94296-0001

Dear Dr. Roland-Nawi:

In accordance with Section 106 of the National Historic Preservation Act, as amended, we are writing to inform you of the proposed Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The Dam Raise FRM Project was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that were based on findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the U.S. Bureau of Reclamation (USBR), Central Valley Flood Protection Board, and the Sacramento Area Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits while also resolving certain dam safety issues associated with passing the probable maximum flood. Pursuant to 36 CFR Part 800.3 we are initiating the Section 106 process for the Dam Raise FRM Project and we are asking for your comments on our proposed efforts to identify historic properties under 36 CFR Part 800.4. We are also asking for your concurrence with our determination of the area of potential effects (APE) for the Dam Raise FRM Project in accordance with 36 CFR Part 800.4(a)(1).

The APE for the Dam Raise FRM Project is located at the Folsom Dam Left and Right Wing Dam embankments, Dikes 1-8, and Mormon Island Auxiliary Dam (MIAD) around Folsom Lake in Sacramento, Placer, and El Dorado Counties. The project is located on the Folsom, Rocklin, and Clarkeville, California, 7.5-minute U.S.G.S. topographic maps. A preliminary APE for the Dam Raise FRM Project is shown in the enclosure. The APE includes a 50 foot buffer area around where construction activities may occur at the wing dams, dikes, and MIAD, as well as areas for staging of equipment during construction. Access to these locations will be by existing paved roads around Folsom Lake.

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We have preliminarily determined that the APE includes those areas highlighted and outlined in the enclosure. We invite any comments you may have on our preliminary determination of the APE for the Dam Raise FRM Project. Most of the APE was included in Section 106 consultation conducted by the USBR for their Dam Safety Project under the Joint Federal Project (JFP) in 2006 and 2007 (reference number BUR061114A) and during our previous consultation for the Phases I-IV of the Corps' JFP (reference number COE081120C). We would also like to ask for your comments on our proposed efforts to identify historic properties as outlined below.

We have completed a records and literature search at the North Central Information Center at California State University, Sacramento as well as a search of surveys and sites within USBR's records. The only known cultural resources within the APE for the Dam Raise FRM Project are Folsom Dam (CA-SAC-937H), Dikes 1-8 (CA-SAC-1103H), MIAD (CA-ELD-2868H), and CA-SAC-659, a large granite boulder with bedrock mortar cupules. Since the previous surveys for the JFP were conducted in 2006 and 2007 we have begun to conduct updated pedestrian surveys of the APE.

The United Auburn Indian Community of the Auburn Rancheria, Shingle Springs Band of Miwok Indians, Wilton Rancheria, and Tsi-Akim Maidu have expressed interest in the Dam Raise FRM Project. We held two open forums on January 26, 2015 and February 2, 2015 to solicit input from Native American tribes regarding the Dam Raise FRM Project. As part of our efforts to identify potential historic properties, we plan to continue to inquire if tribes have knowledge of locations of archeological sites, sacred sites, or areas of traditional cultural value or concern in or near the Dam Raise FRM Project APE.

Pursuant to 36 CFR Part 800.4(a)(1), we request your comments on our preliminary determination of the APE for the Dam Raise FRM Project. We also request any comments your office may have on our proposed efforts to identify historic properties under 36 CFR Part 800.4. Correspondence may be sent to Ms. Melissa Montag, U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922. If you have any questions or would like additional information, please contact Ms. Montag by email at: Melissa.L.Montag@usace.army.mil or by phone at (916) 557-7907.

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Daniel Fonseca, Cultural Resources Director, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, California 95682
Nicholas Fonseca, Chairperson, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, California 95682
Andrew Franklin, Chairperson, Wilton Rancheria, 9300 W. Stockton Blvd, Suite 200, Elk Grove, California 95758
Andrew Godsey, Assistant Director, Cultural Resources Department, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, California 95682
Marcos Guerrero, Cultural Resources Manager, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, California 95603
Steven Hutchason, Executive Director of Environmental Resources, Wilton Rancheria, 9300 W. Stockton Blvd, Suite 200, Elk Grove, California 95758
Eileen Moon, Vice Chairperson, Tsi-Akim Maidu, 1239 East Main Street, Grass Valley, California 95945
Don Ryberg, Chairman, Tsi-Akim Maidu, 1239 East Main Street, Grass Valley, California 95945
Gene Whitehouse, Chairperson, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, California 95603

cc: (w/enclosure)
Scott Williams, U.S. Department of the Interior, Bureau of Reclamation, 2800 Cottage Way, MP-153, Sacramento, California 95825
Jacqueline Wait, Department of Water Resources, Division of Environmental Services, Environmental Compliance & Evaluation Branch, Cultural, Recreation, and Environmental Planning Section, 3500 Industrial Boulevard, West Sacramento, California 95691

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch

JAN 2 6 2017

Mr. Nicolas Fonseca
Chairperson
Shingle Springs Band of Miwok Indians
P.O. Box 1340
Shingle Springs, CA 95682-1340

Dear Mr. Fonseca:

In accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended (54 U.S.C. § 306108), we are writing you to continue consultation on the Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The Dam Raise FRM was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that cited findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the Central Valley Flood Protection Board, and the Sacramento Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits. Pursuant to 36 CFR § 800.4, we are asking for your concurrence on our determination of the Area of Potential Effects (APE) and identification of historic properties. We are also seeking concurrence on our finding of effect pursuant to 36 CFR § 800.5 (b).

The Corps previously contacted the State Historic Preservation Officer (SHPO) and tribes in a letter dated March 3, 2015, to initiate Section 106 consultation and request concurrence on the APE. At that time, SHPO staff indicated they would prefer a complete document that fully addresses the identification efforts and results. The Corps is submitting the following final report to satisfy that request:

- Folsom Dam and Reservoir Project, American River, in El Dorado, Placer, and Sacramento Counties, California; Cultural Resources Inventory Evaluation and Determination of Effects for Folsom Dam Raise Project Construction, including Haul Routes, Recreation Trails, Staging Areas and Proposed Geotechnical Explorations (March 2016) (Enclosure 1).

The APE includes the footprints for the Dam Raise FRM located at the Folsom Dam, the Left Wing Dam (LWD) and Right Wing Dam (RWD) embankments, Dikes 1-8, and the Mormon Island Auxiliary Dam (MIAD) with buffers of 50 feet on all sides,

staging areas, haul routes, and a new recreation trail (Enclosure 2). The undertaking includes strengthening the existing Tainter gates and a new "top seal" bulkhead and hydraulic structure that would prevent overtopping of the spillway gates during a major flood event; retrofit elements (skin plate ribs, lower girder, and trunnion anchorage) on the Tainter gates; a vertical concrete extension to the top of the pier; a 3.5-foot rise of the earthen embankments of Dikes 1 through 8 and the MIAD; a reinforced 3.5-foot concrete flood wall constructed on LWD and RWD that would tie into the main dam; and a reinforced concrete retaining wall (parapet wall) embedded in the earth-fill of the embankment. Enclosure 3 includes design drawings of the planned modifications for the dam and dikes.

Substantial previous inventory efforts have occurred in and around the APE. Four previously documented cultural resources are: Folsom Dam (CA-SAC-937H), Folsom Lake Dikes (CA-SAC-1103H), a historic trash scatter and concrete box (CA-SAC-944H), and a historic water conveyance system (CA-SAC-945H). Folsom Dam and Folsom Lake Dikes are historic properties according to consensus determinations in 2006 and 2007, respectively; CA-SAC-944H and CA-SAC-945H are not historic properties according to consensus determinations in 2007.

An inventory of APE segments requiring new or initial survey coverage proceeded in three episodes during the fall and winter of 2015. Only one new, potential cultural resource was encountered during the new survey, 08-FDR-01, a sparse lithic scatter located at the base of the embankment on the south side of Dike 8. All artifacts were located 10 to 20 cm below the ground surface, but the site did not represent an intact archaeological deposit. Historic photos of dike construction on file with the Corps show that phases of extensive grading and earth-moving took place from 1954 to 1955 within the site boundary. Initially, site 08-FDR-01 was thought to be a redeposit of cultural materials from another context. Based on the ambiguous nature of the materials found, the lack of stratigraphic integrity, and the substantial past landscape alterations, the Corps subsequently determined that the lithic materials likely resulted from mechanical breakage and deposition associated with heavy equipment operations during construction of Dike 8 rather than an indicator of prehistoric use. Site 08-FDR-01 was found to be neither a cultural resource nor a historic property, and therefore merited no further recordation and evaluation under the NHPA.

The Corps engaged in tribal consultation with the Wilton Rancheria, the Tsi-Akim Maidu and the Taylorsville Rancheria, the Shingle Springs Band of Miwok Indians, and the United Auburn Indian Community of the Auburn Rancheria throughout the Section 106 process in an effort to identify sites of religious and cultural significance in the APE that may be affected by the Dam Raise FRM. Consultation was undertaken through formal letters, emails, phone calls, in-person meetings, and site visits. A detailed consultation log is included in Appendix A (Enclosure 1). Tribal consultation revealed

an existing cultural resources site identified near Dike 4 but outside the APE; the boundary of the previously recorded site was updated. The Corps modified the APE closest to the site to provide an ample buffer and reduce potential impacts (Map 3 of Enclosure 2).

The Corps makes a finding of *no adverse effects to historic properties* (36 CFR § 800.5 [b]) for the Dam Raise FRM. Folsom Dam (CA-SAC-937H) and the Folsom Lake Dikes (Ca-SAC-1103H) would undergo physical changes as a consequence of the proposed Project, but the changes would not adversely affect the qualities that render the properties eligible for inclusion in the NRHP under Criterion A: the overall workmanship, materials, feeling, and association aspects of integrity of the Folsom Dam and Folsom Lake Dikes would remain largely unchanged.

The workmanship of the dam and dikes is evidenced primarily in the construction of these flood control structures. The method of construction is fairly typical for poured concrete and built-up earthen dams of the 1950s and earlier eras, many of which were constructed by the Corps, as Folsom Dam was. The retrofits to the Folsom Dam spillway Tainter gates and the raising of the dikes would result in physical modification to these features, but not adversely affect the overall integrity of the workmanship. The dam and dikes will continue to exhibit the original labor, skill, and methods of construction, and would not be diminished by the physical alterations of the Dam Raise FRM Project.

The materials aspect of integrity for the Folsom Dam and Folsom Lake Dikes would be affected, but not in an adverse manner. The retrofit work to the spillway Tainter gates would add features intended to enhance the functionality of the dam. The physical elements of the dam and dikes would be altered slightly by the modifications but would leave the overall structure and integrity of materials intact. Dikes 1 through 8 and the MIAD would be raised with engineered fill material similar to the existing composition of the earthen dikes. The RWD and LWD would include a 3.5-foot concrete flood wall that would tie into the main dam and existing terrain. Overall, the planned modifications would not diminish the materials used and the manner in which the materials were combined for the original construction of the dam and dikes.

Finally, the integrity of feeling and association would remain unchanged. The functionality of the dam and dikes as individual features, and as a system, would not be altered; they would remain as important features of the engineered environment as the original construction intended. The proposed modifications would have no effect on the capacity of the dam to portray the broad patterns of history and are designed to enhance and continue the important function of the structures to impound Folsom Lake for the purposes of flood risk management, hydropower, and irrigation.

At this time, the Corps is requesting your comments on the delineation of the APE and identification of historic properties (36 CFR § 800.4), as well as the finding of *no adverse effects to historic properties* (36 CFR § 800.5 [b]).

Copies of this letter and enclosures will be sent to: Ms. Laureen M. Perry, Regional Archaeologist, Bureau of Reclamation, Mid-Pacific Regional Office, 2800 Cottage Way, MP-153, Sacramento, California 95825; Mr. Daniela Fonseca, Tribal Historic Preservation Officer, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, California 95682; and Ms. Kara Perry, Cultural Resources Department, Shingle Springs Band of Miwok Indians, P.O. Box 1340, Shingle Springs, California 95682.

Correspondence may be sent to Ms. Melissa Montag, U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922. If you have any questions or would like additional information, please contact Ms. Montag by email at Melissa.L.Montag@usace.army.mil, or by phone at (916) 557-7907.

Sincerely,

Mark T. Z

for Alicia E. Kirchner
Chief, Planning Division

Enclosures

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch

JAN 26 2017

Mr. Don Ryberg
Chairman
Tsi-Akim Maidu
11442 Butler Road
Grass Valley, CA 95945

Dear Mr. Ryberg:

In accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended (54 U.S.C. § 306108), we are writing you to continue consultation on the Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The Dam Raise FRM was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that cited findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the Central Valley Flood Protection Board, and the Sacramento Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits. Pursuant to 36 CFR § 800.4, we are asking for your concurrence on our determination of the Area of Potential Effects (APE) and identification of historic properties. We are also seeking concurrence on our finding of effect pursuant to 36 CFR § 800.5 (b).

The Corps previously contacted the State Historic Preservation Officer (SHPO) and tribes in a letter dated March 3, 2015, to initiate Section 106 consultation and request concurrence on the APE. At that time, SHPO staff indicated they would prefer a complete document that fully addresses the identification efforts and results. The Corps is submitting the following final report to satisfy that request:

- Folsom Dam and Reservoir Project, American River, in El Dorado, Placer, and Sacramento Counties, California; Cultural Resources Inventory Evaluation and Determination of Effects for Folsom Dam Raise Project Construction, including Haul Routes, Recreation Trails, Staging Areas and Proposed Geotechnical Explorations (March 2016) (Enclosure 1).

The APE includes the footprints for the Dam Raise FRM located at the Folsom Dam, the Left Wing Dam (LWD) and Right Wing Dam (RWD) embankments, Dikes 1-8, and the Mormon Island Auxiliary Dam (MIAD) with buffers of 50 feet on all sides,

staging areas, haul routes, and a new recreation trail (Enclosure 2). The undertaking includes strengthening the existing Tainter gates and a new "top seal" bulkhead and hydraulic structure that would prevent overtopping of the spillway gates during a major flood event; retrofit elements (skin plate ribs, lower girder, and trunnion anchorage) on the Tainter gates; a vertical concrete extension to the top of the pier; a 3.5-foot rise of the earthen embankments of Dikes 1 through 8 and the MIAD; a reinforced 3.5-foot concrete flood wall constructed on LWD and RWD that would tie into the main dam; and a reinforced concrete retaining wall (parapet wall) embedded in the earth-fill of the embankment. Enclosure 3 includes design drawings of the planned modifications for the dam and dikes.

Substantial previous inventory efforts have occurred in and around the APE. Four previously documented cultural resources are: Folsom Dam (CA-SAC-937H), Folsom Lake Dikes (CA-SAC-1103H), a historic trash scatter and concrete box (CA-SAC-944H), and a historic water conveyance system (CA-SAC-945H). Folsom Dam and Folsom Lake Dikes are historic properties according to consensus determinations in 2006 and 2007, respectively; CA-SAC-944H and CA-SAC-945H are not historic properties according to consensus determinations in 2007.

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The Corps engaged in tribal consultation with the Wilton Rancheria, the Tsi-Akim Maidu and the Taylorsville Rancheria, the Shingle Springs Band of Miwok Indians, and the United Auburn Indian Community of the Auburn Rancheria throughout the Section 106 process in an effort to identify sites of religious and cultural significance in the APE that may be affected by the Dam Raise FRM. Consultation was undertaken through formal letters, emails, phone calls, in-person meetings, and site visits. A detailed consultation log is included in Appendix A (Enclosure 1). Tribal consultation revealed

an existing cultural resources site identified near Dike 4 but outside the APE; the boundary of the previously recorded site was updated. The Corps modified the APE closest to the site to provide an ample buffer and reduce potential impacts (Map 3 of Enclosure 2).

The Corps makes a finding of *no adverse effects to historic properties* (36 CFR § 800.5 [b]) for the Dam Raise FRM. Folsom Dam (CA-SAC-937H) and the Folsom Lake Dikes (Ca-SAC-1103H) would undergo physical changes as a consequence of the proposed Project, but the changes would not adversely affect the qualities that render the properties eligible for inclusion in the NRHP under Criterion A: the overall workmanship, materials, feeling, and association aspects of integrity of the Folsom Dam and Folsom Lake Dikes would remain largely unchanged.

The workmanship of the dam and dikes is evidenced primarily in the construction of these flood control structures. The method of construction is fairly typical for poured concrete and built-up earthen dams of the 1950s and earlier eras, many of which were constructed by the Corps, as Folsom Dam was. The retrofits to the Folsom Dam spillway Tainter gates and the raising of the dikes would result in physical modification to these features, but not adversely affect the overall integrity of the workmanship. The dam and dikes will continue to exhibit the original labor, skill, and methods of construction, and would not be diminished by the physical alterations of the Dam Raise FRM Project.

The materials aspect of integrity for the Folsom Dam and Folsom Lake Dikes would be affected, but not in an adverse manner. The retrofit work to the spillway Tainter gates would add features intended to enhance the functionality of the dam. The physical elements of the dam and dikes would be altered slightly by the modifications but would leave the overall structure and integrity of materials intact. Dikes 1 through 8 and the MIAD would be raised with engineered fill material similar to the existing composition of the earthen dikes. The RWD and LWD would include a 3.5-foot concrete flood wall that would tie into the main dam and existing terrain. Overall, the planned modifications would not diminish the materials used and the manner in which the materials were combined for the original construction of the dam and dikes.

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At this time, the Corps is requesting your comments on the delineation of the APE and identification of historic properties (36 CFR § 800.4), as well as the finding of *no adverse effects to historic properties* (36 CFR § 800.5 [b]).

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Sincerely,

Mark T. Z

for Alicia E. Kirchner
Chief, Planning Division

Enclosures

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch

JAN 26 2017

Mr. Gene Whitehouse
Chairperson
United Auburn Indian Community of the Auburn Rancheria
10720 Indian Hill Road
Auburn, CA 95603

Dear Mr. Whitehouse:

In accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended (54 U.S.C. § 306108), we are writing you to continue consultation on the Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The Dam Raise FRM was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that cited findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the Central Valley Flood Protection Board, and the Sacramento Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits. Pursuant to 36 CFR § 800.4, we are asking for your concurrence on our determination of the Area of Potential Effects (APE) and identification of historic properties. We are also seeking concurrence on our finding of effect pursuant to 36 CFR § 800.5 (b).

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Copies of this letter and enclosures will be sent to: Ms. Laureen M. Perry, Regional Archaeologist, Bureau of Reclamation, Mid-Pacific Regional Office, 2800 Cottage Way, MP-153, Sacramento, California 95825; Mr. Marcos Guerrero, Cultural Resources Manager, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, California 95603; and Mr. Matthew Moore, Tribal Historic Preservation Officer, United Auburn Indian Community of the Auburn Rancheria, 10720 Indian Hill Road, Auburn, California, 95603.

Correspondence may be sent to Ms. Melissa Montag, U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922. If you have any questions or would like additional information, please contact Ms. Montag by email at Melissa.L.Montag@usace.army.mil, or by phone at (916) 557-7907.

Sincerely,

for Alicia E. Kirchner
Chief, Planning Division

Enclosures

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch

JAN 26 2017

Mr. Raymond Hitchcock
Chairperson
Wilton Rancheria
9728 Kent Street
Elk Grove, CA 95642

Dear Mr. Hitchcock:

In accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended (54 U.S.C. § 306108), we are writing you to continue consultation on the Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The Dam Raise FRM was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that cited findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the Central Valley Flood Protection Board, and the Sacramento Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits. Pursuant to 36 CFR § 800.4, we are asking for your concurrence on our determination of the Area of Potential Effects (APE) and identification of historic properties. We are also seeking concurrence on our finding of effect pursuant to 36 CFR § 800.5 (b).

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Substantial previous inventory efforts have occurred in and around the APE. Four previously documented cultural resources are: Folsom Dam (CA-SAC-937H), Folsom Lake Dikes (CA-SAC-1103H), a historic trash scatter and concrete box (CA-SAC-944H), and a historic water conveyance system (CA-SAC-945H). Folsom Dam and Folsom Lake Dikes are historic properties according to consensus determinations in 2006 and 2007, respectively; CA-SAC-944H and CA-SAC-945H are not historic properties according to consensus determinations in 2007.

An inventory of APE segments requiring new or initial survey coverage proceeded in three episodes during the fall and winter of 2015. Only one new, potential cultural resource was encountered during the new survey, 08-FDR-01, a sparse lithic scatter located at the base of the embankment on the south side of Dike 8. All artifacts were located 10 to 20 cm below the ground surface, but the site did not represent an intact archaeological deposit. Historic photos of dike construction on file with the Corps show that phases of extensive grading and earth-moving took place from 1954 to 1955 within the site boundary. Initially, site 08-FDR-01 was thought to be a redeposit of cultural materials from another context. Based on the ambiguous nature of the materials found, the lack of stratigraphic integrity, and the substantial past landscape alterations, the Corps subsequently determined that the lithic materials likely resulted from mechanical breakage and deposition associated with heavy equipment operations during construction of Dike 8 rather than an indicator of prehistoric use. Site 08-FDR-01 was found to be neither a cultural resource nor a historic property, and therefore merited no further recordation and evaluation under the NHPA.

The Corps engaged in tribal consultation with the Wilton Rancheria, the Tsi-Akim Maidu and the Taylorsville Rancheria, the Shingle Springs Band of Miwok Indians, and the United Auburn Indian Community of the Auburn Rancheria throughout the Section 106 process in an effort to identify sites of religious and cultural significance in the APE that may be affected by the Dam Raise FRM. Consultation was undertaken through formal letters, emails, phone calls, in-person meetings, and site visits. A detailed consultation log is included in Appendix A (Enclosure 1). Tribal consultation revealed

an existing cultural resources site identified near Dike 4 but outside the APE; the boundary of the previously recorded site was updated. The Corps modified the APE closest to the site to provide an ample buffer and reduce potential impacts (Map 3 of Enclosure 2).

The Corps makes a finding of *no adverse effects to historic properties* (36 CFR § 800.5 [b]) for the Dam Raise FRM. Folsom Dam (CA-SAC-937H) and the Folsom Lake Dikes (Ca-SAC-1103H) would undergo physical changes as a consequence of the proposed Project, but the changes would not adversely affect the qualities that render the properties eligible for inclusion in the NRHP under Criterion A: the overall workmanship, materials, feeling, and association aspects of integrity of the Folsom Dam and Folsom Lake Dikes would remain largely unchanged.

The workmanship of the dam and dikes is evidenced primarily in the construction of these flood control structures. The method of construction is fairly typical for poured concrete and built-up earthen dams of the 1950s and earlier eras, many of which were constructed by the Corps, as Folsom Dam was. The retrofits to the Folsom Dam spillway Tainter gates and the raising of the dikes would result in physical modification to these features, but not adversely affect the overall integrity of the workmanship. The dam and dikes will continue to exhibit the original labor, skill, and methods of construction, and would not be diminished by the physical alterations of the Dam Raise FRM Project.

The materials aspect of integrity for the Folsom Dam and Folsom Lake Dikes would be affected, but not in an adverse manner. The retrofit work to the spillway Tainter gates would add features intended to enhance the functionality of the dam. The physical elements of the dam and dikes would be altered slightly by the modifications but would leave the overall structure and integrity of materials intact. Dikes 1 through 8 and the MIAD would be raised with engineered fill material similar to the existing composition of the earthen dikes. The RWD and LWD would include a 3.5-foot concrete flood wall that would tie into the main dam and existing terrain. Overall, the planned modifications would not diminish the materials used and the manner in which the materials were combined for the original construction of the dam and dikes.

Finally, the integrity of feeling and association would remain unchanged. The functionality of the dam and dikes as individual features, and as a system, would not be altered; they would remain as important features of the engineered environment as the original construction intended. The proposed modifications would have no effect on the capacity of the dam to portray the broad patterns of history and are designed to enhance and continue the important function of the structures to impound Folsom Lake for the purposes of flood risk management, hydropower, and irrigation.

At this time, the Corps is requesting your comments on the delineation of the APE and identification of historic properties (36 CFR § 800.4), as well as the finding of *no adverse effects to historic properties* (36 CFR § 800.5 [b]).

Copies of this letter and enclosures will be sent to: Ms. Laureen M. Perry, Regional Archaeologist, Bureau of Reclamation, Mid-Pacific Regional Office, 2800 Cottage Way, MP-153, Sacramento, California 95825; Mr. Steve Hutchason, Executive Director of Environmental Resources, Wilton Rancheria, 9728 Kent Street, Elk Grove, California 95642; and Mr. Antonio Ruiz, Wilton Rancheria, 9728 Kent Street, Elk Grove, California 95642.

Correspondence may be sent to Ms. Melissa Montag, U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922. If you have any questions or would like additional information, please contact Ms. Montag by email at Melissa.L.Montag@usace.army.mil, or by phone at (916) 557-7907.

Sincerely,

for Alicia E. Kirchner
Chief, Planning Division

Enclosures

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

Environmental Resources Branch

JAN 26 2017

Ms. Julianne Polanco
State Historic Preservation Officer
Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, CA 95814

Dear Ms. Polanco:

In accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended (54 U.S.C. § 306108), we are writing you to continue consultation on the Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project. The Dam Raise FRM was authorized in the Energy and Water Development Appropriation Act of 2004 based on recommendations contained in the November 2002 Chief of Engineers' Report that cited findings in the 2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report Environmental Impact Statement/Environmental Impact Report. The U.S. Army Corps of Engineers, Sacramento District (Corps), in coordination with the Central Valley Flood Protection Board, and the Sacramento Flood Control Agency, is implementing the Dam Raise FRM in order to provide flood risk management benefits. Pursuant to 36 CFR § 800.4, we are asking for your concurrence on our determination of the Area of Potential Effects (APE) and identification of historic properties. We are also seeking concurrence on our finding of effect pursuant to 36 CFR § 800.5 (b).

The Corps previously contacted the State Historic Preservation Officer (SHPO) and tribes in a letter dated March 3, 2015, to initiate Section 106 consultation and request concurrence on the APE. At that time, SHPO staff indicated they would prefer a complete document that fully addresses the identification efforts and results. The Corps is submitting the following final report to satisfy that request:

- Folsom Dam and Reservoir Project, American River, in El Dorado, Placer, and Sacramento Counties, California; Cultural Resources Inventory Evaluation and Determination of Effects for Folsom Dam Raise Project Construction, including Haul Routes, Recreation Trails, Staging Areas and Proposed Geotechnical Explorations (March 2016) (Enclosure 1).

The APE includes the footprints for the Dam Raise FRM located at the Folsom Dam, the Left Wing Dam (LWD) and Right Wing Dam (RWD) embankments, Dikes 1-8, and the Mormon Island Auxiliary Dam (MIAD) with buffers of 50 feet on all sides,

staging areas, haul routes, and a new recreation trail (Enclosure 2). The undertaking includes strengthening the existing Tainter gates and a new "top seal" bulkhead and hydraulic structure that would prevent overtopping of the spillway gates during a major flood event; retrofit elements (skin plate ribs, lower girder, and trunnion anchorage) on the Tainter gates; a vertical concrete extension to the top of the pier; a 3.5-foot rise of the earthen embankments of Dikes 1 through 8 and the MIAD; a reinforced 3.5-foot concrete flood wall constructed on LWD and RWD that would tie into the main dam; and a reinforced concrete retaining wall (parapet wall) embedded in the earth-fill of the embankment. Enclosure 3 includes design drawings of the planned modifications for the dam and dikes.

Substantial previous inventory efforts have occurred in and around the APE. Four previously documented cultural resources are: Folsom Dam (CA-SAC-937H), Folsom Lake Dikes (CA-SAC-1103H), a historic trash scatter and concrete box (CA-SAC-944H), and a historic water conveyance system (CA-SAC-945H). Folsom Dam and Folsom Lake Dikes are historic properties according to consensus determinations in 2006 and 2007, respectively; CA-SAC-944H and CA-SAC-945H are not historic properties according to consensus determinations in 2007.

An inventory of APE segments requiring new or initial survey coverage proceeded in three episodes during the fall and winter of 2015. Only one new, potential cultural resource was encountered during the new survey, 08-FDR-01, a sparse lithic scatter located at the base of the embankment on the south side of Dike 8. All artifacts were located 10 to 20 cm below the ground surface, but the site did not represent an intact archaeological deposit. Historic photos of dike construction on file with the Corps show that phases of extensive grading and earth-moving took place from 1954 to 1955 within the site boundary. Initially, site 08-FDR-01 was thought to be a redeposit of cultural materials from another context. Based on the ambiguous nature of the materials found, the lack of stratigraphic integrity, and the substantial past landscape alterations, the Corps subsequently determined that the lithic materials likely resulted from mechanical breakage and deposition associated with heavy equipment operations during construction of Dike 8 rather than an indicator of prehistoric use. Site 08-FDR-01 was found to be neither a cultural resource nor a historic property, and therefore merited no further recordation and evaluation under the NHPA.

The Corps engaged in tribal consultation with the Wilton Rancheria, the Tsi-Akim Maidu of the Taylorsville Rancheria, the Shingle Springs Band of Miwok Indians, and the United Auburn Indian Community of the Auburn Rancheria throughout the Section 106 process in an effort to identify sites of religious and cultural significance in the APE that may be affected by the Dam Raise FRM. Consultation was undertaken through formal letters, emails, phone calls, in-person meetings, and site visits. A detailed consultation log is included in Appendix A (Enclosure 1). Tribal consultation revealed an existing cultural resources site identified near Dike 4 but outside the APE; the boundary of the previously recorded site was updated. The Corps modified the APE closest to the site to provide an ample buffer and reduce potential impacts (Map 3 of Enclosure 2). Tribes have been provided a copy of the final report as well as an opportunity to further comment on the findings through this formal consultation package.

The Corps makes a finding of *no adverse effects to historic properties* (36 CFR § 800.5 [b]) for the Dam Raise FRM. Folsom Dam (CA-SAC-937H) and the Folsom Lake Dikes (CA-SAC-1103H) would undergo physical changes as a consequence of the proposed Project, but the changes would not adversely affect the qualities that render the properties eligible for inclusion in the NRHP under Criterion A: the overall workmanship, materials, feeling, and association aspects of integrity of the Folsom Dam and Folsom Lake Dikes would remain largely unchanged.

The workmanship of the dam and dikes is evidenced primarily in the construction of these flood control structures. The method of construction is fairly typical for poured concrete and built-up earthen dams of the 1950s and earlier eras, many of which were constructed by the Corps, as Folsom Dam was. The retrofits to the Folsom Dam spillway Tainter gates and the raising of the dikes would result in physical modification to these features, but not adversely affect the overall integrity of the workmanship. The dam and dikes will continue to exhibit the original labor, skill, and methods of construction, and would not be diminished by the physical alterations of the Dam Raise FRM Project.

The materials aspect of integrity for the Folsom Dam and Folsom Lake Dikes would be affected, but not in an adverse manner. The retrofit work to the spillway Tainter gates would add features intended to enhance the functionality of the dam. The physical elements of the dam and dikes would be altered slightly by the modifications but would leave the overall structure and integrity of materials intact. Dikes 1 through 8 and the MIAD would be raised with engineered fill material similar to the existing composition of the earthen dikes. The RWD and LWD would include a 3.5-foot concrete flood wall that would tie into the main dam and existing terrain. Overall, the planned modifications would not diminish the materials used and the manner in which the materials were combined for the original construction of the dam and dikes.

Finally, the integrity of feeling and association would remain unchanged. The functionality of the dam and dikes as individual features, and as a system, would not be altered; they would remain as important features of the engineered environment as the original construction intended. The proposed modifications would have no effect on the capacity of the dam to portray the broad patterns of history and are designed to enhance and continue the important function of the structures to impound Folsom Lake for the purposes of flood risk management, hydropower, and irrigation.

At this time, the Corps is requesting your concurrence on the delineation of the APE and identification of historic properties (36 CFR § 800.4), as well as the finding of *no adverse effects to historic properties* (36 CFR § 800.5 [b]).

Copies of this letter and enclosures will be sent to Ms. Laureen M. Perry, Regional Archaeologist, Bureau of Reclamation, Mid-Pacific Regional Office, 2800 Cottage Way, MP-153, Sacramento, California 95825.

Correspondence may be sent to Ms. Melissa Montag, U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, California 95814-2922. If you have any questions or would like additional information, please contact Ms. Montag by email at Melissa.L.Montag@usace.army.mil, or by phone at (916) 557-7907.

Sincerely,

Mark T. Z

for Alicia E. Kirchner
Chief, Planning Division

Enclosures

STATE OF CALIFORNIA – THE NATURAL RESOURCES AGENCY EDMUND G. BROWN, JR., *Governor*

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov

March 2, 2017 In reply refer to: COE_2015_0305_001

Alicia E. Kirchner
Chief, Planning Division
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, CA 95814-2922

Re: Section 106 Consultation for the Folsom Dam Raise Flood Risk Management (Dam Raise FRM) Project in El Dorado, Placer and, Sacramento Counties, California

Dear Ms. Kirchner:

The California Office of Historic Preservation (OHP) is in receipt of your letter, received on January 30, 2017, continuing consultation to comply with Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. § 300101), as amended, and its implementing regulation found at 36 CFR § 800. Along with your consultation letter, you also provided the following document:

- *Folsom Dam and Reservoir Project, American River in El Dorado, Placer and Sacramento Counties, California Cultural Resources Inventory, Evaluation, and Determination of Effects for Folsom Dam Raise Project Construction, Including Haul Routes, Recreation Trails, Staging Areas and Proposed Geotechnical Explorations Final Report* (COE 2017)

The undertaking includes strengthening of the Tainter gates; a new "top seal" bulkhead and hydraulic structure to prevent overtopping of the spillway gates; retrofit elements on the Tainter gates; a concrete extension of the pier; a 3.5-foot rise of the earthen embankments of Dikes 1-8 and the Mormon Island Auxiliary Dam (MIAD); a reinforced 3.5-foot concrete flood wall on the left wing and right wing dams; and a reinforced concrete retaining wall embedded in the earth-fill of the embankment. The COE previously consulted with my office and Native American groups regarding the establishment of the undertaking in March, 2015. At that time, the SHPO requested that the COE submit complete documentation of the identification effort and results for the undertaking. The January 30, 2017 submission provided documentation of the Area of Potential Effects (APE) and documentation of the identification efforts and results. The COE has defined the APE as including the footprint for the Dam Raise FRM Project located at the Folsom Dam, the Left Wing Dam and Right Wing Dam embankments, Dikes 1-8, and the MIAD with buffers of 50 feet on all sides. Additionally, the APE includes staging areas, haul routes, and a new recreation trail.

The COE conducted an inventory of the APE segments that required updated or initial survey coverage between fall, 2015 and winter, 2016. Previous identification efforts documented four cultural resources within the APE, including the Folsom Dam (CA-SAC-937H), Folsom Lakes Dikes (CA-SAC-1103H), a historic trash scatter and concrete box (CA-SAC-944H), and a historic water conveyance system (CA-SAC-945H). The updated inventory initially recorded a new site, 08-FDR-01 as a sparse lithic scatter at the base of the embankment on the south side of Dike 8. However, upon further inspection it was determined that the "artifacts" observed were likely the result of mechanical breakage and deposition associated with heavy equipment operations in this location during the construction of Dike 8, rather than an indication of prehistoric occupation. The site was found to not be a cultural resource and will no longer be considered for this undertaking. The remaining four sites were evaluated for previous undertakings and consulted on with OHP in 2007. As a result, the Folsom Dam (CA-SAC-937H), and Folsom Lakes Dikes (CA-SAC-1103H) have been determined as eligible for listing on the National Register of Historic Places (NRHP) under Criterion A, and have received SHPO concurrence. Finally, CA-SAC-944H, and CA-SAC-945H have been determined no eligible for listing on the NRHP and received SHPO concurrence.

The COE has consulted with the Wilton Rancheria, the Tsi-Akim Maidu of the Taylorsville Rancheria, the Shingle Springs Band of Miwok Indians, and the United Auburn Indian Community (UAIC) throughout the section 106 process for this undertaking and has not resulted in the identification of any cultural resources within the APE for the Folsom Dam Raise Project.

The COE has determined that the undertaking will cause changes to the Folsom Dam and Folsom Lake Dikes, but that the changes would not adversely affect the qualities that contribute to the eligibility of the properties. The integrity of the Folsom Dam and Folsom lake Dikes would remain unchanged, and therefore, the COE has determined that the undertaking would have no adverse effect on historic properties. The COE is requesting my comments on their definition of the APE and their identification of historic properties, as well as my concurrence on their finding of *no adverse effect* pursuant to 36 CFR 800.5(b). After reviewing your submission I have the following comments:

- I agree that the Area of Potential Effect (APE) as represented in the attachments noted above is appropriate.
- The historic property identification efforts appear to be sufficient for this undertaking pursuant to 36 CFR § 800.4(b).
- Pursuant to 36 CFR 800.5(d)(1), <u>I do not object</u> to the COE's finding of *no adverse effect* to historic properties affected for this undertaking.
- Please be advised that under certain circumstances, such as an unanticipated discovery or a change in project description, you may have future responsibilities for this undertaking under 36 CFR § 800.

If you have any questions, please contact Jessica Tudor of my staff at (916) 445-7016 or Jessica.Tudor@parks.ca.gov or Kathleen Forrest of my staff at (916) 445-7022 or Kathleen.Forrest@parks.ca.gov.

Sincerely,

Julianne Polanco
State Historic Preservation Officer

APPENDIX H

PUBLIC INVOLVEMENT

1.0 INTRODUCTION

This appendix provides responses to public and agency comments on the Folsom Dam Raise Project, Draft Supplemental Environmental Impact Statement/Environmental Impact Report (draft SEIS/EIR), as received during the public comment period. Coordination with Native American tribes concerning the proposed project and the draft SEIS/EIR is addressed in Appendix G, as are comments submitted by such tribes and responses to these comments.

The draft SEA/EIR was circulated for a 64-day review period to: Federal, State, and local agencies; organizations; elected officials; Native American tribes; and members of the public. The review period (public comment period) started on July 19, 2016 and continued through September 20, 2016. The draft SEIS/EIR was made available both on the Sacramento District of the U.S. Army Corps of Engineers website as well as the website for the Central Valley Flood Protection Board. Hard copies of the draft SEIS/EIR were provided to the Folsom Public Library and the Orangevale Branch Library. Letters were mailed to interested parties and local residents notifying them of the availability of the draft SEIS/EIR, the public comment period, the method for submitting comments, the date, time, and location for the public meetings (see Section 2), and how to obtain copies of the draft SEIS/EIR. Hard copies and/or DVDs of the draft SEIS/EIR, along with the information stated above, were mailed to various resource agencies, interested parties, and elected officials. Public notices and news releases were published in local newspapers to advise readers of the availability of the draft SEIS/EIR, the public comment period, the method for submitting comments, and the date, time, and location for the public meetings. A Notice of Availability (NOA) for the draft SEIS/EIR was published in the Federal Register on July 22, 2016 (reference: Federal Register, Vol. 81, No. 141, Friday, July 22, 2016, Notices – EIS No. 20160167), although this NOA indicated the close of the public comment period as being September 6, 2016 rather than September 20, 2016. All comments received during the public review period were considered and incorporated into the final SEIS/EIR, as appropriate.

2.0 PUBLIC WORKSHOPS AND MEETINGS

Two public workshops were conducted to discuss the proposed project and the draft SEIS/EIR, as well as to solicit public input concerning the proposed project and the draft SEIS/EIR. The first public workshop was held on July 25, 2016, at the Sacramento City Library located at 828 I Street in Sacramento, California. The second public workshop was held on July 27, 2016, at the Folsom Community Center located at 52 Natoma Street in Folsom, California. No one from the general public or external agencies (other than DWR, SAFCA, and USBR) attended the first workshop. It is estimated that approximately 11 people attended the second workshop, not including staff from the Corps, DWR, and USBR.

Prior to the public workshops mentioned above, two public scoping meetings for the proposed project were conducted. The purpose of these meetings was to provide an overview of the Folsom Dam Raise project, provide an overview of the SEIS/EIR process, and afford interested parties with the opportunity to provide comments regarding the scope of the environmental analyses and potential project alternatives. The first public scoping meeting was held on February 19, 2014, at the Folsom Community Center. The second public scoping meeting was held on February 24, 2014, at the Sacramento Library Galleria. Mail and email announcements for these meetings were sent to various stakeholders and other interested parties. The meetings were also advertised in the Sacramento Bee and the Folsom Telegraph. In addition, a Notice of Intent (NOI) was published in the Federal Register on February 6, 2014 (reference: Federal Register, Vol. 79, No. 25, Thursday, February 6, 2014, Notices – FR Doc. 2014-02530). This NOI advised the public of the two scoping meetings and also encouraged interested parties to provide a current address if they wished to be notified of circulation of the draft SEIS/EIR for public comments.

3.0 WRITTEN COMMENTS RECEIVED

The following subsections address written comments received during the public review period concerning the draft SEIS/EIR. Copies of the written comments received are provided at the end of this appendix unless otherwise indicated.

3.1 COMMENTS FROM SMAQMD

Ms. Karen Huss of the Sacramento Metropolitan Air Quality Management District (SMAQMD) submitted comments in a letter dated August 30, 2016. The following lists each comment in bold italicized font, followed by the response to the comment in regular font.

1. ***In order to clarify the particulate matter emissions analysis and mitigation, consider the following recommendations:***
   - ***a. Use the SMAQMD's pounds/day thresholds for particulate matter emissions (both PM10 and PM2.5) rather than the ambient air quality standards.***
   - ***b. Include the SMAQMD's annual thresholds for particulate matter emissions (both PM10 and PM2.5) and compare project emissions to the thresholds.***
   - ***c. Add the SMAQMD's Enhanced Fugitive Dust Control Practices to further reduce particulate matter emissions.***
   - ***d. If particulate matter emissions still exceed the SMAQMD's pounds/day thresholds, include a mitigation fee to reduce emissions below the thresholds. Additionally, reducing particulate matter emissions below the thresholds will ensure the annual SMAQMD thresholds are not exceeded.***
   - ***e. Remove references to dispersion modeling.***

   We concur with all your recommendations and have revised the SEIS/EIR accordingly.

2. ***The document should report maximum pounds/day emissions each year in addition to average pounds/day over the 5 year construction period. This is necessary to more accurately disclose the emissions from the project.***

   Maximum pound/day emissions have been estimated and are included in the current document (see Section 3.6).

3. ***Provide the full Road Construction Emissions Model runs so the assumptions behind the analysis can be reviewed.***

   Appendix E has been revised to include results of the updated/revised Road

Construction Emissions Model runs. We will provide the assumptions supporting these model runs to you via a separate transmittal.

4. ***Provide the documentation supporting the mitigated emissions reported in Tables 13 and 14. All measures assumed in the analysis to reduce emissions should be applied as mitigation.***

   Section 3.6 has been substantially revised based on new emissions model runs. Revisions also include re-numbering of tables, including former Tables 13 and 14. All model runs used to estimate mitigated emissions were based on compliance with the mitigation measures indicated in Section 3.6.

5. ***A general conformity analysis does not appear to be needed based on Table 14. All references indicating a general conformity analysis is needed should be corrected.***

   Concur. All references indicating a general conformity analysis is needed have been corrected.

6. ***In the cumulative analysis, the emissions from the Folsom Dam Raise project should be added to the emissions estimate for the Folsom Joint Federal Project general conformity determination in the overlapping years to determine that the whole JFP complex does not exceed de minimis emissions levels.***

   The anticipated schedule for the overall Folsom Dam Raise project has been revised. Construction of this project is now anticipated to begin in the Fall of 2018, and it would be completed in the Fall of 2022. Construction of the Folsom JFP should be completed by the Fall of 2017. Thus, there is no longer an overlap in the construction schedules for these two projects.

3.2 INITIAL COMMENTS FROM THE U.S. ENVIRONMENTAL PROTECTION AGENCY

Ms. Jean Prijatel of the U.S. Environmental Protection Agency, Region 9, Environmental Review Section, submitted comments in an email dated August 4, 2016. The following lists these comments in bold italicized font, followed by the responses to the comments in regular font.

1. ***Can you provide contacts/timing for the Water Control Manual NEPA process? We submitted comments in 2012 on a scoping notice for a DEIS, but I do not think we have received anything since.***

   The Water Control Manual (WCM) is a separate effort from the Dam Raise Project. Natalie McNair is the environmental lead for that effort. Her phone number is 916-557-7449. The NEPA document being prepared is based on proposed modifications to the existing WCM for Folsom Dam to account for the benefits that will be provided by the new JFP Auxiliary Spillway (slated to become operational in 2017). Please contact Ms. McNair for the latest anticipated schedule for release of the draft NEPA document. A separate WCM update and a new NEPA document covering this update will be needed once the overall Folsom Dam Raise project is nearing completion. However, there is presently no schedule for either of these efforts.

2. ***It would be helpful to better understand the reason for the timing of the current SDEIS. Is there a pressure from authorization or funding deadlines? Why not wait for the economic analysis to more fully inform the purpose and need? Why not wait until the WCM is completed for the existing projects currently under construction?***

   There are both funding and scheduling commitments that drive the timing of the current SEIS/EIR. As for the economic analysis, one was done for the approval of the project before it was authorized. The most recent published economic analysis is contained in the document, "American River Watershed Project, Folsom Modification and Folsom Dam Raise Post Authorization Report and Engineering Documentation Report" (Corps, 2007).

3. ***We would be interested in very briefly speaking with someone who could discuss whether or not there are engineering differences for a 3.5 foot dam raise for flood/surcharge storage vs. water supply storage.***

   The purpose of the Dam Raise project is not to increase water supply storage. This difference is how the reservoir is operated. The Dam Raise will not be raising the standard surcharge line for Folsom Lake. It will be reflected in Flood Operations; the operations might encroach on the surcharge line for a longer limited period of time.

4. ***Can you please send us the PACR from 2007? We're having trouble locating it online.***

   A copy of the 2007 PACR has been transmitted.

3.3 ADDITIONAL COMMENTS FROM THE U.S. ENVIRONMENTAL PROTECTION AGENCY

Ms. Kathleen Goforth of the U.S. Environmental Protection Agency, Region 9, Environmental Review Section, submitted additional comments in a letter dated September 16, 2016. The following lists these comments in bold italicized font, followed by the responses to the comments in regular font.

1. ***The DSEIS includes air emissions calculations in Appendix D, however, these emissions estimates do not correspond with either the mitigated or unmitigated emissions provided in Tables 12 and 14 of Chapter 3. The source of the document's mitigated and unmitigated emissions estimates remains unclear. Additionally, the DSEIS does not identify the model or method used for estimating emissions.***

   Air emissions for the project have been recalculated using the Roadway Construction Emissions Model, Version 8.1.0. The air emissions tables have been revised to reflect these results. The source of mitigated and unmitigated emissions estimates is discussed in the air quality section of the SEIS/EIR. Updated model outputs are provided in Appendix E.

2. ***The air quality cumulative impacts discussion states that the dam raise project will be constructed at the same time as the Corps' Folsom Dam Modification Project Approach Channel and its post-construction restoration, which would contribute to a significant cumulative effect (page 211). This discussion does not provide any emissions estimates nor does it outline how these effects will be reduced, except to say that coordination with SMAQMD and Reclamation would be needed.***

   The cited text in the draft SEIS/EIR was somewhat unclear and has since been revised. Construction of the initial phases of the Folsom Dam Raise project is currently anticipated to begin no earlier than the fourth quarter of 2018. In contrast, the Folsom Joint Federal Project (JFP; includes Folsom Dam Modification Project, Approach Channel) should be completed by the end of the third quarter of 2017. Assuming these schedules, there would be no overlap of the construction activities associated with these two independent projects.

3. ***Recommendations: In the FSEIS clearly explain the methods used to estimate emissions and disclose and summarize all calculations that result in mitigated and unmitigated emissions for the project. The cumulative effects analysis should include emissions estimates and a description of the types of mitigation measures that would be implemented in order to reduce emissions. Describe the process for future coordination with SMAQMD, and how commitments to reduce air quality impacts will be integrated into the construction of the proposed project. If impact reductions are expected to result from coordinated construction schedules, or specific known mitigation measures at this time, include these details in the FSEIS and commit to the schedule in the Record of Decision (ROD).***

   The draft SEIS/EIR already cited the method used to estimate emissions and presented summary data for estimated mitigated and unmitigated emissions. However, the emissions estimates have since been re-run. Sections 3.6 and 3.7 of this SEIS/EIR have been updated accordingly, and Appendix E provides the actual revised emissions modeling outputs.

   As regards cumulative effects, refer to the response to comment #2 above. Also, the cumulative effects section is not appropriate for discussing proposed measures to help reduce emissions. Proposed mitigation measures are set forth in Sections 3.6 and 3.7, as is the process for future coordination with SMAQMD. Impact reductions are indeed expected to result from known mitigation measures discussed in these two sections. Impact reductions are not based on some type of coordinated construction schedules.

4. ***The DSEIS is internally inconsistent on the applicability of general conformity for the project. For example, Section E.5 states, "even with implementation of mitigation measures, emissions would not be reduced below the USEPA's general conformity de minims threshold." Table 14 Mitigated Alternative 2 Annual Emissions Summary for NEPA, however, does not list any emissions higher than the general conformity de minimis limit. We note that Table 14 lists carbon dioxide as exceeding de minimis thresholds; however, EPA's general conformity rules do not have such a threshold for carbon dioxide. In a telephone call between the Corps and EPA on August 25, 2016, the Corps clarified that the***

text of the DSEIS is in error and that the tables properly reflect the anticipated emissions with mitigation, which would be below de minimis thresholds. Recommendation: In the FSEIS, revise the general conformity discussion and data to be consistent. Remove the reference to carbon dioxide de minimis levels.

Concur. The general conformity discussion and data have been revised to demonstrate that unmitigated and mitigated emissions fall below the general conformity *de minimis* thresholds. The reference to carbon dioxide *de minimis* levels has been removed.

5. ***The project area is located in an area designated as non-attainment for ozone and fine particulate matter. The DSEIS includes errors in the text and tables describing the National Ambient Air Quality Standards (NAAQS) designations for the project area. For example, Table 9 lists Sacramento County as designated unclassified/attainment for carbon monoxide, but the county is designated as attainment/maintenance. This document also mischaracterizes the status of the ozone standards by stating that the 8-hour ozone standard was revoked and the 1-hour standard was established in 1997.***
Recommendation: The FSEIS should include the correct air quality designations for the project area and properly characterize the status of the standards. EPA provides maps showing designations at ***https://www3.epa.gov/region9/air/maps/index.html. Information from the website can be downloaded to Google Maps or EPA can provide it in an electronic format if requested.***

Concur. This SIES/EIR has been revised to correct the errors mentioned. The former table for criteria pollutant attainment status has been removed; however, text has been added to Section 3.6 addressing the correct attainment status.

6. ***On August 1, 2016, the Council on Environmental Quality issued final guidance on considering greenhouse gas (GHG) emissions and climate change in NEPA reviews. Fundamental to this guidance are the recommendations that when addressing climate change, agencies should consider: (1) The potential effects of a proposed action on climate change as indicated by assessing GHG emissions (e.g., to include, where applicable, carbon sequestration); and, (2) The effects of climate change on a proposed action and its environmental impacts.***

While the DSEIS includes an estimate of GHG emissions from the project and mitigation measures to reduce impacts to less-than-significant (page 51), it does not include a discussion of reasonably foreseeable climate change impacts in the project area. Hydrology is a resource not considered in detail in the DSEIS. The brief hydrology section describes the existing runoff regime for the watershed (page 66), but does not indicate how this may change in the future. The purpose and need for the project also notes that the dam raise is needed to provide temporary water storage during rare flood events, defined as the 1/254 year event (page 15). Changing climate conditions can exacerbate the environmental impacts of a project as well as affect the proposed project's ability to meet the flood protection purpose and need presented in the DSEIS. For example, potential changes in precipitation and frequency of drought would alter the anticipated flood frequency and could lead to changes in the project's ability to meet its flood protection objectives while also altering sediment transport and water quality,

among other potential impacts. The Bureau of Reclamation's SECURE Water Act Report to Congress in 2011 states that "moisture falling as rain instead of snow at lower elevations will increase wintertime runoff by 22% (December through March) and decrease springtime runoff by 27% (April through July)" for the Sacramento and San Joaquin River basins. The report also anticipates the need for reservoir releases earlier in the flood control period to provide more flood storage during earlier rain or snowmelt events (Chapter 8, page 7).

Recommendations: In the Affected Environment section of the FSEIS, include a summary discussion of climate change and ongoing and reasonably foreseeable climate change impacts relevant to the project, based on U.S. Global Change Research Program assessments or other relevant models. We recommend that the FSEIS include in the Affected Environment section a consideration of future climate scenarios to determine whether the environmental impacts of the project would be exacerbated by climate change. If impacts would likely be exacerbated by climate change, identify and consider incorporating additional measures that could mitigate those impacts.
In addition. We recommend that the FSEIS discuss how the design of the proposal can incorporate resilience to foreseeable climate change. Identify in the FSEIS any commitments that have been made to ensure implementation of design features or measures to adapt to climate change impacts.

The environmental impacts of the proposed project (Alternative 2) would not be exacerbated by climate change. All the project impacts discussed in this SEIS/EIR are tied to project construction, not future operations of Folsom Dam and its facilities. Since it is estimated that overall project construction would last approximately 4 years, it is unlikely that climate change during that period would increase the magnitude of adverse impacts.

The design of the proposed project is in accordance with applicable Corps and USBR dam safety requirements and guidelines. These requirements include preparation of hydrologic and hydraulic models that incorporate potential climate change effects over hundreds of years. The engineering design considers the results of these models to help ensure the Folsom Facilities (main dam, dikes, LWD, RWD, MIAD) do not fail, even during the Probable Maximum Flood (PMF) event.

We believe your concerns are better directed toward the future modification of the Water Control Manual (WCM), which dictates the operation of Folsom Dam and the new JFP auxiliary spillway and thus also guides regulation of water levels in Folsom Lake. As mentioned in this SEIS/EIR and the draft Record of Decision, the WCM will not be modified to account for the benefits of the Dam Raise project until near or after completion of this project. A supplemental joint NEPA/CEQA document will be prepared for the proposed WCM modification prior to its implementation. This future NEPA/CEQA document will appropriately address potential climate change issues. Note that current proposed changes to the WCM to account for the new JFP auxiliary spillway (but not the Dam Raise project) include shifting operations such that they are based more on long-range weather forecasts.

7. ***Folsom Lake is a multiuse facility primarily operated to maximize flood risk management and water supply benefits (page 12). While we recognize that the proposed project would be a "dry" raise providing for an increase in the flood surcharge zone, we do have concerns about potential future conversion of this flood storage and surcharge space into water supply or multipurpose use ("wet" dam raise). Additional NEPA analysis would be required to understand the environmental impacts of more regular inundations of the reserve capacity, particularly for water quality, fish and wildlife, and waters of the U.S. Recommendation: We recommend the FSEIS and ROD include a commitment to future NEPA compliance, with appropriate public review processes, prior to any decision to modify operations or modify the use of the additional flood storage capacity. Include an estimated schedule of when future NEPA analyses would be initiated, if known.***

   The SEIS/EIR mentions that a separate joint NEPA/CEQA document would be prepared when the WCM is being modified to account for completion of the Dam Raise project. We do not yet know when this document might be prepared. The draft ROD includes a commitment to prepare a supplemental joint NEPA/CEQA document (analysis) addressing future modifications to the WCM due to the Dam Raise. Please note that use of the additional surcharge space to provide additional storage for water use purposes would first require completion of a separate authorization process.

8. ***EPA recommends that the FSEIS explain how the project would be consistent with the directives in Executive Order 13690, and discuss changes to the project necessary to meet those directives. For more information, go to: https://www.fema.gov/fderal-flood-risk-management-standard-ffrms.***

   The following text has been added to Section 5.1: "EO 13690, signed January 30, 2015, establishes a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input. It also amends EO 11988 to include the Federal Flood Risk Management Standards. Once implemented, EO 13690 will assist in reducing the risk and cost of future flood disasters by ensuring that Federal investments in and affecting floodplains are constructed to better withstand the impacts of flooding. The EO encourages agencies to consider natural systems, ecosystem processes, and nature-based approaches when development alternatives are considered. In October 2015, the Water Resources Council approved revised guidelines for implementing EO 11988, as amended by EO 13690. These guidelines are advisory and were informed by public dialogue and comment aggregated through FEMA-hosted stakeholder sessions. The Corps will not implement the revised decision making process under EO 11988, as amended, until agency specific guidance for implementation is issued."

3.4 COMMENTS FROM THE SACRAMENTO MUNICIPAL UTILITY DISTRICT

Mr. Rob Ferrera of the Sacramento Municipal Utility District (SMUD) submitted comments in a letter dated September 1, 2016. The following lists these comments in bold italicized font, followed by the responses to the comments in regular font.

1. ***As discussed in the EIR, SMUD has transmission facilities in and around the project area that could be impacted during the construction of the project. In particular, we are concerned about materials or equipment staging under these lines in Staging Areas 1, 2 and 3. SMUD assumes any impact on our facilities due to construction of this project is addressed in your EIR. Please view the following link on smud.org for more information regarding transmission encroachment: https://www.dmud.org/en/do-buisness-with-smud/real-estateservices/transmission-right-of-way.htm.***

   Comment noted. Final construction plans and specifications for the various phases of the proposed project will make note of the location of SMUD transmission facilities, and will advise the construction contractor that any damage or alterations to these facilities are strictly prohibited. This SEIS/EIR does not address impacts to SMUD transmission facilities because no impacts are proposed.

2. ***SMUD would like to be involved with discussing the above areas of interest as well as discussing any other potential issues. We aim to be partners in the efficient and sustainable delivery of the proposed project. Please ensure that the information included in this response is conveyed to the project planners and the appropriate project proponents.***

   Thank you for your goal of helping advance the proposed project. Your interests and concerns have been relayed to the appropriate parties. The Corps will further coordinate with SMUD, as necessary, during the process of preparing final construction plans for the proposed project.

3.5 COMMENTS FROM PLACER COUNTY

Ms. Shirlee Herrington of the Placer County Community Development Resource Agency submitted comments in an email dated August 30, 2016. The following lists these comments in bold italicized font, followed by the responses to the comments in regular font.

1. ***Page 150, third paragraph: The year 2016 is indicated to be the baseline condition. However, page 62 shows the baseline year to be 2014. Which is correct?***

   Section 3.9.1 has been revised to resolve this conflict. The baseline year is 2014.

2. ***Page 156, Table 18: This table should distinguish between the different Counties as only Sacramento County is shown. In Placer County, revise Folsom-Auburn Road to Auburn-Folsom Road. In current ADT for Douglas Blvd. between Barton Road and Auburn Folsom Road is 37,400. The current ADT for Auburn-Folsom Road between Douglas Blvd. to Lake Crossing is 34,860.***

   The cited table in Section 3.9, which is now Table 3-16, has been revised in accordance with your comments.

3. ***Page 157, Class 3 Facilities, Auburn-Folsom Road: Auburn-Folsom Road between the Sacramento County line and Joe Rodgers Road currently has class 2 bike lanes on both sides of the road.***

In Section 3.9, the sentence has been revised as follows: There are class 2 bicycle lanes on each side of the road between the Sacramento County line and Joe Rodgers Road.

4. ***Table 21: Semi trucks and dump trucks will not be able to make a right turn from northbound Auburn-Folsom Road to the Unnamed Road between Bell Drive and Country Court as it is too sharp. The only way is if the number 1 lane is used and Placer County will not support such movements.***

The cited table is now Table 3-18 in Section 3.9.4. This SEIS/EIR has been revised to indicate the cited construction access road would only be used to egress the project site. Construction vehicles would not be allowed to turn into the project site from Auburn-Folsom Road. Construction vehicles using this access road to leave the project site would only be allowed to turn north into the northbound lane of Auburn-Folsom Road.

Note that this SEIS/EIR has also been revised to include construction of a new access road just south of the existing access road discussed above. This temporary access road would be used for both ingress and egress purposes. It would include construction of a new, temporary north-bound turn lane on the east side of Auburn-Folsom Road extending to the new access road. Corps staff met with Placer County staff on November 10, 2016 to discuss this new access road and turn lane. County staff provided turn lane design guidance and indicated the County would not object to the construction of the turn lane and access road (although the final design would require approval by the County and an appropriate encroachment permit from the County).

5. ***Page 163, Table 22: What are the new trips generated for dike's 1 thru 3? Isn't the raising of these 3 dikes part of Alternative 2 (See Table 21)?***

The cited table, which is now Table 3-19, has been revised to indicate the new trips generated during construction associated with Dikes 1 through 3 (aka Work Package 3). The raising of these 3 dikes are indeed part of Alternative 2 (the proposed project).

6. ***Page 167, Table 24: You are using the 1996 version of the Granite Bay CP Noise Element. The GPCP Noise Element was updated in 2012.***

The cited table, which is now Table D in Appendix F, has been revised to use the 2012 Granite Bay CP Noise Element and has also been re-formatted.

7. ***There appears to be no proposal to conduct additional/revised flood inundation mapping as a result of this project, at least there is no discussion of this in Section 3.2.1 Hydraulics. Depending on specific catastrophic dam failure scenarios assumed, it may be warranted that revised flood inundation maps be produced for Dikes 1-6 in Placer County. Please revise these inundation maps or provide an explanation as to why the current maps should not be revised in***

Section 3.2.1.

This SEIS/EIR was prepared to address the proposed project's construction only. There are no expected changes to the operation of Folsom Lake and consequently no changes to the hydraulics or inundation areas at this time. However, it is highly likely there will be changes made to the operation of Folsom Dam (and Folsom Lake) once the proposed Dam Raise project is completed. The evaluation of any future changes in flood risks to downstream communities would be accounted for in a subsequent Water Control Manual (WCM) update. Such an update would take into account changes in operations due to the additional capabilities provided by completion of the Folsom Dam Raise project. It is likely the WCM would not be updated for this reason until near the completion of the overall Dam Raise project. Any proposed changes to the WCM at that time would be evaluated in a new supplemental NEPA/CEQA document.

8. ***Under the listed "Regional County and City Agencies" affected by the project in Placer County, only Placer County is included, not City of Roseville or the Placer County Flood Control and Water Conservation District. Please include the District and the City of Roseville in this list.***

The City of Roseville and the Placer County Flood Control and Water Conservation District have been added to the list of SEIS/EIR recipients in Section 6.4. Keep in mind that this is not intended to be a listing of agencies that may be affected by the proposed project.

9. ***Overall this project should provide additional flood risk reduction benefits to unincorporated Placer County and City of Roseville areas. Please quantify these benefits so that they may be accounted for appropriately in the County's local hazard mitigation plans.***

Please refer to the response to comment #7 above.

3.6 COMMENTS FROM THE U.S. FISH AND WILDLIFE SERVICE

Mr. Doug Weinrich of the U.S. Fish and Wildlife Services (USFWS), Sacramento Fish and Wildlife Office, submitted comments pertaining to the overall draft SEIS/EIR in a letter dated September 13, 2016. The following lists these comments in bold italicized font, followed by the responses to the comments in regular font.

1. ***Executive Summary: ES.5 Environmental Effects and Mitigation Measures ----- The last sentence of the 9th paragraph states: "…with the implementation of mitigation measures…, in combination with transplanting of shrubs, mitigation plantings, and the creation of habitat, these impacts are not likely to adversely affect the valley elderberry longhorn beetle." The Service believes this statement is contradictory because the action of transplanting an elderberry shrub will require take authorization since it likely results in adverse effects to the valley elderberry longhorn beetle, a species federally-listed as threatened under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The Service recommends changing the wording of this sentence to state that "… these impacts are not likely to result in jeopardy."***

Concur. The cited text in the Executive Summary has been revised accordingly. Note also that the means of providing compensatory mitigation for adverse impacts to the beetle proposed in the draft SEIS/EIR have also been revised (see Section 3.5 and Appendix D).

2. ***Section 3.4.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise and Concrete Floodwall; Page 99 ----- The third full sentence at the top of the page states: "Smaller vegetation type acreages, however, are understated in size as blocks of vegetation under eight acres were not mapped as distinct units." Were all vegetation blocks less than 8 acres included in the impact calculations and, if they were, what vegetation type were they classified as?***

   All of Section 3.4, including Section 3.4.4, has been substantially modified since the draft SEIS/EIR was released. The approach to mapping existing vegetation associations/habitats was revised in a manner that allowed separately classifying/mapping areas less than 8 acres in size when necessary. The potential impact calculations were modified to use the revised vegetation/habitat mapping.

3. ***Section 3.4.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise and Concrete Floodwall; Page 104 ----- The first sentence at the top of the page states: "Up to two acres of oak woodland savannah is included in staging area boundaries within the tainter gate project area; however, this smaller acreage was not included in the Northern Sierra Foothills Project mapping due to limited size and was delineated as urban acreage." Were the 2 acres of oak woodland savanna considered in your impact calculations categorized as oak woodland or urban impact acreage?***

   Please refer to the response to comment #2 above. The revisions discussed in the cited response eliminate the need for your question regarding "oak woodland savanna" impact calculations. Oak savanna is now used as its own unique vegetation association/habitat type, and anticipated impacts to this category are segregated from other categories of vegetation associations/habitat types.

4. ***Section 3.4.5 Avoidance, Minimization, and Mitigation Measures; Measure 15; Page 107 ----- This measure states: "Wetlands identified by the Northern Sierra Foothills project at MIAD would be assessed before project commencement, and appropriate protections would be provided." What assessments are being conducted at the MIAD wetlands and do you anticipate impacts to these wetlands due to project construction?***

   The overall Section 3.4 and overall Section 3.11 have been revised subsequent to the release of the draft SEIS/EIR. Wetlands previously located within the proposed construction footprints for raising MIAD and for the proposed staging area immediately south of MIAD were eliminated by USBR's recent dam safety improvements to MIAD, according to the NEPA document generated for that project. The Corps believes, however, that a portion of a riparian woodland wetland that still remains within the proposed staging area could have a hydroperiod that allows this area to still classify as a wetland.

Prior to initiating construction work within the proposed staging area south of MIAD, Corps environmental staff would determine if the remnant riparian woodland wetland still classifies as a wetland. At the same time, Corps environmental staff would also survey other portions of the staging area and lands immediately adjacent to the staging area to search for other remnant, jurisdictional wetlands or other Waters of the U.S (WOUS). If any jurisdictional WOUS are present, these would be protected (e.g. no impacts). Even if the riparian woodland no longer classifies as a wetland, it would also be protected.

5. ***Section 4.4.7 Sensitive Species, Valley Elderberry Longhorn Beetle; Page 214 ----- The fourth sentence of the first paragraph states: "The exact number of injured or killed is unknown but would likely be minimal due to the exceptional flight ability of the beetle to avoid construction vehicles." The Service does not agree that valley elderberry longhorn beetles have exceptional flying ability to avoid on-coming construction traffic and the Service recommends removing that portion of the sentence.***

Concur. The problematic sentence has been deleted.

6. ***General Question ----- The Service has completed a preliminary review of the section 7 consultation package for the proposed project and it had a greater level of detail compared to the draft SEIS/EIR. Since the Service will be completing a final supplemental Fish and Wildlife Coordination Act (CAR) for the proposed project, is the information in the consultation package the most up to date project information and should it be incorporated into the final supplemental CAR? In addition, the draft SEIS described tainter gate retrofits that are not described in the consultation package. Are the tainter gate retrofits included in the proposed project and, subsequently should they be included in the project description for the final CAR?***

These questions were already addressed with Amber Aguilera of USFWS in a telephone conversation prior to USFWS's completion of the final CAR. The project information contained in the consultation package was the most up-to-date at the time the package was written. The submitted package also noted that during the process of generating the final SEIS/EIR, the SEIS/EIR would be revised such that there would be no substantive conflicts between the project information submitted in the consultation package and information contained in final SEIS/EIR. This commitment has been satisfied in the final SEIS/EIR, with a few exceptions involving further updates to project details such as the anticipated project schedule.

The draft SEIS/EIR contained certain specific details related to the proposed Tainter gate refinements ("retrofits') that were not set forth in the consultation package and are also not mentioned in the final SEIS/EIR. The reason for this was that some of the details mentioned in the draft SEIS/EIR were viewed as being unnecessary information that could potentially complicate the reader's basic understanding of the proposed project. For example, the draft SEIS/EIR included a long paragraph describing the intricacies of the proposed new top seal bulkhead – details such as what type of anchors and shear lugs (including size) would be to secure the angle braces that would support the bulkhead. Such details have no bearing on the analysis of potential environmental impacts that could result from the Tainter gate refinements element of the Dam Raise project.

The Tainter gate refinements remain a component of the proposed project and should be (and actually are) included in the project description contained in the final CAR.

3.7 COMMENTS FROM GARY AND REBECCA BOLIN

Gary and Rebecca Bolin, who reside in a neighborhood southeast of the Dike 7 area, submitted comments in a letter dated September 1, 2016. The following lists pertinent comments in bold italicized font, followed by the responses to the comments in regular font. The comments listed are paraphrased from the actual comments.

1. ***Parking lots - we are very supportive of the restoration of the Dike 7 Office Complex and parking lots. It is our understanding the staging area, two parking areas, all equipment, and temporary buildings, fencing and structures will be removed from the complex the area will be restored topographically and restored to native habitat.***

   Comment noted. Your understanding of the final restoration of the Dike 7 Office Complex (which includes the parking lots) is essentially correct. Some fencing may remain adjacent to the south side of Dike 7 for security purposes, but this has not yet been determined. Such details will not be known until final project construction plans for this phase of the Dam Raise project are generated.

2. **Access points-can you please clarify where the access point for construction for Dike 7 area will be? It is not clear to us which is the northern and southern point access and exactly where the access point(s) will be.**

   Figure 2-12 in this SEIS/EIR has been revised. It now shows only one construction access point (the prior northern access point) for the Dike 7 area. This access point is at the intersection of East Natoma Street and the existing private paved access road to Dike 7. This private paved road, which leads to both the Dike 7 Office Complex and Dike 7, has been used in the past and is presently being used for construction access to the Dike 7 area.

3. ***Noise - we would like to request that a noise phone line be established to report extreme construction noise after normal construction hours. To ensure the complaint was recorded and received, we would like to request that procedures someone return a call when a complaint has been left.***

   A noise “hotline” (phone line) would be established for the purpose of reporting noise complaints. Any complaint calls not answered at the time of the call would be returned within approximately 24 hours of their receipt, as long as the message left includes a call-back phone number.

4. ***Dike 7 cove-we believe that Dike 7 cove should be fully restored to its state prior to the Folsom Dam Spillway Project and Folsom Dam Raise Project. Dike 7 cove was part of Folsom Lake proper prior to these projects and it should return to this condition.***

Basically this same comment was responded to in the 2016 final SEA/EIR for the Folsom Dam Modification Project: Phase V Site Restoration and Related Mitigation Activities. Our response remains the same. Prior impacts to the “cove” (a former shallow lobe of Folsom Lake) that was once present immediately north of Dike 7 were previously mitigated via off-site mitigation; hence, restoration is not required nor is it proposed. Please keep in mind that the Dam Raise project and the Folsom Joint Federal Project (the project that impacted the subject area) are two separate and independent projects.

3.8 COMMENTS FROM LA COLLINA DAL LAGO OWNERS’ ASSOCIATION

Mr. Jeremy G. Bernau, President of the La Collina dal Lago Owners’ Association, submitted comments in a letter dated August 28, 2016. The following lists pertinent comments in bold italicized font, followed by the responses to the comments in regular font. The comments listed are paraphrased from the actual comments.

1. ***We are very supportive of the restoration of the Dike 7 Construction Office Complex and parking lots as described on page 42 and 43 of the draft SEIS/EIR. According to the draft SEIS/EIR, the staging area located at the Dike 7 Office Complex would be restored to habitat. This area includes the staging area, two parking areas, all equipment, and temporary buildings, fencing and structures which would be removed from the complex. Both parking lots will be removed and the area will be restored topographically and revegetated. During the construction of the improvements at Folsom Dam, the Dike 7 Construction Office Complex has negatively impacted our neighborhood and property owners. The removal of the office complex and parking lots along with the area’s restoration to native habitat is very welcome news. From the documents we have reviewed, it appears that the removal and restoration will take place around 2021 (page 45 of the draft SEIS/EIR states this work will be award*** **[sic]** ***in calendar year 2019 with a construction duration of 2 years).***

Comment noted. Please refer to the response to comment #1 in Section 3.7 above. Your understanding of the anticipated year during which restoration would take place (e.g. 2021) was correct based on the draft SEIS/EIR that was originally released for public review. However, the anticipated schedule for the overall Dam Raise project has since been revised to start in the Fall of 2018 and end in the Fall of 2022. The removal and restoration work for the Dike 7 Office Complex would occur in 2022. Please keep in mind that the construction schedule for the overall Dam Raise project is subject to change. Thus, the restoration schedule for the Dike 7 Office Complex is also subject to change.

2. ***The La Collina dal Lago owners’ association board members have some questions and need clarification regarding the proposed construction vehicle***

access points to this project. Figure 10 on page 39 and the map in Appendix B, "Staging Areas for Dikes 7, 8, and LW", seem to show two access points to <u>Dike 7</u>. Page 37 states that only the northern access point would be used to access just Dike 7 and that the southern access point would not be used at all. Where exactly is the southern access point? In reading your maps, it appears that the southern access point is at the intersection of East Natoma and Folsom Lake Crossing. Is this correct? If so, there is currently no access point at this location. Are you intending to construct an access point at the East Natoma and Folsom Lake Crossing intersection? If so, please be advised that this is on property owned by the La Collina dal Lago Owners' Association and the board is not inclined to provide a right of access across this property for several reasons including the following:
First, there is a retention basin on this property that is a critical part of the subdivision's drainage and water quality system. This retention basin was required by the City of Folsom as a condition of the development of the La Collina dal Lago neighborhood. If an access point is anticipated to be constructed at this site, that access will negatively impact this retention basin which is a critical part of the overall drainage and water quality control system.
Second, since this access point is closer to the La Collina dal Lago neighborhood than the existing access point to the construction office complex, the traffic impacts will more negatively affect the neighborhood.
Therefore, we need clarification on the exact access point for Dike 7 and assurance that a new access point is not intended to be built on our property. We are extremely concerned about this issue and request that Ms. Brumbaugh contact me directly to discuss this issue prior to the publication of the Final EIR for this project.

Please refer to the response to comment #2 in Section 3.7 above. There would only be one access point to the Dike 7 area (the former "northern" access point) and the access route would not affect property owned by the La Collina dal Lago Owners' Association. Corps staff contacted you (Mr. Jeremy Bernau) to discuss this matter on February 23, 2017.

3. ***We request that a noise voice mail "hot line" be available for residents to call to report excessive construction noise outside of normal construction hours. Further, we would like this telephone line to be monitored with next day return calls to anyone leaving a message. As you are aware, a similar "hot line" has been available during the Folsom Dam Spillway Project. However, despite leaving messages on various dates, no calls were ever returned leaving our residents frustrated and not knowing if the complaint ever made it to human ears.***

Please refer to the response to comment #3 in Section 3.7 above.

3.9 COMMENTS FROM KURT FLYNN

Mr. Kurt Flynn submitted comments in a letter dated August 4, 2016. Mr. Flynn also added another comment to this letter via an email from Mr. Flynn dated August 11, 2016. The following lists pertinent comments in bold italicized font, followed by the responses to the comments in regular font. The comments listed are paraphrased from the actual comments.

1. ***Unfortunately, I believe the DSEIS fails to analyze and disclose all adverse and beneficial impacts of the alternatives and, in accordance with the CEQ NEPA Regulations, a supplement must be prepared with a proper analysis of impacts. (40 CFR 1502.9(a))***

   Comment noted. Chapters 3 and 4 of the SEIS/EIR fully describe and analyze the direct, indirect, and cumulative impacts of the proposed project, including both adverse and beneficial impacts. Therefore no changes have been made to the SEIS/EIR in response to this comment. Please note, however, that this SEIS/EIR contains several passages that state a Supplemental Environmental Assessment/Environmental Impact Report (SEA/EIR) would be prepared in the future for a particular phase of the proposed project if determined necessary by the Corps in coordination with the project's Non-Federal Sponsors.

2. ***Although the DSEIS acknowledges impacts on safety, hazardous waste, toxic contamination, and (4) transportation as part of the Executive Summary and the Purpose and Need, the Environmental Consequences section does not analyze the No Action Alternative's adverse impacts of these resources. In addition, the beneficial impacts of the proposed action on these resources are not analyzed.***

   Comments noted. We do not concur. Hazardous, toxic, and radioactive waste and transportation are both adequately covered in the document (Sections 3.2.11 and 3.9, respectively). Safety is not a resource to be analyzed, but is a concern or consequence on which to base analysis. The proposed project would not have any particularly beneficial impacts to the cited resources, with the possible exception of safety. Currently, the dikes could fail if the probable maximum flood (PMF) event were to occur. Raising the dikes would greatly reduce the potential for dike failure. Also, the proposed project would make it possible to reduce downstream flood risks. This is discussed in Chapter 1 of the SEIS/EIR.

3. ***Beneficial impact is defined (page 64) however, adverse impact is undefined. Please define 'adverse impact'.***

   This SEIS/EIR has been revised to generally define adverse impact (see Section 3.1.2).

4. ***The Environmental Consequences section states, "Under NEPA the effects of the proposed action and alternatives under consideration, including the No Action Alternative, is determined by comparing effects between alternatives and against effects from the No Action Alternative". This does not make sense. Effects are not determined by comparing effects.***

   Concur. Section 3.1.2 has been revised to improve clarity and to accurately reflect the analytical basis for this SEIS/EIR.

5. ***The Environmental Consequences section states, "under NEPA, the No Action Alternative (i.e., expected future conditions without the project) is the benchmark to which the action alternatives are compared, and the No Action Alternative is compared to existing conditions." Under NEPA, the impacts of all alternatives are compared to each other. The impacts of the Action Alternatives and the***

impacts of the No Action Alternative are not compared separately.

We partially concur. Section 3.1.2 has been revised to improve clarity and to accurately reflect the analytical basis for this SEIS/EIR.

6 ***The Environmental Consequences section states, "Levels of Significance can vary by alternative based on the setting and the nature of the change in the existing physical condition". Why is this statement important? The analysis of impacts does not include a discussion of 'different levels of significance'.***

Comment noted. We do not concur. Chapter 3.0 of this SEIS/EIR does address different levels of significance in some cases when addressing the proposed project's anticipated impacts to the various resource categories evaluated.

7. ***Please consider using the proper title for the 'Endangered Species Act' (delete Federal) and, consider adding the 'Bald and Golden Eagle Protection Act' (page 108)***

This SEIS/EIR has been revised per your recommendations.

8. ***I also request an analysis of the economic impacts of the alternatives.***

Section 3.2.8 of the SEIS/EIR addresses socieconomics and explains why this resource category is not considered in detail. Note that extensive economic analyses were performed in the past for the proposed project. These analyses indicated the proposed project would result in a positive and desirable benefit to cost ratio.

9. ***Headings in Sections 3.10.1 and 3.12.1 are inconsistent with the headings of other similar actions. Upper case needs to be used for Federal when referring to the US Government. Federally should be lower case. State should be upper case when referring to a specific state, such as California.***

Consistency of headings should not be an issue that prevents the reader from understanding the document. We understand that the word "federal" should be lowercase unless it is part of a title or an organization's name. Thus, we understand that "federally" should be lowercase. We understand that the word "state" should be lowercase when using it as a common noun (ex. state of California), but should be capitalized if it is part of a proper name, used in place of a particular state or when referring to a specific government body.

3.10 COMMENTS FROM ROBERTA LONG

Ms. Roberta Long submitted one comment in an email dated September 17, 2016. The following lists this comment in bold italicized font, followed by the response to the comment in regular font.

1. ***I attended the July 27 public meeting in Folsom and was given the information I need to understand the project. I would like to be informed when Operations decisions are being formulated.***

Thank you for your interest. We will include you on the mailing list for notifications pertaining to the draft NEPA/CEQA document that will eventually be prepared for proposed revisions to the Water Control Manual (the document that dictates how the dam is operated) that will be made once construction of the Dam Raise project is nearing completion.

3.11 COMMENTS FROM AARON RYDER

Mr. Aaron Ryder submitted comments in an email dated September 18, 2016. The following lists pertinent comments in bold italicized font, followed by the responses to the comments in regular font.

1. ***The description of work to be done at the main dam is very hard to understand. What are tainter gates? What is a top seal bulkhead? What are the piers? What are trunnions? What is the emergency spillway and what is the non-emergency spillway? What are the emergency spillway gates? What are stop logs? What is the bridge parapet wall? Providing photos and drawings would be helpful along with clarifying text.***

   The project description found in Section 2.3 of this SEIS/EIR has been revised to hopefully provide a better understanding of many of the components/items you mention. Various figures (drawings) have also been added (see Chapter 9) to help visualize elements of the Tainter gate refinements component of the proposed project.

2. ***What is the "new dike tip road" proposed?***

   The cited text has been revised. This was intended to refer to reconstructing existing roads that currently run along the crests (tops) of several dikes. When raising the dikes, the existing roads would first be removed (along with other dike embankment material) prior to constructing the raised portion. The existing crest roads would be replaced by new roads on the raised crest of the dikes.

3. ***Text is confusing about where dike changes will involve changes to the dike top and upstream side of dike and where dike changes will straddle the entire dike. Explain better.***

   Section 2.3 of this SEIS/EIR has been revised to help clarify this matter. New figures have also been added to show preliminary, typical cross-sections that illustrate the raised design for all the existing dikes.

4. ***The report says that updates to the WCM and completion of the auxiliary spillway may eliminate the need for the work proposed in the dam raise project. If this is possible, why is work proposed at all until it is known whether the work is needed?***

   The referenced text was erroneous and has been deleted from this SEIS/EIR. Completion of the JFP Auxiliary Spillway and the associated update/revision to the WCM may show that more flood risk management benefits will be provided by the

Auxiliary Spillway than originally anticipated. However, the probability of these benefits providing all the flood risk management benefits that would be derived from the Folsom Dam Raise project is extremely low.

5. ***Text says the southern access point to Dike 7 will not be used at all, only the northern one. If so, then why show the southern access in Figure 10?***

   Please refer to the response to comment #2 in Section 3.7 above.

6. ***The access route to Dike 8 is along a portion of Folsom Point Road, not Briggs Ranch Drive. Using Folsom Point Road seems like a bad idea because of traffic conflicts between construction vehicles and vehicles driving to and from Folsom Point. The report says Folsom Point itself may be used for access to MIAD and Dikes 7 and 8, but would remain accessible during construction. How?***

   Some of the text in the draft SEIS/EIR concerning these matters was inappropriate and has been revised. The cited access route would indeed be along a portion of Folsom Point Road, although construction access to Dike 8 could also be via the access point near Dike 7 (see Figure 2-12). Use of Folsom Point Road for construction access would result in conflicts between construction traffic and non-construction traffic. However, these conflicts would be minimized and motorist safety would be ensured through the implementation of a traffic management/control plan (ex. flaggers, signs, etc.). Folsom Point itself (e.g. the Folsom Point day use recreation area) would not be used for construction access to MIAD or to any other components of the proposed project.

7. ***Drawings seem to show that the road to Beals Point will be a construction access route, but the recreation section says Beals Point would not be used for access. Will this road be used for access or not? Use for construction access could be a real problem because of traffic conflicts. The Beals Point road is already clogged with traffic during the summer.***

   Figure 2-11 of this SEIS/EIR does show a construction access point at the intersection of the Beals Point road and Auburn-Folsom Road. The text addressing this access has been revised to indicate use of Beals Point road for construction access would be restricted to emergency access and to rare instances when construction equipment is too large to access Dikes 4, 5, and 6 using the primary access route (north of the Beals Point road).

8. ***The haul route/access to dikes 1, 2, and 3 appears to be along the main access to Granite Point. The traffic section says impacts to traffic would be less than significant. I believe users of Granite Point would disagree.***

   Concur. Section 3.9.4 has been revised. It now recognizes that construction traffic in this area would constitute a temporary but significant impact to traffic and traffic circulation in the general area.

9. ***Your report says "grade separated vehicular and/or pedestrian crossings" may be used to help maintain public access to recreation areas and trails. Where would these be located?***

The cited text has been deleted from this SEIS/EIR. Construction of grade-separated vehicular crossings and/or grade-separated pedestrian crossings is not proposed.

10. ***Why don't the haul roads from Dike 7 to Dike 8 and from Dike 8 to MIAD follow the bench road that the last NEPA-CEQA document for the joint federal project says will be built? The routes you show would cause needless impacts to some areas that haven't been disturbed.***

    Your assessment is correct based on the haul road alignments shown in the draft SEIS/EIR. This has since been corrected. The proposed haul routes cited have been revised to follow the O&M Bench Road that has been constructed as part of the final restoration phase of the Folsom JFP (see Figures 2-12 and 2-14).

11. ***The recreation section says Figures 12 and 13 show the trails within the FLSRA, but they do not.***

    This SEIS/EIR has been revised to cite the correct figure, which is now Figure 3-3.

12. ***The report says existing bike "detours" near dikes 4, 5, and 6 would allow continuous use of trails during construction. This is misleading since most bicyclists using the road along the top of these dikes don't ride bikes suited for the dirt detour trails.***

    Concur. The text has been revised accordingly.

13. ***The report first says the project would have significant effects to recreation, but later says effects should be less than significant but that significant effects could remain. This is confusing.***

    Concur. The text has been revised to indicate that potential project impacts to recreational resources would be temporary but would still be significant.

14. ***The report says use of staging areas "would not constitute a substantial change from existing visual resource conditions." I disagree because some of the staging areas are covered by vegetation and are not actively used. To state that all the staging areas are previously disturbed areas with limited vegetation is also misleading.***

    The text has been revised to indicate development and use of several, but not all, of the proposed staging areas would indeed represent a substantial change compared to existing conditions. The majority of these changes would be temporary, however.

15. ***Table 3 infers that construction would only affect views from homes on the side of Auburn-Folsom Road that is opposite construction. What about homes on roads like Vogel Valley Road, Sierra Drive, Lake Court, Mount View Drive, Lelvie Lane, Lorena Lane, Quigley Court, Cummings Way, etc.?***

    The original Table 3 stated that construction traffic on Auburn-Folsom Road would affect views of the area. However, Table 2-3 (formerly Table 3) has since been revised to indicate views from other homes would also be temporarily affected by project construction.

16. ***The no action alternative under the vegetation/wildlife section says conditions would remain the same as existing conditions. How can this be true if part of the project is in areas still under construction or restoration that will come to an end? Also, the Bureau of Reclamation previously said that native habitats will be restored in areas disturbed by the ongoing work finishing up now. When would this restoration happen and couldn't this project impact restored areas?***

Discussion of the no action alternative has been revised to mention changes that would occur after completion of certain construction and restoration activities in the immediate project vicinity.

It is assumed that your comment about future USBR restoration of disturbed areas refers to commitments made in the 2007 EIS/EIR prepared for the overall Folsom JFP and the overall Dam Raise project. This document indicates that USBR will develop a revegetation plan for all disturbed areas and will implement this plan. If such a plan were implemented soon, the Dam Raise construction activities at Dike 7, Dike 8, and the proposed staging area immediately adjacent to MIAD could directly and adversely impact restored habitats. However, if the revegetation activities were not implemented until after the proposed project is completed, then the Dam Raise construction work would not have such effects. Unfortunately, the Corps has not been able to obtain a schedule for developing or implementing the revegetation plan from USBR.

17. ***The vegetation/wildlife section is confusing by first stating impacts to habitat and wildlife would be significant, then saying the impacts would be less than significant. Which is it?***

Impacts as described (without mitigation) would be significant; however with mitigation, impacts to vegetation (habitats) and wildlife would be less-than-significant. The cited section (3.4) has been revised to help clarify this matter.

18. ***Why did the wetland delineation performed only cover the areas near dikes 4, 5, and 6? What about areas near the rest of the project?***

This SEIS/EIR has been revised to also include and address a wetland delineation that was conducted for areas near Dike 1 (see Appendix A). The lack of wetland delineations that would cover other areas that could be affected by the proposed project seems to have been an oversight. However, it is noted that a delineation of jurisdictional Waters of the United States (WOUS) was conducted as part of the 2007 EIS/EIR, and this delineation covered the majority of the areas that could be affected by the proposed project.

Prior to developing final construction plans for a given phase of the proposed project, Corps environmental staff would conduct additional field surveys to determine the limits of any wetlands or other WOUS in the immediate vicinity of proposed construction activities. If necessary, construction plans would be adjusted to avoid all direct wetland impacts.

19. *The vegetation/wildlife section says fresh emergent wetland has the potential to be removed as part of project. Table 4 shows 0.3 acres, plus it shows impacts to 19.6 acres of reservoir (lacustrine). But later text says the project would not affect open water or waters of the U.S. This is confusing. Also, how can you actually capture impacts to wetlands and open water areas when the delineation only covers a fraction of the total project?*

The vegetation/wildlife section of this SEIS/EIR has been revised, and the prior Table 4 is now Table 3-1. Potential impacts to lacustrine habitats and to wetlands have been better addressed in this revision. Also, please refer to the response to your comment #18 above.

20. *The report says that the construction footprint for the dikes and MIAD could go 50 feet past both sides of these features. But it also says that the project would have no dredge or fill material below the ordinary high water mark of the lake and would have no effect on waters of the US. This is contradictory.*

Comment noted. For clarification, the construction footprint is the broadest expanse of potential project area. This does not mean that any action would occur within the entirety of the footprint, just that it is the defined boundary used to analyze the action's effects on resources. Also, Sections 3.4 and 3.11 of this SEIS/EIR have been revised to eliminate the contradiction you mention and better address potential impacts to WOUS.

21. *The analysis of fisheries says no work would occur in a wet or aquatic environment. This conflicts with the project description for dikes and with some staging areas being in the lake.*

Section 3.2.4 of this SEIS/EIR (fisheries and aquatic resources) has been revised. It now better addresses potential work within wet/aquatic environments.

22. *Text first says noise effects would be significant even with mitigation measures but then says the mitigation measures would make the effects less than significant. Why this discrepancy?*

Text in Section 3.10 (Noise) of this SEIS/EIR has been revised to eliminate this discrepancy. Potential noise effects would be significant, even with mitigation. These significant impacts would only be temporary since they would be limited to the duration of project construction activities.

23. *Cumulative impacts fail to account for how the dam raise construction will affect restoration work that was covered in the most recent joint federal project NEPA-CEQA.*

The cumulative impacts section has been revised to address potential project impacts to restoration work completed as part of the Folsom JFP.

24. ***Chapter 5 mentions the Executive Order about invasive species but doesn't explain how the dam raise project complies with this order.***

The cited chapter has been revised to better address compliance with this Executive Order. Also, Section 3.4 (Vegetation and Wildlife) has been revised to include a brief discussion of efforts that will be taken to control and eradicate invasive plant species.

25. ***Why are statutes pertaining to roadways and utilities even mentioned in Chapter 5? How do these pertain to the dam raise project?***

Chapter 5 has been revised to remove statutes pertaining to roadways and utilities.

26. ***Why are the effects of the dam raise project based on conditions present in 2014? Much has changed since then.***

Sections 3.1, 3.1.1, and 3.1.2, have been revised to clarify how the terms existing conditions, No Action Alternative, and environmental consequences are used in this SEIS/EIR.

For the purposes of CEQA, project effects are based on conditions in 2014 because this was when the NOP was filed. For the purposes of NEPA, conditions in 2014 represent the existing conditions at the time the environmental analysis was being scoped and conducted. The No Action Alternative (future without project conditions) was determined to be substantially similar to existing conditions. Environmental impacts that consider other projects and actions in the project area are described in Section 4.4, Cumulative Effects.

27. ***What does "pool release mechanisms" mean?***

This phrase has been removed from the SEIS/EIR for clarity.

3.6 COMMENTS FROM UNITED STATES FISH AND WILDLIFE SERVICE

In a letter dated October 24, 2016, the United States Fish and Wildlife Services (USFWS) submitted their final Supplemental Fish and Wildlife Coordination Act Report (CAR) for the proposed action and draft SEIS/EIR (see Appendix B). This final supplemental CAR included project recommendations. The following lists each of these recommendations in bold italicized font followed by the responses to the recommendations in regular font.

1. ***Avoid impacts to oak/grey pine woodland, riparian woodland, and seasonal wetlands adjacent to, but outside of, construction areas through use of construction fencing.***

All natural habitats (oak woodland, oak savanna, riparian woodland, seasonal wetlands) situated outside the limits of construction (LOC) would be protected. In cases where the boundaries of such features are located very close to the LOC, orange mesh fencing would be installed along those portions of the features close to or coincident with the LOC. However, many such features (natural habitat areas) or portions thereof would be located well beyond the nearest LOC. No orange mesh fencing would be installed along such areas since the construction contractor would not be allowed to work in or near such areas in the first place. Project construction plans would clearly indicate areas/features to be protected and would designate the LOC. These plans and the project specifications given to the construction contractor would also make it clear that no construction activities are allowed in areas outside the LOC or outside of designated haul routes/access routes.

2. ***Avoid impacts to woody vegetation at all staging areas, borrow sites, and haul routes by enclosing them with construction fencing.***

   No on-site borrow areas are proposed. Native woody vegetation having a diameter breast height (DBH) of 2 inches or greater and located at the project site would be protected to the extent practicable. In the case of elderberry shrubs, those shrubs having one or more stems with a DBH of 1 inch or greater at ground level would be protected to the extent practicable. Orange mesh construction fencing would likely be installed around such native woody vegetation to avoid construction impacts. However, physical barriers other than this type of construction fencing may be used. Native woody vegetation not located in close proximity to the project LOC or designated haul routes would not be protected by fencing or other barriers. Note that the LOC includes proposed staging areas.

3. ***Avoid impacts to water quality at Lake Natoma and Folsom Lake when loading, unloading, and transporting materials to be used for the project by taking appropriate measures to prevent soil, fuel, oil, lubricants, etc. from entering into these waters.***

   Concur. The proposed actions to help avoid, minimize, and mitigate any impacts to water quality are described in Section 3.11 of the SEIS/EIR.

4. ***Avoid future impacts to the site by ensuring all fill material is free of contaminants.***

   Concur. The construction specifications that will be developed for each project construction phase will require the construction contractor to use only fill materials that are free of contaminants (potential pollutants) and to submit test data to the Corps that demonstrate this is the case.

5. ***Avoid impacts to migratory birds nesting in trees or on the ground along the access routes and adjacent to the proposed repair sites. Impacts can be avoided by conducting pre-construction surveys for active nests along proposed haul roads, staging areas, and construction sites. This would especially apply if construction begins in the spring or early summer. Work activity around active nests should be avoided until the young have fledged. The following protocol from the CDFW 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 mile 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 mile 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 Wildlife. If work is begun and completed between September 1 and February 28, a survey is not required.

The proposed actions to help avoid, minimize, and mitigate any impacts to nesting migratory birds and to nesting Swainson's hawks are described in Section 3.5 of this SEIS/EIR. These actions are in keeping with your recommendations. It is noted, however, that there may be instances when work activity near active migratory bird nests cannot be avoided. There may also be instances when an active migratory bird nest must be removed. Construction work would be performed in manner to help avoid such instances to the extent practicable. If an active migratory bird nest must be removed, this would only be done after first obtaining an appropriate take permit from USFWS.

6. ***Minimize impacts to wildlife by selection of material least likely to lead to entrapment.***

Materials used in the proposed project would be largely selected to meet the required specifications. For a given type of material or item, if various brands or sources meet the required specifications and one brand/source is least likely to lead to wildlife entrapment, then the contractor would be required to use this brand/source. An exception to this might occur if the brand/source is prohibitively expensive. In addition, some construction materials would be used and/or placed in a manner that could not possibly pose the potential for wildlife entrapment. Material selection in such cases would not consider the material's wildlife entrapment potential.

7. ***Minimize impacts to annual grassland habitat and other disturbed areas, by re-seeding all disturbed areas with appropriate native species as construction elements are completed.***

At the close of construction of a given project phase, areas that were disturbed by construction activities would be hydroseeded with a mixture of native grass and forb seeds. Exceptions to this general statement include:

- Constructed permanent features would not be hydroseeded (ex. modified dikes and dams).
- Areas that are features such as dirt roads and trails, gravel roads and trails, paved roads, and gravel or rock pads prior to the start of project construction but are subsequently disturbed by project construction activities would typically not be hydroseeded. Instead, features such as these would likely be returned to their pre-construction condition (or similar) in most cases.
- Staging areas situated below the ordinary high water elevation of Lake Folsom (e.g. located within lake habitat) may be subject to minimal disturbance if used, but these areas would not be hydroseeded.

8. ***Minimize project impacts by reseeding all disturbed areas at the completion of construction with forbs and grasses.***

   Please refer to the response to recommendation #7 above.

9. ***Minimize the impact of removal and trimming of all trees and shrubs by having these activities supervised and/or completed by a certified arborist.***

   Concur as regards trimming of native trees and shrubs. Removal of trees and shrubs would not be required to be conducted by or under the supervision of a certified arborist since the affected plant would be destroyed anyway.

10. ***Compensate for the loss of 4.9 acres of oak/grey pine woodland habitat by developing 5.9 acres of oak/grey pine woodland habitat at a site jointly selected with the Service.***

    The prior designation of some existing habitat as "oak/grey pine woodland" has been deleted from this SEIS/EIR. This document now refers to such areas as oak woodlands. The potential acreage of oak woodland that could be affected by the proposed project has also been revised to be a total of approximately 9.9 acres (refer to Section 3.4).

    It is highly doubtful that all 9.9 acres of oak woodland that could be affected actually would be directly impacted (e.g. removed/destroyed). Once the total acres lost is known, a specific mitigation plan would be developed to compensate for this loss. The minimum ratio of acres of oak woodland restored or created per acre of oak woodland lost would be 1.2:1 per USFWS's guidance in the final CAR. The mitigation site would be selected in coordination with USFWS, DWR, and SAFCA. If on-site mitigation is feasible, this coordination would also include USBR.

11. ***Compensate for the loss of 0.1 acre of riparian woodland by developing 0.11 acre of riparian woodland habitat at a site jointly selected with the Service.***

    The potential acreage of riparian woodland that could be directly affected by the proposed project has been revised to be 2.2 acres (refer to Section 3.4). However, this acreage only means the single riparian woodland area is located within the limits of proposed project features. In actuality, the riparian woodland feature (located in the proposed staging area south of MIAD) would be protected and preserved. Thus, no compensatory mitigation is proposed since there would be no loss of riparian woodland habitat.

12. ***Compensate for the loss of 0.3 acre of seasonal wetland habitat by developing 1.2 acre of seasonal wetland habitat at a site jointly selected with the Service.***

    Revisions made to this SEIS/EIR include a commitment to not directly impact (remove/fill) any jurisdictional wetlands. Since there would be no loss of wetland habitat, no compensatory mitigation is proposed.

13. ***Develop a monitoring and adaptive management program to monitor vegetation around the reservoir over the life of the project. Baseline conditions would be established and updated at intervals (10 years). After major flood events (those that encroach above the existing maximum flood pool elevation), vegetation would be surveyed and damages attributable to inundation would be mitigated as deemed appropriate using best management practices at the time.***

Do not concur. Development of a monitoring and adaptive management program as you describe would be premature at this time.

Construction of the Folsom Dam Raise project would not significantly affect the maximum water level in Folsom Lake, except possibly following very rare and extreme storm events. Instead, the Water Control Manual (WCM) for Folsom Dam and its facilities dictates how lake water levels are managed and controlled. The WCM will be revised once the Dam Raise project is completed or near completion. As stated in this SEIS/EIR, a supplemental joint NEPA/CEQA document will be prepared for the proposed WCM revision/modification prior to its implementation. It is this future NEPA/CEQA document that would evaluate potential impacts of modifications to the way lake water levels are managed and indicate measures necessary to help avoid, minimize, or mitigate potential adverse impacts. These measures may include a monitoring and adaptive management program. The specifics of any monitoring program, adaptive management program, and/or mitigation program pertaining to potential impacts to vegetation associations, wildlife habitats, and federally listed species would be coordinated with USFWS during preparation of the future NEPA/CEQA document.

14. ***Develop operation and maintenance manuals for all mitigation sites developed for this project. Coordinate with the Service on the development of these manuals.***

Concur. Please keep in mind that any necessary O&M manuals pertaining to Corps-implemented mitigation sites would not be developed until well after completion of the proposed project in most cases. For example, Section 3.4 of this SEIS/EIR discusses providing compensatory mitigation for losses of oak woodland and oak savannah habitats that occur due to project construction activities. This mitigation would be initiated at or near the end of the overall Dam Raise project, then it would likely be at least another 4 to 5 years before success criteria are achieved. The O&M manual for this mitigation would not be developed until achievement of success criteria is evident, since the mitigation would not be turned over to the Non-federal Sponsor until these criteria are adequately satisfied.

15. ***Contact the NOAA Fisheries for possible effects of the project on federally-listed species under their jurisdiction.***

NOAA Fisheries staff was contacted during the course of preparing this SEIS/EIR. Coordination with NOAA Fisheries staff indicated that the proposed project would have no effect on any federally-listed species under this agency's jurisdiction.

16. *Contact the CDFW regarding possible effects of the project on State listed species.*

CDFW staff was contacted during the course of preparing this SEIS/EIR. Staff advised that there was a potential for the project to affect nesting Swainson's hawks and white-tailed kites, and bald eagles if these state-listed bird species are nesting in the immediate vicinity of the proposed project. Section 3.5 of the main body of this SEIS/EIR discusses these species and proposed measures to avoid or mitigate any project impacts to these species.

17. Re-survey the construction and staging areas, borrow sites, and access/haul roads for the presence of any new elderberry shrubs prior to construction activity.

Concur. Please keep in mind that no on-site borrow areas are proposed.

COPIES OF WRITTEN COMMENTS RECEIVED

SACRAMENTO METROPOLITAN
AIR QUALITY
MANAGEMENT DISTRICT

Larry Greene
AIR POLLUTION CONTROL OFFICER

August 30, 2016

SENT VIA E-MAIL ONLY

Ms. Mariah Brumbaugh
U. S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, CA 95814

Ms. Erin Brehmer
California Department of Water Resources
3464 El Camino Avenue, Room 150
Sacramento, CA 95821

Folsom Dam Raise Project Draft Supplemental Environmental Impact Statement/Environmental Impact Report (DSEIS/EIR) (SAC200500806)

Dear Ms. Brumbaugh and Ms. Brehmer:

Thank you for providing the Folsom Dam Raise Project DSEIS/EIR to the Sacramento Metropolitan Air Quality Management District (SMAQMD) for review. The Folsom Dam Raise Project proposes modifying the gates on the existing Folsom Dam and raising the dikes and wing dams by 3.5 feet to increase flood storage capacity and to provide increased flood damage protection. SMAQMD staff comments on the DSEIS/EIR follow.

1. In order to clarify the particulate matter emissions analysis and mitigation, consider the following recommendations:
    a. Use the SMAQMD's pounds/day thresholds for particulate matter emissions (both PM10 and PM2.5) rather than the ambient air quality standards.
    b. Include the SMAQMD's annual thresholds for particulate matter emissions (both PM10 and PM2.5) and compare project emissions to the thresholds.
    c. Add the SMAQMD's Enhanced Fugitive Dust Control Practices to further reduce particulate matter emissions.
    d. If particulate matter emissions still exceed the SMAQMD's pounds/day thresholds, include a mitigation fee to reduce emissions to below the thresholds. Additionally, reducing daily particulate matter emissions below the thresholds will ensure the annual SMAQMD thresholds are not exceeded.
    e. Remove references to dispersion modeling.

2. The document should report maximum pounds/day emissions each year in addition to average pounds/day over the 5 year construction period. This is necessary to more accurately disclose the emissions from the project.

3. Provide the full Road Construction Emissions Model runs so the assumptions behind the analysis can be reviewed.

4. Provide the documentation supporting the mitigated emissions reported in Tables 13 and 14. All measures assumed in the analysis to reduce emissions should be applied as mitigation.

5. A general conformity analysis does not appear to be needed based on Table 14. All references indicating a general conformity analysis is needed should be corrected.

6. In the cumulative analysis, the emissions from the Folsom Dam Raise project should be added to the emissions estimate for the Folsom Joint Federal Project general conformity determination in the overlapping years to determine that the whole JFP complex does not exceed de minimis emissions levels.

If you have any questions regarding these comments, please contact me at 916-874-4881 or khuss@airquality.org.

Sincerely,

Karen Huss

Karen Huss
Associate Air Quality Planner/Analyst

Cc: Paul Philley, SMAQMD
Charles Anderson, SMAQMD
Tom Kelley, U.S. EPA

From:	Prijatel, Jean
To:	Brumbaugh, Mariah M SPK
Cc:	Hoffman, Hugo; Carithers, Clayton V SPK
Subject:	[EXTERNAL] Folsom Dam Follow-up
Date:	Thursday, August 04, 2016 4:59:00 PM

Hi Mariah,

Thank you so much for taking some time this afternoon to speak with us about the Folsom Dam project. As we discussed, we are hoping for a few follow-up items from you or your office.

1. Can you provide contacts / timing for the Water Control Manual NEPA process? We submitted comments in 2012 on a scoping notice for a DEIS, but I do not think we have received anything since.

2. It would be helpful to better understand the reason for the timing of the current SDEIS. Is there a pressure from authorization or funding deadlines? Why not wait for the economic analysis to more fully inform the purpose and need? Why not wait until the WCM is completed for the existing projects currently under construction?

3. We would be interested in very briefly speaking with someone who could discuss whether or not there are engineering differences for a 3.5 foot dam raise for flood / surcharge storage vs. water supply storage.

4. Can you please send us the PACR from 2007? We're having trouble locating it online.

Thank you for your help and I hope you enjoy your vacation!

Regards,

Jean

Jean Prijatel

Environmental Review Section

US Environmental Protection Agency Region 9

75 Hawthorne St. (ENF 4-2)

San Francisco, CA 94105-3941

415-947-4167

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

September 16, 2016

Ms. Alicia Kirchner
Chief, Planning Division
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814

Subject: Draft Supplemental Environmental Impact Statement for the Folsom Dam Raise Project, Sacramento County, California [CEQ# 20160167]

Dear Ms. Kirchner:

The U.S. Environmental Protection Agency has reviewed the Draft Supplemental Environmental Impact Statement (DSEIS) for the Folsom Dam Raise Project. Our review and comments are pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

The DSEIS supplements the 2007 Final EIS for the Folsom Dam Safety and Flood Damage Reduction Project, which evaluated dam safety alternatives to be implemented by the Bureau of Reclamation, flood damage reduction measures to be implemented by the US Army Corps of Engineers (Corps), and an auxiliary spillway to be implemented by both agencies. The American River Long-Term Study Final Snpplemental Plan Formulation Report EIS in 2002 analyzed the environmental impacts of a 7 foot dam raise at Folsom Dam. That project was reevaluated in the 2007 EIS with a recommendation for a 3.5 foot dam raise. The current supplemental document updates the previous environmental and programmatic analyses and is limited in scope to modifying the gates on the existing Folsom Dam and raising the dikes and wing dams by 3.5 feet to increase flood storage capacity and to provide increased flood damage protection. The DSEIS includes a single action alternative with a goal to "fully disclose revised project alternatives and updated project-related effects."

EPA has rated the project and the DSEIS as *Environmental Concerns – Insufficient Information* (EC-2). Please see the enclosed "Summary of EPA Rating Definitions." Our rating is based primarily on onr concerns about cumulative air impacts and the need to coordinate construction scheduling to minimize impacts to the air basin. Please see the attached detailed comments for additional information about our concerns and recommendations for the Final SEIS.

We appreciate the opportunity to review and comment on this DSEIS, and are available to discuss the recommendations provided. When the FSEIS is released for public review, please send one hard copy and one CD to the address above (Mail Code: ENF 4-2). Should you have any questions, please contact me at (415) 947-4161, or contact Jean Prijatel, the lead reviewer for the project. Jean can be reached at (415) 947-4167 or prijatel.jean@epa.gov. Please include EPA on the distribution lists for all future environmental review documents for the Folsom Dam Safety and Flood Damage Reduction Project, including the Water Control Manual.

Sincerely,

Connell Dunning

FOR Kathleen M. Goforth, Manager
Environmental Review Section

Enclosures: Summary of EPA Rating Definitions
Detailed Comments

cc via email: Karen Huss, Sacramento Metropolitan Air Quality Management District
Matthew See, U.S. Bureau of Reclamation

SUMMARY OF EPA RATING DEFINITIONS*

This rating system was developed as a means to summarize the U.S. Environmental Protection Agency's (EPA) level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the Environmental Impact Statement (EIS).

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

ADEQUACY OF THE IMPACT STATEMENT

"Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, Policy and Procedures for the Review of Federal Actions Impacting the Environment.

U.S. EPA DETAILED COMMENTS ON THE DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR FOLSOM DAM RAISE PROJECT, SACRAMENTO COUNTY, CA SEPTEMBER 16, 2016

Air Quality

EPA appreciates the measures in the DSEIS to reduce air emissions, as recommended by the Sacramento Metropolitan Air Quality Management District (SMAQMD), including enhanced exhaust control practices, fugitive dust control measures, best management practices, and Guidance for Construction Greenhouse Gas Emissions Reductions. These emission control and air quality measures will be essential to meet Federal General Conformity *de minimis* thresholds and reduce air quality impacts to the greatest extent possible.

The DSEIS includes air emissions calculations in Appendix D, however, these emissions estimates do not correspond with either the mitigated or unmitigated emissions provided in Tables 12 and 14 of Chapter 3. The source of the document's mitigated and unmitigated emissions estimates remains unclear. Additionally, the DSEIS does not identify the model or method used for estimating emissions.

The air quality cumulative impacts discussion states that the dam raise project will be constructed at the same time as the Corps' Folsom Dam Modification Project Approach Channel and its post-construction restoration, which would contribute to a significant cumulative effect (page 211). This discussion does not provide any emissions estimates nor does it outline how these effects will be reduced, except to say that coordination with SMAQMD and Reclamation would be needed.

> ***Recommendations***: In the FSEIS clearly explain the methods used to estimate emissions and disclose and summarize all calculations that result in mitigated and unmitigated emissions for the project. The cumulative effects analysis should include emissions estimates and a description of the types of mitigation measures that would be implemented in order to reduce emissions. Describe the process for future coordination with SMAQMD, and how commitments to reduce air quality impacts will be integrated into the construction of the proposed project. If impact reductions are expected to result from coordinated construction schedules, or specific known mitigation measures at this time, include these details in the FSEIS and commit to the schedule in the Record of Decision (ROD).

EPA's General Conformity Rule, established under Section 176(c)(4) of the Clean Air Act, provides a specific process for ensuring federal actions will conform with State Implementation Plans to achieve National Ambient Air Quality Standards. The DSEIS is internally inconsistent on the applicability of general conformity for the project. For example, Section E.5 states, "even with implementation of mitigation measures, emissions would not be reduced below the USEPA's general conformity *de minimis* threshold." Table 14 Mitigated Alternative 2 Annual Emissions Summary for NEPA, however, does not list any emissions higher than the general conformity *de minimis* limit. We note that Table 14 lists carbon dioxide as exceeding *de minimis* thresholds; however, EPA's general conformity rules do not have such a threshold for carbon dioxide. In a telephone call between the Corps and EPA on August 25, 2016[1], the Corps clarified that the text of the DSEIS is in error and that the tables properly reflect the anticipated emissions with mitigation, which would be below *de minimis* thresholds.

> ***Recommendation:*** In the FSEIS, revise the general conformity discussion and data to be consistent. Remove the reference to carbon dioxide *de minimis* levels.

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[1] Phone conversation between Clayton Carithers and Mariah Brumbaugh, with the US Army Corps of Engineers, and Hugo Hoffman and Tom Kelly, with EPA Region 9 on August 25, 2016.

The project area is located in an area designated as non-attainment for ozone and fine particulate matter. The DSEIS includes errors in the text and tables describing the National Ambient Air Quality Standards (NAAQS) designations for the project area. For example, Table 9 lists Sacramento County as designated unclassified/attainment for carbon monoxide, but the county is designated as attainment/maintenance. This document also mischaracterizes the status of the ozone standards by stating that the 8-hour ozone standard was revoked and the 1-hour standard was established in 1997.

> ***Recommendation***: The FSEIS should include the correct air quality designations for the project area and properly characterize the status of the standards. EPA provides maps showing designations at https://www3.epa.gov/region9/air/maps/index.html. Information from the website can be downloaded to Google Maps or EPA can provide it in an electronic format if requested.

Climate Change

On August 1, 2016, the Council on Environmental Quality issued final guidance on considering greenhouse gas (GHG) emissions and climate change in NEPA reviews. Fundamental to this guidance are the recommendations that when addressing climate change, agencies should consider: (1) The potential effects of a proposed action on climate change as indicated by assessing GHG emissions (e.g., to include, where applicable, carbon sequestration); and, (2) The effects of climate change on a proposed action and its environmental impacts.

While the DSEIS includes an estimate of GHG emissions from the project and mitigation measures to reduce impacts to less-than-significant (page 51), it does not include a discussion of reasonably foreseeable climate change impacts in the project area. Hydrology is a resource not considered in detail in the DSEIS. The brief hydrology section describes the existing runoff regime for the watershed (page 66), but does not indicate how this may change in the future. The purpose and need for the project also notes that the dam raise is needed to provide temporary water storage during rare flood events, defined as the 1/254 year event (page 15). Changing climate conditions can exacerbate the environmental impacts of a project as well as affect the proposed project's ability to meet the flood protection purpose and need presented in the DSEIS. For example, potential changes in precipitation and frequency of drought would alter the anticipated flood frequency and could lead to changes in the project's ability to meet its flood protection objectives while also altering sediment transport and water quality, among other potential impacts. The Bureau of Reclamation's SECURE Water Act Report to Congress in 2011 states that "moisture falling as rain instead of snow at lower elevations will increase wintertime runoff by 22% (December through March) and decrease springtime runoff by 27% (April through July)" for the Sacramento and San Joaquin River basins.[2] The report also anticipates the need for reservoir releases earlier in the flood control period to provide more flood storage during earlier rain or snowmelt events (Chapter 8, page 7).

> ***Recommendations***: In the Affected Environment section of the FSEIS, inclnde a summary discussion of climate change and ongoing and reasonably foreseeable climate change impacts relevant to the project, based on U.S. Global Change Research Program[3] assessments or other relevant models. We recommend that the FSEIS include in the Affected Environment section a consideration of future climate scenarios to determine whether the environmental impacts of the project would be exacerbated by climate change. If impacts would likely be exacerbated by

[2] http://www.usbr.gov/climate/secure/docs/2016secure/2016SECUREReport-chapter2.pdf, page 7

[3] Third National Climate Assessment (Regional impacts chapters) available at http://www.globalchange.gov/nca3-downloads-materials.

climate change, identify and consider incorporating additional measures that could mitigate those impacts.

In addition, we recommend that the FSEIS discuss how the design of the proposal can incorporate resilience to foreseeable climate change. Identify in the FSEIS any commitments that have been made to ensure implementation of design features or other measures to adapt to climate change impacts.

Future NEPA

The proposed dam raise project would result in an ability to sustain an increased flow of 160,000 cfs for a longer period of time, and would allow for an increase in reservoir inundations up to 486.34 feet from the current authorized top of flood pool water surface elevation of 468.34 feet. The DSEIS defers evaluation of the operational impacts of this increase in storage and release capacity, as it states that operations will remain the same as existing conditions until they can be defined and analyzed in a Water Control Manual update and its accompanying future environmental document (page 30).

Folsom Lake is a multiuse facility primarily operated to maximize flood risk management and water supply benefits (page 12). While we recognize that the proposed project would be a "dry" raise providing for an increase in the flood surcharge zone, we do have concerns about potential future conversion of this flood storage and surcharge space into water supply or multipurpose use ("wet" dam raise). Additional NEPA analysis would be required to understand the environmental impacts of more regular inundations of the reservoir capacity, particularly for water quality, fish and wildlife, and waters of the U.S.

Recommendation: We recommend the FSEIS and ROD include a commitment to future NEPA compliance, with appropriate public review processes, prior to any decision to modify operations or modify the use of the additional flood storage capacity. Include an estimated schedule of when future NEPA analyses would be initiated, if known.

Flood Protection (Executive Order 13690)

The DSEIS briefly describes Executive Order 11988 – Floodplain Management in the Compliance with Environmental Laws and Regulations chapter. On January 30, 2015 President Obama issued Executive Order 13690 – Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input, which amends Executive Order 11988 – Floodplain Management. Section 2(i) of E.O. 13690 establishes a new definition of the term "floodplain."

Recommendation: EPA recommends that the FSEIS explain how the project would be consistent with the directives in Executive Order 13690, and discuss any changes to the project necessary to meet those directives. For more information, go to: https://www.fema.gov/federal-flood-risk-management-standard-ffrms.

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SMUD™

September 1, 2016

Erin Brehmer
Department of Water Resources
3464 El Camino Ave, Suite 150
Sacramento, CA 95821

Subject: Draft Supplemental Environmental Impact Statement/Environmental Impact Report (EIS/EIR), Folsom Dam Safety & Flood Damage Reduction – Folsom Dam Raise

Hello,

The Sacramento Municipal Utility District (SMUD) appreciates the opportunity to provide comments on the Draft Supplemental EIS/EIR for the Folsom Dam Safety & Flood Damage Reduction – Folsom Dam Raise project. SMUD is the primary energy provider for Sacramento County and the proposed project area. SMUD's vision is to empower our customers with solutions and options that increase energy efficiency, protect the environment, reduce global warming, and lower the cost to serve our region. As a Responsible Agency, SMUD aims to ensure that the proposed project limits the potential for significant environmental effects on SMUD facilities, employees, and customers.

As discussed in the EIR, SMUD has transmission facilities in and around the project area that could be impacted during the construction of the project. In particular, we are concerned about materials or equipment staging under these lines in Staging Areas 1, 2 and 3. SMUD assumes any impact on our facilities due to construction of this project is addressed in your EIR.

Please view the following link on smud.org for more information regarding transmission encroachment: https://www.smud.org/en/do-business-with-smud/real-estateservices/transmission-right-of-way.htm.

SMUD would like to be involved with discussing the above areas of interest as well as discussing any other potential issues. We aim to be partners in the efficient and sustainable delivery of the proposed project. Please ensure that the information included in this response is conveyed to the project planners and the appropriate project proponents.

Environmental leadership is a core value of SMUD and we look forward to collaborating with you on this project. Again, we appreciate the opportunity to provide input on this EIR. If you have any questions regarding this letter, please contact Emily Bacchini, SMUD Environmental Specialist at (916) 732-6334.

Sincerely,

Rob Ferrera
Environmental Specialist
Environmental Management
Workforce and Enterprise Services
Sacramento Municipal Utility District

Cc: Emily Bacchini
Jose Bodipo-Memba
Pat Durham
Joseph Schofield

From: Shirlee Herrington
To: erin.brehmer@water.ca.gov
Cc: Brumbaugh, Mariah M SPK
Subject: [EXTERNAL] Placer County Comments: Folsom Dam Raise Project, Supplemental Environmental Impact Statement/Environmental Impact Report
Date: Tuesday, August 30, 2016 1:27:41 PM
Attachments: image003.png

Good Afternoon,

Placer County appreciates the opportunity to review the Folsom Dam Raise Project, Supplemental Environmental Impact Statement/Environmental Impact Report and to engage in the environmental review process. The County's Environmental Review Committee has reviewed the Folsom Dam Raise Project, Supplemental Environmental Impact Statement/Environmental Impact Report. After reviewing the SEIS/EIR, the County offers the following comments for your consideration:

1. Page 150, Third Paragraph: The year 2016 is indicated to be the baseline condition. However, page 62 shows the baseline year to be 2014. Which is correct?
2. Page 156, Table 18: This table should distinguish between the different Counties as only Sacramento County is shown.
3. Page 156, Table 18: In Placer County, revise Folsom-Auburn Road to Auburn-Folsom Road.
4. Page 156, Table 18: The current ADT for Douglas Blvd between Barton Road and Auburn Folsom Road is 37,400.
5. Page 156, Table 18: The current ADT for Auburn Folsom Road between Douglas Blvd. to Lake Crossing is 34,750.
6. Page 157, Class 3 Facilities, Auburn Folsom Road: Auburn Folsom Road between the Sacramento County line and Joe Rodgers Road currently has class 2 bike lanes on both sides of the road.
7. Page 162, Table 21: Semi trucks and dump trucks will not be able to make a right turn from northbound Auburn Folsom Road to the Unnamed Road between Bell Drive and Country Court as it is too sharp. The only way is if the number 1 lane is used and Placer County will not support such movements.
8. Page 163, Table 22: What are the new trips generated for dike's 1 thru 3? Isn't the raising of these 3 dikes part of Alternative 2 (See Table 21)?
9. Page 167, Table 24: You are using the 1996 version of the Granite Bay CP Noise element. The GPCP Noise Element was updated in 2012.
10. There appears to be no proposal to conduct additional/revised flood inundation mapping as a result of this project, at least there is no discussion of this in Section 3.2.1 Hydraulics. Depending on specific catastrophic dam failure scenarios assumed, it may be warranted that revised flood inundation maps be produced for Dikes 1-6 in Placer County. Please revise these inundation maps or provide an explanation as to why the current maps should not be revised in Section 3.2.1.
11. Under the listed "Regional County and City Agencies" affected by the project in Placer County, only Placer County is included, not City of Roseville or the Placer County Flood Control and Water Conservation District. Please include the District and the City of Roseville in this list.
12. Overall this project should provide additional flood risk reduction benefits to unincorporated Placer County and City of Roseville areas. Please quantify these benefits so that they may be accounted for appropriately in the County's local hazard mitigation plans.

Again, Placer County appreciates the opportunity to comment on the Folsom Dam Raise Project, Supplemental Environmental Impact Statement/Environmental Impact Report. Should you have any questions, please contact Sarah Gillmore at 530-745-7518.

Thank you,

Shirlee

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Shirlee I. Herrington

Environmental Coordination Services

Placer County Community Development Resource Agency

3091 County Center Drive, Suite #190

Auburn, CA 95603

530-745-3132

sherring@placer.ca.gov <mailto:sherring@placer.ca.gov>

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
FF08ESMF00-
2014-CPA-0010-1

SEP 13 2016

Alicia E. Kirchner
Chief, Planning Division
Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814-2922

Subject: Review of the Draft Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR) for the Folsom Dam Raise Project, Sacramento, El Dorado, and Placer Counties, California

Dear Ms. Kirchner:

This is in response to your request for comments regarding the draft Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR), dated July 13, 2016, for the Folsom Dam Raise Project in Sacramento, El Dorado, and Placer Counties, California. The Fish and Wildlife Service (Service) received your request on July 21, 2016.

The project is anticipated to begin in 2017 and involves four phases of improvements to Folsom Dam and its associated facilities (collectively referred to as the Folsom Facility). The U.S. Army Corps of Engineers proposes to provide increased flood damage protection by increasing the flood storage capacity and/or pool release mechanisms at the Folsom Facility.

Upon review of the draft SEIS/EIR draft, the Service recommends that the following comments be addressed:

<u>Executive Summary; ES.5 Environmental Effects and Mitigation Measures</u>

The last sentence of the ninth paragraph states: "... with the implementation of mitigation measures…, in combination with transplanting of shrubs, mitigation plantings, and the creation of habitat, these impacts are not likely to adversely affect the valley elderberry longhorn beetle." The Service believes this statement is contradictory because the action of transplanting an elderberry shrub will require take authorization since it likely results in adverse effects to the valley elderberry longhorn beetle, a species federally-listed as threatened under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). The Service recommends changing the wording of this sentence to state that "… these impacts are not likely to result in **jeopardy**.

Section 3.4.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise and Concrete Floodwall; Page 99

The third full sentence at the top of the page states: "Smaller vegetation type acreages, however, are understated in size as blocks of vegetation under eight acres were not mapped as distinct units." Were all vegetation blocks less than 8 acres included in the impact calculations and, if they were, what vegetation type were they classified as?

Section 3.4.4 Alternative 2: Spillway Tainter Gate Modification and Combination Earthen Raise and Concrete Floodwall; Page 104

The first sentence at the top of the page states: "Up to two acres of oak woodland savannah is included in staging area boundaries within the tainter gate project area; however, this smaller acreage was not included in the Northern Sierra Foothills Project mapping due to limited size and was delineated as urban acreage." Were the 2 acres of oak woodland savanna considered in your impact calculations categorized as oak woodland or urban impact acreage?

Section 3.4.5 Avoidance, Minimization, and Mitigation Measures; Measure 15; Page 107

This measure states: "Wetlands identified by the Northern Sierra Foothills project at MIAD would be assessed before project commencement, and appropriate protections would be provided." What assessments are being conducted at the MIAD wetlands and do you anticipate impacts to these wetlands due to project construction?

Section 4.4.7 Sensitive Species, *Valley Elderberry Longhorn Beetle*; Page 214

The fourth sentence of the first paragraph states: "The exact number injured or killed is unknown but would likely be minimal due to the exceptional flight ability of the beetle to avoid construction vehicles." The Service does not agree that valley elderberry longhorn beetles have exceptional flying ability to avoid on-coming construction traffic and the Service recommends removing that portion of the sentence.

General Question

The Service has completed a preliminary review of the section 7 consultation package for the proposed project and it had a greater level of detail compared to the draft SEIS/EIR. Since the Service will be completing a final supplemental Fish and Wildlife Coordination Act Report (CAR) for the proposed project, is the information in the consultation package the most up to date project information and should it be incorporated into the final supplemental CAR? In addition, the draft SEIS described tainter gate retrofits that are not described in the consultation package. Are the tainter gate retrofits included in the proposed project and, subsequently, should they be included in the project description for the final supplemental CAR?

If you have any concerns regarding this response or other aspects of the Service's involvement with the Folsom Dam Raise Project, please contact Amber Aguilera (amber_aguilera@fws.gov), Fish and Wildlife Biologist, at (916) 414-6577, or myself, at (916) 414-6563.

Sincerely,

Doug Weinrich

Doug Weinrich
Acting Field Supervisor

cc:
Mariah Brumbaugh, Army Corps of Engineers, Sacramento, California
Clay Carithers, Army Corps of Engineers, Sacramento, California

Gary and Rebecca Bolin
760 Lorena Lane
Folsom, CA 95630
(916) 983-3008
Email: gbolinfive@gmail.com

September 1, 2016

California Department of Water Resources
3463 El Camino Ave., Room 150
Sacramento, CA 95821
Attn: Erin Brehmer
Email: Erin.Brehmer@water.ca.gov

U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, CA 95814
Attn: Ms. Mariah Brumbaugh, Environmental Manager
Email: Mariah.M.Brumbaugh@usace.army.mil

Dear Ms. Brehmer and Ms. Brumbaugh:

RE: Comments on Folsom Dam Raise Project

Thank you for providing the workshop in Folsom to review the Draft Supplemental Environmental Impact Statement/Environment Impact Report (SEIS/EIR) for the Folsom Dam Raise Project. We have a few comments and questions.

Parking Lots – we are very supportive of the restoration of the Dike 7 Office Complex and parking lots. It is our understanding the staging area, two parking areas, all equipment, and temporary buildings, fencing and structures will be removed from the complex the area will be restored topographically and restored to native habitat.

Access Points – can you please clarify where the access point for construction for Dike 7 area will be? It is not clear to us which is the northern and southern point access and exactly where the access point(s) will be.

Noise – we would like to request that a noise phone line be established to report extreme construction noise after normal construction hours. To ensure the compliant was recorded and received, we would like to request that procedures someone return a call when a compliant has been left.

Dike 7 Cove – We believe that Dike 7 cove should be fully restored to its state prior to the Folsom Dam Spillway Project and Folsom Dam Raise Project. Dike 7 Cove was part of Folsom Lake proper prior to these projects and it should return to this condition.

Thank you for the opportunity to provide comments on the Folsom Dam Raise Project SEIR/EIR. We would appreciate it if you would provide us with your responses to our comments directly and prior to their publication in the Final Environmental Impact Report.

Sincerely,

Gary Bolin

Gary Bolin

Rebecca Bolin

Rebecca Bolin

La Collina dal Lago

Owners' Association

August 28, 2016

California Department of Water Resources
3463 El Camino Ave., Room 150
Sacramento, CA 95821
Attn: Erin Brehmer
Email: Erin.Brehmer@water.ca.gov

U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, CA 95814
Attn: Ms. Mariah Brumbaugh, Environmental Manager
Email: Mariah.M.Brumbaugh@usace.army.mil

Dear Ms. Brehmer and Ms. Brumbaugh:

RE: Comments on Folsom Dam Raise Project

The La Collina Dal Lago neighborhood is adjacent to the Folsom Dam Raise Project, specifically Dike 7. The La Collina dal Lago Owners' Association board members have reviewed the Draft Supplemental Environmental Impact Statement/Environment Impact Report (SEIS/EIR) and have the following comments and concerns:

1. Parking Lots

   We are very supportive of the restoration of the Dike 7 Construction Office Complex and parking lots as described on page 42 and 43 of the draft SEIS/EIR. According to the draft SEIS/EIR, the staging area located at the Dike 7 Office Complex would be restored to habitat. This area includes the staging area, two parking areas, all equipment, and temporary buildings, fencing and structures which would be removed from the complex. Both parking lots will be removed and the area will be restored topographically and revegetated. During the construction of the improvements at Folsom Dam, the Dike 7 Construction Office Complex has negatively impacted our neighborhood and property owners. The removal of the office complex and parking lots along with the area's restoration to native habitat is very welcome news. From the documents we have reviewed, it appears that the removal and restoration will take place around 2021 (page 45 of the draft SEIS/EIR states this work will be award in calendar year 2019 with a construction duration of 2 years).

2. Access Points

The La Collina dal Lago owners' association board members have some questions and need clarification regarding the proposed construction vehicle access points to this project. Figure 10 on page 39 and the map in Appendix B, "Staging Areas for Dikes 7, 8, and LW", seem to show two access points to Dike 7. Page 37 states that only the northern access point would be used to access just Dike 7 and that the southern access point would not be used at all. Where exactly is the southern access point? In reading your maps, it appears that the southern access point is at the intersection of East Natoma and Folsom Lake Crossing. Is this correct? If so, there is currently no access point at this location. Are you intending to construct an access point at the East Natoma and Folsom Lake Crossing intersection? If so, please be advised that this is on property owned by the La Collina dal Lago Owners' Association and the board is not inclined to provide a right of access across this property for several reasons including the following:

First, there is a retention basin on this property that is a critical part of the subdivision's drainage and water quality system. This retention basin was required by the City of Folsom as a condition of the development of the La Collina dal Lago neighborhood. If an access point is anticipated to be constructed at this site, that access will negatively impact this retention basin which is a critical part of the overall drainage and water quality control system.

Second, since this access point is closer to the La Collina dal Lago neighborhood than the existing access point to the construction office complex, the traffic impacts will more negatively affect the neighborhood.

Therefore, we need clarification on the exact access point for Dike 7 and assurance that a new access point is not intended to be built on our property. We are extremely concerned about this issue and request that Ms. Brumbaugh contact me directly to discuss this issue prior to the publication of the Final EIR for this project. For your convenience, I am enclosing a copy of your map with the two access points in question circled (see attached).

3. Noise

We request that a noise voice mail "hot line" be available for residents to call to report excessive construction noise outside of normal construction hours. Further, we would like this telephone line to be monitored with next day return calls to anyone leaving a message. As you are aware, a similar "hot line" has been available during the Folsom Dam Spillway Project. However, despite leaving messages on various dates, no calls were ever returned leaving our residents frustrated and not knowing if the compliant ever made it to human ears.

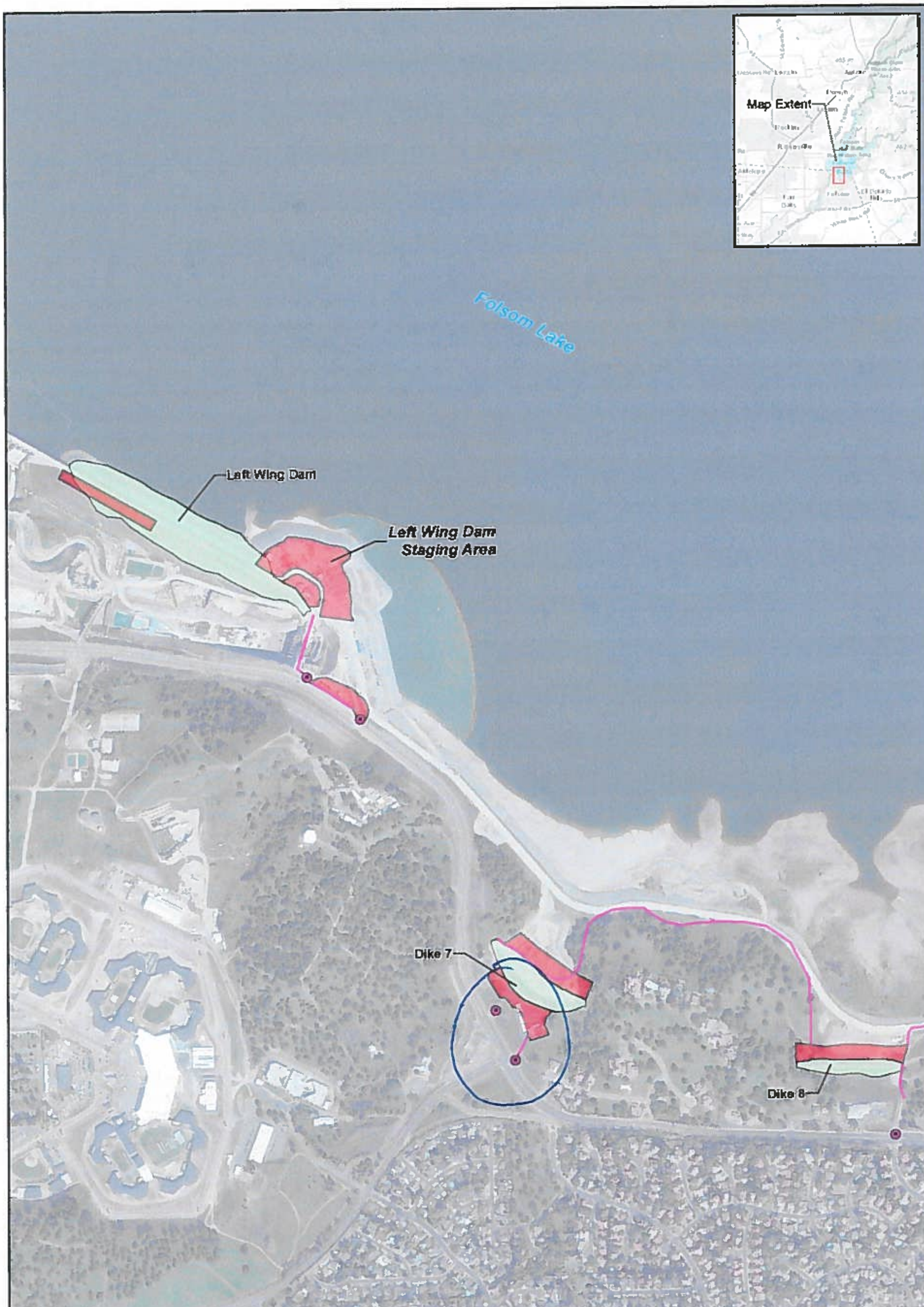
Thank you for the opportunity to provide comments on the Folsom Dam Raise Project SEIR/EIR. Please provide us with your responses to our comments prior to their publication in the Final Environmental Impact Report. I look forward to hearing from you.

Sincerely,
La Collina dal Lago Owners' Association

Jeremy G. Bernau

Jeremy Bernau
President

Enclosure



Legend

- Access Point
- HaulRoutes
- Staging Area
- Dikes

Imagery Source: World View 2 .4m, March 23, 2014

N

0 700 1,400 Feet

The information depicted in this GIS layer is the result of digital analyses performed on a database consisting of information from a variety of governmental and other credible sources. The accuracy of the information presented is limited to the collective accuracy of the database on the date of the analysis.

The information is believed accurate and reasonable efforts have been made to ensure the accuracy of the data. However, the US Army Corps of Engineers Sacramento District GIS Unit expressly disclaims responsibility for damages or liability that may arise from use of this data. This product is the property of the US Army Corps of Engineers Sacramento District GIS Team and its use is thereby restricted. This map was created using the EGIS Gateway map template.

AMERICAN RIVER WATERSHED PROJECT
FOLSOM DAM RAISE PROJECT

STAGING AREAS FOR DIKES 7, 8 and LW

JUNE 2014

US Army Corps of Engineers
Sacramento District

August 4, 2016

Kurt Flynn
NEPA70@YMAIL.COM

Mariah Brumbaugh
Savannah District
US Corps of Engineers

Subject: FOLSOM DAM RAISE DEIS.

Dear Ms. Brumbaugh:

Unfortunately, I believe the DSEIS fails to analyze and disclose all adverse and beneficial impacts of the alternatives and, in accordance with the CEQ NEPA Regulations, a supplement must be prepared with a proper analysis of impacts. (40 CFR 1502.9(a))

The Executive Summary describes that the No Action Alternative would result in: loss of life and injury (safety); contamination from hazardous materials and toxic materials; and, shutdown of transportation corridors. [i] Potential safety impacts are also described in the Purpose and Need. The Purpose is to provide, "flood risk management benefits to the Sacramento area". The Need for the project is described as, "Sacramento is identified as one of the most at-risk communities in the nation for flooding. Therefore, there is a need to reduce this risk through numerous flood damage reduction measures. The existing system leaves the highly urbanized Sacramento area at an unacceptably high level of flood risk".

Although the DSEIS acknowledges impacts on safety, hazardous waste, toxic contamination, and (4) transportation as part of the Executive Summary and the Purpose and Need, the Environmental Consequences section does not analyze the No Action Alternative's adverse impacts of these resources. [ii] In addition, the beneficial impacts of the proposed action on these resources are not analyzed.

The following provides editorial comments.

I appreciate your consideration of my comments. I look forward to your response.

Respectfully,

Kurt

Copied: Kathleen Goforth, USEPA; Jean Prijatel USEPA

Editorial Comments on the FOLSOM DAM RAISE DSEIS

1. Beneficial impact is defined (page 64) however, adverse impact is undefined. Please define 'adverse impact'.

2. The Environmental Consequences section states, "Under NEPA, the effects of the proposed action and alternatives under consideration, including the No Action Alternative, *is determined* by comparing effects between alternatives and against effects from the No Action Alternative". (Italics added) This does not make sense. Effects are not determined by comparing effects.

3. In the above sentence, replace "*is determined*" with "are determined".

4. The Environmental Consequences section states, "Under NEPA, the No Action Alternative (i.e., expected future conditions without the project) is the benchmark to which the action alternatives are compared, and the No Action Alternative is compared to existing conditions." Under NEPA, the impacts of all alternatives are compared to each other. The impacts of the Action Alternatives and the impacts of the No Action Alternative are not compared separately.

5. The Environmental Consequences section states, "Levels of Significance can vary by alternative based on the setting and the nature of the change in the existing physical condition". Why is this statement important? The analysis of impacts does not include a discussion of 'different levels of significance'.

6. Please consider using the proper title for the 'Endangered Species Act' (delete Federal) and, consider adding the 'Bald and Golden Eagle Protection Act' (page 108).

7. Headings in Sections 3.10.1 and 3.12.1 are inconsistent with the headings of other similar sections.

8. Upper case needs to be used for Federal when referring to the US Government.

9. Federally should be lower case.

10. State should be upper case when referring to a specific state, such as California.

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[i] The Executive Summary states, "…significant loss of life is expected … as well as injuries, illnesses, and the release of hazardous and toxic contaminants … lives would continue to be threatened… transportation corridors would be impacted… the No Action Alternative was not selected because it was not considered to be in the best interest of public safety – it did not … allow for an increase in Folsom Dam safety measures."

[ii] Hazardous Material, Toxic Waste, and Public Safety were eliminated from detailed consideration. (p. 65) The Environmental Consequences (Section 3.9) only describes construction impacts on transportation. (p. 160) Potential flood impacts from the No Action Alternative are analyzed for some resources, as shown below.
p. 117 - "PMF flood event may result in the loss of critical habitat, and special status species could be adversely affected."
p. 131 - "A possible flood event may temporarily increase the amount of vehicle emissions during flood fighting activities, as well as increase the amount of vehicle emissions resulting from clean-up Activities."

p. 142 - “However, a flood associated with a PMF event may result in large amounts of GHG emissions during flood-fighting activities, as well as large amounts of emissions resulting from clean-up activities and the repair and/or replacement of flood damaged housing, commercial and industrial properties, and public infrastructure.”
p. 186 - “Extreme flooding events could wash siltation and contaminants into the water system, and if emergency work became necessary to prevent dike failure, measures required for the protection of water quality might not be used.”
p. 201 - “If a great enough flood event, or PMF, were to occur, the gates and dam would be at risk for failure, threatening the levee system downstream with a surge of flow beyond the current 160,000 cfs levee capacity and affecting the dam as a historic property. As a result, the No Action Alternative would likely result in an adverse effect to cultural resources.”

From:	Kurt Flynn
To:	Brumbaugh, Mariah M SPK
Cc:	Carithers, Clayton V SPK; goforth.kathleen@epa.gov; prijatel.jean@epa.gov
Subject:	[EXTERNAL] Re: Folsom Dam Raise Draft EIS
Date:	Thursday, August 11, 2016 4:41:12 PM

Dear Ms Brubaugh,

I would like to add a comment to my August 4, 2016 letter. In addition to analyzing the impacts of the alternatives on the loss of life and injury (safety); contamination from hazardous materials and toxic materials; and, shutdown of transportation corridors, I also request an analysis of the economic impacts of the alternatives.

Thank you,

Kurt

From: Kurt Flynn <nepa70@ymail.com>
To: "Brumbaugh, Mariah M SPK" <Mariah.M.Brumbaugh@usace.army.mil>
Cc: "Carithers, Clayton V SPK" <Clayton.V.Carithers@usace.army.mil>; "goforth.kathleen@epa.gov" <goforth.kathleen@epa.gov>; "prijatel.jean@epa.gov" <prijatel.jean@epa.gov>
Sent: Thursday, August 4, 2016 4:37 PM
Subject: Folsom Dam Raise Draft EIS

Ms. Brumbaugh,

Please see the attached comments on the DEIS.

Thank you,

Kurt

From: Roberta Long
To: Brumbaugh, Mariah M SPK
Subject: [EXTERNAL] Folsom Dam Raise
Date: Saturday, September 17, 2016 9:14:05 AM
Attachments: Folsom book cover copy.jpeg

I attended the July 27 public meeting in Folsom and was given the information I need to understand the project. I would like to be informed when Operations decisions are being formulated.

Roberta Long

Roberta Long, Author
FOLSOM 1960-2015
PO Box 958
Folsom, CA 95763
530-305-0720

From: agryder01@yahoo.com
To: Brumbaugh, Mariah M SPK
Subject: [EXTERNAL] Comments about Folsom Dam Raise draft SEIS-EIR
Date: Monday, September 19, 2016 1:58:20 PM

Ms. Brumbaugh,

I reviewed the draft Supplemental Environmental Impact Statement/Environmental Impact Report for the Folsom Dam Raise project. I have many comments and questions listed below. Please respond to these in your final report.

Sincerely,

Aaron Ryder

* What does "pool release mechanisms" mean?

* The description of work to be done at the main dam is very hard to understand. What are tainter gates? What is a top seal bulkhead? What are the piers? What are trunnions? What is the emergency spillway and what is the non-emergency spillway? What are the emergency spillway gates? What are stop logs? What is the bridge parapet wall? Providing photos and drawings would be helpful along with clarifying text.

* What is the "new dike tip road" proposed?

* Text is confusing about where dike changes will involve changes to the dike top and upstream side of dike and where dike changes will straddle the entire dike. Explain better.

* The report says that updates to the WCM and completion of the auxiliary spillway may eliminate the need for the work proposed in the dam raise project. If this is possible, why is work proposed at all until it is know whether the work is needed?

* Text says the southern access point to Dike 7 will not be used at all, only the northern one. If so, then why show the southern access in Figure 10?

* The access route to Dike 8 is along a portion of Folsom Point Road, not Briggs Ranch Drive. Using Folsom Point Road seems like a bad idea because of traffic conflicts between construction vehicles and vehicles driving to and from Folsom Point. The report says Folsom Point itself may be used for access to MIAD and Dikes 7 and 8, but would remain accessible during construction. How?

* Drawings seem to show that the road to Beals Point will be a construction access route, but the recreation section says Beals Point would not be used for access. Will this road be used for access or not? Use for construction access could be a real problem because of traffic conflicts. The Beals Point road is already clogged with traffic during the summer.

* The haul route/access to dikes 1, 2, and 3 appears to be along the main access to Granite Point. The traffic section says impacts to traffic would be less than significant. I believe users of Granite Point would disagree.

* Your report says "grade separated vehicular and/or pedestrian crossings" may be used to help maintain public

access to recreation areas and trails. Where would these be located?

* Why don't the haul roads from Dike 7 to Dike 8 and from Dike 8 to MIAD follow the bench road that the last NEPA-CEQA document for the joint federal project says will be built? The routes you show would cause needless impacts to some areas that haven't been disturbed.

* The recreation section says Figures 12 and 13 show the trails within the FLSRA, but they do not.

* The report says existing bike "detours" near dikes 4, 5, and 6 would allow continuous use of trails during construction. This is misleading since most bicyclists using the road along the top of these dikes don't ride bikes suited for the dirt detour trails.

* The report first says the project would have significant effects to recreation, but later says effects should be less than significant but that significant effects could remain. This is confusing.

* The report says use of staging areas "would not constitute a substantial change from existing visual resource conditions." I disagree because some of the staging areas are covered by vegetation and are not actively used.

* To state that all the staging areas are previously disturbed areas with limited vegetation is also misleading.

* Table 3 infers that construction would only affect views from homes on the side of Auburn-Folsom Road that is opposite construction. What about homes on roads like Vogel Valley Road, Sierra Drive, Lake Court, Mount View Drive, Lelvie Lane, Lorena Lane, Quigley Court, Cummings Way, etc.?

* The no action alternative under the vegetation/wildlife section says conditions would remain the same as existing conditions. How can this be true if part of the project is in areas still under construction or restoration that will come to an end? Also, the Bureau of Reclamation previously said that native habitats will be restored in areas disturbed by the ongoing work finishing up now. When would this restoration happen and couldn't this project impact restored areas?

* The vegetation/wildlife section is confusing by first stating impacts to habitat and wildlife would be significant, then saying the impacts would be less than significant. Which is it?

* Why did the wetland delineation performed only cover the areas near dikes 4, 5, and 6? What about areas near the rest of the project?

* The vegetation/wildlife section says fresh emergent wetland has the potential to be removed as part of project. Table 4 shows 0.3 acres, plus it shows impacts to 19.6 acres of reservoir (lacustrine). But later text says the project would not affect open water or waters of the U.S. This is confusing. Also, how can you actually capture impacts to wetlands and open water areas when the delineation only covers a fraction of the total project?

* The report says that the construction footprint for the dikes and MIAD could go 50 feet past both sides of these features. But it also says that the project would have no dredge or fill material below the ordinary high water mark of the lake and would have no effect on waters of the US. This is contradictory.

* The analysis of fisheries says no work would occur in a wet or aquatic environment. This conflicts with the project description for dikes and with some staging areas being in the lake.

* Text first says noise effects would be significant even with mitigation measures but then says the mitigation measures would make the effects less than significant. Why this discrepancy?

* Cumulative impacts fail to account for how the dam raise construction will affect restoration work that was covered in the most recent joint federal project NEPA-CEQA.

* Chapter 5 mentions the Executive Order about invasive species but doesn't explain how the dam raise project complies with this order.

* Why are statutes pertaining to roadways and utilities even mentioned in Chapter 5? How do these apply to the dam raise project?

* Why are the effects of the dam raise project based on conditions present in 2014? Much has changed since then.

APPENDIX I

CLEAN WATER ACT SECTION 404(b)(1) EVALUATION
FOLSOM DAM RAISE PROJECT

Appendix I
Clean Water Act Section 404(b)(1) Evaluation

This document constitutes the Statement of Findings, and review and compliance determination according to the Section 404(b)(1) guidelines for the proposed work (preferred alternative; proposed project). This analysis has been prepared in accordance with 40 CFR Part 230- Section 404(b)(1) guidelines and USACE Planning Guidance Notebook, ER 1105-2-100.

1. PROJECT DESCRIPTION

A. PROPOSED PROJECT

The proposed project is referred to as the Folsom Dam Raise project and is fully described in Section 2.3 of the Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR). The proposed project would be constructed in phases, with one of these being the raising of Dikes 1, 2, and 3 (also referred to as Work Package 3 or WP3). This phase of the overall project would directly impact jurisdictional Waters of the United States (WOUS). A segment of Park Road that runs along the crest of Dike 1 would need to be temporarily relocated to allow raising of Dike 1 and simultaneously maintain access to the roadway. The proposed Park Road detour (PRD) would pass through a small portion of Folsom Lake, which is a jurisdictional WOUS. This evaluation focuses on the proposed impact to Folsom Lake that would result from construction of the temporary PRD.

B. LOCATION

The overall project area is located within and near the city of Folsom adjacent to the south and west sides of Folsom Lake, approximately 20 miles northeast of Sacramento. Folsom Dam and Reservoir (e.g. Folsom Lake) 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. Figures 1-1 and 1-2 in Chapter 9 of the SEIS/EIR provide location maps for the overall project area. The jurisdictional WOUS (portion of Folsom Lake) that would be impacted during WP3 construction activities are shown in Figure 1 below.

C. PURPOSE AND NEED

The purpose and need for the overall Folsom Dam Raise project are discussed in Section 1.2 of the SEIS/EIR.

Park Road is a 2-lane, paved public road within the Folsom Lake State Recreation Area (FLSRA). It runs along the west side of Dikes 2 and 3, but runs along the crest (top) of Dike 1 before continuing northward. Project construction activities would temporarily destroy that portion of Park Road that runs along the crest of Dike 1 during the course of raising the dike embankment. After the dike has been raised, the Park Road segment destroyed would be restored as part of the proposed project. However, construction of this project phase is anticipated to last approximately 2 years. FLSRA visitors, FLSRA staff, and U.S. Bureau of Reclamation (USBR) staff would still need to travel on an uninterrupted Park Road during this construction period. Thus, a temporary detour road segment (the PRD) would be constructed at the beginning of this project phase to meet this need.

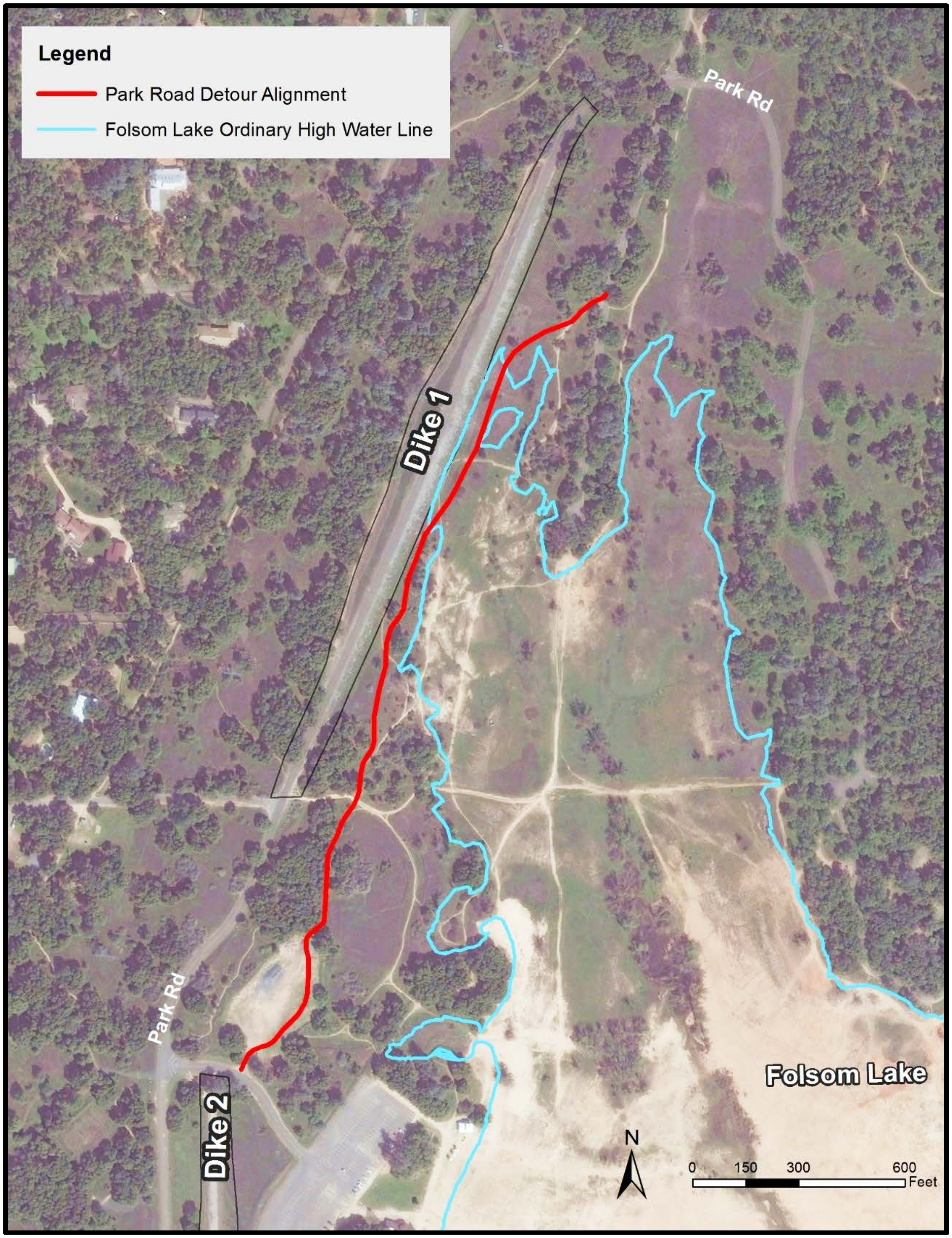

Figure 1. Proposed temporary Park Road detour in relation to the jurisdictional boundaries (ordinary high water elevation) of Folsom Lake.

D. AUTHORITY

The authorization for the Folsom Dam Raise project is discussed in Section 1.1 of the SEIS/EIR.

E. ALTERNATIVES [40 CFR 230.10]:

In the SEIS/EIR, two main alternatives are evaluated; the No Action alternative (Alternative 1) and the proposed project (Alternative 2; the preferred action/preferred alternative/proposed project). Section 2.1.2 of the SEIS/EIR also discusses several other alternatives to the proposed project that were considered in the past but were eventually removed from further consideration for a variety of reasons. However, the SEIS/EIR does not specifically address alternative alignments of the proposed PRD that were considered. These are discussed below.

Three potential alignments of the PRD were developed and are illustrated in Figure 2 below as Alternatives 1 through 3. Alternative 3 would run through uplands on the west side of Dike 1 and would therefore not result in any direct impacts to jurisdictional WOUS. This alternative would be approximately 3,036 feet long (0.56 mile), making it the longest detour and somewhat more expensive to construct compared to the Alternative 2 alignment. Constructing this detour would require removing at least 13 very large oak trees, significant trimming of several other mature hardwood trees, and removal of several native shrubs. To minimize habitat impacts, the Alternative 3 alignment was routed to run within a portion of an existing electrical transmission line's cleared easement. Preliminary discussions with the easement holder/transmission line owner revealed it could be very difficult, if not impossible, to obtain permission from the owner to build the detour road through the powerline easement. In addition, routing a public road beneath an electrical transmission line can pose a safety hazard to roadway users. Alternative 3 was ultimately eliminated from further consideration due to the following: (a) Substantially greater impacts to much higher quality habitats compared to Alternatives 1 or 2; (b) Significant difficulties in obtaining permission to build the road through the electric transmission easement, and; (c) Poses a potential safety hazard to roadway users.

Alternative 1 would extend from an existing FLSRA public parking lot on its south end to an existing public road segment on its northern end, passing through both uplands and portions of Folsom Lake. This alternative would be approximately 1,787 feet long (0.34 mile), making it the shortest detour but it would be more expensive to construct than the other two alternatives due to the amount of road embankment fill required. Construction of Alternative 1 would directly impact approximately 1.7 acres of Folsom Lake, with its alignment running through a total of roughly 1,130 feet (0.21 mile) of the lake. The total amount of fill that would be placed within the lake for this alternative would be approximately 21,965 cubic yards (cy).

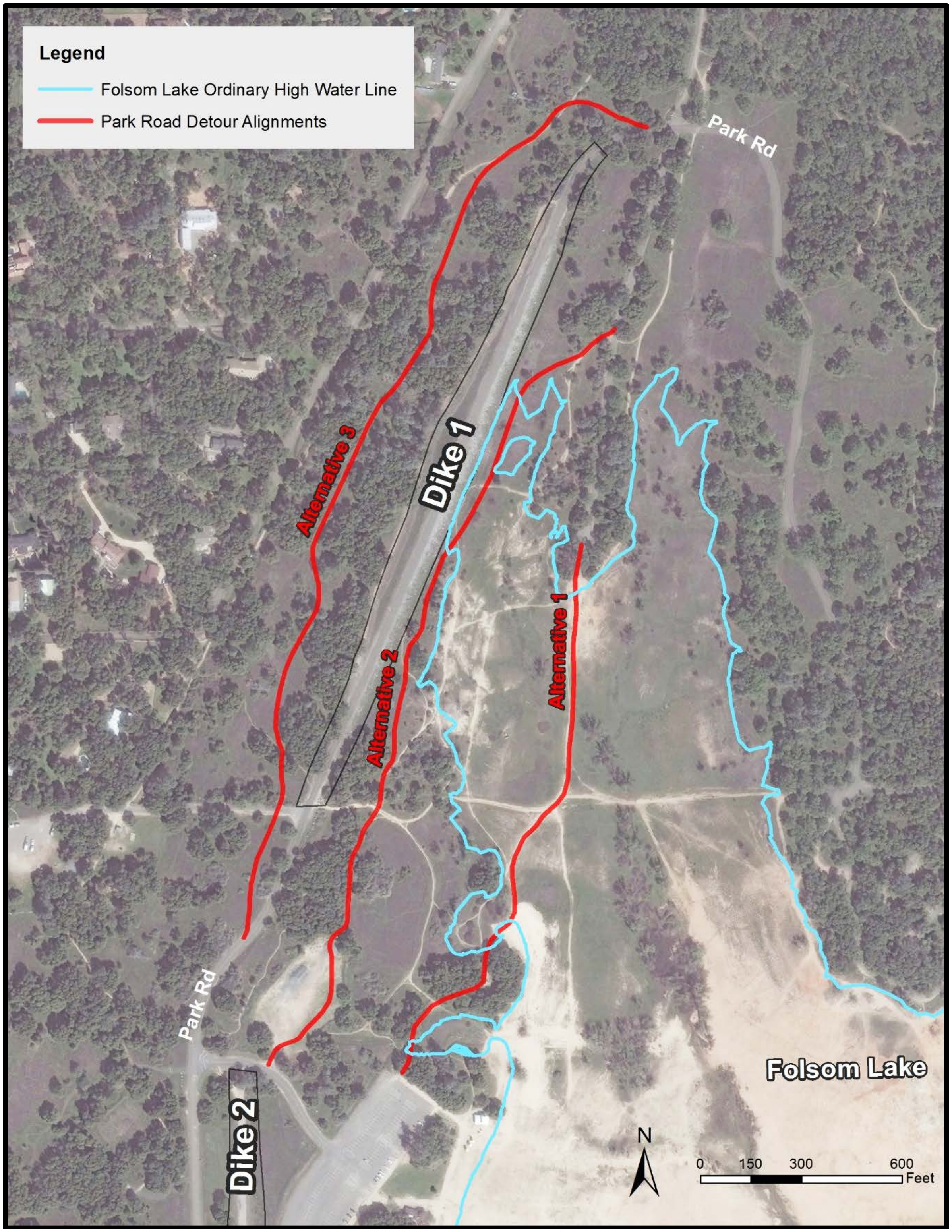

Figure 2. Alternative alignments considered for the temporary Park Road detour in relation to the jurisdictional boundaries (ordinary high water elevation) of Folsom Lake.

The existing lake bottom elevation along the alignment affected by Alternative 1 ranges from elevation 450 feet NAVD88 to 466 feet NAVD88 (the lake's OHW elevation). That portion of the PRD running through the lake would primarily follow existing dirt trails and cleared areas. Besides these features, the impact footprint within the lake would affect a variety of native and invasive graminoids and forbs. Where the alignment passes through uplands, it would also largely follow existing dirt trails. At least 3 large oak trees would need to be removed and a few hardwood trees and shrubs would need to be trimmed during construction of this alternative. Alternative 1 was ultimately eliminated from further consideration due to the following: (a) Substantially greater impacts to Folsom Lake compared to Alternative 2; (b) Much higher cost to construct this alternative compared to Alternative 2; and; (c) Greater safety risk to roadway users compared to Alternative 2, due to the greater potential depth of water on either side of the PRD where it crosses Folsom Lake.

Alternative 2 would extend from a public roadway on its south end to the same existing public road segment on its northern end that Alternative 1 would join. This alternative would be approximately 2,560 feet long (0.21 mile), making it shorter than Alternative 3 but significantly longer than Alternative 1. Construction of Alternative 2 would directly impact approximately 0.5 acre of Folsom Lake, with its alignment running through a total of roughly 509 feet (0.10 mile) of the lake. The total amount of fill that would be placed within the lake for this alternative would be approximately 2,413 cy.

The existing lake bottom elevation along the alignment affected by Alternative 2 ranges from elevation 462 feet NAVD88 to 466 feet NAVD88 (the lake's OHW elevation). That portion of the PRD running through the lake would primarily impact a variety of native and invasive graminoids and forbs, as well as 2 or 3 native shrubs. Where the alignment passes through uplands, it would largely affect annual grasslands, a previously disturbed staging area, and segments of existing dirt trails. A few large hardwood trees would need to be trimmed to construct this alternative. At the most, it may be necessary to remove 1 or 2 trees and a few woody shrubs. Alternative 2 was selected as the preferred PRD alignment, largely because of the following: (a) Less impacts to high quality habitats than Alternative 3; (b) Less impacts to Folsom Lake (jurisdictional WOUS) than Alternative 1; (c) Lower cost than Alternative 1 and somewhat lower cost than Alternative 3; (d) No need for permission to use existing powerline easement as would be the case with Alternative 1; (e) Less safety hazards compared to Alternatives 1 and 3.

The PRD Alternative 2 alignment is the only alignment considered hereafter in this evaluation since the other two potential alignments were eliminated from further consideration. This alignment is simply referred to as the temporary PRD and as the proposed project, since the PRD is just a component of WP3 (the phase of the Folsom Dam Raise project that includes raising Dikes 1 through 3). The No Action alternative addressed in the SEIS/EIR is not evaluated herein since this alternative assumes the Folsom Dam Raise project would not be built at all and thus it would have no impacts to WOUS. However, the No Action alternative would not achieve the project purpose or fulfill the need for the project; hence it is not a truly viable alternative.

The proposed PRD would have a total width of 24 feet, consisting of two 10'-wide paved (asphalt) travel lanes and a 2'-wide gravel shoulder on each side of the travel lanes. The roadway side slopes, where needed for the road embankment, would have 2H:1V side slopes. These steeper side slopes were selected to reduce the impact footprint of the road where it crosses Folsom Lake. The PRD's crest (top) elevation would be 467 feet NAVD88 for that portion that crosses the lake, which is 1 foot above the lake's OHW elevation. The average base width of the roadway embankment where it crosses the lake would be approximately 40 feet. The paved portion of the PRD would consist of a 3"-thick layer of asphalt over a 6"-thick layer of aggregate base course. This base course would extend beyond the asphalt to form the roadway shoulders.

It is currently anticipated that construction of the WP3 phase of the proposed project would begin in the summer of 2019 and be completed in the summer of 2021. Construction of the temporary PRD would likely be one of the first elements of WP3. The PRD would be built using heavy equipment such as bulldozers, front-end loaders, haul trucks, pavers, and rollers. Once the PRD is no longer needed and prior to the end of the WP3 phase, the PRD would be completely removed. The removed material would be hauled off-site to a licensed commercial disposal facility. After the PRD is removed, areas disturbed by PRD construction would be restored to match pre-construction topography as much as possible. Disturbed natural areas would then be planted with a mixture of native grasses and forbs.

The following outlines various measures, including construction best management practices (BMPs), that would be employed to help avoid, minimize, and mitigate the proposed project's impacts to jurisdictional WOUS. These are in addition to measures discussed above.

- The construction contractor would be required to develop and implement a site-specific Storm Water Pollution Prevention Plan (SWPPP). Among other things, the SWPPP would identify measures necessary to mitigate potential construction-related water quality concerns, erosion and sediment control measures, control of non-stormwater discharges, hazardous spill prevention and response measures, BMP inspections, monitoring, and maintenance. The SWPPP would first be reviewed and approved by the Corps prior to submitting it to the CVRWQCB (Central Valley Regional Water Control Board) as part of the contractor's application for a Construction General Permit.
- Prior to initiating project construction, the construction contractor would be required to obtain a National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (DWQ Order No. 2009-009-DWQ; NPDES No. CAS000002), otherwise known as a Construction General Permit (CGP), from CVRWQCB. The contractor would be required to comply with all applicable conditions of the permit, including monitoring requirements.
- The construction contractor would be required to develop and implement a Spill Prevention, Containment, and Cleanup Plan (SPCCP) that would address practices to prevent, minimize, and/or clean up potential spills during project construction.

- Prior to starting construction, the Corps would obtain a Clean Water Act (CWA) Section 401 Water Quality Certification (Section 401 WQC) for the proposed project from the CVRWQCB. The construction contractor would be required to comply with the applicable technical certification conditions set forth in this permit.
- The construction contractor would be required to keep construction equipment and vehicles properly maintained and inspected to help prevent spills or leaks of liquids, including petroleum products. On-site fueling of the equipment and vehicles would only occur in designated staging areas with appropriate spill controls. Any hazardous materials and wastes would be appropriately managed to prevent spills or similar discharges.
- Impacts to water quality would be minimized during construction through adherence to the SWPPP, the CGP, and the 401 WQC, including any surface water sampling and monitoring requirements. Measures to minimize soil or sediment from migrating into WOUS would include the installation and maintenance of erosion control devices such as silt fencing, straw wattles, and, if necessary, floating turbidity curtains (silt curtains).
- Construction work necessary to build the proposed PRD road and subsequently remove it would be timed to coincide with low lake water levels when possible to minimize water quality impacts.

F. GENERAL DESCRIPTION OF DREDGED OR FILL MATERIAL

The following sections only pertain to project actions that would directly impact WOUS.

(1) General Characteristics of Material

Materials to be placed as fill to construct the PRD roadway embankment and surface would include soil free of pollutants (embankment material), asphalt (roadway surface), and aggregate (roadway base and shoulders). No excavation (dredging) within Folsom Lake is proposed, other than during the removal of the temporary PRD. This excavation would constitute a mitigation/restoration activity rather than an impact activity.

(2) Quantity of Material

The total amount of fill placed in Folsom Lake would be approximately 2,413 cy.

(3) Source of Material

Soil (earthen material) would primarily be obtained from a commercial facility located off-site. It is also possible that some of this material may be obtained during the process of the initial degrading of Dikes 2 and/or 3. Dikes 1 through 3 must first be slightly degraded (excavated) to establish a firm and suitable base for the materials used in raising these dikes. Asphalt and aggregate would be obtained from an off-site commercial facility.

G. DESCRIPTION OF PROPOSED DISCHARGE SITE

(1) Location

The location of the proposed PRD is shown in Figure 1. It would be located in Placer County, California, near the community of Granite Bay and on lands owned by the USBR.

(2) Size

The impact footprint of the base of the proposed PRD embankment within the jurisdictional limits of Folsom Lake would encompass approximately 0.5 acre, or approximately 20,360 square feet.

(3) Type of Site

The affected jurisdictional WOUS is a man-made lake. The proposed PRD would cross through a small arm of the lake, as can be seen in Figure 1. This location falls within what is referred to as the lake fluctuation zone, which is that portion of the lake that is not subject to relatively permanent inundation.

(4) Type of Habitat

As mentioned, the average existing lake bottom elevation where the PRD would cross Folsom Lake is approximately 463 feet NAVD88. Past lake water surface elevation data indicate that in any given year, there is only about a 7% chance of the lake's water level reaching elevation 463' or higher (Corps. 2017. Folsom Dam Modification Project, Water Control Manual Update, Draft SEA/EIR). Lake water level data for the period from 1984 through 2011 reveal that the lake level only reached elevation 460 feet or higher during 14 years of the 28-year monitoring period and that there were 9 consecutive years when the lake level never reached elevation 460 feet (Corps. 2012. Folsom Dam Modification Project, Approach Channel, Final SEIS/EIR).

Water levels in Folsom Lake normally fluctuate between elevations 440 feet in early summer to 405 feet in early winter. In the flood control season (October 1 to May 31), the lake must be lowered to elevation 427 feet to accommodate the minimum flood flow capacity, and lowered to elevation 390 feet to accommodate the maximum flood storage capacity. Lake levels during this period generally range from elevation 405 feet to 444 feet. Outside the flood control season, lake water levels typically range from roughly 444 feet (June) to 417 feet (September). Lake levels as high as 466 feet and as low as 347 feet have occurred during the period from 1976 to 2006 (California Parks and Recreation. 2007. Folsom State Recreation Area and Folsom Powerhouse State Historic Park: General Plan/Resource Management Plan, Chapter II Existing Conditions).

The extreme nature of water level fluctuations in Folsom Lake adversely affect the aquatic functions and values provided by those portions of the lake situated at higher elevations. That portion of the lake that would be directly impacted by construction of the PRD is such an area, given that the elevation here averages less than 3 feet below the lake's OHW elevation. In many years the affected area would not be inundated or even saturated by water, leaving it incapable of actively providing aquatic resources and functions.

The lake area within the proposed impact footprint of the PRD is more similar to the upland annual grassland habitats present in the immediate project area than it is to typical lacustrine or lake littoral zone habitats. The affected area lacks a canopy of trees or woody shrubs, although a few woody shrubs are present. Common broadleaf forbs, such as miniature lupine (*Lupinus bicolor*), mustard, pearly everlasting (*Anaphalis margaritacea*), butter and eggs (*Linaria vulgaris*), Ludwigia (*Ludwigia* spp.), and common cocklebur (*Xanthium strumarium*) tend to rapidly colonize newly-exposed soils following the few periods when this part of the lake is inundated. As the dry season progresses, sparse non-native annual grasses tend to dominate. Examples include ripgut brome (*Bromus diandrus*), wild oat (*Avena fatua*), and Italian ryegrass (*Lolium multiflorum*). Wildlife utilization of this lake area tends to be limited due to the area's proximity to the existing Park Road and the frequency of usage of the road by vehicles, bicyclists, and pedestrians, as well as the general character of the habitat. Terrestrial wildlife species such as California quail, wild turkey, black-tailed jackrabbit, deer, and rattlesnake may occasionally frequent the area. Wading birds and shorebirds like spotted sandpiper and killdeer can be seen foraging in the general area when it is inundated or saturated by water. Obviously, fish cannot use or occupy the affected area except during the rare periods when it is inundated.

(5) Timing and Duration of Discharge

The WP3 phase of the overall Dam Raise project would likely begin in the summer of 2019 and would likely be completed by the summer of 2021. The actual time required to build the PRD through Folsom Lake is estimated to be approximately 1 to 2 months and this construction would likely occur near the start of the WP3 phase. Removal of the PRD would likely occur near the end of the WP3 and should take no more than 1 month to complete.

H. DESCRIPTION OF DISPOSAL METHOD

Construction of the PRD would be performed using typical construction equipment such as motor graders, backhoes, bulldozers, track and wheel loaders, dump trucks, pavers, rollers, and similar equipment.

2. FACTUAL DETERMINATIONS

A. PHYSICAL SUBSTRATE DETERMINATIONS (Sections 230.11(a) and 230.20)

(1) Comparison of Existing Substrate and Fill

The soils within and immediately adjacent to the PRD impact footprint are mapped as Angregg coarse sandy loam and as "water" (lake). The existing soils and lake substrate have been previously disturbed during construction of Dike 1 as well as past repairs/improvements to Dike 1, and as result of lake inundation and sedimentation. The fill material used to construct the embankment for the PRD would be compacted soil and possibly degraded granite. Once the PRD is removed, the substrate where it crossed Folsom Lake would be effectively the same as the existing substrate.

(2) Changes to Disposal Area Elevation

The crest elevation of the proposed PRD would be 467 feet. The existing lake bottom elevation where the PRD would cross Folsom Lake ranges from 466 feet to approximately 462 feet, and tends to average 463 feet. After the temporary PRD is removed, that area of the lake disturbed by road construction would be returned to pre-construction topography (pre-construction elevations).

(3) Migration of Fill

Construction of the PRD where it crosses Folsom Lake would be performed when the area is not inundated, if at all practicable. If this is not practicable, then appropriate erosion control devices (e.g. silt fences, floating turbidity curtains) would be used to help minimize turbidity and migration of fill. The limits of the PRD embankment (fill limits) would be clearly marked where the PRD crosses the lake to help ensure fill placement stays within these limits. The embankment itself would be compacted to avoid sloughing, erosion, and migration of fill into other parts of Folsom Lake.

(4) Duration and Extent of Substrate Change

At the most, the PRD would alter the substrate of Folsom Lake for a period of approximately 2 years. Construction of this temporary detour road would alter approximately 0.5 acre of lake substrate (i.e. the impact footprint of the PRD). Once the PRD is no longer needed, it would be completely removed thereby effectively returning the affected lake substrate to its pre-construction condition.

(5) Changes to Environmental Quality and Value

Some common beneficial functions of wetlands and other WOUS are listed in Table 1, along with a qualitative rating of how well Folsom Lake currently provides or performs these functions. The rating system used included 5 levels; very high, high, moderate, low, very low. The rating indicated is based on that portion of the lake that would be directly impacted by construction of the PRD.

Table 1. Rating of various functions as currently performed by that portion of Folsom Lake that would be directly impacted by PRD construction.

Function	Rating
Short- or long-term surface water storage	Very high
Subsurface water storage	Low
Dissipation of energy	Low
Cycling of nutrients	Low to moderate
Removal of elements and compounds	Low
Retention of particulates	Moderate to high
Export of organic carbon	Very low
Maintenance of plant and animal communities	Very low

Construction of the PRD would not result in long-term adverse changes to the existing quality and values (aquatic resource functions and values) provided by Folsom Lake. This is because the PRD would be removed near the end of the WP1 project phase and the disturbed part of the lake would be restored to pre-construction topography and would be seeded/planted with a mixture of native graminoids and forbs. As a result, there would be no permanent or long-term loss of lake acreage, lake storage volume, or lake habitat.

There could be a minimal, temporary loss of aquatic functions and values during the roughly 2-year period that the PRD is present. Folsom Lake occupies approximately 11,450 acres when it reaches its OHW elevation. The PRD would temporarily eliminate 0.5 acre of the lake, but this represents a mere 0.004 percent of the total lake acreage. The PRD would temporarily eliminate approximately 1.5 acre-feet of the total lake storage volume of approximately 1,010,000 acre-feet when the lake is at its OHW elevation. This temporary loss constitutes a little more than 0.0001 percent of the lake's total storage volume.

While the PRD is present, the affected portion of Folsom Lake would not be able to provide any habitat for wildlife or aquatic organisms, nor would it be able to provide other functions such as nutrient cycling, energy dissipation, particulate retention, organic carbon export, or removal of compounds and elements from the water column. It is important to remember, however, that there is a high probability that the lake area that would be affected by the PRD would not be able to provide any aquatic functions during a typical year under existing conditions. As previously mentioned, there is only a 7 percent chance in any particular year that the affected area would be inundated or partially inundated and past records document the affected lake area might not be inundated at all for as long as 9 consecutive years.

(6) Actions to Minimize Impacts

Construction activities within the PRD would have minimal, short-term impacts to approximately 0.5 acres of WOUS. However, standard BMPs would be implemented to avoid or minimize any effects during the two year time frame of construction. These BMPs are further discussed and listed above in Section E. Any additional measures to avoid and minimize impacts are discussed in the Water Quality/WOUS section (Section 3.11) of this SEIS/EIR.

B. WATER CIRCULATION, FLUCTUATION, AND SALINITY DETERMINATIONS

(1) Alteration of Current Patterns and Water Circulation

The Folsom Reservoir (Folsom Lake) is located within the American River Basin, which covers an area of approximately 2,100 square miles and has an average annual unregulated runoff volume of 2,700,000 acre-feet; however, because Folsom Reservoir is managed as a flood control facility, the annual runoff volume has varied in the past from 900,000 acre-feet to 5,000,000 acre-feet. The Folsom Reservoir is fed by the North Fork American River and the Middle Fork American River, and the water is released on a regulated basis into Lake Natoma and the South Fork American River. Folsom Reservoir is the principal reservoir on the American River, impounding runoff from a drainage area of approximately 1,875 square miles.

The Folsom Reservoir is fed by the North Fork American River and the Middle Fork American River, and the water is released on a regulated basis into Lake Natoma and the South Fork American River. It is managed as a flood control facility and covers an area of approximately 2,100 square miles. Because the Folsom Dam and Reservoir is an already regulated system designed for flood protection, the impacts of the proposed project Alternative 2 would have minimal impact to current, circulation and drainage patterns. The Folsom Dam uses a regulated system to control flows of water from the lake.

(2) Interference with Water Level Fluctuation

Because the Folsom Facility is regulated to allow a specific amount of water to be released into Lake Natoma and the lower American River, Alternative 2 would not change water level fluctuation patterns.

(3) Salinity Gradients Alteration

Salinity gradients would not be affected.

(4) Effects on Water Quality

The water quality within Folsom Lake is currently good, with the water being utilized for: municipal and domestic water supply; irrigation; industrial power; water contact and non-contact recreation; warm and cold freshwater habitat, warm freshwater spawning habitat; and wildlife habitat.

(a) Water Chemistry

Construction activities within the PRD have the potential to affect turbidity if water levels manage to reach the PRD's impact footprint. Approved BMPs and water quality monitoring would be conducted in compliance with the Section 401 Water Quality Certification. Stormwater runoff has the potential to impact turbidity and pH of the reservoir. Stormwater discharges would be permitted under the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activities. All storm water discharges and activities would be monitored under the project Storm Water Pollution Prevention Plan (SWPPP). With appropriate BMPs and an approved SWPPP, impacts to turbidity and pH from stormwater runoff is anticipated to be minimal.

Heavy equipment and vehicles would be used on site during the actual construction of the PRD and during its removal. Appropriate measures implemented during PRD construction and removal, such as BMPs and a Spill Prevention, Control and Countermeasures Plan (SPCCP), would reduce temporary water chemistry impacts to less than significant.

If there is water present and it reaches the elevation of the PRD, placement (disposal) of fill to create the road may disturb or mobilize sediments, which has the potential to affect turbidity, total suspended solids, dissolved oxygen, pH, and water temperature. The re-suspension of sediments may also affect the concentrations of various metals in the water column by releasing such metals from lake sediments, including sediments deposited at the site by construction. In addition to the potential adverse effects to general water quality that could result from mobilizing such metals, this could create the potential for bioaccumulation of mercury in the aquatic environment.

Typical lake water quality monitoring requirements contained in past Section 401 WQCs and WDR Orders have focused on monitoring dissolved oxygen, pH, turbidity, settleable matter, and visible pollutants like oil, grease, fuel, and petroleum products. The construction contractor would monitor Folsom Lake water quality parameters in the immediate vicinity of the PRD site in accordance with monitoring requirements set forth in the project's WQC, and would provide monitoring results to USACE. This monitoring would be conducted throughout the duration of WP3 construction.

If lake water levels are such that the PRD lake crossing site is inundated, there is potential for short-term adverse water quality impacts that would largely be confined to the immediate area. The impacts would be minimized through the use of the BMPs discussed above, by compliance with WQC and CGP requirements, and through implementation of a thorough monitoring plan. These mitigation measures would reduce long-term effects on water quality to a less than significant level.

(b) Salinity

The project would not change salinity levels.

(c) Clarity

If water levels in Folsom Lake inundate that portion of the PRD that crosses the lake, there is potential for PRD construction and removal to affect water clarity. Filling and road removal/restoration of the affected area within WOUS could temporarily reduce water clarity due to an increase in total suspended solids. However, the reduction of clarity caused by construction activities would be limited to the duration of PRD construction and removal activities and would be returned to pre-construction levels soon after these activities are completed.

(d) Color

There is potential for construction and removal of the PRD to adversely affect the color of the lake water. The same effects from construction activities listed above in section (c) apply to color as well. The activities discussed above could temporarily induce a color change due to an increase in turbidity. However, conditions would return to pre-construction levels upon completion of the project.

(e) Odor

The project would not affect odor.

(f) Taste

The project would not affect taste.

(g) Dissolved Gas Levels

Construction activities within the PRD could temporarily increase turbidity levels if water levels rise high enough, which could minimally change water temperature and reduce dissolved oxygen concentrations in the immediate vicinity of the project. Dissolved oxygen concentrations would return to pre-construction levels once the project reaches completion.

(h) Temperature

Construction activities within the PRD have the potential to create turbidity, thus affecting water temperature. Proposed minimization measures that would be implemented by the BMPs would help limit the extent and magnitude of any water temperature changes. Water temperature would no longer be affected following project completion.

(i) Nutrients

Release of suspended sediments from project activities could potentially cause turbidity thresholds to be exceeded. This could concurrently cause thresholds for metals and nutrients to be exceeded. Turbidity would be controlled outside the working areas using a combination of BMPs previously discussed. Development and implementation of an approved SWPPP would also prevent release of excess nutrients into the lake.

(j) Eutrophication

The project would not input excess nutrients into the lake or promote excessive plant growth. The project would not contribute to eutrophication.

(5) Changes to Environmental Quality and Value

The proposed project could temporarily impact the water quality of the Folsom Lake due to earth moving operations in the PRD if lake water levels were to rise high enough to inundate the segment of the PRD that would cross the lake. Temporary construction and associated materials, including solvents, waste materials, and oil and gas associated with and construction equipment present on-site could introduce hazardous or toxic materials and silt and debris into surrounding waters and could cause degradation of the water quality within the Folsom Lake. Although there may be impacts to water quality during project construction, these impacts would be short-term. These impacts would also be avoided or minimized through implementation of the measures previously discussed in Section E above.

The proposed direct impacts to WOUS would not result in a long-term reduction in the existing extent of WOUS. Reductions in aquatic functions and values (environmental quality and value) would be restricted to the time project construction activities are occurring, which is only temporarily during the creation of the PRD and the removal of the road after this phase of the project is completed in two years. After the road removal, topography would be restored to preconstruction conditions as practicable and would then be reseeded with native grasses and forbs. Therefore, there would be no long-term adverse effects and there would be no net loss of aquatic functions and values.

(6) Actions to Minimize Impacts

BMPs and other measures that would be employed to avoid and minimize potential impacts to WOUS are discussed in Sections 3.11 and 4.4.4 of the SEIS/EIR, as well as in Section E above. Some of the main measures include: conducting construction/disturbance activities in WOUS when the lake water level is low, if feasible; adherence to WQC requirements, including water quality monitoring and reporting requirements; development of and adherence to the SWPPP; adherence to CGP requirements. Through these actions, project impacts to water quality would be less than significant.

C. SUSPENDED PARTICULATES/TURBIDITY DETERMINATIONS

(1) Alteration of Suspended Particulate Type and Concentration

During construction and associated removal of the PRD, there could be increased levels of turbidity as soils are exposed and during rain events, which may erode these soils into the reservoir. In addition, excavation of material and placement of soil and other material in nearby upland areas could cause increased turbidity into the reservoir. Removal of the PRD after construction is completed and the road is being taken out, soils from WOUS portions of the site would expose the underlying substrate. This exposed material could be eroded by wave action or storm runoff. The water could enter the Folsom Reservoir, and could potentially migrate into Lake Natoma to the south. It is likely, however, that the suspended particulates would settle in Folsom Lake before reaching Lake Natoma. Any suspended particulates that do migrate to Lake Natoma would settle within this lake and it is unlikely that the lower American River would be affected. The use of best management practices (BMPs) would minimize any increases in suspended sediments or turbidity associated with the proposed project.

(2) Particulate Plumes Associated with Discharge

Temporary local particulate plumes may occur during construction activities but would quickly dissipate after construction activities are complete.

(3) Changes to Environmental Quality and Value

Particulate plumes resulting from any construction activity are not expected to persist after project completion. Particulates suspended within the disposal area are not expected to differ in type from particulates currently within the project area.

(4) Actions to Minimize Impacts

Although the probability of water levels reaching the elevation of the PRD is limited, effects would be minimized by performing work during low lake level periods to the extent feasible. Other measures to minimize impacts are in Section E of this document and Section 3.11 of the SEIS/EIR.

D CONTAMINANT DETERMINATIONS

The potential biological hazard for sediments within Folsom Reservoir stems from mercury released into the American River and its tributaries from historic mining activities. Chemical testing of reservoir sediment has not identified concentrations of mercury above background in areas where in-reservoir work may occur. There may also be residual contaminants on the downstream side of the reservoir from the original construction of the Folsom Facility, likely as a result of spills of petroleum products during initial construction. The soil contamination is being handled through standard hazardous materials protocols and is not at risk of being released into the terrestrial or aquatic environments.

E. AQUATIC ECOSYSTEM AND ORGANISMS DETERMINATIONS

(1) Effects on Plankton

Plankton are drifting organisms that inhabit the pelagic zone of oceans, seas, or bodies of fresh water. Construction and removal of the PRD would be short-termed. Limited impacts to plankton, if plankton are present at all, are anticipated during the construction phase and any reduction in the plankton population or changes in plankton composition would be alleviated after completion of the project.

(2) Effects on Benthos

Benthic organisms are found in the benthic zone which is the ecological region at the lowest level of a body of water such as ocean or a lake, including the sediment surface and some sub-surface layers. Historically, water levels at Folsom Lake have not typically reached elevations high enough to provide habitat for benthic organisms within the PRD footprint. Currently there are no benthic organisms present.

Nevertheless if populations arise in the PRD footprint before the start of construction for this phase, PRD construction would likely result in extirpation of benthic organisms situated within the PRD impact footprint. Following completion road removal, benthic organisms found in undisturbed portions of Folsom Lake would rapidly colonize the affected areas when adequate standing water is present. The PRD's temporary impact to the overall benthic community of the lake would be minimal if any.

(3) Effects on Nekton

Nekton are comprised of actively swimming aquatic organisms. Habitat within Folsom Reservoir and Lake Natoma allow for a diverse assemblage of native and introduced fish species to coexist. Folsom Reservoir is managed as a 'two-story' fishery, with cold-water fishes such as trout inhabiting the hypolimnion and warm water fishes such as bass and sunfish inhabiting the epilimnion and shoreline areas. Two cold water fisheries for rainbow trout and Chinook salmon are actively maintained through a stocking program.

The Folsom Reservoir provides habitat for game fish such as; Rainbow trout (*Oncorhynchus mykiss*), Chinook Salmon (*Oncorhynchus tsawytcha*), Brown Trout (*Salmo trutta*), Bluegill (*Lepomis macrochirus*), Redear sunfish (*Lepomis microlophus*), Green sunfish (*Lepomis cyanellus*), White crappie (*Promoxis annularis*), Black crappie (*Promoxis nigromaculatus*), Largemouth bass

(Micropterus salmoides), Spotted bass *(Micropterus punctulatus)*, Brown bullhead *(Ameiurus nebulosus)*, White catfish *(Ictalurus catus)*, and Channel catfish *(Ictalurus punctatus)*. Native, non-game fishes present within the project area include; Hardhead *(Mylopharodon conocephalus)*, Sacramento pikeminnow *(Ptychocheilus grandis)*, California roach *(Lavinia symmetricus)*, Sacramento sucker *(Catostomus occidentalis)*, and riffle sculpin *(Cottus gulosus).* Introduced, non-game fishes common to the Folsom Reservoir include threadfin shad *(Dorosoma pretenense)* and Wakasagi smelt *(Hypomesus nipponensis)*.

Construction and removal of the PRD would result in temporary loss of potential fish habitat, if water levels manage to rise enough during the two year duration of this phase. This includes potential temporary adverse impacts to habitat related to an increase in suspended sediments and turbidity associated with construction and removal of the PRD. Impacts to habitat would be minimized through the use of BMPs and other measures discussed in Section E of this document and Section 3.11 of the SEIS/EIR. Provided the proposed BMPs and related measures are conducted, the proposed project would have minimal temporary impacts on fish and aquatic wildlife habitat.

(4) Effects on Aquatic Food Web

Excessive turbidity in aquatic systems can lead to light altered regimes that can directly affect primary productivity, species distribution, behavior, foraging, reproduction and survival of aquatic biota (Wilber and Clarke, 2001). Aquatic system productivity can also be reduced. As an indirect effect, the suppression of aquatic productivity is not as apparent as direct effects on larger organisms. Sustained turbidity can cause the shading of 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 re-suspended 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. Turbidity can 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. This could potentially play a part in the overall food web of the aquatic ecosystem inhabiting Folsom Lake. Implementation of BMPs would result in minimal impacts on fish and aquatic wildlife habitat.

Construction and removal of the PRD would result in no effect to the aquatic food web of Folsom Lake except for temporary impacts resulting from fill disposal and road removal within the OHW of Folsom Lake.

(5) Effects on Special Aquatic Sites

(a) Sanctuaries and Refuges

No sanctuaries and refuges are within the project area.

(b) Wetlands

No wetlands would be affected.

(c) Mud Flats

No mud flats are within the project area.

(d) Vegetated Shallows

No vegetated shallows are within the project area.

(e) Coral Reefs

No coral reefs are within the project area.

(f) Riffle and Pool Complexes

No riffle and pool complexes are within the project area.

(6) Threatened and Endangered Species

The overall WP3 project could potentially affect the following special status (listed) species: valley elderberry longhorn beetle (VELB), federally-listed as threatened; bald eagle, state-listed as endangered and protected under the federal Bald and Golden Eagle Protection Act, and; Swainson's hawk, state-listed as threatened. Construction of the PRD could also affect these same species, although the likelihood of directly impacting elderberry shrubs (and thereby directly impacting the VELB) is much lower than construction activities to raise Dikes 1 through 3.

Section 3.5 of this SEIS/EIR sets forth various measures that would be implemented to help avoid and minimize any adverse impacts of the WP3 project to the cited listed species. In the case of potential direct impacts to the VELB, Section 3.5 also describes the compensatory mitigation that would be provided by USACE should removal of elderberry shrubs having at least one stem with a diameter of 1 inch or more (as measured at ground level) be necessary. The WP3 project's effects upon Swainson's hawks, bald eagles, and VELBs would be less than significant based on implementation of the described mitigation measures.

(7) Other Wildlife

Implementation of the PRD could have short-term effects on resident mammals, birds, reptiles, and amphibians. Noise from construction equipment and increased human presence could temporarily displace some wildlife, and temporary alteration of habitat would occur. Species utilizing the project area should be somewhat accustomed to noise and human activity since Dikes 1 through 3 are used as recreational trails, Dike 1 is also a segment of existing Park Road, and the general area is heavily used for recreational purposes. Construction of the PRD would eliminate wildlife habitat within the 0.5-acre impact footprint of the PRD for a period of almost 2 years. However, the affected area currently offers very poor quality habitat and it is doubtful that any wildlife use this area for permanent dens or burrows, so PRD construction should not result in the death of any wildlife. Near the end of the WP3 phase, the PRD would be removed, pre-construction topography would be restored in the affected area, and the affected area would be planted with native graminoids and forbs. Since pre-construction habitat would be restored, the minimal adverse impacts to wildlife generated by the PRD would be temporary and less than significant.

To ensure that there would be no significant adverse effects to migratory birds, preconstruction surveys would be conducted in and around the project area. If any active migratory bird nests are found, a protective buffer would be delineated, and USFWS and CDFW would be consulted for further actions. The various measures that would be employed to avoid and minimize project impacts to migratory birds are further addressed in Section 3.5 of the SEIS/EIR.

(8) Actions to Minimize Impacts

Minimizations measures to reduce impacts to WOUS would be implemented through the BMPs and other measures discussed in Section E of this document and Section 3.11 of the SEIS/EIR.

Actions proposed to minimize and mitigate for project impacts to listed species are discussed in Section 3.5 of the SEIS/EIR. As regards impacts to VELB specifically, mitigation would be provided in accordance with the requirements set forth by the USFWS. These requirements are provided in Appendix D of the SEIS/EIR and are further discussed in Section 3.5 of the SEIS/EIR.

F. PROPOSED DISPOSAL SITE DETERMINATIONS

(1) Mixing Zone Size Determination

A mixing zone is not applicable to PRD construction activities. Any turbid stormwater runoff from the PRD could mix with unaffected lake water assuming the lake's water level covers or is very close to the PRD. However, it is not anticipated that this "mixing" area would extend more than a few feet beyond the limits of the PRD.

(2) Determination of Compliance with Applicable Water Quality Standards

No water quality or effluent standards would be violated either during or after construction of the PRD. Fill material being used to create the PRD would not result in violation of Environmental Protection Agency or State water quality standards or violate the primary drinking water standards of the Safe Drinking Water Act (42 USC 300f - 300j).

The project BMPs and monitoring requirements included in the 401 Water Quality Certification and Construction General Permit would be followed to ensure the project activities conform to applicable water quality standards.

(3) Potential Effects on Human Use Characteristics

(a) Municipal and Private Water Supplies

Folsom Lake supplies drinking water and irrigation water to a variety of end users. The proposed project would not decrease the availability of water to such users since it would not appreciably reduce the water storage capacity of the lake. Through compliance with the provisions of the Section 401 WQC that would be obtained for the project, applicable water State water quality standards would be achieved. Primary drinking water standards set forth in the Safe Drinking Water Act (42 USC 300f – 300j) are not applicable to the lake itself, but rather to the water suppliers that receive water from the lake. Various water treatment facilities such as the Folsom water treatment plant, the San Juan District water treatment plant, the El Dorado Hills water treatment plant, and the Roseville water treatment plant, are used to ensure drinking water meets the required standards. The proposed project would not impair the ability of the treatment facilities to achieve these standards.

(b) Recreation and Commercial Fisheries

The proposed construction would not affect recreational fisheries in lake areas immediately adjacent to the PRD. The alignment of the proposed PRD segment through Folsom Lake would closely follow the existing alignment of Dike 1 along the east side (lake side) of the dike. The footprint of the PRD would also be effectively adjacent to the existing footprint of Dike 1; hence, there would be no portion of Folsom Lake remaining in between the PRD and Dike 1. Because of this, construction of the PRD would not isolate any portion of the lake from recreational fishing opportunities. Note that commercial fishing is prohibited in Folsom Lake. The 0.5 acre of lake directly impacted by PRD construction would not be available for fishing while the PRD is present. However, the affected area typically does not have an adequate depth of standing water present to allow fishing.

(c) Water-related recreation

In addition to recreational fishing, Folsom Reservoir is a popular location for picnicking, swimming and boating. Temporary lake access restrictions would only be necessary while construction is occurring at the time of the PRD construction and removal. Other than days it takes for the PRD to be built and removed, there would be no substantial lake access restrictions during the two-year construction period of WP3. The public would be notified in advance of any closures and would be directed to alternative lake access sites for recreational opportunities. The reservoir itself would not be closed during construction and the public would be allowed access to most trails and are expected to continue recreational activities.

Therefore, the impacts to other water related recreation from Alternative 2 would be both temporary and minimal.

(d) Aesthetics

The proposed PRD activities would temporarily affect the aesthetics of the area during construction. However due to the nature of Alternative 2 construction, in which the PRD is being positioned immediately abutting the existing Dike 1, aesthetic value is not expected to decrease in value by a significant amount. The PRD would not be much larger than the dike and it would serve the same purpose as Dike 1 currently does, aesthetically. There are no homes located immediately next to the PRD site and would the presence of the PRD would primarily affect people using Folsom Lake recreationally. Total temporary impacts to aesthetics anticipated from construction of the overall WP3 phase are discussed in Section 3.8 of the SEIS/EIR. The temporary adverse impacts to aesthetics/visual resources would be less than significant with mitigation (the mitigation for the PRD being its final removal and restoration of the affected area).

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves.

Folsom Lake State Recreation Area (FLSRA) is managed by the California Department of Parks and Recreation. This area attracts approximately a million visitors annually for boating, swimming, hiking, biking, equestrian activities, and picnicking. Section 3.3 of the SEIS/EIR discusses the measures that would be used to help avoid and minimize temporary adverse impacts to recreational facilities and opportunities. Construction of the PRD is actually a measure to help reduce adverse impacts to recreational resources, since the PRD is necessary to maintain vehicular access to large portions of the FLSRA.

G. DETERMINATION OF CUMULATIVE EFFECTS ON THE AQUATIC ECOSYSTEM

The proposed PRD construction activities would result in the following direct impacts to WOUS.

- Temporary impacts to approximately 0.5 acres of jurisdictional WOUS (i.e. Folsom Lake).

Raising Dikes 1 through 8 and MIAD, which are elements of the overall Dam Raise project, would require removing some of the existing materials from the crests and side slopes of the dikes and MIAD prior to placing materials involved in raising the elevation of these features. For a few of the dikes, it is possible that the material removal and placement process could include portions of the dike side slopes that are below the OHW of Folsom Lake. This would constitute additional direct excavation and backfill impacts to this jurisdictional WOUS.

Design plans for raising the dikes are presently not at a stage that allows an accurate estimate of the exact locations and extent of the aforementioned excavation/backfill impacts. However, preliminary evaluations indicate that such impacts, if required, would be limited in extent. The backfill activities would not result in an appreciable loss of WOUS acreage (lake acreage) or of the lake's existing water storage volume. Given this, it these additional impacts would be *de minimis*, resulting in no net loss of WOUS. Additional temporary impacts to Folsom Lake resulting from raising the dikes would include increased turbidity but this would be minimized through implementation of the mitigation measures discussed in Section 3.11 of the SEIS/EIR.

H. DETERMINATION OF SECONDARY EFFECTS ON THE AQUATIC ECOSYSTEM

Secondary effects from Alternative 2 could result from the unintentional placement of soil material or the unintentional excavation of material outside of the proposed project area during the implementation and removal of the PRD. This could result in additional adverse impacts to water quality, erosion and accretion patterns, aquatic and other wildlife habitat, recreation, aesthetics and air quality. Construction equipment could potentially release contaminants (i.e., petroleum products) that could migrate into the lake. Such secondary impacts would be avoided and minimized through the use of BMPs previously discussed.

3. FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

A. ADAPTATION OF THE SECTION 404(b)(1) GUIDELINES TO THIS EVALUATION

No significant adaptations of the guidelines were made relative to this evaluation.

B. EVALUATION OF AVAILABILITY OF PRACTICABLE ALTERNATIVES TO THE PROPOSED DISCHARGE SITE WHICH WOULD HAVE LESS IMPACT ON THE AQUATIC ECOSYSTEM

All alternatives proposed for the PRD are discussed above in Section E (Alternatives) above. Although Alternative 3 would have no real impact on the aquatic ecosystem, the detrimental effects to the environment that would be produced as a result of this action would be greater than those produced from Alternative 2. It also might not be feasible to obtain authorization to utilize an existing electrical transmission line easement for a portion of the Alternative 3 alignment, which would either make this alternative nonviable or require even greater adverse impacts to high quality oak woodland habitat. Therefore, Alternative 3 is not the best viable alternative for the location and alignment of the PRD.

C. COMPLIANCE WITH APPLICABLE STATE WATER QUALITY STANDARDS

Construction and subsequent removal of the PRD would not cause or contribute to violation of any applicable State water quality standards. The discharge operations would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

D. COMPLIANCE WITH ENDANGERED SPECIES ACT

PRD construction activities in WOUS would not impact federally-listed species or federally-designated critical habitats for such species. Construction of all elements of WP3 could adversely affect the VELB. Impacts to the VELB would be avoided and minimized by following the mitigation measures discussed in Section 3.5.5 of the SEIS/EIR. If direct impacts are unavoidable, compensatory mitigation would be provided as also discussed in Section 3.5.5. Note that the USFWS has issued an amended Biological Opinion for the overall Dam Raise project that endorses the mitigation measures proposed in Section 3.5.5. This Biological Opinion is provided in Appendix D of the SEIS/EIR.

E. EVALUATION OF EXTENT OF DEGRADATION OF THE WATERS OF THE UNITED STATES

PRD construction activities would result in temporary impacts to a total of approximately 0.5 acres of WOUS for the two year construction period and would not result in any permanent impacts. While disposal and removal of fill material at the PRD site would result in temporary impacts to WOUS (Folsom Lake), there would be no long-term significant effects. This project would not impact any special aquatic sites. Long-term significant effects on the aquatic ecosystem diversity, productivity, and stability would not occur, nor would long-term effects to recreational, aesthetic, and economic values of the affected WOUS occur.

Immediately following completion of the raising of Dikes 1 through 3, the PRD would be removed and disturbed topography would be restored to match pre-construction conditions as closely as practicable. Once restoration of the topography is complete, there would be reseeding of native grasses and forbs as well within the footprint disturbed by the PRD. There would not be significant long-term degradation of WOUS as a result of this project.

F. COMPLIANCE WITH SPECIFIED PROTECTION MEASURES FOR MARINE SANCTUARIES DESIGNATED BY THE MARINE PROTECTION, RESEARCH, & SANCTUARIES ACT

Not applicable.

G. APPROPRIATE AND PRACTICABLE STEPS TAKEN TO MINIMIZE POTENTIAL ADVERSE IMPACTS OF THE DISCHARGE ON THE AQUATIC ECOSYSTEM

Appropriate steps to minimize potential adverse impacts of the discharge on aquatic systems would be implemented, as discussed in Section E above and in Section 3.11 of the SEIS/EIR. On the basis of the 404(b)(1) guidelines, the proposed WOUS impacts within the PRD site are deemed to be compliant with the requirements of the guidelines with the inclusion of appropriate and practicable measures to minimize pollution or adverse effects to the aquatic ecosystem.

The Corps' Nationwide Permit 33 addresses impacts to WOUS resulting from the temporary construction, access, and dewatering. It is noted that the proposed PRD would qualify for use of this permit given that it involves construction of a temporary access road and the temporary fill placed in WOUS as a result of the PRD would be entirely removed near the end of construction of WP3, the affected area would be returned to pre-construction topography, and the affected area would be revegetated, as appropriate. Nationwide Permit 33 allows for the total loss of up to one-third acre of jurisdictional WOUS, including wetlands, without any compensatory mitigation. The proposed PRD would not result in the long-term loss of any WOUS and the BMPs and restoration measures proposed would not result in any long-term loss or degradation of aquatic functions and values provided by the affected WOUS.