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Program Environmental Impact Report for the Lower Putah Creek Restoration Project – Upper Reach Program

SOLANO COUNTY WATER AGENCY

yolo basin foundation

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

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Program Environmental Impact Report for the Lower Putah Creek Restoration Project – Upper Reach Program

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GLOSSARY

Alluvial – Composed of loose or unconsolidated sediments, which have been eroded, reshaped by water in some form, and re-deposited in a non-marine setting. An **alluvial stream** is a stream in which the bed and banks are made up of mobile sediment and/or soil.

Active channel – A feature in an alluvial stream formed by prevailing discharges; its upper limit is defined by a break in the relatively steep bank slope of the channel to a more gently sloping surface beyond the channel edge.

Armoring – The formation of an erosion resistant layer of rocks or gravel on the surface of a stream bed.

Bank – The sloping margin of a natural, stream-formed, alluvial channel that confines discharge during non-flood flows.

Bar – An in-channel depositional feature formed of relatively coarse bed sediments, typically in coarse sand through cobbles sizes, that is generally deposited during the recession of high flow events and is mostly exposed during periods of low flow; the upper surface elevations of bars in perennial streams are typically equivalent to a stage of about 40-percent flow duration.

Channel – A natural, or constructed, passageway or depression of perceptible linear extent containing continuously or periodically flowing water and sediment, or connecting two bodies of water.

Channel Capacity – The maximum amount of flow that a channel can transport within its banks.

Channel cross section – A sectional view of a stream channel, formed by a plane cutting through the stream and its banks, usually at right angles to the main flow direction (see Figure i, below).

Degradation – The process of a channel lowering its elevation through increased erosion, channel bed scour, or down-cutting.

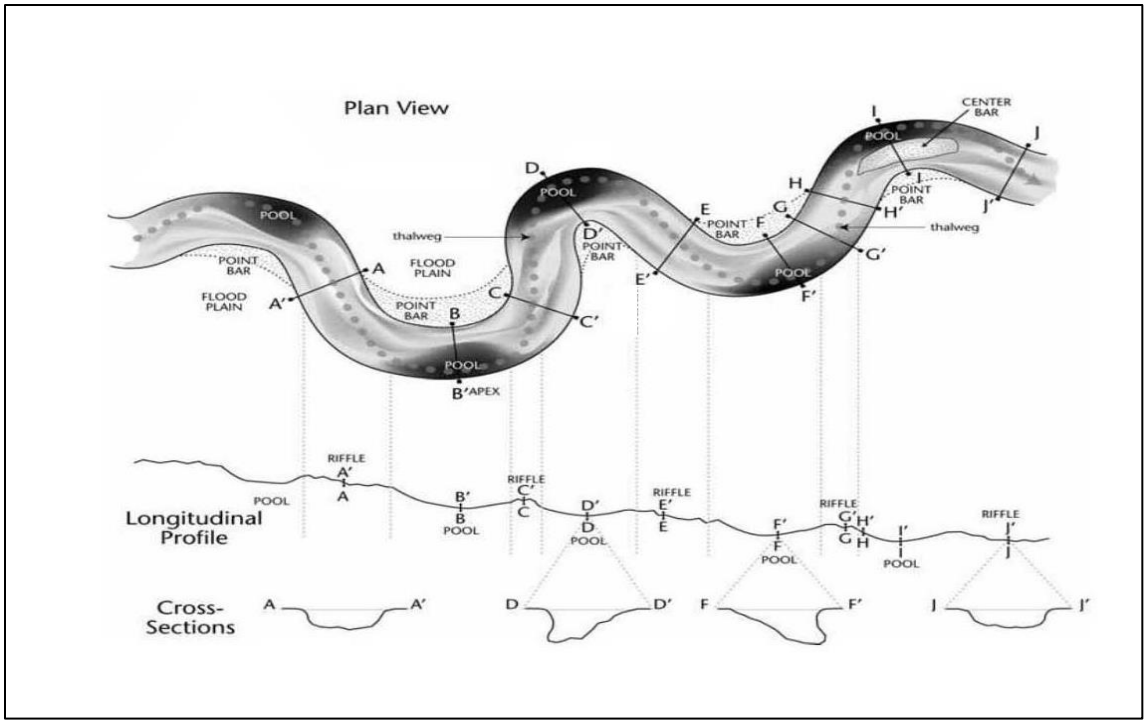


Figure i. Geomorphic Terms – Plan View with Profile and Cross Sections

W. Barry Southerland, 2003

Floodplain – An area of low-lying ground adjacent to a stream or river, formed mainly of alluvial sediments and subject to flooding.

Fluvial – Referring to or pertaining to streams; includes stream processes (fluvial processes), fluvial landforms, such as fluvial islands and bars, and biota living in and near stream channels.

Incised channel – A stream channel in which the bed has dropped and as a result, the stream is disconnected from its floodplain.

Glide – A relatively shallow and low velocity reach that has little or no turbulence.

Longitudinal profile – A profile of a stream or valley, drawn along its length between two given points. These profiles are generally drawn to illustrate the gradient of the stream.

Low flow channel -- A channel formed by base flows or receding flood flows and may occur as a distinct, incised feature or may be distinguished only by subtle changes in composition of bed material or vegetation. The low flow channel is the portion of a stream in which the water is contained during periods of low flow or base flow, when the stream is not in flood.

Meander – One of a series of regular, freely developing, and sinuous curves, bends, loops, turns, or windings in the course of a stream; the process of stream meandering is a means of channel-gradient adjustment through sorting of stored sediment by erosion at the outside of a bend and deposition, as a point bar, at the inside of the bend.

Nick point, nick zone -- A location where there is an abrupt change of gradient in the profile of a stream or river, typically due to a change in the rate of erosion. Nick points migrate upstream due to bed erosion, leaving deep channels and abandoned floodplains, which then become terraces.

Ordinary high water – The line on the shore of a water body established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Planform – Stream channel pattern as viewed from above (see Figure i, above).

Pool –A relatively deep, low velocity reach of quiescent flow between upstream and downstream riffles, or rapids, at which the flows are ordinarily more rapid and turbulent.

Pool-riffle sequence – In alluvial stream channels, refers to a succession of one or more combinations of pools and riffles within the channel in the downstream direction; during flood the normally low water velocities in pools and higher water velocities at riffles are reversed, causing scour and removal of accumulated sediment from pooled reaches and deposition of bed sediment on riffles.

Reach (of a stream) – An uninterrupted section of a stream channel between two points along its longitudinal course.

Riffle – A short, relatively shallow and coarsely bedded length of channel over which the stream ordinarily flows at higher velocities and greater turbulence than it does through upstream and downstream reaches.

Riparian – An ecological term referring to the part of the fluvial landscape inundated or saturated by flood flows; it consists of all surfaces of active fluvial landforms up through the floodplain including channel, bars, banks, and related riverine features such as oxbow lakes, oxbow depressions, and natural levees. Particularly in arid and semiarid

(water-deficient) environments, the riparian zone may support plants and other biota not present on adjacent, drier uplands.

Sinuosity – The ratio of stream channel length (measured in the thalweg) to the down-valley distance, or is also the ratio of the valley slope to the channel slope.

Stream – A body of water confined to a narrow topographic depression, through which it flows and transports rock particles, sediment, and dissolved particles. Rivers, creeks, brooks, and runs are all streams.

Terrace – a former floodplain, abandoned due to incision or down cutting.

Thalweg – the deepest point in any waterway cross-section.

EXECUTIVE SUMMARY

OVERVIEW OF THE PROGRAM AND DRAFT EIR

This Program Environmental Impact Report (PEIR) addresses the potential environmental impacts of the Lower Putah Creek Restoration Project, Upper Reach Project, a component of the *Lower Putah Creek Restoration Project, California Department of Fish and Wildlife Ecosystem Restoration Program (ERP Grant No E1183015)*. The Lower Putah Creek Restoration Project Upper Reach Project (hereafter referred to as "the Program") proposes to restore and enhance geomorphic and ecological function on approximately 24.2 miles of Putah Creek between the Putah Diversion Dam (PDD) and the western boundary of the Yolo Bypass Wildlife Area (YBWA) (see Figure 1). This reach of Putah Creek crosses a combination of privately (primarily) and publically owned lands in Solano and Yolo counties. The restoration efforts analyzed in this PEIR are planned by the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC) for implementation over the next 15 years. The SCWA is the CEQA lead agency for the Project.

This PEIR is intended to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of the proposed Program, which is the CEQA "Project." SCWA has prepared this PEIR in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended) and the State CEQA Guidelines (14 California Code of Regulations [CCR]) Section 15000 et seq.).

This PEIR is intended to meet CEQA requirements and to integrate CEQA review with related consultations and anticipated programmatic and project-level permit requirements. SCWA, in its role as the lead agency, will use the PEIR to comply with CEQA review requirements for its approval of each of the restoration activities described herein. Program-level documentation may provide sufficient CEQA analysis to meet site-specific, project-level analysis for future projects, or additional documentation may be needed to fulfill CEQA compliance. This determination will be made by the lead agency on a case-by-case basis, typically with preparation of an Initial Study.

PROGRAM PURPOSE AND NEED

The Lower Putah Creek corridor is one of the largest remaining tracts of high quality wildlife habitat in Yolo and Solano counties, and provides habitat for a unique

assemblage of fish and wildlife species native to the Central Valley. However, the creek suffers from substantially reduced flows from flow diversions, altered channels and eroding banks, habitat loss and degradation, invasive weed infestations, and other problems. In many locations in the Program area, the Putah Creek channel is oversized for current flows and has been deepened by mining, which have resulted in degraded habitat. The Program proposes to develop restoration projects on up to 17 separate creek reaches to optimize benefits to fish, wildlife, and other resources.

The overall Program purpose is to restore and rehabilitate the creek channel, banks, and associated habitats to more natural, self-sustaining form and function, consistent with the current (post-Monticello Dam) hydrologic regime. The Program would be implemented to stop further degradation of the creek corridor and to "jump-start" natural geomorphic and ecological processes in site-specific locations. The primary goals for the Program include:

- Improve passage, rearing, and emigration of adult and juvenile salmonids in Putah Creek
- Preserve and enhance, where possible, existing beneficial uses including public access, wildlife viewing, hunting and fishing, balanced with existing, enhanced, and restored ecological functions
- Enhance habitats for Delta native fishes and wildlife within the Putah Creek Upper Reach

PROGRAM ACTIVITIES

The proposed Program activities are designed to work together in a comprehensive manner to achieve the Program goals and objectives. The activities would be implemented (singly or in combination) in a series of individual actions (projects), applied to specific locations within the Program area, as determined by site-specific conditions. For purposes of description of site conditions and of proposed locations for the various activities, the Program area has been divided into 17 stream segments (Project reaches) (see Figure 2-1).

Program activities fall into three general categories: (1) Channel Reconfiguration, (2) Vegetation Management, and (3) Maintenance. These activities are listed by category in Table ES-1. As stated above, site-specific Project implementation may entail application of one or a combination of these activities. All in-stream activities would be implemented adaptively, based upon understanding of the ecosystem and its changes over time. A site-specific Adaptive Management Plan would be developed for each

individual project, based on the desired environmental outcomes and the potential for environmental impacts.

Table ES-1 Program Activities by Category

Channel Reconfiguration	Vegetation Management	Maintenance of Enhancement Sites
• Modify Channel Geometry • Construct Grade/Flow Control Structures • Stabilize Channel Banks • Improve Fish Spawning Gravels • Fill Abandoned Gravel Pits	• Remove Invasive Plants • Plant Native Vegetation	• Irrigate Native Revegetation Sites • Manage Non-Native Vegetation at Restored Sites • Maintain Long-Term Access Points

PUBLIC INVOLVEMENT IN THE CEQA PROCESS

In accordance with State CEQA Guidelines (14 CCR Section 15082[a], Section 15103, Section 15375), SCWA circulated a Notice of Preparation (NOP) for the proposed Program on January 30, 2015 (**Appendix A**). The NOP, in which SCWA was identified as the lead agency for the proposed Program, was circulated to the public; to local, state, and federal agencies; and to other interested parties. The purpose of the NOP was to inform responsible agencies and the public that the proposed Program could have significant effects on the environment, and to solicit their comments so that any concerns raised could be considered during the preparation of the PEIR. In addition, SCWA held a public scoping meeting on February 12, 2015, to provide the public with another opportunity to comment. Comments received in response to the NOP and at the public scoping meeting are included in **Appendix B.**

After the Draft PEIR (DPEIR) is completed, SCWA will issue a notice of availability, providing agencies and the public with formal notification that the DPEIR document is available for review. SCWA will host a public hearing approximately 30 days after release of the DPEIR. The purpose of public circulation and the public hearings are to provide agencies and interested individuals with opportunities to comment on or express concerns regarding the contents of the DPEIR.

CEQA requires the lead agency to prepare a Final PEIR (FPEIR), addressing all substantive comments received on the Draft PEIR before approving a project. Written and oral comments received in response to the Draft PEIR will be addressed in the FPEIR. The FPEIR must include a list of all individuals, organizations, and agencies that provided

comments on the Draft PEIR, and must contain copies of all comments received during the public review period along with the lead agency's responses to those comments.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The environmental impacts of the proposed Program and applicable mitigation measures are summarized in Table ES-3 (at the end of this section) and briefly described by topic below.

Hydrology

The Program would not result in any significant, long-term impacts to hydrology. Construction of the various Program elements could potentially cause adverse, short-term impacts due to erosion and siltation. These short-term impacts would be mitigated to a less-than-significant level by the implementation of erosion and sediment control best management practices (BMPs) during and following construction. Within the Project reaches occasional small roadway or agricultural storm drains may need to be modified or replaced due to channel realignment. If modifications or replacement of these drainage systems were not performed according to current standards, they could be damaged, or perform in a substandard manner. Such impacts would be avoided by designing any modifications of storm drainage systems according to current standards appropriate for the setting.

Water Quality

The Program would not result in any significant, long-term impacts to water quality. As discussed above for hydrology, construction of the various Program elements could potentially cause adverse, short-term impacts to water quality due to erosion and sediment release, which would be mitigated to a less-than-significant level by implementing erosion and sediment control BMPs. Construction of the program elements could also cause short-term impacts to water quality through the introduction of fuels and lubricants from construction equipment into Putah Creek. Implementing restrictions on construction vehicle storage and maintenance would reduce these impacts to a less-than-significant level. The use of herbicides for invasive weed control in the various reaches could cause adverse impacts to water quality if such application is not performed according to the appropriate standards. Application of all herbicides by a licensed applicator, in accordance with label directions and U.S. Environmental Protection Agency (US EPA) recommendations to avoid overspray and accidental water introduction (during non-aquatic uses) would reduce these impacts to a less-than-significant level.

Geology, Soils, and Mineral Resources

The Program would not result in any significant, long-term impacts to geology and soils. As described above for hydrology, construction of the Program elements could potentially result in substantial soil erosion. These short-term impacts would be mitigated to a less-than-significant level by implementing erosion and sediment control BMPs during construction. The Program would not have an impact on the availability of important mineral resources.

Biological Resources

The Program would not result in any significant, long-term impacts to biological resources. Construction of the various Program elements could potentially cause adverse, short-term impacts to a number of special status species and their habitats. All of these short-term impacts would be mitigated to a less-than-significant level by the implementation of mitigation measures prior to, during and following construction.

Air Quality and Greenhouse Gas Emissions

The Program would not have any long-term impacts on air quality or greenhouse gas emissions. Construction of the Program elements could result in short-term impacts to air quality from emissions of criteria pollutants, but these impacts would be mitigated to a less-than-significant level by implementing standard construction best management practices aimed at reducing such emissions.

Noise

The Program would have no long-term impacts to noise levels. However, construction of Program elements would exceed the Solano County daytime non-transportation noise standards at residences closest to some project sites in Solano County, resulting in a potentially significant impact. Implementation of noise reducing construction practices would reduce this impact to a less-than-significant level at some project sites, but the impacts would be significant and unavoidable in three of the Project reaches (Duncan-Giovannoni, Warren, and MacQuiddy Lester).

Hazards and Hazardous Materials

There are no known contaminated sites within the Program footprint that could cause the release of hazardous materials, if disturbed. The nearby LEHR Superfund site does not pose an immediate risk to people or the environment and Program activities would have no effect on this area. If evidence of hazardous materials are discovered during

Project activities, these materials would be tested and analyzed following proper protocols to determine the presence of hazardous substances prior to making arrangements for off-site reuse/recycling or disposal. Implementing restrictions on construction vehicle storage and maintenance would prevent the accidental release of construction-related contaminants (fuels, lubricants, etc.) into the environment. Potential impacts due to the use of herbicides for weed control during Project implementation would be reduced to a less-than-significant level by ensuring that herbicide application is conducted by a licensed applicator, in accordance with label directions and US EPA recommendations to avoid overspray and accidental water introduction (during non-aquatic uses). To prevent the accidental ignition of a wildfire during construction, appropriate fire suppression equipment will be available on all work sites and other BMPs will be implemented to reduce fire risks.

Land Use

Agricultural land uses within the Project reaches could potentially be impacted by construction activities and long-term operations of the Program, including maintenance activities and potential trespass by recreational users. These impacts would be mitigated to a less-than-significant level by (1) coordinating all construction and maintenance activities with adjacent landowners to ensure that access does not impact agricultural operations, and (2) installing access restrictions, such as warning signs and wildlife-friendly fencing, as needed. There would be no impact to non-agricultural land uses.

Aesthetics

There would be no long-term adverse impact to views within the Project reaches due to Program implementation. There may be short-term impacts to views within Project reaches and adjacent areas during construction due to the presence of construction equipment and changes in the appearance of the riparian area and creek channel. These short term impacts would be mitigated to a less-than-significant level by the use of interpretive signs explaining the restoration process, locating stockpiles away from public view, and, in some cases, installing visual screening fencing to limit the view of construction equipment and stockpiles from existing public access areas.

Recreation

The Program would not have any long-term adverse impacts on recreation. Recreation within the reaches would be temporarily impacted during construction and potentially for a period of time following construction due to disturbance by construction and associated access restrictions. The primary impacts would be loss of access to the creek

and associated recreational amenities, including trails, picnic areas, and boating access. These impacts would be mitigated to a less-than-significant level by providing alternate access to high-use recreational sites during construction, minimizing the impact of construction upon recreational site access where feasible, and by working with adjacent landowners to facilitate their provision of public access and recreational infrastructure into the Proposed Project where impacts to sensitive biological resources can be avoided.

Cultural Resources

The Program would not have any long-term adverse impacts on cultural resources. The presence of documented cultural resources within the Project Area indicates that there is a possibility that additional significant sites, features, and artifacts could be discovered or disturbed as a result of Program-related ground-disturbing activities, resulting in a potentially significant impact. These impacts would be reduced to a less-than-significant level by establishing a construction buffer ($\geq$ 100 feet) beyond the known boundaries of documented cultural resources, and by contacting a qualified cultural resource specialist to assess any unrecorded cultural resources encountered during construction. In accordance with the California Health and Safety Code, if human remains are uncovered during ground-disturbing activities, excavation in the area of the burial shall be halted and the County Coroner and a professional archaeologist shall be contacted to determine the nature and extent of the remains.

Transportation and Traffic

Implementation of the Program would not result in any significant long- or short-term impacts to transportation and traffic.

Public Services

Implementation of the Program would not result in any significant long- or short-term impacts to the demand for public services.

Utilities and Service Systems

Construction activities involving excavation could inadvertently damage pipelines crossing underneath some of the Project reaches, which could result in short-term and long-term impacts such as work injuries, property damage, unintentional fire or explosions, and environmental damage. Such potentially significant impacts would be avoided by identification of pipeline locations before excavation activities begin. Also, as

described in the hydrology section, within the Project reaches occasional small roadway or agricultural storm drains may need to be modified or replaced due to channel realignment. Such impacts would be avoided by designing any modifications of storm drainage systems according to current standards appropriate for the setting.

CUMULATIVE IMPACTS

A cumulative impact refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period. The cumulative impacts identified in this EIR include issues regarding: hydrology and geomorphology, water quality, geology and soils, air quality, noise, aesthetics, land use, recreation, transportation/traffic, public services, utilities and service systems, and hazardous materials. However, none of these impacts are considered to be cumulatively significant given the nature and extent of other planned/ongoing projects within the Program vicinity.

ALTERNATIVES

Three alternative programs were analyzed in this effort alongside the proposed Program. These alternatives and the variation in impacts, as compared to the proposed Program, are described below. Table ES-2 provides a summary of the potential effects of the two alternatives, as compared to the proposed Program.

Alternative 1 – No Project

The No Project Alternative analyzes the environmental effects of the future conditions along the Project reach absent the Project. This alternative assumes that the Project Area would remain in its current condition as a degraded-habitat stream corridor. Unlike the proposed Project, the No Project Alternative would not catalyze funding by creating a series of “shovel-ready” projects. Although some restoration projects may occur in the proposed Project’s absence, the number of likely future restoration projects and their scale is dependent on episodic funding which is not predictable. This alternative assumes nominal restoration, but ongoing implementation of existing maintenance activities such as irrigation to establish native vegetation, management of non-native vegetation (including manual and mechanical removal and chemical control), and maintenance of long-term access points.

Table ES-2 Comparison of Alternatives to the Proposed Program

Environmental Category	Proposed Project	Alternative 1 No Project	Alternative 2 Pool Filling Only	Alternative 3 Reduced Project
Aesthetics	LS/MM	NI	LS/MM	LS/MM-
Air Quality & Greenhouse Gas Emissions	LS/MM	NI	LS/MM-	LS/MM-
Biological Resources	LS/MM	NI	LS/MM-	LS/MM-
Cultural Resources	LS/MM	NI	LS/MM-	LS/MM-
Geology and Soils, Mineral Resources	LS/MM	NI	LS/MM-	LS/MM-
Hazards	LS/MM-	NI	LS/MM-	LS/MM-
Hydrology	LS/MM-	NI	LS/MM-	LS/MM-
Land Use	LS	NI	LS	LS/MM-
Noise	SU/MM	NI	SU-	SU-
Public Services	NI	NI	NI	NI
Recreation	LS	NI	LS-	LS-
Transportation/Traffic	LS	NI	LS/MM-	LS/MM-
Utilities	LS/MM	NI	LS/MM-	LS/MM-
Water Quality	LS/MM	NI	LS/MM-	LS/MM-
Consistency with Project Objectives	Consistent	Inconsistent	Less Consistent	Less Consistent

Notes:
NI = No impact would occur.
LS = All impacts would be less than significant, no mitigation required.
LS/MM = All impacts would be less than significant after mitigation.
SU = One or more impacts would be significant and unavoidable, even after mitigation.
- = Alternative impacts are less severe than the Proposed Project.
+ = Alternative impacts are more severe than the Proposed Project.
Where no **+** or **-** is indicated, impacts of the Proposed Project and the Alternative are identical or very similar.

This alternative would not fully meet any of the Program objectives. Degraded conditions associated with the deep pools would not be remedied, or may be partially remedied depending on funding available for maintenance and periodic restoration activities. Existing erosion and habitat degradation associated with non-native vegetation and invasive weeds would likely continue.

Alternative 2 – Restoration of Pools Only

This alternative limits restoration activities to only re-contouring the channel to remove approximately 112.5 acres of wide, deep pools in the Program Area. No Program-wide

channel re-construction or restoration would occur. This alternative assumes nominal restoration but ongoing implementation of existing maintenance activities such as irrigation to establish native vegetation, management of non-native vegetation (including manual and mechanical removal and chemical control), and maintenance of long-term access points. Alternative 2 could feasibly accomplish significant restoration of areas with the worst aquatic habitat and water quality effects.

This alternative would only partially fulfill the Program objectives and would not meet the integrative restoration needs of the creek system as a whole. Therefore, Alternative 2 would be less consistent with project objectives than the proposed Project.

Alternative 3 – Reduced Project Alternative

This alternative focuses all of the proposed potential restoration activities in the four reaches from PDD to the Interstate 505 (I-505) bridge (NAWCA/Mariani, Duncan-Giovannoni, Winters Putah Creek Nature Park, and East of I-505), a distance of approximately 4 miles. Activities would be accomplished over a 2-year period, 2 miles per year. This alternative was selected instead of a downstream Reduced Project Alternative because upstream areas of the creek contain colder water and higher quality fisheries habitat than downstream, resulting in better project results and the most efficient use of funding. This alternative would provide very high value aquatic and riparian habitat for the colder water species and a contiguous corridor for movement, linking to the existing high quality PDD to Berryessa riparian corridor.

This alternative fulfills many of the Program objectives, but to a lesser extent than the Proposed Program due to the reduction in the Program implementation area. However, this alternative fails to meet Objective 6 (Maintain a balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits, including water supply and agriculture, between the PDD and YBWA) because it would not perform activities along Putah Creek all the way to the YBWA, and instead would stop at I-505 near the City of Winters. For this reason, Alternative 3 fails to meet the integrative restoration needs of the Creek system as a whole. Therefore, Alternative 3 would be less consistent with project objectives than the proposed Program.

Environmentally Superior Alternative

CEQA Guidelines Section 15126.6(e)(2) requires that the environmentally superior alternative be identified. If the environmentally superior alternative is the No Project/No Development Alternative, the EIR shall also identify an environmentally

superior alternative among other alternatives. CEQA also requires public agencies to mitigate or avoid significant effects of a project whenever it is feasible to do so (Public Resources Code Section 21002.1).

The environmentally superior alternative is Alternative 2, Pool Filling Only, which achieves some of the water quality and habitat benefits of the proposed Project but with lessened short-term construction-related impacts. However, this alternative is less consistent with the Project objectives than the proposed Projects, as shown in Table ES-2.

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
Hydrology			
3.1-1	Excessive erosion and siltation within stream reaches due to construction activities.	**3.1-1: Implement Erosion and Sediment Control BMPs.** In the cases in which a SWPPP is not required for Project activities, the Project applicant shall implement BMPs selected by a Qualified SWPPP Developer. The BMPs shall be drawn from the Construction BMP Handbook published by the California Stormwater Quality Association (CASQA) or equivalent prior to the start of any ground-disturbing activities. These BMPs may include, but are not restricted to, the menu of measures listed below, and would be applied both during and after construction, until the work site is stabilized according to the same closure requirements that would be applicable were the work area subject to a SWPPP. In order to ensure that the BMPs implemented are functioning to prevent erosion and sediment impacts, a California-qualified Qualified SWPPP Practitioner (QSP) must inspect functioning of the BMPs on a weekly basis. If the BMPs are insufficient, the QSP shall make recommendations for additional or sufficient BMPs. Erosion Controls – Menu of Potential BMPs • Stream Bank and Channel Stabilization: Where creek banks and channels are disturbed by construction, application of the full suite of available BMPs shall be coordinated by the QSP for application during and following construction to reduce the discharge of sediment and other pollutants from stream banks to minimize the impact of construction activities (CASQA, 2009, Fact Sheet EC-12). • Scheduling: The QSP shall prepare a written plan to sequence construction activities and the implementation of other BMPs to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking. Environmental constraints such as nesting season prohibitions shall also be taken into account in developing a schedule (CASQA, 2009a, Fact Sheet EC-1). • Preservation of Existing Vegetation: Where possible, existing non-invasive and native vegetation shall be preserved to minimize the	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion (CASQA, 2009, Fact Sheet EC-2). • Hydroseeding: Where soil has been disturbed by construction and requires temporary protection until permanent stabilization is established, a mixture of hydraulic mulch, seed, fertilizer, and stabilizing emulsion shall be applied to temporarily protect exposed soils from erosion by water and wind (CASQA, 2009, Fact Sheet EC-4). • Geotextiles and Mats: Where soil has been disturbed by construction on slopes where the erosion hazard is high and vegetation will be slow to establish, mattings shall be used to cover the soil surface to reduce erosion from rainfall, hold soil in place, and absorb and hold moisture near the soil surface (CASQA, 2009, Fact Sheet EC-7). • Wood Mulching: Where soil has been disturbed by construction and temporary protection is needed until permanent stabilization is established, an applied mixture of shredded wood mulch, bark, or compost shall be applied to disturbed soils to reduce erosion by protecting bare soil from rainfall. This BMP shall not be used on areas exposed to concentrated flows or on slopes steeper than 3:1 (H:V) (CASQA, 2009, Fact Sheet EC-8). • Velocity Dissipation Devices: Where needed, a physical device composed of rock, grouted riprap, or concrete rubble, shall be placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated high velocity flows. This BMP will be applied to stormwater structures as needed to divert run-on flow during construction (CASQA, 2009, Fact Sheet EC-10). Sediment Controls– Menu of Potential BMPs • Silt Fence: Where needed, a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support will be installed temporarily to detain sediment-laden water and promote sedimentation behind the fence. This shall be used in areas disturbed by construction as a perimeter	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		control, above channels, and/or below the toe or downslope of exposed and erodible slopes (CASQA, 2009, Fact Sheet SE-1). • Fiber Rolls: Where needed, fiber rolls shall be placed at the toe and on the face of slopes along the contours to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (CASQA, 2009, Fact Sheet SE-5). • Gravel Bag Berm: Where needed, a series of gravel-filled bags shall be placed on a level contour to intercept sheet flow runoff, allow sediment to settle out, and release runoff slowly as sheet flow, preventing erosion (CASQA, 2009, Fact Sheet SE-6). • Straw Bale Barrier: Where needed, a series of straw bales shall be placed on a level contour to intercept sheet-flow runoff and allow sediment to settle out (CASQA, 2009h). • Compost Sock and Berm: Where needed, a three-dimensional biodegradable filtering structure shall be used at the site perimeter or at intervals on sloped areas to intercept runoff where sheet flow occurs to retain sediment (CASQA, 2009, Fact Sheet SE-13). • Stabilized Construction Entrance and Exit: A pad of aggregate underlain with filter cloth shall be constructed at a point where traffic would be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto roadways and help prevent deposition of sediments into local storm drains and production of airborne dust (CASQA, 2009i). • Stabilized Construction Roadway: Access roads and parking areas shall be stabilized immediately after any grading and maintained to prevent erosion and control dust after grading (CASQA, 2009, Fact Sheet TC-2). Non-Stormwater Controls • Temporary Stream Crossing: Where needed, a temporary culvert, ford, or bridge shall be placed across a waterway to provide access for	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		construction purposes for a period of less than 1 year. These crossings are intended to eliminate erosion and downstream sedimentation caused by vehicles (CASQA, 2009, Fact Sheet NS-4).	
3.1-2	Diversion of stream flows around construction areas during Project implementation.	N/A	No impact
3.1-3	Increase in flood hazards in the program vicinity due to changes in channel geometry or roughness.	N/A	No impact
3.1-4	Reduced performance or ineffective operation of roadway and agricultural storm drains if they are not modified/replaced according to current design standards.	**3.1-2: Standards for Modification or Replacement of Storm Drains.** In the event roadway or agricultural storm drains need to be modified or replaced as a result of the channel alignment or other Project activities, such modification or replacement will be done in a manner to bring the drain(s) up to current standards. The Project would replace or upgrade the facility to applicable standards in consultation with property owner. Depending on the funding source or location for a given Project activity, the improvements would be conducted be under city, county, state, or federal standards. For drains in Solano County, the Project would rely on the Solano County Public Works specifications. For portions of the Project occurring exclusively within Yolo County (Mace Road to Road 106A Reach and Road 106A to the YBWA) replacement drains would rely on the Yolo County Public Works specifications. In the event that roadway or agricultural storm drains within flood levees need to be modified or replaced as a result of Project activities, such modification or replacement shall be performed in strict consultation with the Central Valley Flood Protection Board (CVFPB) and according to CVFPB standards and requirements.	Less than significant
Water Quality			
3.2-1	Impacts to water quality due to excessive erosion and sediment release during construction activities.	*See Mitigation Measure 3.1-1, Implement Erosion and Sediment Control BMPs. in the hydrology section*.	Less than significant
3.2-2	Impacts to water quality from operation of construction equipment within stream.	**3.2-1: Procedures to Prevent Contamination from Construction Equipment.**	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
	channels and the potential introduction of fuel and lubricants.	In order to prevent contamination from vehicle or equipment leaks during Project activities, the Project Applicant shall implement the following actions: 1. Vehicles shall be maintained and operated in a leak-free condition. 2. Project vehicles shall not park or stored on impervious surfaces. 3. No fueling or maintenance of vehicles or equipment shall occur in the channel or floodplain. The exception would be if equipment that cannot be readily relocated (e.g., pumps and generators). 4. All off-site fueling sites (e.g., on access roads above the top-of-bank) shall be equipped with secondary containment and avoid a direct connection to underlying soil, surface water, or the storm drainage system. 5. For any stationary equipment (e.g., pumps and generators) that must be fueled on-site, secondary containment, such as a drain pan, drop cloth or booms, shall be provided in such a manner to prevent accidental spill of fuels to underlying soil, surface water, or the storm drainage system. 6. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials shall not be allowed to enter receiving waters or the storm drainage system. 7. Waste disposal containers shall be covered when they are not in use.	
3.2-3	Impacts of the Project upon stream temperature, dissolved oxygen, and biological oxygen demand.	N/A	Less than significant
3.2-4	Impacts to water quality due to the release of contaminants, such as boron, mercury, fertilizers, and pesticides/herbicides.	*See Mitigation Measure 3.1-1, Implement Erosion and Sediment Control BMPs, in the Hydrology section and Mitigation Measure 3.4-5, Swainson's Hawk Avoidance, in the biological resources section.*	Less than significant
Geology and Soils, and Mineral Resources			
3.3-1	Damage to structures or injury to people from seismic activity such as fault rupture, ground shaking, or liquefaction.	N/A	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
3.3-2	Exacerbated or new channel bank slope failure hazards due to project implementation.	N/A	Less than significant
3.3-3	Substantial soil erosion within restored areas during or after Project construction.	*See Mitigation Measure 3.1-1, Implement Erosion and Sediment Control BMPs. in the Hydrology section.*	Less than significant
3.3-4	Loss of access to mineral resources, such as aggregate and natural gas, within restored areas	N/A	No impact
Biological Resources			
3.4-1	General impacts on special-status species and habitats.	**3.4-1: Worker Environmental Awareness Program (WEAP).** During construction of the Project, before any work occurs on the Project site, including grading, vegetation removal and equipment staging, all construction personnel shall participate in an environmental awareness training regarding special status species and sensitive habitats present on the Project site. Any additional construction personnel that are employed following the initial start of construction shall receive the mandatory training before starting work. As part of the training, an environmental awareness handout will be provided to all personnel that describes and illustrates sensitive resources (i.e., special status species and habitat, nesting birds/raptors) to be avoided during proposed Project construction and lists measures to be followed by personal for the protection of biological resources. Such measures shall include, but are not limited to: • Procedures to follow if a special status species is found within the work area. • Checking under equipment and staging areas for wildlife species each morning prior to work. • Staying within designated work areas. • Maintaining exclusion/silt fencing. • Reduced Project speed limits. • No pets or firearms on-site. • Contain trash/food waste and remove daily to avoid encouraging	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		predators onto the Project site. • Following Project Best Management Practices (BMPs).	
3.4-2	Impacts on Western pond turtle.	**3.4-2: Western Pond Turtle Avoidance.** The western pond turtle shall be protected from Project Area staging and operations areas through monitoring by a qualified biologist. The Project Area shall be inspected daily for the presence of turtles. If necessary, with consultation with CDFW, barriers shall be used when needed to direct the turtles and move them to an area of suitable habitat outside of the construction activity.	Less than significant
3.4-3	Impacts on giant garter snake.	**3.4-3: Giant Garter Snake Avoidance.** In areas that provide suitable habitat for giant garter snake, construction shall only occur during the active period for the snake, between May 1 and October 1. During the active period for giant garter snake direct mortality is lessened because snakes are expected to actively move and avoid danger. Preconstruction surveys for the giant garter snake shall occur within 24 hours prior to ground disturbing activities. A survey of the Project Area should be repeated if a lapse in construction activity of two weeks or greater has occurred. If a snake is encountered during construction, work shall stop within the vicinity of the snake and the USFWS will be contacted immediately. Only following receipt of USFWS approval shall giant garter snake be collected and transferred to the nearest suitable habitat outside the work area. Work shall not re-commence until a qualified biologist has either removed the snake from the construction area or, after thorough inspection, determined that the snake has vacated the construction area. Any dewatering or vegetation clearing within 200 feet of potential aquatic habitat for giant garter snake shall be limited to the minimum amount necessary.	Less than significant
3.4-4	Impacts on Valley elderberry longhorn beetle.	**3.4-4: Valley Elderberry Longhorn Beetle (VELB) Avoidance.** Valley elderberry plants (with stems greater than 1-inch diameter at ground level) occurring within the Project Area shall be avoided and, if avoidance is not possible, relocated to a designated location. Where Project impacts to elderberry shrubs cannot be avoided, or where shrubs are located	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		within 30.5 meters (100 feet) of Project Area-specific activities, activities shall be conducted according to USFWS Conservation Guidelines for VELB (1999), or other VELB guidance as updated by the USFWS. VELB habitat shall be considered directly affected if Project construction requires the removal of the shrub or if ground-disturbing activities would occur within 6.1 meters (20 feet) of the dripline of the shrub. The species would be considered indirectly affected if Project construction would disturb the ground between 6.1 and 30.5 meters (20 and 100 feet) from the dripline of the shrub (USFWS, 1999). Transplantation or temporary removal of the affected shrubs may be necessary as prescribed by the guidelines, but plants that are extremely difficult to remove may be exempted. Planting of additional seedlings or cuttings may be required under the Project or program USFWS Biological Opinion, depending on the number of elderberry shrubs with emergence holes present in the Project Area. A monitoring plan of any mitigation measures in the Project Area shall be implemented as required under the Biological Opinion, including monitoring the general condition of the mitigation Project Area and the condition of the elderberry plantings for up to ten consecutive years. The plan shall describe monitoring responsibilities, intervals, intensity, and success rates. The monitoring plan shall further include requirements for reporting observations and findings to the applicable agency, for example, for VELB observations, to USFWS.	
3.4-5	Impacts on Swainson's hawk.	**3.4-5: Swainson's Hawk Avoidance.** For any construction activities initiated between March 15 and September 1, surveys for nesting Swainson's hawk shall be conducted within 0.5-mile of areas of disturbance for this species as described in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in the California's Central Valley* (Swainson's Hawk Technical Advisory Committee, 2000). The recommended minimum survey protocol is completion of surveys for at least the two survey periods immediately prior to a project's initiation. Survey periods correspond to typical migration, courtship, and nesting	Less than significant

Table ES-3 Impacts and Mitigation Measures

<table>
<tr><th>Impact Number</th><th>Impact</th><th>Applicable Mitigation Measures</th><th>Impact Significance after Mitigation</th></tr>
<tr><td></td><td></td><td>behavior and defined as follows:
<table><tr><th>Survey Period</th><th>Survey Dates</th><th>Survey Time</th><th>Number of Surveys</th></tr><tr><td>1 Recommend optional</td><td>January 1-March 20</td><td>All day</td><td>1</td></tr><tr><td>2</td><td>March 20-April 5</td><td>Sunrise to 1000 or 1600 to sunset</td><td>3</td></tr><tr><td>3</td><td>April 5-April 20</td><td>Sunrise to 1200 or 1630 to sunset</td><td>3</td></tr><tr><td>4 Initiating surveys is not recommended</td><td>April 21-June 10</td><td>All day; Monitoring known nests only</td><td>Ongoing</td></tr><tr><td>5</td><td>June 10-July 30</td><td>Sunrise to 1200 or 1630 to sunset</td><td>3</td></tr></table>
If surveys determine that the species is present and nesting within this area, a buffer zone of 0.5-mile shall be established and coordination with CDFW shall be required prior to any work in this buffer zone during the nesting season. Work within 0.5-mile may be permitted with CDFW approval if a qualified biologist monitors the nest when Project disturbance activities occur within 0.5-mile of the nest. If the monitor determines that construction may result in abandonment of the nest, all construction activities within 0.5-mile shall be halted until the nest is abandoned or all young have fledged. The monitor shall continue monitoring the nest until construction within 0.5-mile of the nest is completed, or until all chicks have completely fledged and are no longer dependent on the nest.</td><td></td></tr>
<tr><td>3.4-6</td><td>Impacts on nesting bird species.</td><td>3.4-6: Nesting Bird Avoidance. A pre-construction survey by a qualified biologist for nesting birds shall be required if construction activities are scheduled to occur during the breeding season (February 1 to August 31) for raptors and other migratory birds, including special-status bird species. The survey shall be conducted 15 days prior to ground disturbing</td><td>Less than significant</td></tr>
</table>

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		activities and shall cover 500-foot radius surrounding the construction zone. If active nests are found, actions typically include, but are not limited to, monitoring by agency-approved biologists, establishment or refinement of species-specific buffers, reduction or elimination of the use of loud equipment, reducing foot traffic and remaining in the vehicles, and the maintenance of visual screens. Migratory birds shall be protected from Project Area staging and operations through the use of a buffer established based on the birds sensitivity and response to the potential activity. Baseline behavior of the bird should be established to inform the buffer size. The qualified biologist may start with a 100-foot nest buffer or a 250-foot nest buffer for raptors, but may adjust the buffer size based of the reaction of the bird to the activity. If there is a potential for nest abandonment due to intrusion into the buffer zone, as established by the qualified biologist, then CDFW and the USFWS shall be consulted. If a lapse in Project-related work of 15 days or longer occurs, another focused survey, and if required, consultation with CDFW and the USFWS shall be performed before Project work can resume.	
3.4-7	Impacts on special-status bats.	**3.4-7**: **Avoid and Minimize Impacts to Special-Status Bats.** In areas where suitable habitat occurs and there is potential for special-status bat species to be present, specific mitigation measure(s) will be developed in consultation with CDFW.	Less than significant
3.4-8	Impacts on rare plants.	**3.4-8: Avoid and Minimize Impacts to Rare Plants.** Before the initiation of any vegetation removal or ground-disturbing activities, in areas that provide suitable habitat for special-status plants, the following measures shall be implemented: • A qualified botanist shall conduct appropriately timed surveys for special status plant species, in all suitable habitat that would be potentially disturbed by the Project. • Surveys shall be conducted following CDFW- or other approved protocol. • If no special status plants are found during focused surveys, the	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		botanist shall document the findings in a letter to the lead agency, and other appropriate agencies as needed, and no further mitigation will be required. • If special status plants are found during focused surveys, the following measures shall be implemented: – Information regarding the special status plant population shall be reported to the CNDDB. – If the populations can be avoided during Project implementation, they shall be clearly marked in the field by a qualified botanist and avoided during construction activities. Before ground clearing or ground disturbance, all on-site construction personnel shall be instructed as to the species' presence and the importance of avoiding impacts to this species and its habitat. – If special status plant populations cannot be avoided, consultations with CDFW and/or USFWS would be required. If allowed under the appropriate regulations, the plants shall be mapped, photographed, and then transplanted to a suitable location by a qualified botanist. If required by the relevant agency, a plan to compensate for the loss of special status plant species, detailing appropriate replacement ratios, methods for implementation, success criteria, monitoring and reporting protocols, and contingency measures that would be implemented if the initial mitigation fails; the plan would be developed in consultation with the appropriate agencies prior to the start of local construction activities. – If mitigation is required, the Project proponent shall maintain and monitor the mitigation area for 5 years following the completion of construction and restoration activities. Monitoring reports shall be submitted to the resource agencies at the completion of restoration and for 5 years following restoration implementation. Monitoring reports shall include photo-documentation, planting specifications, a site layout map, descriptions of materials used, and justification for any deviations from the mitigation plan. Additional mitigation, monitoring may be required or modified by the administering	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		agency, and those requirements would supersede this section.	
3.4-9	Impacts on riparian habitat.	**3.4-9: Monitor Riparian Habitat.** In advance of construction, a Riparian Revegetation and Monitoring Plan shall be prepared for riparian areas which will describe the thresholds of revegetation success, monitoring and reporting requirements, and a description of the site-specific planting plan. The long-term ecological monitoring program described in the Plan will provide the basis for gauging the achievement of minimum performance standards. The Plan will describe a three-year riparian monitoring program that assesses the survival and health of on-site plantings. Appropriate performance standards may include, but are not limited to: an 80 percent survival rate of restoration tree and shrub plantings; absence of invasive plant species in restored areas; and self-sustaining conditions (i.e., plant viability without supplemental water) at the end of three years. The Plan will be submitted to the appropriate regulatory agencies for review and approval.	Less than significant
3.4-10	Impacts on fish.	**3.4-10: Implement Aquatic Habitat Protection.** Aquatic habitat shall be protected during Project Activities by limiting the amount of in-channel work and acquiring proper permits for work done within aquatic habitats. A fence shall be installed to the extent necessary to prevent the unintended discharge of excavated material and turbid water. The fencing shall be checked regularly and maintained until construction is complete. If needed, fish salvage shall be performed under the direct supervision of an approved biologist to avoid incidental take from Project activities. Following installation of any water diversion structures, and prior to placement of fill, the approved biologist shall perform surveys for any fish in the Project Area, collect, and transfer native fish, including Pacific lamprey, to the nearest suitable habitat to the work area. During holding and transportation, fish would be held in stream water collected from the Project reach. • Before removal and relocation begins, the approved biologist shall identify the most appropriate release location(s). Release locations should offer ample habitat for Pacific lamprey and other native fish	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		and should be selected to minimize the likelihood of reentering the work area. • Relocation activities shall be performed during the morning when temperatures are coolest. Air and water temperatures would be periodically measured during dewatering activities to ensure native fish that may be present are protected. • If Pacific lamprey are relocated, the following procedure shall be used: 1. Handling of fish would be minimized. However, when handling is necessary, hands and nets would be wetted prior to handling. 2. Any handled fish would be immediately placed in an aerated container with a lid in cool, shaded water. Aeration would be provided with a battery powered external bubbler. Fish would not be held more than 30 minutes. 3. All handled fish would be moved directly to the nearest suitable habitat in the creek, as identified above.	
3.4-11	Impacts on wetland habitats.	N/A	Less than significant
3.4-12	Impacts on wildlife corridors and movement in the Project Area.	**3.4-11: Native or Migratory Fish or Wildlife Species Avoidance.** The Native or Migratory Fish and Wildlife Species, such as North American beaver, North American otter, and other protected species shall be protected from Project staging and operations impacts through monitoring by a qualified biologist. Prior to construction, the Project Area shall be inspected for the presence of these species. If necessary, with consultation with CDFW, appropriate measures shall be taken to avoid and minimize Project impacts to these species. Additional specific measures to protect native or migratory wildlife species, may be required by CDFW under the 1600 series permit for the Project and shall be adhered to by the Project proponent.	Less than significant
3.4-13	Impacts on biological resources from herbicide use.	**3.4-12: Implement Herbicide Protective Actions.** During all Project activities, herbicides shall only be used by a licensed applicator and shall be applied only to target plants. Herbicides shall not be used within 100 feet of blue elderberry plants.	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		In order to avoid and minimize impacts related to herbicide use, use any herbicides during Project activities in accordance with all directions and protective actions listed on the product label of the herbicide being applied. In addition, take the following actions to ensure protection of fish, plant, and bird life during use of the herbicides listed below: 1. Glyphosate: a. Implement the following US EPA recommendations during Project activities (US EPA, 1993): i. For non-aquatic uses, do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters and rinsate. ii. For aquatic uses, only end-use products that are registered for aquatic uses. Do not contaminate water when disposing of equipment washwaters and rinsate. Treatment of aquatic weeds can result in oxygen loss from decomposition for dead plants. This loss can cause fish kills. 2. Triclopyr: a. As recommended by US EPA, avoid spray drift to prevent toxicity to non-target plants during Project activities (US EPA, 1998). b. Do not apply to open water or wetland areas to prevent toxicity to freshwater fish. 3. Imazapyr: a. Implement the following US EPA recommendations during Project activities (US EPA, 2006): i. If groundborne application is performed, take the following precautions to minimize potential risk to non-target terrestrial plants, aquatic vascular plants, and threatened and endangered species (US EPA, 2006, p. 33): • Use a nozzle height below 4 feet above the ground or plant canopy and coarse or coarser droplet size. (ASABE S572) or, if specifically using a spinning atomizer nozzle,	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		use a volume mean diameter (VMD) of 385 microns or greater. • Do not apply with wind speeds greater than 10 mph. • Do not apply into temperature inversions. b. To minimize potential risk to aquatic vascular plants, do not apply to bodies of water or portions of bodies of water where emergent and/or floating weeds do not exist (US EPA, 2006, p. 32-33). 4. Aminopyralid: a. In addition to following all directions and protective actions listed on the product label, apply aminopyralid using hand-spray and spot treatments only (US EPA, 2005a, p. 19). 5. Chlorsulfuron: a. To minimize potential harm to non-target plants, implement the following US EPA recommendations during Project activities (US EPA, 2005b, p. 6): i. Employ measures to control spray drift. ii. Restrict use to only one application per growing season. 6. Dithiopyr: a. Do not apply dithiopyr in or near water due to its toxicity to fish. b. To minimize potential harm to non-target plants, implement the following US EPA recommendations during Project activities (US EPA, 1991, p. 8): i. Do not apply dithiopyr aerially. 7. Isoxaben: a. To minimize exposure to fish and aquatic invertebrates, implement the following actions (WSDOT, 2006, p. 3): i. Do not apply directly to water, to areas where surface water is present, to wetlands, or to intertidal areas below the mean high water mark. ii. Employ measures to control spray drift. iii. Do not contaminate water when disposing of equipment washwaters and rinsate.	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
Air Quality and Greenhouse Gas Emissions			
3.5-1	Population and/or employment growth that exceeds growth estimates included in the applicable air quality plan.	N/A	Less than significant
3.5-2	Short-term construction emissions of criteria pollutants that contribute to existing or projected air quality violations.	**3.5-1: Implementation of Construction Best Management Practices.** Project construction activities should implement as feasible and necessary to control dust, the Best Management Practices for construction identified in Section 6.1 of the YSAQMD 2007 CEQA Handbook. Best Management Practices identified to reduce dust emissions include: • Water all active construction sites at least twice daily. Frequency should be based on the type of operation, soil, and wind exposure. • Haul trucks shall maintain at least 2 feet of freeboard. • Cover all trucks hauling dirt, sand, or loose materials. • Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas after cut and fill operations and hydroseed area. • Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days). • Plant tree windbreaks on the windward perimeter of construction projects if adjacent to open land. • Plant vegetative ground cover in disturbed areas as soon as possible. • Cover inactive storage piles. • Sweep streets if visible soil material is carried out from the construction site. • Treat accesses to a distance of 100 feet from the paved road with a 6 to 12 inch layer of wood chips or mulch. • Treat accesses to a distance of 100 feet from the paved road with a 6-inch layer of gravel.	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
3.5-3	Short-term construction emissions that expose persons to substantial levels of toxic air contaminants.	N/A	Less than significant
3.5-4	Short-term objectionable odors exposure to sensitive receptors due to construction activities.	N/A	Less than significant
3.5-5	Long-term emissions from project maintenance activities.	N/A	Less than significant
3.5-6	Program-related emissions conflict with state goals for reducing greenhouse gas emissions.	N/A	Less than significant
Noise			
3.6-1	Construction-related conflicts with local noise standards.	**3.6-1: Noise Reducing Construction Practices.** The following mitigation measures shall be implemented to reduce noise impacts of construction activities within 400 feet of residences: • Limit construction activities in all cases to 7:00 a.m. to 7:00 p.m. • Configure the construction site in a manner that keeps noisier equipment and activities as far as possible from noise sensitive locations, including the placement of staging areas as far as practicable from nearby residences. • Require that all construction equipment powered by gasoline or diesel engines have sound-control devices that are at least as effective as those originally provided by the manufacturer. • Preventing excessive noise by shutting down idle vehicles or equipment. • When practical, use noise barriers between major construction activities and noise sensitive land uses or take advantage of existing barrier features (e.g., terrain to block sound transmission to noise-sensitive land uses). To be effective, the barriers shall break the line of sight between the noise-sensitive use and on-site construction equipment. • Designate an on-site construction complaint and enforcement	Potentially significant and unavoidable

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		manager for the project and notify neighbors and occupants within 400 feet of the Project construction area at least 30 days in advance of extreme noise generating activities about the estimated duration of the activity.	
3.6-2	Temporary construction noise disturbances to local receptors.	*See Mitigation Measure 3.6-1 above.*	Potentially significant and unavoidable
Hazards and Hazardous Materials			
3.7-1	Encounter and potential release of undocumented contaminated soil or groundwater during construction.	**3.7-1: Procedures if Hazardous Materials Discovered.** If evidence of hazardous materials is discovered during Project activities, the Applicant shall notify the appropriate County Environmental Health Services. The Applicant shall test and analyze the materials following proper protocols to determine the presence of hazardous substances prior to making arrangements for off-site reuse/recycling or disposal. Testing shall be performed according to one of the following methods: 1. The method recommended by the County Environmental Health Services in the county in which the materials are located. 2. If the County Environmental Health Services does not specify a method, then the potentially hazardous material shall be tested as follows: a. Conduct representative sampling of the material in accordance with procedures specified in Section One of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" SW-846, 3rd Edition, US EPA (US EPA, 2014; US EPA, 2013). b. Arrange for testing of the material by a laboratory following the analytical procedures outlined in CCR Title 22, Division 4.5. The laboratory performing the testing shall be certified to perform the specific waste analysis by the State of California Department of Environmental Health. c. Deliver samples to the testing laboratory with a "Chain of Custody" type document which indicates the sample type, date	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		and time sample was taken, sample size, source of the waste, quantity of the waste, the type of sample container, place and address of collection, and the name and signature of collector. 3. If testing indicates the presence of contamination, then the contaminated materials shall be excavated and disposed of in a permitted off-site disposal facility prior to completion of construction.	
3.7-2	Contamination from accidental release of contaminants from construction equipment (fuels, lubricants, etc.)	*See Mitigation Measure 3.2-1, Procedures to Prevent Contamination from Construction Equipment, in the Water Quality section.*	Less than significant
3.7-3	Human health hazards from misapplication of herbicides.	*See Mitigation Measure 3.4-12, Implement Herbicide Protective Actions, in the Biology section.*	Less than significant
3.7-4	Accidental ignition of a wild fire by construction equipment.	**3.7-2: Fire Prevention Measures.** 1. All earthmoving and portable equipment with internal combustion engines shall be equipped with spark arrestors. 2. Work crews shall have appropriate fire suppression equipment available at the work site. 3. On days when the fire danger is high and a burn permit is required (as issued by the relevant Air Pollution Control District), flammable materials, including flammable vegetation slash, shall be kept at least 10 feet away from any equipment that could produce a spark, fire, or flame.	Less than significant
Land Use			
3.8-1	Potential conflicts with adjacent non-agricultural land uses.	N/A	No impact
3.8-2	Potential conflicts with adjacent agricultural land uses.	**3.8-1: Coordinate with Adjacent Landowners and Implement Access Restrictions.** The following measures shall be implemented to reduce impacts of restoration on adjacent agricultural lands: • The Project sponsor shall coordinate with adjacent landowners providing access and/or storage areas for project construction activities and materials. Access and construction work area plans	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		acceptable to all parties shall be developed prior to the start of any construction abutting potentially affected lands. • In locations where post-construction access to private agricultural lands by the public may be facilitated by restoration efforts, the Project shall provide warning signage (i.e., Private Property – No Trespassing) and wildlife-friendly fencing along the creek as needed.	
Aesthetics			
3.9-1	Short-term impacts to views during construction.	**3.9-1**: **Construction Fencing and Educational Signage.** In areas where construction activities would be visible to substantial numbers of viewers, SCWA shall place interpretive signage explaining the restoration process and goals. In addition, stockpiles shall be located away from public views and, if that is not feasible, screening fencing shall be placed to limit public views of equipment storage and soil stockpiles from public paths and recreation areas.	Less than significant
3.9-2	Long-term Program impacts on views.	N/A	No impact
Recreation			
3.10-1	Reduction in recreation opportunities during and following project construction.	**3.10-1: Provide Alternate Access to High-Use Recreational Sites.** The following measures shall be implemented as feasible to reduce impacts of construction access: • Where feasible, provide alternate trail and creek access where such access would be eliminated due to Project construction. • Stage restoration work in high-use areas to permit continued access to parts of reaches that are not undergoing active construction activities. • Minimize construction work limits. • To the maximum extent feasible, store equipment and soil stockpiles within the active construction zone. • If necessary, provide alternate access to picnic areas and formal trails/pathways that avoid the active construction zone. • Provide an alternative canoe take out above the Olmo-Hammond-UCD site when boat take-out at that site is interrupted.	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		3.10-2: Implement Applicable Yolo County Recreation Policies, Where Feasible. The Project sponsors shall work closely with Solano and Yolo Counties, University of California, Davis, and adjacent landowners to facilitate their provision of public access and recreational infrastructure into the Proposed Project on public lands and in places where the landowner is a willing participant and where impacts to sensitive biological resources can be avoided.	
Cultural Resources			
3.11-1	Construction impacts to significant cultural resources.	**3.11-1**: **Establish a Buffer.** In order to minimize or eliminate the possibility that Project-related ground-disturbances would impact the integrity of the documented site components and/or human remains, a buffer of at least 100 feet shall be defined around the presently-mapped boundaries of each archaeological site. No ground-disturbing Project activities could occur within this buffer or the mapped site boundaries. This would reduce potential impacts to less-than-significant levels. **3.11-2**: **If Unrecorded Cultural Resources are Encountered.** If an inadvertent discovery of cultural materials (e.g., unusual amounts of shell, animal bone, glass, ceramics, structure/building remains, dark soil deposits and charcoal, stone implements and flakes, etc.) is made during Project-related construction activities, ground disturbances in the area of the find shall be halted and a qualified professional archaeologist will be notified regarding the discovery. The archaeologist shall determine whether the resource is potentially significant per the CRHR and develop appropriate mitigation to protect the integrity of the resource and ensure that no additional resources are impacted. Mitigation could include, but not necessarily be limited to preservation in-place, archival research, subsurface testing, or contiguous block unit excavation and data recovery.	Less than significant
3.11-2	Construction impacts to human remains.	**3.11-3**: **Human Remains.** The county sheriff/coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		of a Native American, he or she must contact the NAHC by phone within 24 hours of making that determination (Health and Safety Code Section 7050[c]). Following the coroner's findings, the property owner, contractor or Project proponent, an archaeologist, and the NAHC-designated MLD shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in PRC Section 5097.9. The landowner shall ensure that the immediate vicinity (according to generally accepted cultural or archaeological standards and practices) is not damaged or disturbed by further development activity until consultation with the MLD has taken place. The MLD shall have 48 hours to complete a site inspection and make recommendations after being granted access to the site. A range of possible treatments for the remains, including nondestructive removal and analysis, preservation in place, relinquishment of the remains and associated items to the descendants, or other culturally appropriate treatment may be discussed. Assembly Bill (AB) 2641 suggests that the concerned parties may extend discussions beyond the initial 48 hours to allow for the discovery of additional remains. AB 2641(e) includes a list of site protection measures and states that the landowner shall comply with one or more of the following: • Record the site with the NAHC or the appropriate Information Center; • Utilize an open-space or conservation zoning designation or easement; and/or • Record a document with the county in which the property is located. The landowner or their authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface	

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		disturbance if the NAHC is unable to identify a MLD or the MLD fails to make a recommendation within 48 hours after being granted access to the site. The landowner or their authorized representative may also re-inter the remains in a location not subject to further disturbance if they reject the recommendation of the MLD, and mediation by the NAHC fails to provide measures acceptable to the landowner. Adherence to these procedures and other provisions of the California Health and Safety Code and AB 2641(e) will reduce potential impacts to human remains to a less-than-significant level.	
Transportation/Traffic			
3.12-1	Construction conflicts with Yolo or Solano County transportation planning policies.	N/A	Less than significant
3.12-2	Substantial increase in roadway hazards during construction.	N/A	Less than significant
3.12-3	Adverse effects on emergency access during construction.	N/A	No impact
3.12-4	Adverse effects on public transit, bicycle, or pedestrian facilities.	N/A	No impact
Public Services			
3.13-1	Increased demand for police services during or after construction.	N/A	Less than significant
3.13-2	Increased demand for fire services during or after construction.	N/A	Less than significant
Utilities and Service Systems			
3.14-1	Potential impacts on storm water drainage facilities.	*See Mitigation Measure 3.1-2, Standards for Modification or Replacement of Storm Drains, in the Hydrology section.*	Less than significant
3.14-2	Impacts on landfill capacity due to construction waste.	N/A	Less than significant
3.14-3	Construction impacts to pipelines and electrical lines.	**3.14-1**: **Locate and Avoid Buried Pipelines.** In accordance with state Government Code Section 4216 et seq. and guidance issued by the U.S. Department of Transportation Pipeline & Hazardous Materials Safety	Less than significant

Table ES-3 Impacts and Mitigation Measures

Impact Number	Impact	Applicable Mitigation Measures	Impact Significance after Mitigation
		Administration (PHMSA), the Project applicant and excavator will contact the regional notification center at least two working days, but not more than 14 calendar days, prior to commencing that excavation. If practical, the excavator shall delineate the area to be excavated with white paint or other suitable markings. In accordance with Government Code Section 4216.4, if consultation with the regional notification center indicates a Project excavation is near a pipeline, then the excavator shall determine the exact location of the pipeline by excavating with hand tools before using any power-operated or power-driven excavating or boring equipment. However, power-operated or power-driven equipment may be used for the removal of any existing pavement if there are no subsurface installations contained in the pavement. If documented notice of the intent to use vacuum excavation devices, or power-operated or power-driven excavating or boring equipment, has been provided to the pipeline operator, and it is mutually agreeable with the operator and the excavator, the excavator may utilize vacuum excavation devices, or power-operated or power-driven excavating or boring equipment within the approximate location of a pipeline. If the exact location of the pipeline cannot be determined by hand excavating, the excavator shall request the pipeline operator to provide additional information, to enable the excavator to determine the exact location of the installation. In the event Project activities discover damage or cause damage to a pipeline installation, including all breaks, leaks, nicks, dents, gouges, grooves, or other damage, to lines, conduits, coatings, or cathodic protection, the Project applicant and excavator shall immediately notify the pipeline operator. If a pipeline is damaged and the operator cannot be contacted, the excavator shall call 911 emergency services.	

1 INTRODUCTION

The Yolo Basin Foundation (YBF), in close collaboration with the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC), has prepared this Program Environmental Impact Report (PEIR) as part of the *Lower Putah Creek Restoration Project, California Department of Fish and Wildlife Ecosystem Restoration Program (ERP Grant No E1183015)*, which proposes to restore and enhance geomorphic and ecological function of approximately 24.2 miles of Putah Creek below the Putah Diversion Dam. The ERP grant was awarded to YBF to fund preparation of the PEIR.

This PEIR analyzes a program of restoration actions proposed for the Lower Putah Creek Restoration Project Upper Reach—the portion of Putah Creek between the Putah Diversion Dam (PDD) and the western boundary of the Yolo Bypass Wildlife Area (YBWA). This reach of Putah Creek crosses a combination of privately (primarily) and publically owned lands over two counties. The restoration efforts described in this PEIR are planned by the Solano County Water Agency (SCWA) and the Lower Putah Creek Coordinating Committee (LPCCC) for implementation over the next 5 to 15 years.

This PEIR is intended to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of the proposed Upper Reach Program of the Putah Creek Restoration Project. The Upper Reach Program, hereinafter referred to as the "Program" is, for purposes of CEQA, the proposed Project. YBF and SCWA have prepared this PEIR in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended) and the State CEQA Guidelines (14 California Code of Regulations [CCR]) section 15000 et seq.).

SCWA is the lead agency under CEQA, and will be responsible for certifying the Final EIR and issuing findings for the Putah Creek Restoration Upper Reach Program. SCWA, and its project partner the LPCCC, will be responsible for planning, design, environmental review, securing permits, construction management, monitoring, and maintenance for all of the activities that collectively form the Program described herein.

1.1 GENERAL BACKGROUND

SCWA is responsible for water supply, flood protection, and stream stewardship in Solano County, California. SCWA manages streams, canals, and dams throughout the

county to fulfill its responsibilities. SCWA acts not only as Solano County's water wholesaler but also has a limited flood protection role in the county. SCWA's stream stewardship includes creek restoration and wildlife habitat projects, mitigation monitoring, and pollution prevention efforts. SCWA approves LPCCC restoration activities on Putah Creek and acts as LPCCC's fiscal agent. SCWA is the CEQA lead agency for preparation of the PEIR.

The LPCCC was formed by a settlement agreement (the Putah Accord[1]) between Solano County water users and Yolo County environmental advocates concerning operations of the Solano Project, as related to adequacy of in-stream flows to sustain native fish and wildlife resources of Putah Creek. The LPCCC consists of representatives of the Boards of Supervisors of Solano and Yolo counties; Cities of Davis, Fairfield, Suisun, Vacaville, Vallejo, and Winters; SCWA; Solano Irrigation District; Maine Prairie Water District; University of California, Davis; Putah Creek Council; and landowners along Putah Creek. The LPCCC serves as the watershed group joining several primary stakeholders together to oversee implementation of the Putah Accord, and to undertake maintenance, restoration, enhancement, and protection of Putah Creek's natural resources between the Putah Diversion Dam and the Yolo Bypass.

Implementation of the Program described herein would be a continuation of restoration and enhancement activities that have been conducted by SCWA and the LPCCC on Putah Creek since 2002. Documents prepared in support of restoration and enhancement activities conducted to date include:

- Lower Putah Creek Watershed Management Action Plan, Phase I – Resource Assessments (EDAW, 2005).
- Lower Putah Creek Watershed Management Action Plan – Proposed Projects (EDAW/AECOM, 2008).
- CEQA Initial Study and Mitigated Negative Declaration (IS-MND) for Winters Putah Creek Nature Park/Floodplain Restoration and Recreational Access Project (Wallace-Kuhl, 2008).

[1] Second Amended Judgement, Putah Creek Council v. Solano Water Agency and Solano Irrigation District, Sacramento County Superior Court Case Number 515766, October 30, 2002.

Additional funding would be needed to implement restoration work described in this PEIR, and is anticipated to come from a combination of local, state, and/or federal sources.

All Program activities would be performed on properties of *willing landowners* only. More details regarding the proposed Upper Reach Program are provided in Chapter 2, Project Description.

1.2 INTENDED USES OF THE ENVIRONMENTAL IMPACT REPORT

This chapter discusses CEQA requirements for the Program, public involvement in the CEQA process, and organization of the PEIR.

As described in Section 15121(a) of the State CEQA Guidelines, an EIR is a public information document that assesses potential environmental effects of a proposed project and identifies mitigation measures and alternatives to the Project that could reduce or avoid adverse environmental impacts (14 CCR Section 15121[a]).

The purpose of this PEIR is to analyze the environmental impacts of implementing the Upper Reach Program of proposed activities over a period from approximately 2015 to 2030. The proposed Program consists of the implementation of a combination of stream restoration and habitat enhancement activities along approximately 24 miles of Lower Putah Creek, extending from the downstream face of the PDD to the western boundary of the YBWA, as shown on Figures 1-1 and 1-2.

The lead agency has determined that a PEIR is the appropriate CEQA document to comprehensively address short- and long-term activities planned for the Putah Creek Upper Reach. A PEIR reviews the environmental impacts "of a series of actions that can be characterized as one large project" and that are related geographically, as logical parts in a chain of proposed actions, in connection with general criteria to govern the conduct of a continuing program, and/or "as individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways" (CEQA Guidelines, Section 15168, subd. [a]). A PEIR offers several advantages over multiple separate project-level CEQA documents, including providing for a more exhaustive consideration of cumulative effects and alternatives, avoiding duplicate consideration of cumulative impacts and policy issues, reducing paperwork, and allowing the lead agency to consider program-wide mitigation measures "at an early time when the agency has greater flexibility to deal with basic problems or cumulative impacts" (CEQA Guidelines, Section 15168, subd. [b]).

Figure 1-1

Project Location

Source: Stillwater Sciences

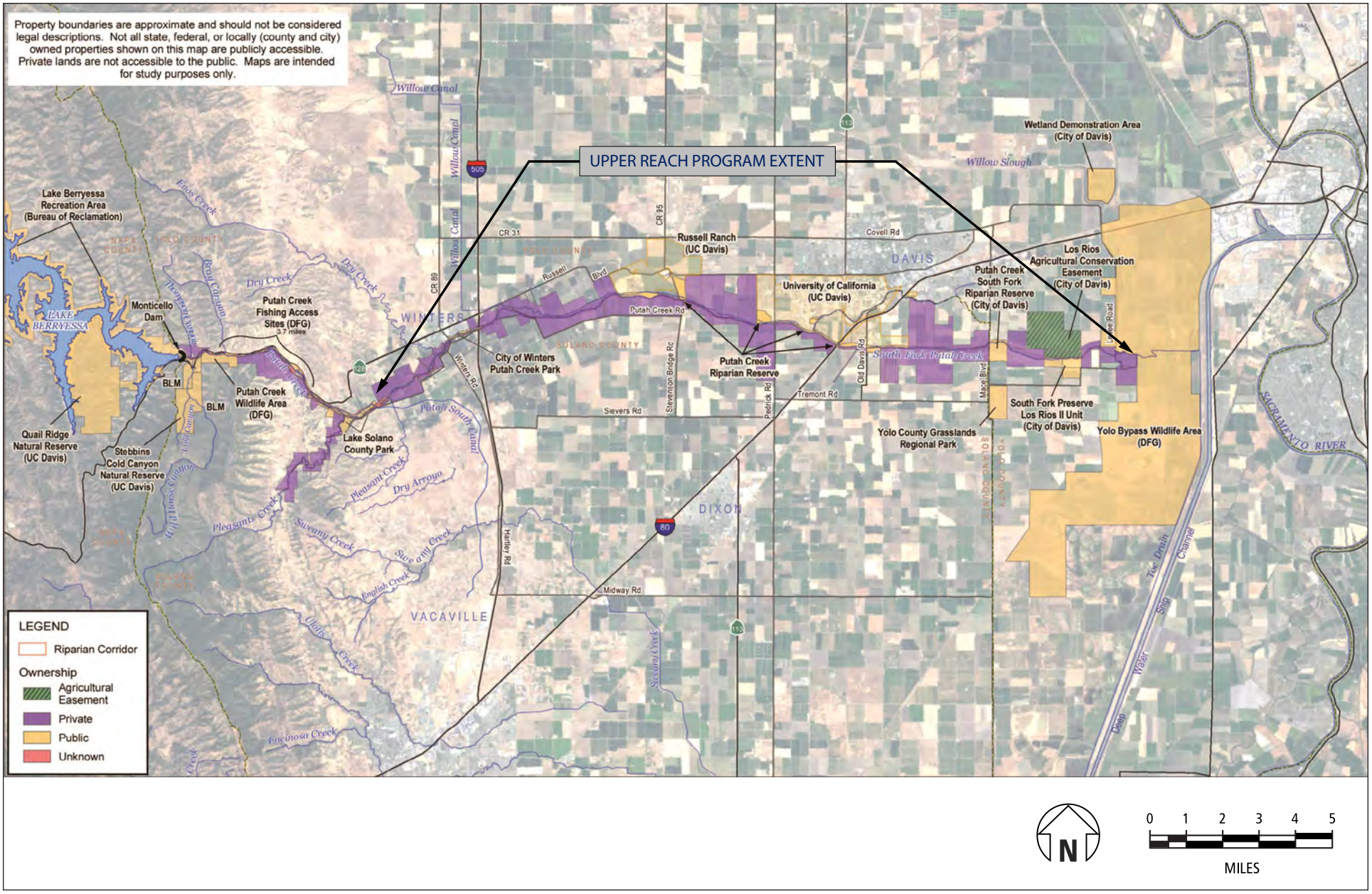


Figure 1-2

Regional Vicinity Map

Sources: USGS 2003, Yolo County 2002, Solano County 2002, UC Davis 2005

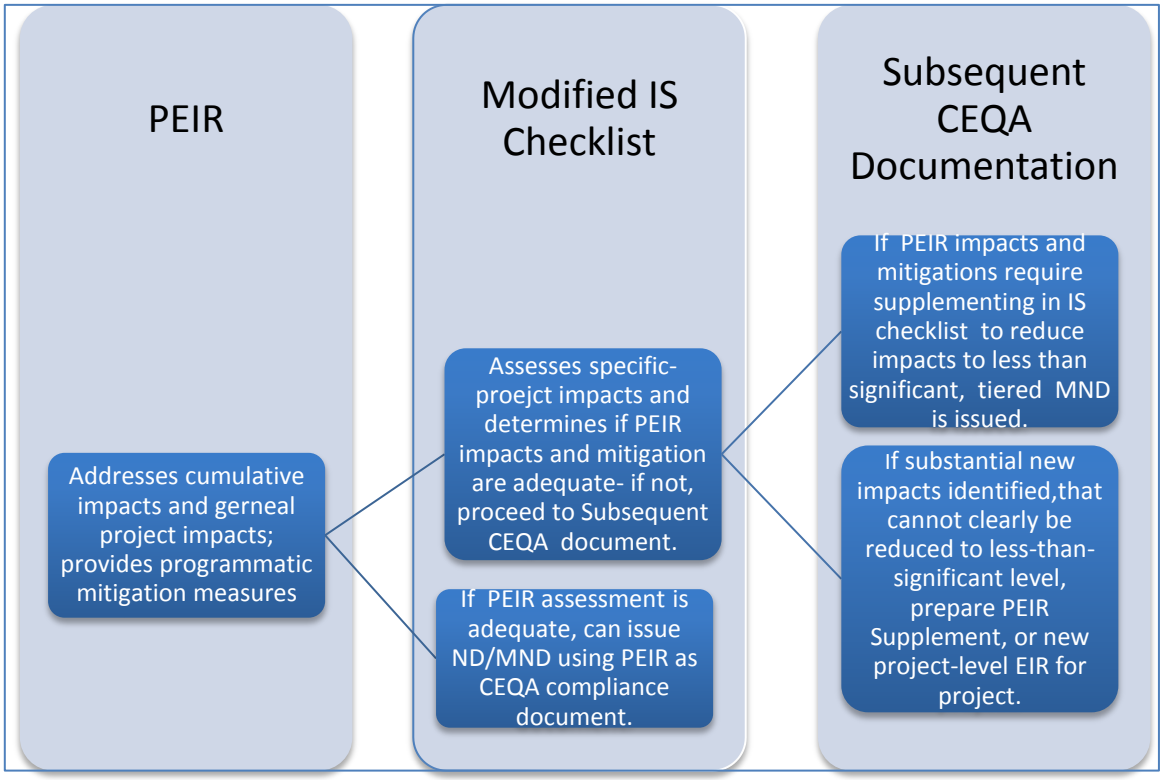
This PEIR discloses relevant information about the proposed Program and alternatives being considered, and invites all interested agencies, organizations, and individuals to play a role in both the decision-making process and implementation of the decision. The document provides federal, state, and local decision makers with detailed information concerning the environmental effects and the significance of these impacts. Further information on the federal, state, and local environmental permits and regulating (responsible) agencies is provided below.

This PEIR is intended to meet CEQA requirements and to integrate CEQA review with related consultations and anticipated programmatic and project-level permit requirements. SCWA, in its role as the CEQA lead agency, will use the PEIR to comply with CEQA review requirements for its approval of each of the restoration activities described herein. Program-level documentation may provide sufficient CEQA analysis to meet site-specific, project-level analysis for future projects, or additional documentation may be needed to fulfill CEQA compliance. This determination will be made by the lead agency on a case-by-case basis, typically with preparation of an Initial Study.

The procedure for conducting the CEQA review for projects addressed at a program level in this EIR is as follows:

1. The specific project design proposed will be evaluated to determine if it may result in any different or greater impacts than described in this EIR. That assessment will be documented in either a standard (CEQA Guidelines Appendix G) Initial Study checklist or a modified version of that checklist that focuses on impacts associated with this type of project.
2. If it is determined, on the basis of substantial evidence, that the analysis performed in this program EIR adequately assesses project-specific impacts, then the lead agency for the specific project may approve that project using this EIR as the CEQA review.
3. If, on the basis of the checklist review, it is determined that new or more severe impacts than described in this EIR may result from a specific project, but that those impacts clearly can be reduced to a less-than-significant level with the application of additional mitigation measures, then a tiered Initial Study/Mitigated Negative Declaration may be used in conjunction with this EIR as the CEQA documentation for that project.

Figure 1-3 CEQA Review for Projects under the Upper Reach Program



4. If, on the basis of the checklist review, a fair argument remains that any project-specific impacts may still be significant after mitigation, then a focused EIR would be prepared. This may be in the form of either a new EIR tiered off of this EIR or a supplement to this EIR.

The Responsible Agencies may use this PEIR for their respective permit approvals. A list of possible state and local permit approvals that the PEIR may be used to support is described in Section 1.4, below.

1.3 RESPONSIBLE AND TRUSTEE AGENCIES

The PEIR is being circulated to responsible agencies, trustee agencies, and interested stakeholders. The following responsible, permitting, and trustee agencies have been identified:

- Office of Historic Preservation
- California Department of Fish and Wildlife
- California Department of Transportation
- California Regional Water Quality Control Board

- California State Lands Commission
- Central Valley Regional Water Quality Control Board
- Central Valley Flood Protection Board
- Yolo County
- Solano County
- University of California, Davis

Federal agencies that also may review this document and utilize portions of it in their permitting include:

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- National Marine Fisheries Service

1.4 ANTICIPATED PERMITS AND APPROVALS

Implementation of the Lower Putah Creek Restoration Upper Reach Program will require compliance with multiple federal, state, and local laws and regulations. This section identifies the permits or approvals that may be needed for the implementation of Program activities. Discussions of applicable laws, regulations, and policies are provided in the resource sections of Chapter 3. Other agencies may use the information provided in this PEIR for their permitting and approval processes.

1.4.1 Anticipated Permits and Approvals for Program Implementation

Federal Agency Permits

- U.S. Army Corps of Engineers (USACE)
  - Regional General Permit (RGP)
- U.S. Fish and Wildlife Service/National Marine Fisheries Services
  - Federal Endangered Species Act (ESA) Section 7 Consultation for the USACE RGP

State and Local Agency Permits

- Central Valley Regional Water Quality Control Board
  - Program 401 Water Quality Certification (following RGP)

1.4.2 Anticipated Permits and Approvals for Individual Project Implementation

State and Local Agency Permits

- Solano County Water Agency (SCWA)
  - Discretionary Grading Permits, under Solano County authority pursuant to Solano County Code Sec. 31-22(i)
- California Department of Fish and Wildlife
  - 1600 Streambed Alteration Agreement
- California State Parks Office of Historic Preservation
  - Consultation with State Historic Preservation Officer (SHPO), if required for USACE permitting
- California State Water Resources Control Board
  - General Permit for Waste Discharge Requirements
- Central Valley Flood Protection Board
  - Encroachment Permit
- Central Valley Regional Water Quality Control Board
  - 401 Water Quality Certification (for projects not adequately covered by RGP)
  - National Pollutant Discharge Elimination System (NPDES) General Construction Stormwater Permit (requires applicant to develop and implement a Stormwater Pollution Prevention Plan [SWPPP])
- Solano County
  - Public Works Encroachment Permit (for ingress to and egress from individual project areas in cases where the project may impact public rights-of-way)
- Yolo County
  - Public Works Encroachment Permit (for ingress to and egress from individual project areas in cases where the project may impact public rights-of-way)
- Yolo-Solano Air Quality Management District
  - Permit to Operate
  - Portable Equipment Registration Program

1.5 CEQA PROCESS

1.5.1 Scoping Comment Period

Scoping refers to the public outreach process used under CEQA to determine the coverage and content of an Environmental Impact Report (EIR). The scoping comment period offers an opportunity for public review and comment in the early phases of a project. The formal scoping process for an EIR is initiated by publication of the Notice of Preparation (NOP) required by CEQA, which provides formal notice to the public and to interested agencies and organizations that a Draft EIR (DEIR) is in preparation. During the scoping period, agencies and the public are invited to comment on the Project, the approach to environmental analysis, and any issues of concern to be discussed in the DEIR. Scoping also can assist the lead agency with identification of project alternatives and mitigation measures.

In accordance with State CEQA Guidelines (14 CCR Section 15082[a], Section 15103, Section 15375), SCWA circulated a NOP for the proposed Program on January 30, 2015 (see **Appendix A**). The NOP, in which SCWA was identified as the lead agency for the proposed Program, was circulated to the public; to local, state, and federal agencies; and to other interested parties. The purpose of the NOP was to inform responsible agencies and the public that the proposed Program could have significant effects on the environment, and to solicit their comments so that any concerns raised could be considered during the preparation of the PEIR. In addition, SCWA held a public scoping meeting on February 12, 2015, to provide the public with another opportunity to comment. Comments received in response to the NOP and at the public scoping meeting are included in **Appendix B**, and the preparers of this PEIR considered these comments.

1.5.2 Draft PEIR Public Comment Period

When the Draft PEIR (DPEIR) is completed, SCWA will issue a notice of availability, providing agencies and the public with formal notification that the DPEIR document is available for review. The notice will be sent to the State Clearinghouse, all responsible and trustee agencies, any person or organization requesting a copy, and will be posted at the Solano County clerk's office. The notice also will be published in a general-circulation newspaper. These actions will trigger a 45-day public review period, during which SCWA will receive and collate public and agency comments on the Program and the DPEIR document. SCWA will host a public hearing approximately 30 days after release of the DPEIR. The purpose of public circulation and the public hearings are to

provide agencies and interested individuals with opportunities to comment on or express concerns regarding the contents of the DPEIR.

1.5.3 Preparation of Final PEIR and Public Hearing

CEQA requires the lead agency to prepare a Final PEIR (FPEIR), addressing all substantive comments received on the Draft PEIR before approving a project. Written and oral comments received in response to the Draft PEIR will be addressed in the FPEIR. The FPEIR must include a list of all individuals, organizations, and agencies that provided comments on the Draft PEIR, and will contain copies of all relevant comments received during the public review period along with the lead agency's responses to those comments. After review of the FPEIR, SCWA staff will recommend to SCWA Board of Directors whether to approve or deny the proposed Program. This governing body then will review the FPEIR, consider SCWA staff recommendations and public testimony, and decide whether to certify the FPEIR and approve, modify, or deny the proposed Program.

If significant impacts are identified in the PEIR that cannot be mitigated, a statement of overriding considerations must be included in the record of the proposed Program approval and mentioned in the Notice of Determination, to be filed with the State Office of Planning and Research and at the office of the County Clerk (14 CCR Section 15093[c], Section 15094). Filing of the Notice of Determination starts a 30-day period for filing of any litigation challenging the PEIR.

If the Program is approved, SCWA will also adopt requisite CEQA findings and a Mitigation Monitoring and Reporting Program. After certification of the PEIR, at the close of the 30-day challenge period, CEQA responsible agencies may use this document in subsequent individual project approvals.

1.6 ORGANIZATION OF THIS PEIR

This PEIR contains the information required by CEQA Guidelines (Sections 15120-15131). It is organized into the following chapters:

- **Executive Summary:** Summarizes the PEIR contents, includes a summary table of anticipated impacts and proposed mitigation measures, and briefly describes alternatives eliminated from further consideration, including the environmentally superior alternative.

- **Chapter 1. Introduction:** Provides an overview of the PEIR and the proposed Program, including background, an introduction to the CEQA process, and anticipated permits/approvals.
- **Chapter 2. Description of Project:** Describes the Project site, objectives, activities, and implementation and sequencing.
- **Chapter 3. Environmental Setting, Impacts, and Mitigation Measures:** Describes the affected environment, analyzes the environmental impacts, including site specific and cumulative effects, and identifies mitigation measures to reduce or avoid significant impacts.
- **Chapter 4. Alternatives:** Describes a range of reasonable alternatives and compares their impacts to those of the proposed Program.
- **Chapter 5. Other Statutory Considerations:** Discusses cumulative impacts, growth-inducing effects, irreversible and irretrievable commitments of resources, energy analysis, and significant and unavoidable impacts to comply with various requirements of CEQA.
- **Chapter 6. Consultation and Coordination:** Identifies agencies and individuals that contributed to the preparation of this document and are involved in ensuring compliance with other environmental laws.
- **Chapter 7. References**: Lists references cited in the PEIR, organized by chapter.
- **Appendices**: Provides scoping documents and technical studies and information supporting the PEIR analyses.

2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

Putah Creek Restoration Upper Reach Program activities would occur within and along an approximately 24.2-mile length of Putah Creek, extending from the downstream face of the Putah Diversion Dam (PDD) to the western boundary of the Yolo Bypass Wildlife Area (YBWA), as shown in Figures 1-1 and 1-2 in Chapter 1, *Introduction.* The Program footprint (Program Area) includes the creek, its riparian area, banks, terraces, adjacent wetlands, and adjacent seasonally flooded riparian forest, and encompasses approximately 1,354 acres. Through most of the Program Area, the creek forms the border between Solano and Yolo counties, with the exceptions of two reaches that lie entirely within Solano County (I-80 to Old Davis Road Reach and Old Davis Road to Mace Reach) and two reaches that lie entirely within Yolo County (Mace Road to Road 106A Reach and Road 106A to YBWA Reach), on the eastern edge of the Program Area.

The Program Area is bordered to the south in many places by rural Putah Creek Road, various intermittent farm roads to the south and north, and by the Cities of Winters and Davis to the north. The precise boundaries of the Program Area are shown in **Figure 2-1**.

2.2 PROJECT BACKGROUND

Although Lower Putah Creek (including its riparian corridor) is one of the largest remaining tracts of high quality wildlife habitat in Yolo and Solano counties and provides habitat for a unique assemblage of fish and wildlife species native to the Central Valley, it is characterized by altered channels and eroding banks, habitat loss and degradation, flood and flood control related impacts, invasive weed infestations, and other problems. Lower Putah Creek offers a unique opportunity to develop restoration projects to optimize benefits to fish, wildlife, and other resources.

In the Program Area, the Putah Creek channel is, in many locations, no longer in natural form and function. Gravel extraction, channelization, vegetation removal, and other channel modifications have caused significant degradation of natural channel form, process, and ecology.

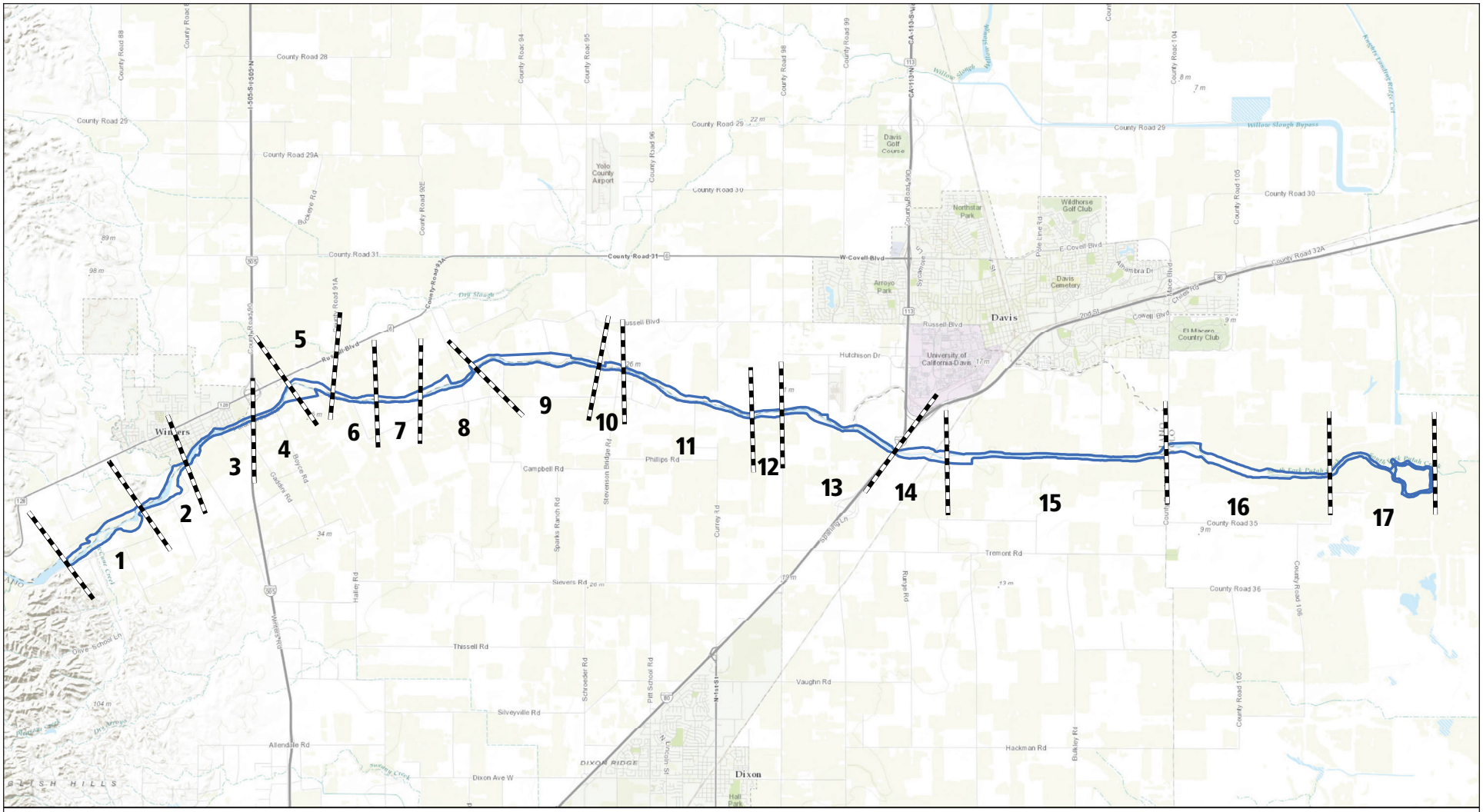


Figure 2-1

Program Area Map with Reach Locations

Source: BSK Associates

Ecological damage has been compounded by the trapping of sediments behind the Channel. As a result, the Putah Creek channel has become deeply incised, and is generally lacking in pool-riffle-run sequences, natural meander patterns, and functional floodplains. Gravel extraction operations have created reaches of over-wide channel, characterized by long, featureless pools and devoid of floodplains. Extensive Gravel Mining Occurred on Putah Creek West of Winters (circa Putah Creek Road at Olive School Road) as shown in a 1952 photo (**Figure 2-2**). These reaches cannot 'self-adjust' to more natural morphology, because flow velocities are insufficient to mobilize sediment, and natural gravel recharge is substantially arrested. In this condition, the creek is virtually devoid of riffles and spawning habitat, and lacks the materials and functions needed to build such features naturally.

Figure 2-2 1952 Photo Showing Extensive Gravel Mining on Putah Creek West of Winters (Putah Creek Road at Olive School Road)

Source: SCWA Archives.

2.3 PROGRAM OBJECTIVES

CEQA requires that an EIR include a statement of the underlying objectives to be achieved by a proposed project (CEQA Guidelines Section 15124 subd. [b]). These objectives are intended to help the lead agency develop a range of reasonable alternatives, and to aid decision makers in preparing findings including, if necessary, a statement of overriding considerations.

The overall Program purpose is to restore and rehabilitate the creek channel, banks, and associated habitats to more natural, self-sustaining form and function, consistent with the current (post-Monticello Dam) hydrologic regime. The Program would be implemented to stop further degradation of the creek corridor and to "jump-start" natural geomorphic and ecological processes in site-specific locations.

In the Lower Putah Creek Restoration Project planning process, goals and objectives were established by a group of stakeholders. The goals and implementing objectives for the Upper Reach Program are:[1]

GOAL 1: IMPROVE PASSAGE, REARING, AND EMIGRATION OF ADULT AND JUVENILE SALMONIDS IN PUTAH CREEK	
At YBWA/Upper Reach Boundary	
Objective 1.3	Provide for effective fish passage for essential life history stages – i.e., structural passage and recruitment and emigration flows – between the Yolo Bypass and Putah Creek above the Yolo Bypass Wildlife Area
Between YBWA and Putah Diversion Dam	
Objective 1.4	Provide for effective fish passage for essential life history stages – i.e., structural passage and recruitment and emigration flows – on Putah Creek from the YBWA boundary to upstream spawning grounds below the Putah Diversion Dam
Objective 1.5	Restore, enhance, and maintain spawning and rearing physical habitats and processes on Putah Creek below the Putah Diversion Dam
Objective 1.6	Provide necessary flow regimes and water quality conditions for recruitment, rearing, and emigration of self-sustaining runs of salmonids on Putah Creek
Objective 1.7	Incorporate natural planform and cross sectional geomorphology that supports structural habitat complexity and natural hydrologic, geomorphic, and ecological processes

GOAL 4: PRESERVE AND ENHANCE, WHERE POSSIBLE, EXISTING BENEFICIAL USES INCLUDING PUBLIC ACCESS, WILDLIFE VIEWING, HUNTING AND FISHING, BALANCED WITH EXISTING, ENHANCED, AND RESTORED ECOLOGICAL FUNCTIONS	
Objective 4.1	Maintain a balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits including water supply and agriculture between the PDD and YBWA

[1] Six goals were established for the Lower Putah Creek Restoration Project. Goals 2 and 3 were specific only to the Project on the Yolo Bypass Wildlife Area, Goal 5 is specific only to the Upper Reach Program

GOAL 5: ENHANCE HABITATS FOR DELTA NATIVE FISHES AND WILDLIFE WITHIN THE PUTAH CREEK PROJECT UPPER REACH	
Objective 5.1	Provide for effective fish passage for essential life history stages – i.e., structural passage and recruitment and emigration flows – on Putah Creek above YBWA to upstream spawning grounds below the Putah Diversion Dam (same as Objective 1.4)
Objective 5.2	Restore, enhance, and maintain spawning and rearing physical habitats and processes on Putah Creek below the Putah Diversion Dam (same as Objective 1.5)
Objective 5.3	Provide necessary flow regimes and water quality conditions to support anadromous and other native Delta fishes on Putah Creek
Objective 5.4	Incorporate natural planform and cross sectional geomorphology that supports structural habitat complexity and natural hydrologic, geomorphic, and ecological processes (same as Objectives 1.7)
Objective 5.5	Maintain and enhance native riparian vegetation communities along Putah Creek below the Putah Diversion Dam
Objective 5.6	Maintain a balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits, including water supply and agriculture, between the PDD and YBWA (same as Objective 4.1)

2.4 PROGRAM ACTIVITIES

The proposed Program activities are designed to work together in a comprehensive manner to achieve the Program objectives identified above, and have been grouped to simplify the analyses of their effects for the purposes of CEQA and associated environmental permits. The activities would be implemented (singly or in combination) in a series of individual actions (projects), applied to specific locations within the Program Area, as determined by site-specific conditions. For purposes of description of site conditions and of proposed locations for the various activities, the Program Area has been divided into a series of stream segments (Project subreaches) (see Figure 2-1). Individual Project subreach maps are provided in **Appendix C.**

Activities proposed under the Upper Reach Program fall into three general categories: (1) channel reconfiguration, (2) vegetation management, and (3) maintenance. A more detailed description of the activities to be undertaken within each of these categories follows. As stated above, site-specific Project implementation may entail application of one or a combination of these activities. All in-stream activities would be implemented adaptively, based upon understanding of the ecosystem and its changes over time. A site-specific Adaptive Management Plan would be developed for each individual project, based on the desired environmental outcomes and the potential for environmental impacts.

2.4.1 Channel Reconfiguration

A “stable” stream is in dynamic equilibrium when, over time, sedimentation processes are balanced so that the channel, while adjusting locally to variable conditions, maintains the same general morphological character. A stream's morphology is a result of its response to two principal driving variables—runoff and sediment yield—acting in concert with channel boundary conditions to determine the channel planform, cross section, and grade. Boundary conditions include the valley slope, geology, resistance, substrate type and size, and vegetation. They may also include natural or man-made controls such as dams, bridges, and water levels of receiving water bodies. Changes in sediment load, flow regime, and boundary conditions can disrupt this balance, resulting in rapid morphologic changes. When long-term erosion exceeds sedimentation, channel incision occurs. Channel modification, such as enlargement or straightening for flood control or water diversions, is probably the most common human-induced cause of channel incision, and often results in the most severe cases. Other human-induced causes of channel incision include reduced sediment load due to upstream dams. In a typical incising channel, the streambed degrades until the critical bank height is exceeded and the bank fails, increasing channel width and sediment load. In severe cases, nick points and nick zones migrate upstream and destabilize large parts of the system, including tributaries. Over time, the stream will move toward a new equilibrium. However, in systems (such as Putah Creek) where incision is initiated by watershed changes that affect hydrology and sediment yield, a new equilibrium may take decades or even centuries to achieve (Fischenich, 2000).

As is typical of incised channels, Putah Creek in the Program Area is deep, broad, and lacks a defined or stable low flow channel. The banks are steep and subject to ongoing failure. Pool and riffle habitat is lacking and riparian vegetation is often rare or absent. The original floodplain habitat has become hydrologically disconnected from the stream. Channel incision has been a major cause of floodplain and wetland deterioration and loss. For these reasons channel reconfiguration on Putah Creek is a high priority.

Proposed Program activities would reconfigure degraded areas of the creek channel to more natural cross sectional form (confined, sinuous low flow channel with adjacent floodplain surfaces) to stabilize eroding banks, facilitate channel shading with bank-side riparian vegetation, lower water temperatures, and improve habitat values for native fish species. A narrower (more efficient) low flow channel would also serve to increase flow velocities, restore competency of the channel to mobilize gravels (for spawning), and restore geomorphic processes that support natural channel and ecosystem

dynamics. Implementation of these activities would expand the geographical extent of high quality habitat for native fish species, including local fall-run Chinook salmon and steelhead, and increase riparian habitat by converting shallow, open water areas to floodplains. Channel reconfiguration activities may consist of modifications to channel geometry, construction of grade/flow control structures, stabilizing channel banks, improving spawning gravels, and/or filling abandoned gravel pits. These activities are described in detail below.

Channel Geometry

As described above, the role of physical structure is important to restoration strategies that seek to improve the ecological function of stream systems. Channel reconfiguration and realignment actions are applied to restore geometry, meander, sinuosity, substrate composition, structural complexity, re-aeration, stream bank stability, re-establishment of riffle substrates, re-establishment of riparian vegetation, and stabilization of stream banks.

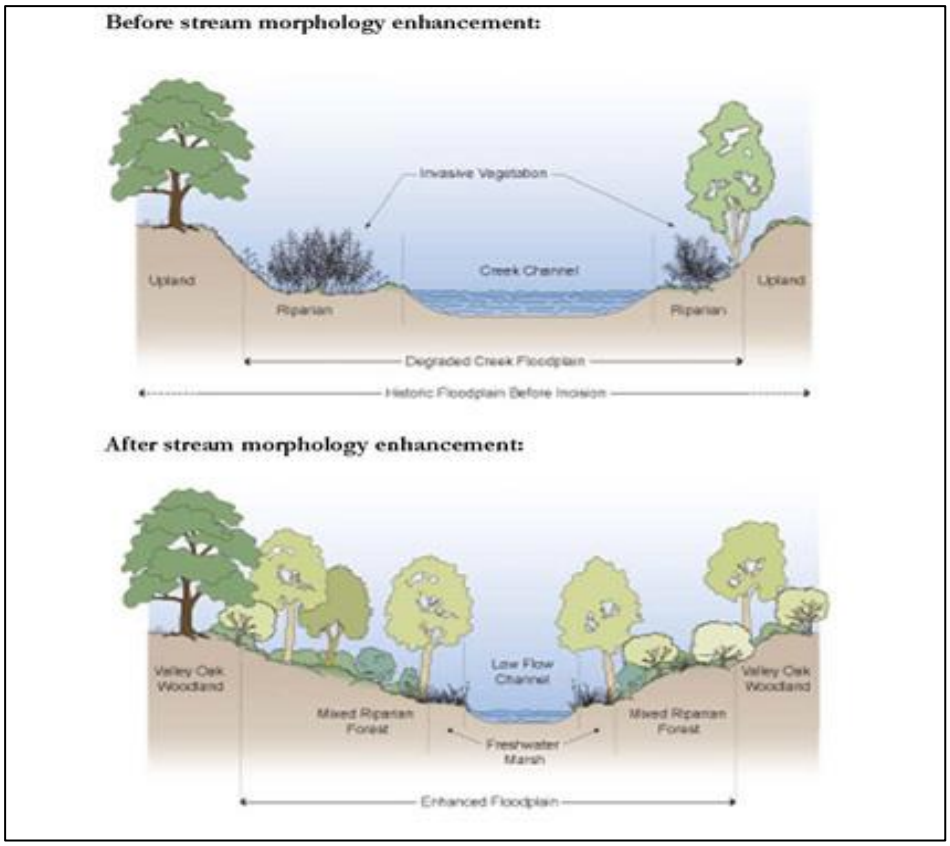
Program actions to restore functional channel morphology on Putah Creek may include modification of channel cross-section, planform, and longitudinal profile. Each potential component of channel geometry modification activities is described below.

Create Low Flow Channel and Floodplain

Naturally meandering alluvial streams produce floodplains with spatially diverse hydrology and plant types, and often contain a variety of wetlands. These floodplain wetlands serve many functions and provide important habitats for a diversity of fish and wildlife species. Floodplains are especially important to fishes inhabiting streams and rivers. Due to their high productivity and quickly warming waters in spring, floodplains are important spawning and rearing areas for many fish species. Floodplain wetlands act as nutrient and sediment sinks—improving water quality in the stream. They also provide storage capacity that can decrease magnitude of downstream floods, benefiting stream fishes and riparian landowners. Animals other than fish also rely on floodplain habitat. Many amphibians and reptiles require floodplain habitats for some or all of their life stages, and floodplain habitat loss has been linked to declines in some species. Neotropical birds rely upon riparian habitats associated with floodplains for feeding and roosting. Much of the migratory waterfowl in the United States could not survive without access to healthy floodplain habitat, and many animals that are not generally thought of as wetland species thrive in floodplains because of their natural productivity.

To create a low flow channel bordered by functional floodplain surfaces, alluvial material from within the stream corridor would be excavated and placed within the (currently over-wide) channel (**Figure 2-3**). Modified channel dimensions, including channel invert width, channel bank slopes, and floodplain width, would be determined based upon reach specific conditions. In reaches that were heavily mined for gravel, substantial quantities of fill may be required to create the desired channel morphology. In such cases, appropriate material would be obtained from adjacent agricultural lands or from other local sources (the Putah South Canal spoil site, for example).

Figure 2-3 Typical Channel Reconfiguration



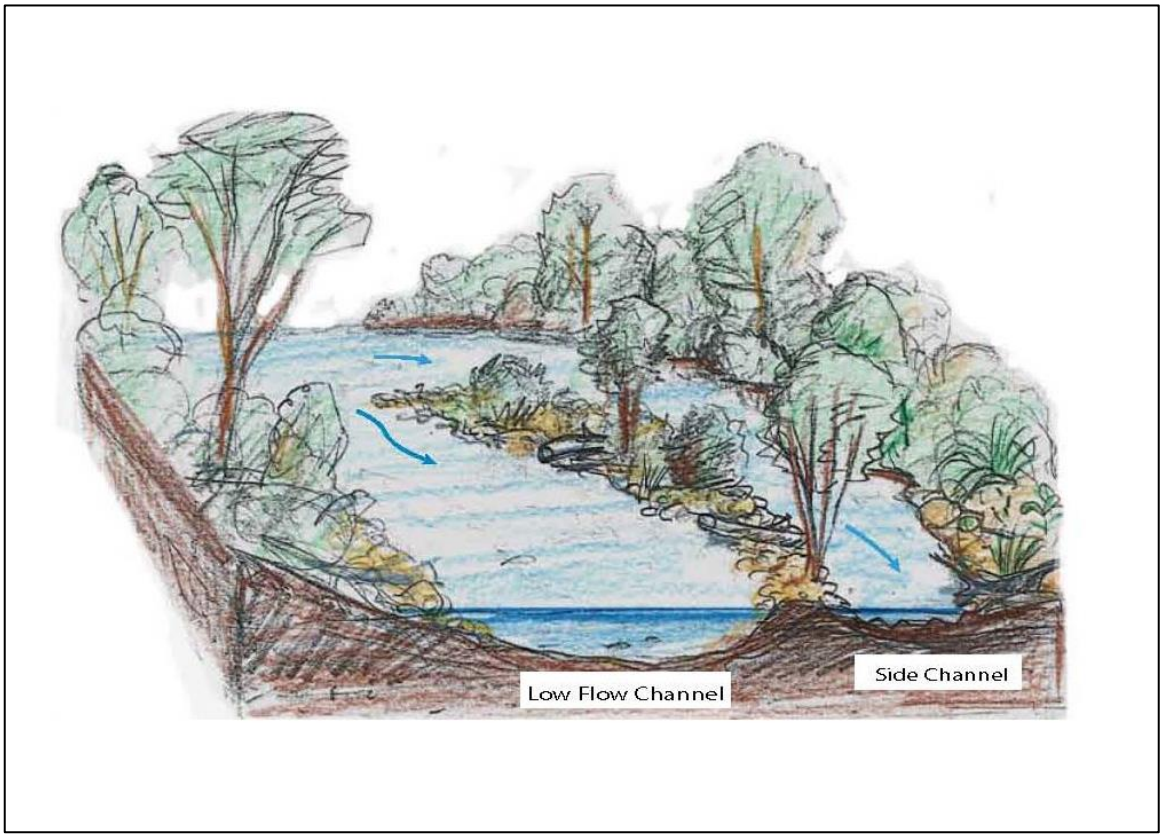
Source: EDAW, 2005.

Create Side Channels

Secondary side channels carry flows from the main creek channel through adjacent floodplain areas before rejoining the main channel downstream. Side channels can reduce high stage flow rates and velocities in the main channel during storm events. These areas can also provide important habitat for salmonids due to lower velocities, cover (large wood, pools, edge complexity), and higher food production.

In areas where the stream corridor is wide enough, secondary side channels may be excavated adjacent to the main low flow channel. These channels would have smaller cross sectional areas than those of the main low flow channel (**Figure 2-4**). The side channels would be constructed by excavating and grading to define a new channel. Side channel geometry would be determined based upon site specific design flows and channel configuration. The side channel edges would be graded to create transitional habitat and cover as flow rates rise and fall during the winter months. Wood structures (see Section 2.4 below, *Install Large Woody Debris*) may be installed to provide habitat, channel complexity, and to maintain hydraulic and geomorphic function within the channels. The new side channels would provide velocity refugia, areas for foraging, and protection from predators. The side channels would provide similar function during larger storm events and would also alleviate erosive forces in the main channel that are causing bank erosion in some locations on Putah Creek.

Figure 2-4 Main Channel and Side Channel – Typical

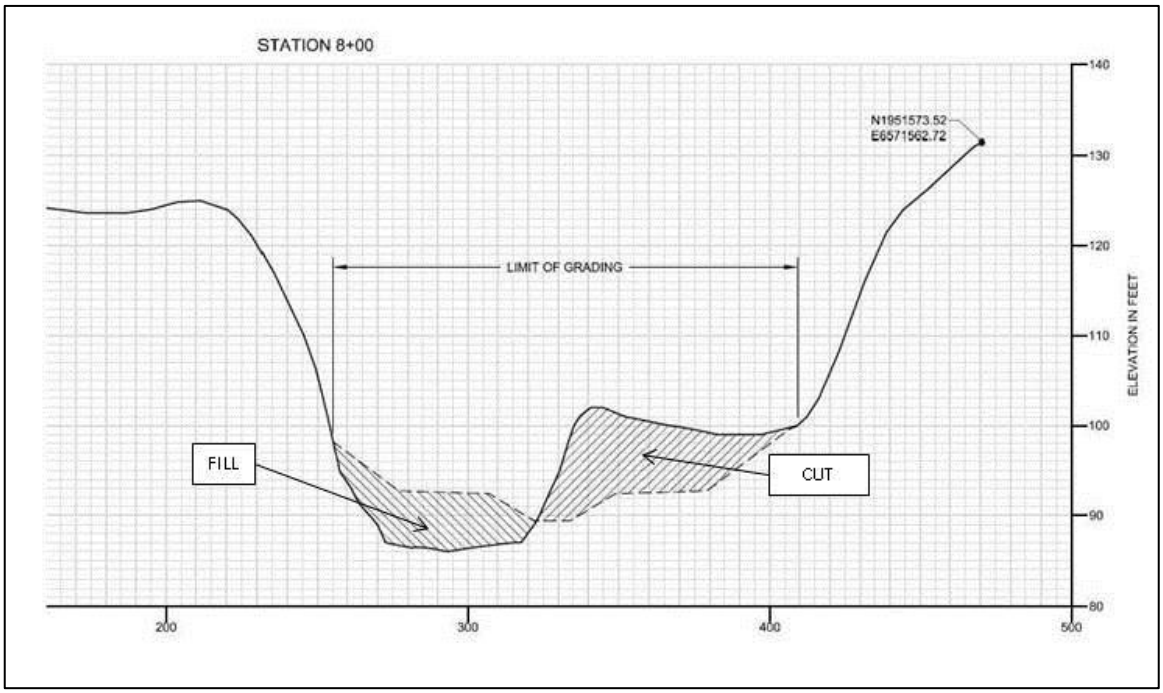


Source: ESA, 2014.

Reposition Thalweg

In areas where the channel thalweg (the deepest point in the channel cross section) has been negatively "captured" by an in-channel pool, or its location is contributing to bank instability, the thalweg would be repositioned within the active channel. Thalweg repositioning would involve excavating a new thalweg and/or filling all or portions of the old thalweg with the excavated material (**Figure 2-5**). In reaches where the thalweg is repositioned, work may also include repositioning of sand or gravel bars to function properly with the realigned channel thalweg.

Figure 2-5 Grading to Reposition Thalweg – Typical



Source: LPCCC, 2015.

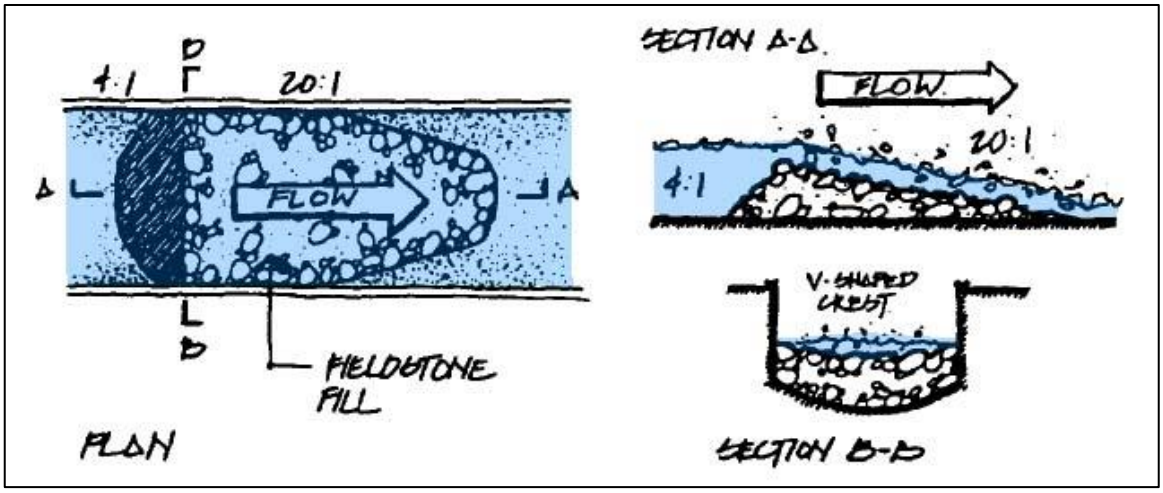
Construct Riffles

Riffle and pool habitats are lacking in Putah Creek and are critical to successful enhancement efforts. Riffles, high points in the channel bed with higher flow velocities, provide spawning habitat if suitable gravel size and flow conditions are present. Pools, low points in the channel bed with slower velocities, provide valuable and necessary locations for juvenile salmonid rearing, cover, and foraging and are resting locations for migrating adults. As noted previously, the formation of riffle-pool sequences in Putah Creek has been disturbed by construction of structures that artificially control the slope of the water surface, by excavation of the channel for gravel mining and other activities,

by long, straight, and confined reaches, and by entrapment of stream sediments behind the Monticello and Putah Diversion dams.

Riffles would be constructed by placing appropriately sized (relatively coarse) substrate material into the active channel to raise the channel invert adjacent to or within existing in-channel pools, or by realigning the low flow channel so that it crosses suitable in-channel gravels, and filling the former channel (**Figure 2-6**). Appropriately sized gravels would be collected from within the reach or imported from local sources. Gravels would be placed into the stream bed using a loader. Where gravels must be imported, the majority would come from the nearby Putah South Canal spoil site. A maximum of 10,000 cubic yards of gravel would be placed in the Program Area per year. In some locations, wood structures would be installed in conjunction with gravel placement activities to induce channel sinuosity, bar formation, and to support natural processes that would continue to form and/or maintain riffles and pools. Installation of wood structures at the channel margins would also provide (immediate) critical cover and foraging habitat for fish (see *Construct Log Revetments*, below).

Figure 2-6 Constructed Riffle – Typical Plan and Section Views



Source: Hough, 1993.

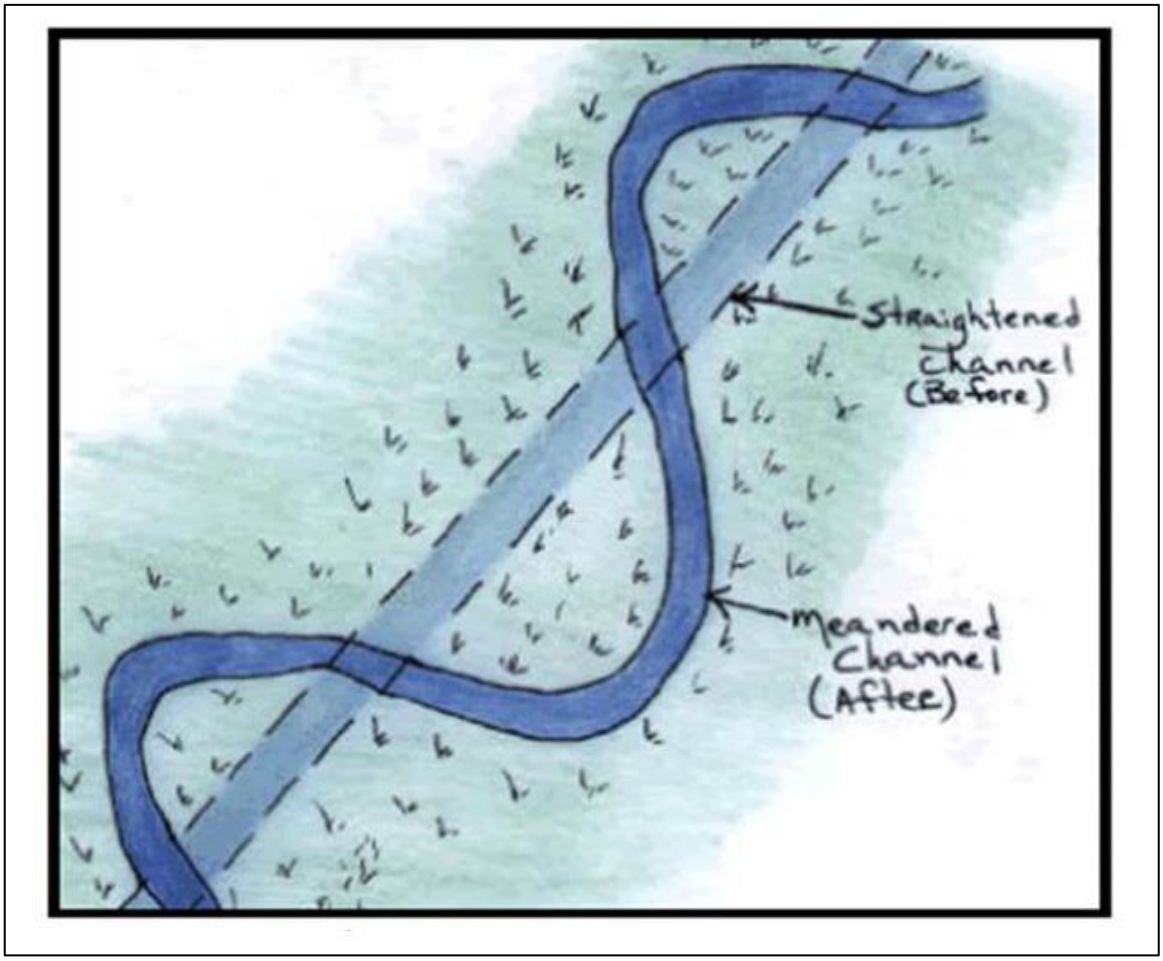
Increase Channel Sinuosity

Stream meander restoration is the restoration of natural alignment, channel capacity, and meander relationships to establish a functional, stable stream consistent with the modern hydrologic regime. This type of channel reconfiguration would transform a straightened stream reach to a more curvilinear planform, based upon channel size and meander relationships in conjunction with expected flow and sediment regimes and the geomorphology of the area. Meandering channels offer physical stability and support

natural ecological functions of the stream corridor. Meandering channels typically have higher levels of physical habitat diversity than straightened channels.

In areas of the stream corridor where low flow channel and floodplain morphology exists, but with an unnaturally straight alignment, a new meandering low flow channel alignment would be excavated and the excavated material would be used to fill the old, straightened channel alignment (**Figure 2-7**).

Figure 2-7 Stream Meander Restoration – Schematic



Source: USACE, 2007.

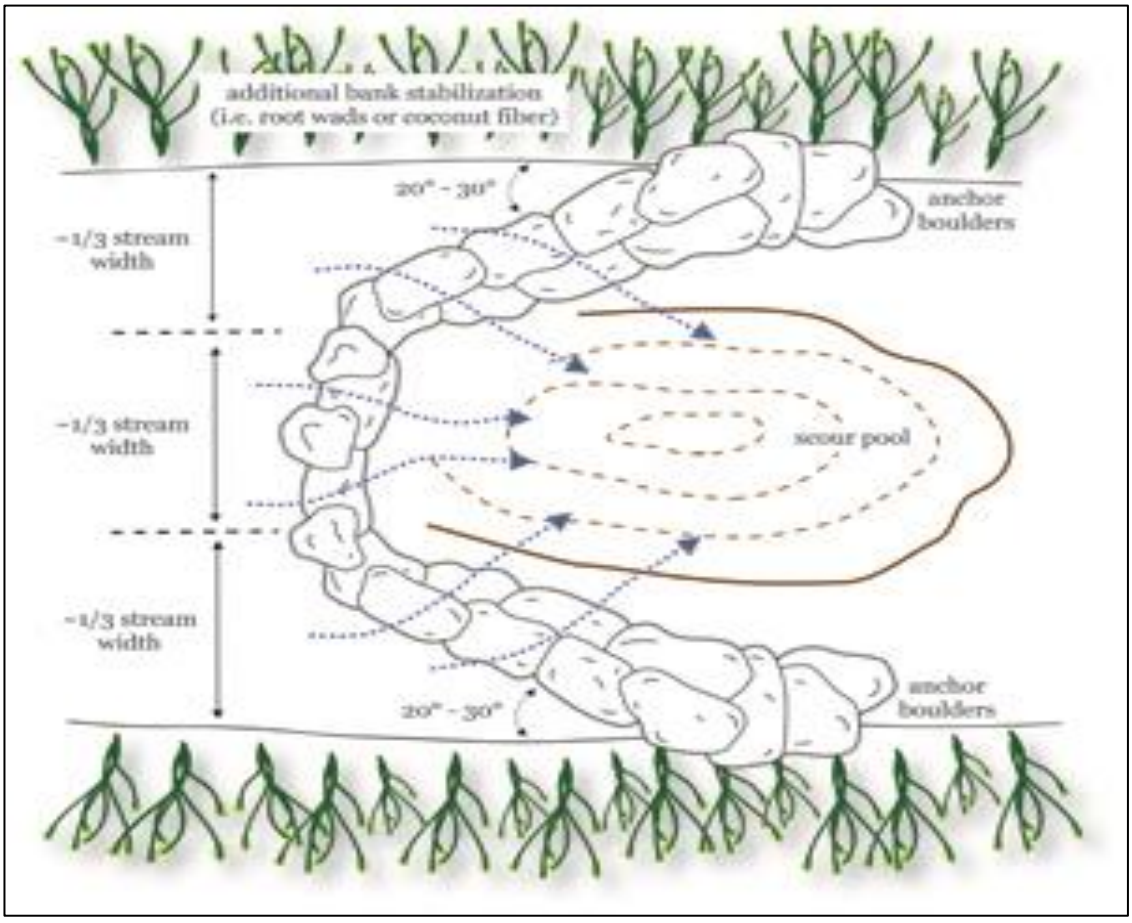
Construct Grade/Flow Control Structures

Grade control structures, such as rock cross-vanes and weirs, can decrease near-bank shear stress, velocity and stream power, but increase the energy in the center of the channel. Rock cross-vanes and similar grade control structures would be installed to establish grade control, reduce bank erosion, create a stable width/depth ratio, and maintain channel capacity, while maintaining sediment transport capacity and sediment

competence (**Figure 2-8**). The cross-vane also can improve stream habitat by: 1) increasing bank cover due to a differential raise of the water surface in the bank region, 2) creating holding and refuge cover during both high and low flow periods in the deep pool, 3) developing feeding lanes in the flow separation zones (the interface between fast and slow water) due to the strong down-welling and up-welling forces in the center of the channel, and 4) creating spawning habitat in the tail-out or glide portion of the pool.

Rock sizes and placement locations of grade control structures in Putah Creek would be determined based on site-specific conditions and calculations of bank-full shear stress. Large boulders used in constructing these features would be gathered on-site (where possible) and/or imported from local sources.

Figure 2-8 Rock Cross-Vane – Typical Plan View



Source: Hill et al., 2007.

Stabilize Channel Banks

Maintaining stable banks is the foundation of stewardship and water quality protection efforts along the creek. Bank erosion contributes fine sediments to the creek that degrade the water quality and habitat conditions for salmonids and other aquatic species. Increased sediment reduces visibility needed for foraging, can cover or bury incubating salmonid eggs, and the associated increased level of nutrients can reduce oxygen levels in the water.

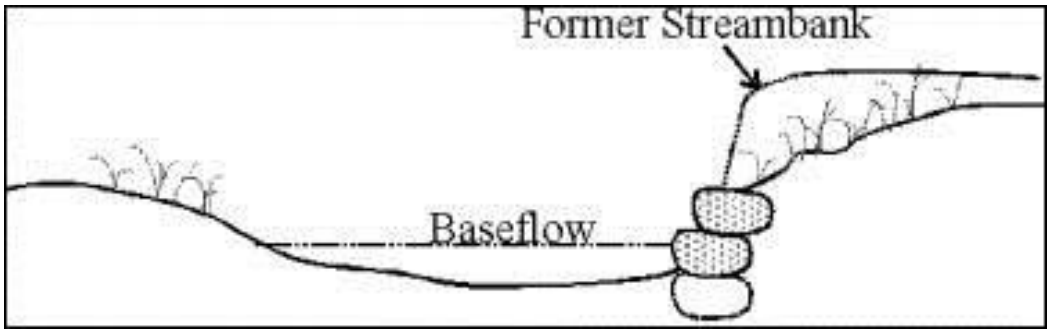
Priority would be given to bank stabilization methods that can provide multiple benefits (e.g., cover, velocity refuge, shade, and foraging opportunities). Channel bank stabilization methods that may be employed include installation of rock revetment, log revetment, root wads, and/or large woody debris. These structural approaches may also incorporate the use of native plant materials (e.g., willow fascines, live stakes and cuttings, brush matting) and/or geotextiles/erosion control fabric. Rock material used in these installations would be sourced on-site to the extent possible. Large logs and or root wads would primarily be sourced on-site or from neighboring agricultural operations (dead orchard trees and eucalyptus removed in riparian forest management, for example). Live native cuttings and brush would similarly be collected on-site or from adjacent lands.

Construct Rock Revetments

Along streams, the most erosion prone area is the toe of the stream bank. Failure at the toe of the stream bank can result in failure of the entire bank and lead to large influxes of sediment to the stream. Rock (or boulder) revetments serve to protect the most vulnerable portion of the stream bank. Rock revetments are often combined with other bank stabilization measures to protect the stream bank area above the revetment.

Rock revetments would be created by first excavating a trench below the invert of the stream along the toe of the stream bank. In this trench, a series of generally large, flat or rectangular boulders would be placed as a foundation for the revetment stones. Once the foundation stones were been installed, the revetment stones would be placed on top the foundation stones (**Figures 2-9** and **2-10**). Rocks or boulders would be placed up to the ordinary high water elevation. If protection is needed higher on the bank, a second set of rock may be placed on top of the first. Rock size would be determined based on reach specific stream velocity conditions. Used alone, rock revetments have only a modest potential to enhance stream habitat. Rock revetment may be combined with planting of live cuttings in interstices between the rocks to increase habitat value.

Figure 2-9 Rock Revetment Concept Drawing



Source: The Stormwater Manager's Resource Center.

Figure 2-10 Rock Revetment Under Construction

Source: Pier+Kieli, 2007.

Construct Log Revetments

Log revetments are constructed by cabling logs along eroding stream banks to deflect, absorb, and diffuse the erosive force of stream flows. To facilitate sediment settling, brush is densely packed around the large logs (**Figure 2-11**).

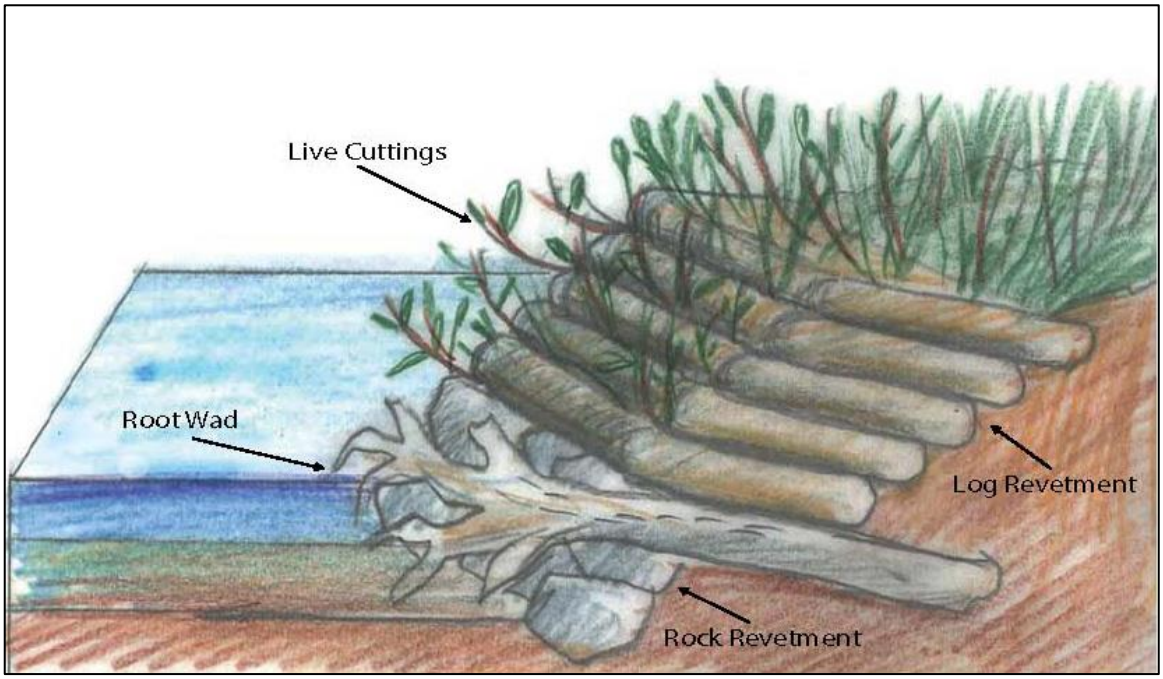
Figure 2-11 Log Revetment Immediately Post Construction

Source: ESA, 2014.

Logs would be placed at the streambed, bank toe, and bank, up to the ordinary high water elevation, aligned along the channel banks, and stacked on top of each other. Logs would be anchored to the bed and bank of the channel and attached to each other using cable, rebar, or other similar materials. Logs used to construct revetments would typically vary between 12 and 36 inches in diameter.

Live plant cuttings, brush, and in some cases, soil (where log revetments are installed in conjunction with creation of floodplain surfaces, for example) would be packed between the logs and into the eroding banks, and incorporated with log revetments to further stabilize the structures and to provide forage and refugia for fish and other aquatic and terrestrial wildlife. Log revetments can work in tandem with other stream bank stabilization techniques, such as rock revetments, root wads, and live willow cuttings (**Figure 2-12**).

Figure 2-12 Log Revetment, Rock Revetment, and Root Wad Combination, Using Live Cuttings



Source: ESA, 2014.

Install Root Wads

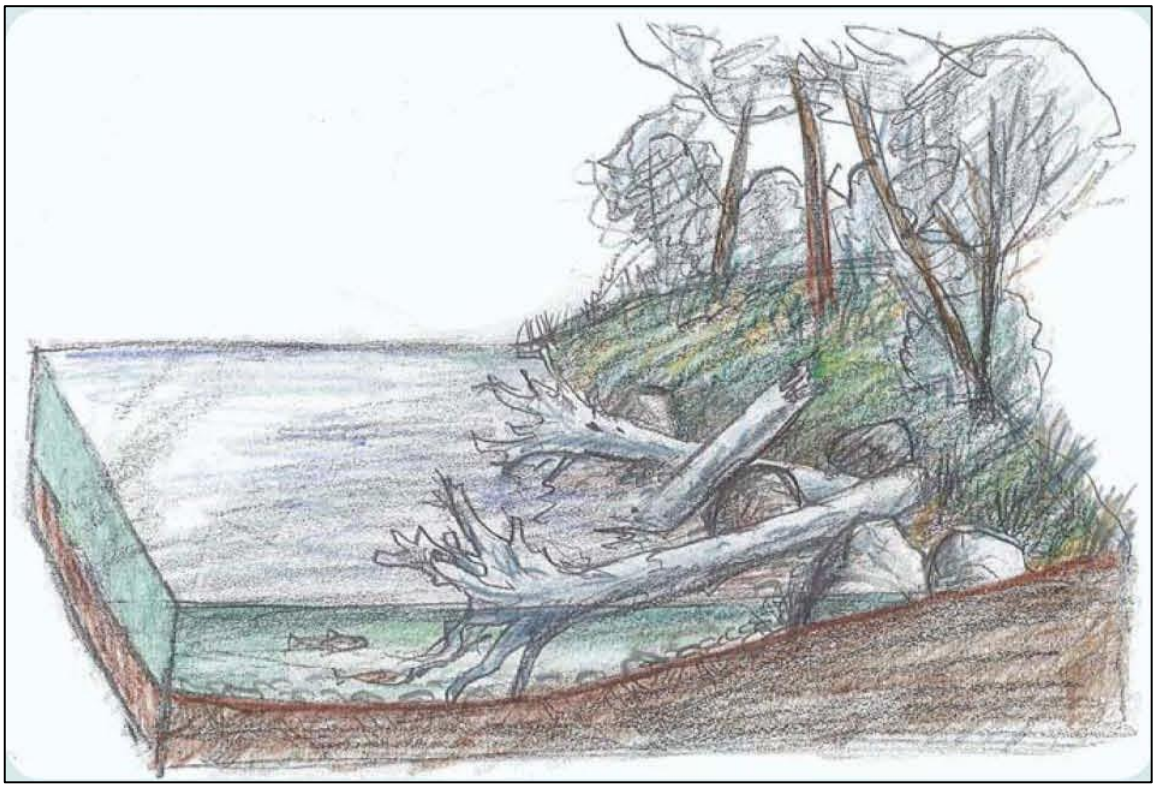
Root wads are log installations that can be embedded in the stream bank to deflect flow against the bank, create instream habitat for fish and other aquatic species, and add roughness to the channel and floodplain. Root wads provide cover, velocity refuge, shade, and foraging locations for fish (perennially in the main channel and seasonally on the floodplain, under high flow conditions). Root wad structures can provide necessary cover and food sources for salmonids immediately following construction.

Root wads would be constructed by embedding the trunk of a "footer log" into the bank, below the thalweg, topped diagonally by a second log, with root crown and roots projecting into the channel to form an "X". The logs would be anchored to the bed and bank of the channel and attached to each other using cable, rebar, or other fasteners (**Figure 2-13**).

Install Large Woody Debris

Large wood is a vital component of creek systems because it provides lasting structural and habitat components and creates hydraulic conditions that support more sustainable off-channel habitats. Large wood structures can be used to create local scour holes for riffle and pool enhancement, flow deflection, and cover and edge complexity. These

Figure 2-13 Root Wad



Source: ESA, 2014.

structures support significant habitat complexity by creating trapping sediment, and providing cover for fish over a range of flows and depths. The placement and orientation of multiple wood structures can be used to create areas of flow constriction, to direct or turn flow, and to induce scour to maintain openings at connections to side channels.

Large wood structures installed under the Program would typically consist of one to three logs with intact root wads. Construction would include excavation and trenching to embed logs, driving logs into the bank and bed, and interlocking individual logs. The logs would be stabilized using large boulders for ballast, pinning with other logs that would be driven vertically into the bank, or using existing trees to interlock the logs (**Figure 2-14**). Large logs and anchoring boulders would primarily be sourced on-site or from neighboring agricultural operations.

Improve Fish Spawning Gravels

Gravel mining and changes in flow regimes created by dam construction have left many salmon-bearing Pacific coast gravel-bed rivers and streams in geomorphically and biologically dysfunctional states. Trapping of coarse gravels has led to deficits in the

Figure 2-14 Large Woody Debris Anchored by Boulders

Source: ESA, 2014.

reaches below the dams. These coarse gravels are a necessary characteristic of spawning beds, so a gravel deficit leads to a reduction in spawning habitats. Poor intragravel conditions, primarily associated with low permeability (caused by an excess of fine material) and/or armoring of substrate materials, have degraded spawning areas. Gravel is a mobile material, so is important for maintaining geomorphic processes that lead to dynamic and diverse stream channels. Since construction of the Monticello Dam, habitat in Lower Putah Creek for spawning and other salmon life stages has become severely degraded, and salmon populations have drastically declined.

The general aim of this category of activities is improvement of spawning habitat, but also the restoration of the geomorphic and biological functioning of the stream such that spawning habitat is naturally maintained over the long term. Program activities would include gravel augmentation, salvage of gravel for reuse, and loosening of gravels embedded in the creek bed by scarification. Each potential spawning gravel improvement activity is described in more detail below.

Gravel Augmentation and Salvage

Gravel augmentation or gravel replenishment means artificially adding gravel suitable in size distribution for salmon spawning and fry emergence to existing riffles in the streambed where these riffles lacks sufficient or suitable gravel.

Gravel would be augmented in riffles to restore and/or improve conditions in gravel bar deposits for salmon spawning. Gravels would be salvaged from within the Program site from activities that involve excavating gravels, or gravels would be imported to the site. Where gravels must be imported, the majority would come from the nearby Putah South Canal spoil site. Gravels would be placed into the streambed using a loader.

Loosen Embedded Gravels by Scarification

In locations where armoring has rendered streambed gravels unsuitable for use by spawning salmon, gravel scarification may be undertaken to loosen embedded gravels. Scarification would be accomplished using excavators to loosen gravels that are impacted by cementation.

Fill Abandoned Gravel Pits

Historically, side channels on Putah Creek were mined for gravel and disconnected from the stream and its floodplain. Wetland and riparian habitat around these side channels was also destroyed. Fish and aquatic organisms lost access to the slower water flows and adjacent floodplain wetlands the mined areas formerly provided. By filling abandoned gravel pits and reconnecting these areas to the functional creek corridor, these areas would be returned to a more natural state and provide habitat for the threatened Chinook salmon.

The Program would fill and reconnect former gravel pits to the creek as off-channel habitat. Abandoned gravel pits would be filled to floodplain elevation. Isolated (off-channel) pool areas would be retained or may be created. In some locations, fill would be placed to slightly lower elevations to create wetland habitat within the footprint of abandoned gravel pits. Fill material would consist of clean soil and rock. If not available within the site, these materials would be imported from local sources, such as the Putah South Canal spoil site, where a mix of native soil, rock, and gravel is available. Restored gravel pits would be planted with appropriate native plant species (see *Plant Native Vegetation* discussion, below).

2.4.2 Vegetation Management

The vegetation patterns of Putah Creek have changed significantly due to the operation of the Monticello and Putah Diversions dams, agricultural diversions, and other disturbances. Active vegetation management would be undertaken, and would include both invasive vegetation removal and establishment of new native plantings. For the benefit of salmonid habitat, plantings would be designed to: manage stream bank and channel stability; shade the main channel and newly created off-channel habitats; provide surface sediment filtering; provide food sources; restore structural diversity; suppress invasive species; and provide sources of small organic debris and wood for the channel. These activities are further described below.

Remove Invasive Plants

Invasive vegetation control activities would occur year round. Weed control activities would typically be accomplished in combination with clearing and grubbing, and followed by revegetation with native wetland and riparian plant species. Invasive vegetation control would be accomplished via manual/mechanical removal, chemical control, or a combination of these methods (**Table 2-1**). Temporary access trails may be created to facilitate weed control activities. Creation of such temporary access features would be undertaken during the construction season.

A. **Manual and/or Mechanical Removal** – Mechanical equipment, such as bulldozers, scrapers, weed whackers, and hand tools, including broom wrenches, would be used to remove invasive weeds and other nuisance vegetation.

B. **Chemical Control** – Herbicides that are approved by the California Department of Pesticide Regulation would be used in accordance with their labels to control invasive weeds and other nuisance vegetation, such as *Arundo donax*, *Lepidium latifolium, Rubus armeniacus*, *Tamarix* spp., and *Ailanthus altissima*.

Plant Native Vegetation

The LPCCC plants native vegetation in all seasons to enhance fish and wildlife habitat and to deter regrowth of invasive weeds. The LPCCC operates a nursery that propagates native plants from locally collected seeds and cuttings or purchased seeds from local sources. Native plants of up to 4 inches diameter at breast height (DBH) may be transplanted at revegetation sites. Some revegetation sites may also serve as on-site growing grounds for native transplants. Growing grounds sites would be planted at higher densities to compensate for future removal. Such growing ground sites are typically located 100 feet or more from the low flow channel to minimize potential for

Table 2-1 Invasive Vegetation Control Methods

	Mechanical			Herbicides						
Species	**Excavator**	**Loader/ Dozer**	**Weed Wrench**	**Glyphosate**	**Triclopyr**	**Imazapyr**	**Aminopyralid**	**Clorsulfuron**	**Diothopyr**	**Isoxaben**
Almond (*Prunus dulcis*)	✓		✓		✓	✓				
Arundo (*Arundo donax*)	✓			✓						
Black Locust (*Robinia pseudoacacia*)	✓		✓		✓	✓				
Catalpa (*Catalpa bignoniodes*)	✓		✓		✓	✓				
Edible Fig (*Ficus carica*)	✓		✓		✓					
English Ivy (*Hedera helix*)	✓				✓	✓				
Eucalyptus (*Eucalyptus sp.*)	✓		✓	✓						
Fennel (*Foeniculum vulgare*)		✓		✓						
Himalayan Blackberry (*Rubus discolor*)	✓	✓		✓						
Pampas Grass (*Cortaderia sp.*)	✓			✓						
Milk Thistle (*Silybum marinum)*		✓		✓			✓			
Pepper tree (*Shinus molle*)	✓				✓	✓				
Perennial Pepperweed (*Lepidium latifolium*)				✓				✓		
Tamarisk (*Tamarix sp.*)	✓				✓					
Tree-of-Heaven (*Ailanthus altissima*)	✓			✓	✓	✓				
Tree Tobacco (*Nicotiana glauca*)			✓	✓	✓					
Vinca (*Vinca major*)		✓		✓						

Table 2-1 Invasive Vegetation Control Methods

	Mechanical			Herbicides						
Species	**Excavator**	**Loader/ Dozer**	**Weed Wrench**	**Glyphosate**	**Triclopyr**	**Imazapyr**	**Aminopyralid**	**Clorsulfuron**	**Diothopyr**	**Isoxaben**
Virginia Creeper (*Parthinocissus quincifolia*)		✓		✓						
Winter Annual Weeds (pre-emergent)		✓		✓					✓	✓
Yellow Starthistle (*Centaurea solstitialis*)		✓		✓			✓			

flood flow obstruction. The LPCCC would install native plant poles, cuttings, seeds, container plants, and plugs following weed management and site preparation activities, such as clearing and grubbing (see Section 2.5.1 below).

2.4.3 Maintenance of Habitat Enhancement Sites

Adaptive management plans including site-specific performance criteria would be established for each project implemented under the Upper Reach Program. Maintenance and monitoring would be conducted, and corrective measures implemented where these criteria were not achieved. Maintenance activities at sites where creek and habitat enhancement activities have been implemented would include irrigation, invasive plant species control, replanting of failed native plantings, adjustments/repairs to damaged or failed structures, and maintenance of some long-term access points. These activities are described below.

Irrigate Native Revegetation Sites

Irrigation is expected to be used for up to three years at revegetated sites to establish native plantings. Different irrigation methods may be used depending on the site (e.g., low pressure low impact spray heads, drip irrigation, bubblers), but all irrigation components would be above ground and temporary. Longer-term irrigation (beyond the first three years) may be needed to maintain plants or irrigate new plantings if the original plantings fail to meet success criteria.

Manage Non-Native Vegetation at Restored Sites

Invasive species would be removed using hand, mechanical, and/or chemical methods as necessary (Table 2-1).

Maintain Long-Term Access Points

With landowner agreement, the LPCCC Streamkeeper may establish access easements at key locations along the creek for the purposes of long-term restoration/enhancement site management. In such cases, the access points created during restoration project construction would not be fully revegetated, and would be managed to allow Streamkeeper access and use of small equipment/vehicles, such as ATVs or front loaders. These access points would be developed with local landowners for the purposes of the Program and are not intended to provide public access where such access is not expressly granted by the landowner.

2.5 CONSTRUCTION RELATED ACTIVITIES

Implementing the Program would entail varying degrees of temporary site manipulation and/or disturbance. This section describes Program implementation construction activities.

2.5.1 Site Preparation

Site preparation activities would include clearing and grubbing, vegetation management, and installation of protective fencing around sensitive resources on or adjacent to Project work areas.

Clearing and Grubbing

Clearing and grubbing would include removal of debris, vegetation, and/or minor demolition (of relict structures, for example). Vegetation would be cleared to the ground surface, and large tree roots would be removed. Where feasible, native vegetation removed from the site would be salvaged for re-use in restoration activities. Non-native species would be chipped and/or removed to an appropriate disposal/recycle facility. All refuse and debris would be removed from the site and legally disposed of.

Vegetation Management

Vegetation management activities may include the removal of invasive vegetation, native plant protection, and removal or trimming of vegetation in areas of the Project sites where grading or placement of biotechnical, rock, or other materials would occur, and/or to facilitate access.

Invasive plants would be removed using manual, mechanical or chemical treatments or a combination of these, as appropriate to the specific target species (see Section 2.4.2 above and Table 2-1).

Existing native vegetation or other sensitive resources to remain within or adjacent to the Project site may be identified and protected with fencing prior to commencement of invasive species treatments and/or site disturbing activities (including construction of temporary access ramps/roads). Elderberry shrubs (*Sambucus sp.*), which provide habitat for the federally listed valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), typically would be protected in place following the standard elderberry protection guidelines; however, on some sites a mitigation plan may need to be prepared to identify measures to transplant or replace elderberry shrubs. Such

determination would be made on a project-specific basis. (See Section 3.4, *Biological Resources*, of this PEIR for further discussion.)

2.5.2 Project Access

Materials and equipment would be delivered to the Project area via surface roads. Trucks and vehicles would access the Project Areas via Putah Creek Road and local private roads on the north or south side of Putah Creek. Existing roads in the Program Area would be used as the primary access for construction of the bank protection measures. Access to the stream bank would be via existing roads wherever possible. Internal access within the Program implementation areas would be restricted to disturbed areas once initial site preparation activities had commenced.

During construction, existing roads through the subject site(s) would be cleared of vegetation (to a width of approximately 12 feet) and may be nominally improved (graded and possibly surfaced with gravel and rock or potentially matting/cribbing) to accommodate heavy equipment and trucks.

Should access across adjacent property be needed for Program implementation, landowners would be notified prior to commencement of construction activities, and the necessary authorizations (e.g., access easement agreement, road maintenance agreement) would be obtained to ensure minimal disruptions to their land and daily activities. These agreements would contain measures to minimize dust on private roads by maintaining low vehicle speeds (less than 10 mph) and by watering roads. The agreements would also provide for proper notification in advance of construction access, maintain access for agricultural traffic, grading or laying gravel to improve roads disturbed by construction traffic, schedule access around irrigations, avoid travel over wet ground, and other measures negotiated with the landowners.

Construction materials, including any needed soil, sand, and aggregate, would be hauled from a commercial or previously permitted quarry or borrow site located within 30 miles of the Program Area.

Construction Access to Channel

Construction equipment access to the stream channel and floodplain for implementation of Program activities would be via existing access ramps and roadways. In some cases these are overgrown and would need to be cleared and grubbed. Following completion of construction and post construction establishment activities, cleared access features would be re-graded to match natural contours and fully

revegetated with appropriate native plant species, except where they are intended to be maintained for future use.

2.5.3 Construction Staging Areas

For projects where staging areas would be needed for storage/staging of vehicles, fuels, materials, and other associated construction equipment, these would be designated in previously disturbed areas and/or in areas along the tops of the upper creek terraces with easy access to the stream banks and (constructed temporary or existing) access points. Staging areas would be cleared of any vegetation and/or debris. Adjacent native vegetation would be protected. Following completion of project activities necessitating the use of staging areas, these areas would be cleared of any equipment and/or debris and revegetated with appropriate native plant species.

2.5.4 Temporary Flow Diversion

Flow diversion is typically implemented where channel reconfiguration activities are to be implemented over a long stream reach, in a reach where a deep pool is located, or where alternate methods of separation of the work area from the flowing stream are not feasible. In some cases, regulatory agencies may require stream diversion to allow work in a stream channel. For projects that require temporary diversion/dewatering of the active channel, prior to commencement of earth moving activities within the creek channel, temporary diversion pipe(s) and sheet-pile coffer dam would be installed. Diversion pipe(s) would be placed such that they are aligned with the thalweg of the design channel. Fill would be placed around the pipe(s) to floodplain elevation. Following completion of in-channel activities, flows would be released into the restored channel, and diversion pipe(s) and coffer dam would be removed.

2.5.5 Construction Schedule

Based on current and anticipated resource levels (staff and funding), physical constraints to work in or near the creek (e.g., high flows, species work window restrictions, mandatory flow releases), and the intent of the Program to limit construction-related impacts, it is anticipated that a limited number of projects would be implemented each year. Depending on site conditions and the results of pre-construction surveys, construction would occur during the months between April and October. The various wildlife and stream flow release constraints on work scheduling are shown below (**Table 2-2**). On average, 12 construction workers would be on-site, and a maximum of 20 workers would be working on any given work day. Construction is expected to occur primarily during daytime hours 8:00 a.m.to 5:00 p.m., Monday

through Friday; however, if needed, construction could occur between 7:00 a.m. and 7:00 p.m. No nighttime construction or weekend work is anticipated.

2.5.6 Site Specific Project Reaches and Locations

This PEIR is intended to cover activities that may be implemented along Putah Creek between the Putah Diversion Dam and the Yolo Bypass Wildlife Area (the Putah Creek Restoration Project Upper Reach). For the purposes of Program planning and implementation, the Upper Reach has been further divided into 17 Project reaches (Figure 2-1). Specific activities are anticipated within each Project reach as determined by current conditions. **Table 2-3** shows the Project activities anticipated to be implemented at each project reach within the overall Project Area. Preliminary versions of maps and summaries of conditions and anticipated activities and outcomes for the individual project reaches are provided in Appendix C.

2.6 ANNUAL SCOPE OF ACTIVITIES

The Program has been designed to minimize environmental impacts of overlapping projects by including the following annual construction limits:

- Implementation of the proposed Program activities would be limited to a *combined* total maximum of 640 acres per calendar year, with a typical range from 20 to 60 acres/year; and a maximum annual total Project length of five stream miles, with a typical distance of 2 miles per year. Work in any one activity category would not exceed 60 acres per year in order to minimize potential impacts. Activities would be conducted in a discontinuous pattern to further avoid or minimize any potential construction-related effects.
- Gravel augmentation and salvage would be limited to 500 cubic yards each, per year.
- No more than 61 new riffles would be created each year within the Project Area, each requiring approximately 170 cubic yards of gravel, for a total maximum of 10,187 cubic yards of gravel placed per year.
- In the Solano County portion of the Project Area, the maximum number of one-way 3- and 4-axle truck trips would be 42 per day. In the Yolo County portion of the Project Area, daily 3- and 4-axle truck trips would not exceed 19 one-way trips.
- Construction materials, including any needed soil, sand, and aggregate, would be hauled from a commercial or previously permitted quarry or borrow site located within 30 miles of the Project Area.

Table 2-2 Program Work Scheduling Limitations

	January	February	March	April	May	June	July	August	September	October	November	December
Biological Restrictions[a]												
Swainson's Hawk			Mar. 15	No intensive new disturbances within ½-mile of active nests (away from urban development)[b]				Aug. 15*	Sept. 1			
Breeding Birds		Feb. 1			Require Survey[c]			Aug. 31				
Valley Elderberry Beetle	Transplant only in November through first 2 weeks in February										Transplant only in November through first 2 weeks in February	
Hydrologic Restrictions[a]												
In-water work	Work restriction through April 15				Unrestricted work when Los Rios Check Dam is in Place[d]							No later than Dec. 15

Note: *If a Management Authorization or BO is obtained.
[a] Additional restrictions may be required by trustee agencies.
[b] See Mitigation Measure 3.4-5.
[c] If construction, grading, or other project-related improvements are scheduled during the nesting season of protected raptors and migratory birds (typically February 1 to August 31), a focused survey for active bird nests shall be conducted by a qualified biologist within 15 days prior to the beginning of project-related activities (see Mitigation Measure 3.4-6).
[d] Work shall be timed with the driest time within the channel. The time period for completing the work within the flowing or standing water of the watercourses shall be confined to the period of April 15 to the date when boards are pulled at the Los Rios Check Dam (not later than December 15). Work within the dry portion of the stream zone shall be timed with awareness of precipitation forecasts and likely increases in stream flow and river flood stages. Construction activities within the stream zone shall cease until all reasonable erosion control measures, have been implemented prior to all storm events. Construction equipment and material shall be removed from the floodplain if inundation is likely. Revegetation, restoration and erosion control work is not confined to this time period.
Sources: BSK Associates, 2015; typical CDFW conditions for work on Putah Creek.

Table 2-3 Activities within Project Subreaches

	NAWCA\Mariani	Duncan-Giovannoni	Winters Putah Creek Nature Park	East of 505	Warren	Upper McNamara	Lower McNamara	Lester	Russell Ranch	Stevenson Bridge	Glide Ranch	Nishikawa	Olmo-Hammond-UCD	I-80 to Old Davis Road	Old Davis Road to Mace	Mace to Road 106A	Road 106A to Yolo Bypass
Channel Reconfiguration																	
Create low-flow channel and floodplain	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create side channels	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Reposition thalweg	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construct riffles	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Increase channel sinuosity	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construct rock cross-vane grade/flow control structures	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stabilize channel banks	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construct rock revetments	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construct log revetments	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Install root wads	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Install large woody debris	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Improve fish spawning gravels	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
Gravel augmentation	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
Loosen embedded gravels by scarification	✓				✓			✓		✓		✓					
Fill abandoned gravel pits		✓	✓	✓		✓	✓		✓		✓		✓			✓	

Table 2-3 Activities within Project Subreaches

	NAWCA\Mariani	Duncan-Giovannoni	Winters Putah Creek Nature Park	East of 505	Warren	Upper McNamara	Lower McNamara	Lester	Russell Ranch	Stevenson Bridge	Glide Ranch	Nishikawa	Olmo-Hammond-UCD	I-80 to Old Davis Road	Old Davis Road to Mace	Mace to Road 106A	Road 106A to Yolo Bypass
Vegetation Management																	
Remove invasive plants	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Manual and/or mechanical removal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chemical control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Plant native vegetation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pole planting	✓				✓		✓	✓	✓	✓		✓	✓			✓	✓
Cuttings	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Seedlings	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Seeding (drill/direct)	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
Container plants	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Plugs	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Transplant	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maintenance of Habitat Enhancement Sites																	
Irrigate native revegetation sites	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Manage non-native vegetation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Manual and/or mechanical removal				✓					✓	✓		✓	✓				
Chemical control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-3 Activities within Project Subreaches

	NAWCA\Mariani	Duncan-Giovannoni	Winters Putah Creek Nature Park	East of 505	Warren	Upper McNamara	Lower McNamara	Lester	Russell Ranch	Stevenson Bridge	Glide Ranch	Nishikawa	Olmo-Hammond-UCD	I-80 to Old Davis Road	Old Davis Road to Mace	Mace to Road 106A	Road 106A to Yolo Bypass
Maintain long-term access points	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construction Related Activities																	
Temporary flow diversion		✓				✓	✓		✓	✓	✓		✓		✓	✓	
Temporary staging areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Site Preparation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clearing and grubbing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vegetation management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Installation of protective fencing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: ESA Associates, Inc., 2015.

2.7 PROJECTED PROGRAM OUTCOMES

Project goals and projected Program outcomes (with implementation of all anticipated individual reach projects) are presented in **Table 2-4**.

Table 2-4 Project Goals and Projected Outcomes

Goal	Objectives	Projected Outcome by Program Activity		
		Channel Reconfiguration	Vegetation Management	Maintenance of Habitat Enhancement Sites
1 Improve passage, rearing and Emigration of adult and juvenile salmonids in Putah Creek	1.3 1.4 Provide for ***effective fish passage for essential life history stages—i.e., structural passage and recruitment and emigration flows***[a]—between the Yolo Bypass and Putah Creek above the Yolo Bypass Wildlife Area (Objective 1.3) and on Putah Creek from the YBWA boundary to upstream spawning grounds below the Putah Diversion Dam (Objective 1.4)	Modifying channel geometry by creating a confined low flow channel would enhance flow depths for fish passage. Constructing in-channel pools would provide resting locations for migrating adults. Constructing grade/flow control structures would remove velocity barriers to and provide sufficient flow depths for fish passage. Bank stabilization and large woody debris features would provide velocity refuges, resting and foraging locations. Specific to the Mace to Road 106A subreach project: replacing the current seasonal earthen fill crossing with modular box culverts and providing a fish ladder or equivalent natural feature would improve fish passage between the YBWA and Putah Creek upstream of Road 106A.	N/A	N/A
	1.5 Restore, enhance, and maintain spawning and rearing physical habitats and processes on Putah Creek below the Putah Diversion Dam	Modifying channel geometry by creating low flow channels and floodplains and constructing riffles would restore and enhance spawning and rearing habitat. Constructing grade/flow control structures would create spawning habitat in glide portions of pools. Improving fish spawning gravels would enhance spawning habitat. Restoring 171 acres of open water pools to 89 acres of reconfigured channel and 82 acres of floodplain habitat would provide important spawning and rearing areas for many fish species. Bank stabilization measures that incorporate live plant material (log revetments, root wads, large woody debris) would provide cover, velocity refuge, shade, and foraging locations for fish (perennially in the main channel and seasonally on the floodplain, under high flow conditions).	Planting native vegetation would provide food sources, restore structural diversity, provide sources of in-stream small organic debris and wood, and increase shaded riverine area cover, therefore restoring and enhancing spawning and rearing physical habitats. Removing invasive plants would support establishment of native vegetation and thus support restoring and enhancing spawning and rearing habitat.	Irrigating and maintaining restored native riparian vegetation and managing non-native vegetation would promote establishment of native over non-native vegetation, which is turn would support spawning and rearing habitat.

Table 2-4 Project Goals and Projected Outcomes

Goal	Objectives	Projected Outcome by Program Activity		
		Channel Reconfiguration	**Vegetation Management**	**Maintenance of Habitat Enhancement Sites**
	1.6 Provide necessary ***flow regimes[1] and water quality conditions for recruitment, rearing, and emigration of self-sustaining runs of salmonids*** on Putah Creek	Restoration of 82 acres of functional floodplains would support salmonid runs and other fish species— floodplains are important spawning and rearing areas for many fish species. Floodplain wetlands also act as nutrient and sediment sinks—improving water quality in the stream. Bank stabilization actions provide refugia and forage locations and would reduce contributions of fine sediment to the creek waters from unstable, eroding banks. Bank erosion contributes fine sediments to the creek that degrade the water quality and habitat conditions for salmonids and other aquatic species. Increased sediment reduces visibility needed for foraging, can cover or bury incubating salmonid eggs, and the associated increased level of nutrients can reduce oxygen levels in the water. Bank stabilization measures that incorporate live plant material (revetments, root wads, large woody debris) would provide shade (lower water temperatures), and foraging locations for fish (perennially in the main channel and seasonally on the floodplain, under high flow conditions).	Planting native vegetation would enhance water quality by stabilizing channel banks and filtering surface water runoff thereby by reducing erosion and fine sedimentation loads and improve water temperature by providing shade along low flow channel and off-channel habitats.	Maintaining native revegetation and managing non-native vegetation would help native tree and other vegetation establish over time. Established native riparian vegetation would provide more channel shading and surface sediment filtering, improving water quality conditions.
	1.7 Incorporate ***natural planform and cross sectional geomorphology*** that supports ***structural habitat complexity and natural hydrologic, geomorphic, and ecological processes***	Modifying channel geometry by creating low flow channels and floodplains (providing habitat complexity), side channels (providing velocity refugia, foraging area, and protection from predators), repositioning the thalweg (providing stabilization of channel form), increasing channel sinuosity (increasing structural complexity), and filling abandoned gravel pits (creating floodplain and wetland habitat) would support natural hydrologic, geomorphic, and ecological processes.	Planting native vegetation would help to provide stability to reconfigured channel planform and cross section, thus supporting outcomes described under Channel Reconfiguration.	Irrigating native revegetation and managing non-native vegetation would provide stability to reconfigured channel planform and cross section, thus supporting outcomes described under Channel Reconfiguration.

Table 2-4 Project Goals and Projected Outcomes

Goal	Objectives	Projected Outcome by Program Activity		
		Channel Reconfiguration	Vegetation Management	Maintenance of Habitat Enhancement Sites
4 Preserve and enhance, where possible, existing beneficial uses including public access, wildlife viewing, hunting and fishing, balance with existing, enhanced, and restored ecological functions.	4.1 Maintain a ***balance of existing fish and wildlife habitats, hunting, fishing, wildlife viewing, and other public benefits*** including water supply and agriculture between the PDD and YBWA[b]		N/A	Maintaining long-term access points would support a continued balance of wildlife, hunting, fishing, wildlife viewing, and other public benefits. Specific to the Olmo-Hammond-UCD subreach project: maintaining access would greatly enhance the natural setting and learning opportunities for Camp Putah (a week-long summer camp for Davis youth).
5 Enhance habitats for Delta native fishes and wildlife within the Putah Creek Project Upper Reach	5.1	*Same as Objective 1.3*		
	5.2	*Same as Objective 1.5*		
	5.3 Provide necessary ***flow regimes[a] and water quality conditions to support anadromous and other native Delta fishes*** on Putah Creek	*Same as Objective 1.6*		
	5.4	*Same as Objective 1.7*		
	5.5 ***Maintain and enhance native riparian vegetation communities*** along Putah Creek below the Putah Diversion Dam	Bank stabilization measures that incorporate live plant material would promote native riparian community enhancement along channel banks.	Converting 82 acres of open water to floodplain habitat, which would be planted with riparian vegetation, would enhance native riparian communities along Putah Creek. Removing 94 acres of invasive plants and planting them with native riparian vegetation would enhance riparian vegetation communities.	Irrigating restored areas of native revegetation and managing non-native vegetation would enhance native riparian vegetation communities
	5.6	*Same as Objective 4.1*		

[a] Flow regimes to support effective fish passage and to provide conditions necessary for recruitment, rearing, and emigration of salmonids, other anadromous fish, and other native Delta fish are provided by the Putah Creek Accord.

[b] The program would maintain current public uses along Putah Creek including hunting, fishing, wildlife viewing, public access, and water uses for agriculture. The program also contains annual limits of Project activities and would typically occur at a range of 20 to 60 acres/year. Activities would be conducted in a discontinuous pattern to minimize any potential construction-related effects that may affect public uses.

3. ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES

This chapter provides a programmatic analysis of the potential environmental impacts of implementing the proposed Lower Putah Creek Restoration Project, Upper Reach Program (Project). As described in Chapter 1, *Introduction*, of this Program Environmental Impact Report (PEIR), the approach to analyzing the Project's environmental impacts is programmatic because the program presents a program of proposed activities over a period from approximately 2015 to 2030. The proposed Project consists of the implementation of a combination of stream restoration and habitat enhancement activities along approximately 24 miles of Lower Putah Creek.

The programmatic analysis of Project impacts addresses potential impacts related to all aspects of the restoration program, as described in Chapter 2, *Project Description,* of this EIR. Much of the project description is presented at a programmatic level of detail, meaning that the project description lacks the detail that will be available when each of the specific restoration projects are proposed. Thus, to conduct this California Environmental Quality Act (CEQA) analysis, assumptions were made about the results of implementing the proposed project. These assumptions are discussed in Chapter 2, *Project Description*.

The structure of the analysis is similar for each environmental issue. The analysis starts with a discussion of the existing environmental setting, and is followed by a programmatic discussion of potentially significant adverse effects resulting from implementation of the proposed Project. A table summarizing potential impacts and applicable mitigation measures for each reach follows the text discussion.

Each issue analysis includes the following sub-sections:

- **Environmental Setting:** This section describes the existing conditions of the environmental issue being analyzed, and includes a general setting and reach-specific settings for each of the 15 project reaches.
- **Regulatory Setting:** This section describes the applicable federal, state, regional, and local regulations related to the environmental issue being analyzed.

- **Thresholds of Significance:** Thresholds for analysis are independently determined by considering the regional context and the setting. This section presents the guidelines used to determine significance for each issue area.
- **Impacts and Mitigation Measures:** This section presents the evaluation methodology and the analysis of each specific environmental issue area. It then identifies any potentially significant environmental impacts or explains why an impact would not occur. Mitigation measures are identified for any potentially significant impacts that were identified. This section first identified general impacts and mitigation measures for the entire program then identifies impacts and mitigation measures applicable to each of the specific reaches.

3.1 HYDROLOGY

This section discusses local and regional hydrologic conditions, current channel conditions, expected channel evolution, potential changes in drainage patterns, flooding, and erosion in the Project Area. The section describes the interrelationship of these factors and the potential for the Project to impact them.

Analyses in this section are based on review of Federal Emergency Management Agency (FEMA) Flood Maps, a Geomorphology Assessment (Stillwater Sciences, 2014), and the Putah Creek Watershed Management Action Plan (WMAP) (EDAW, 2005), among other sources.

Water quality issues are discussed in Section 3.2, *Water Quality*. Section 3.14, *Utilities and Service Systems*, addresses water supply and associated systems.

The following CEQA Guidelines Appendix G hydrology topics are not addressed in this PEIR because the Project has no potential to affect them:

- 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 (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam
- Inundation by seiche, tsunami, or mudflow

3.1.1 Setting

Environmental Setting

Climate and Precipitation

The Putah Creek watershed has a Mediterranean climate of hot dry summers and mild rainy winters. Approximately 75 percent of the annual rainfall is received between November and March, the typical rainy season. Near the headwaters of Putah Creek in the Coast Range, 40 to 60 inches of rain falls annually, while the City of Davis, on the lower portion of Putah Creek, averages about 17 inches per year (EDAW, 2005, p. 1-8).

Regional Drainage

The Putah Creek watershed lies along the eastern flank of the California Coast Range and the western side of the Central Valley, within USGS hydrologic unit code (HUC) 18020109. In all, the 90-mile-long creek drops over 3,540 feet and drains a watershed area of approximately 660 square miles. The Putah Creek watershed is bordered by the watersheds of Cache Creek to the north and Napa River to the southwest.

Below Monticello Dam, the creek flows through a 6.7-mile-long "inter-dam" reach between the dam and Putah Creek Diversion Dam (PDD), where the creek emerges from the Coast Ranges. Tributaries to Putah Creek below Monticello Dam include Thompson Creek, Cold Creek, Bray Canyon Creek, and Pleasants Creek above the PDD, and McCune/Pleasant Creek and Dry Creek downstream of the PDD. Below the PDD and entering the Project Area (the upper reach of lower Putah Creek), Putah Creek flows eastward for approximately 26 miles, past the cities of Winters and Davis, and through the Yolo Bypass where it reaches the toe drain (see Figure 1-2 in Chapter 1, *Introduction*). The toe drain eventually joins the Sacramento-San Joaquin River Delta after following a straight, 20-mile long course along the Yolo Bypass.

Through the Project Area, Putah Creek flows along the bottom of a deeply incised corridor. Water surface elevations are typically 28 to 32 feet below the terrace elevations (City of Winters 2008, p. 12). The portion of the creek within the Project Area includes several long, deep, and wide pools created by historic mining activities. These pools reduce flow velocities and accelerate warming of the creek. The pools range in size from approximately 1.5 to 27 acres and are located in the following Project reaches: Duncan-Giovannoni, Upper McNamara, Lower McNamara, Russell Ranch, Stevenson Bridge, Glide Ranch, Olmo-Hammond-UCD, Old Davis Road to Mace, Mace to Road 106A, and Road 106A to Yolo Bypass Wildlife Area (YBWA).

An earthen dam at Road 106A, about 3 miles upstream of the Los Rios Check Dam forms a seasonal barrier to Putah Creek flows. Under a California Department of Fish and Wildlife (CDFW) permit, a plug of earth is pushed annually across the stream channel at this point. Downstream of the Project Area, the Los Rios Check Dam—a 30-foot-wide concrete dam, fitted with wooden flash-boards—is operated in conjunction with installation of the flash-boards at the dam at Road 106A to control the hydrology of the lower creek. From approximately from April 1 to December 1, to these dams are operated to form a pool of water for diversion to irrigation canals, and are also operated to impound water for irrigation and flood-up of wetlands managed by CDFW (Stillwater Sciences, 2014, p. 5). The check-dam boards and the soil plug are removed to provide fish passage in the winter rainy season.

Lower Putah Creek Flows

Historically, the inherently unpredictable nature of runoff in the upper watershed and flooding in the Yolo Basin resulted in substantial year-to-year variability in streamflow and overbank inundation patterns along Lower Putah Creek. Completion of the Solano Project in 1957 has led to a dramatic reduction in peak streamflow downstream; the post-dam 100-year peak flow is about one-fifth of the pre-dam peak flow. The creek historically discharged to the Yolo Basin with occasional through-flow farther into the north Delta during the highest flows (Whipple, *et al*., 2012; as cited in Stillwater Sciences, 2014, p. 12). The lower creek is believed to have been intermittent during most water years, as the upper watershed tributaries would usually run dry in summer months. Most low flows in the creek were wholly maintained by shallow groundwater inflow (Yates, 2003; EDAW, 2005; as cited in Stillwater Sciences, 2014, p. 12).

Since completion of the Solano Project, peak flows in the lower creek have been limited to high run-off from tributary inputs below the dam, such as McCune/Pleasant Creek or occasionally Dry Creek, or the considerably less frequent events when the Lake Berryessa rises to its upper level and spills via its glory hole. With the deeply incised channel and regulated flood flows after the Solano project, all peak flows have been contained within the confines of the upper terrace elevations (City of Winters, 2008, p. 12).

Currently, daily mean flows through the inter-dam reach are much reduced in the rainy season ranging from 10-15 cubic feet per second (cfs) compared with historic conditions. Conversely, baseflows in July through October are greater than historic

flows, ranging from a high of 43 cfs in July to a low of 20 cfs in September and October (SCWA, 2015).

The majority of the Putah Creek flows are diverted into the Putah South Canal at the PDD for irrigation, municipal, and industrial uses. Annual average diversion into the canal between water years 1995 and 2013 (excluding water year 1998) was approximately 190,000 acre-feet (USGS, 2014; as cited in Stillwater Sciences, 2014, p. 13; USGS 2007). Monthly mean flows in Putah Creek over this same time period were greatest between May and September (300 to 600 cfs) and lowest between November and February (40 to 60 cfs) (USGS, 2014; as cited in Stillwater Sciences, 2014, p. 13; SCWA 2015, p. 1). Between water years 2004 and 2013, the majority of streamflow reaching Lake Solano at PDD was routed into the Putah South Canal even during the large winter flow events in 2004, 2005, and 2006 (Stillwater Sciences, 2014, p. 13).

In May 2000, the Putah Creek Accord formally regulated seasonal flow releases by Solano County Water Agency (SCWA) and Solano Irrigation District (SID) from Putah Diversion Dam to ensure minimum instream flows to chiefly benefit aquatic and riparian resources in the lower creek. Four flow-requirement categories, rearing flows, spawning flows, supplemental flows, and drought-year flows were established in the Accord. The minimum daily "rearing flows" to be maintained in the lower creek are summarized in **Table 3.1-1**. The Accord calls for the highest flows during the late spring and early summer months (April-July). Finally, "drought year flows" with reduced minimum flow releases from Putah Diversion Dam are triggered when total storage in Lake Berryessa is less than 750,000 acre-feet. Maintenance of continuous flows downstream of I-80 is not required under drought conditions; however, to date, this condition has not been triggered as storage in Lake Berryessa has maintained at least 900,000 acre-feet (USBR, 2014; as cited in Stillwater Sciences, 2014, p. 16).

Table 3.1-1 Minimum Daily Required "Rearing Flows" to be Recorded at Two SCWA-Operated Gaging Stations on Lower Putah Creek

SCWA Gaging Station	Water Year Type	Minimum Daily Required "Rearing Flows" (cfs)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
PDD	Normal	20	25	25	25	16	26	46	43	43	43	34	20
	Drought	20	25	25	25	16	26	46	43	43	43	34	20
I-80	Normal	5	10	10	15	15	25	30	20	15	15	10	5
	Drought	2	2	2	2	2	2	2	2	2	2	2	2

Source: Stillwater Sciences, 2014; Table 3, p. 16.

The Accord also stipulates that "spawning flows" must be released below the PDD as a 3-day pulse with associated minimum flows and gradual ramp-down rates between February 15 and March 31 of every year: 150 cfs for the first 24 hours, 100 cfs for the second 24 hours, and 80 cfs for the third 24 hours. The "supplemental flows" require that flows of at least 50 cfs be maintained at the point where Putah Creek discharges into the toe drain for five consecutive days each year between November 15 and December 15. This pulse is coordinated with removal of the flash-boards at Los Rios Check Dam. Removal of the earthen dam at Road 106A generally coincides with this activity.

Since the Accord was enacted, flows released from the Putah Diversion Dam into Lower Putah Creek have averaged approximately 40 cfs. Flows events with greater peaks and duration occur due to increased uncontrolled run-off, particularly from Dry and McCune creeks. Since the construction of Monticello Dam, peak flows have been attenuated from an estimated daily average of approximately 18,000 cfs to 8,000 cfs, with the pre-dam instantaneous peak of over 50,000 cfs dropping to the post-dam peak of approximately 18,000 cfs (City of Winters, 2008, p. 12; USGS, 2015). Between Monticello Dam and Putah Diversion Dam, instantaneous peak flows have measured 15,000-18,000 cfs during flood events (in 1970, 1983, and 1997) (County of Yolo, 2005, p. 4-39 and Figure 4-39). Peak flows of about 12,500 cfs occurred on this reach in January 2006 (SCWA streamflow data).

Once the capacity of Lake Berryessa's reservoir pool is exceeded and the glory hole begins to spill, flood events both upstream and downstream of the PDD are similar to the natural instantaneous peak discharges prior to the dam construction. A release of over 14,000 cfs was recorded in March of 1983. Solano County Water agency records indicate that inflow to Lake Berryessa during the December 2002 flood may have been in excess of 90,000 cfs (City of Winters 2008, p. 12). While the lake buffered the full effect of this flood in the Project Area, flows through the proposed Project Area still likely reached several thousand cfs due to input from tributaries below the dam (City of Winters, 2008, p. 12).

In summer months, daily flows are shown to decrease downstream along the length of the creek, which are likely due to infiltration losses to the subsurface, evapotranspiration from aquatic and riparian vegetation, surface water pumping from the creek, and nearby groundwater pumping. An unusual set of flow conditions occurs roughly three out of 10 years, when backwater conditions are induced on the lowest reaches of the Creek by high flows in the toe drain or even flooding of the Yolo Bypass

(Stillwater Sciences, 2014). Under these conditions, Putah Creek's flow velocity nears zero, flow in the creek is significantly less than in the Yolo Bypass, and thus the flow essentially builds up at the mouth of the bypass.

Under ordinary conditions, all tributary flows into the Project Area are seasonal, because there are no perennial waterways flowing into Putah Creek within the Project Area.

Lower Putah Creek Sediment Transport

Downstream of the PDD, changes to Putah Creek channel form have largely been caused by dams blocking larger coarse sediment transport, direct manipulation of the channel for flood protection and gravel mining operations, and diversion of streamflows into of the South Fork canal (EDAW, 2005, pp. 4-19 and 4-20). Following completion of the Solano Project in 1957, water released from the PDD became relatively sediment-free, or "sediment-starved" because sediments settled out in the reservoir behind the Dry Creek dam rather than continue downstream. Fine sediments, such as silt and sands, are still transported over the dam, but coarse sediment, such as gravel and cobbles, are not. When sediment-free water flows over existing sediment it has an increased capacity to entrain, or pick up and carry, particles from the bed and banks, which can contribute to continuing channel scour and erosion along lower Putah Creek.

The only consistent source of coarse sediments to the Lower Putah Creek channel is from Dry Creek, which now delivers only a fraction of the course sediments supplied prior to the Solano Project. While sediments (and woody debris) are occasionally flushed through the sluice gates at PDD, nearly all are fine-grained materials (Yates, 2003; EDAW, 2005; as cited in Stillwater Sciences, 2014, p. 26). Thus, the lower creek is effectively starved of coarse-grained sediments. The high proportion of fine sediments has degraded water quality and aquatic habitat conditions (EDAW, 2005; as cited in Stillwater Sciences, 2014, p. 26). These issues are addressed in the Water Quality and Biological Resources sections of this document, respectively.

Along the length of Lower Putah Creek, bed material generally transitions from predominantly sand and gravel near Winters to predominantly sand, silt, and clay near the YBWA (NHI *et al*., 2002; Yates, 2003; as cited in Stillwater Sciences, 2014, p. 26). Mean particle sizes (D50) between PDD and Pedrick Road bridge (just east of Davis and the North Fork split) show a general trend of coarser bed material near Winters to finer bed material towards the Mace Boulevard bridge. Limited field observations in 2012 support these trends, which continue through the YBWA Reach to the toe drain. Bank

substrates throughout are fine-grained, being composed mostly of silty/sandy loams, with some clay and gravels.

Flood Hazards

The Federal Emergency Management Agency (FEMA) produces Flood Insurance Rate Maps (FIRMs) that identify flood-prone areas. The FIRMs for the Project Area show the majority of the Project Area is in the 100-year flood zone (Zone A), with some areas designated as Zones X, AO (river or stream flood hazard areas with a 1 percent or greater chance of shallow flooding), or AE (areas subject to inundation by a 100-year flood event, for which base flood elevations have been established) (FEMA, 2014a.). In the Project Area, flood hazards take four general forms:

1. Some 100-year flood zones occur exclusively within the confined channel because it is incised.
2. Some 100-year flood zones involve the channel overtopping into the shallow upland flood areas, primarily in the City of Davis and downstream to the bypass.
3. Some 100-year flood zones involve flooding from upland areas that drain into the creek via existing tributary channels, and this occurs primarily in areas around the City of Winters.
4. Some 100-year flood zones are associated with sheet flow across the landscape, flowing generally towards the Yolo Bypass, parallel to the creek. This occurs in the last two reaches of the Project Area, downstream of the City of Davis.

Detailed descriptions of flood-prone areas along the Project alignment are presented below, in "Project Area Conditions by Reach."

Project Area Conditions by Reach

Reach-by-reach information on hydrologic conditions is described below. Flood hazards are described below and shown generally on **Figures 3.1-1A** through **3.1-1D**, FEMA flood hazard maps.

NAWCA/Mariani

Outside sources of seasonal flow in this reach include McCune/Pleasant Creek. McCune Creek drains areas south and west of the Project Area and enters the creek and Project Area in the first third of the reach. The stream channel is deeply incised, and the 100-year floodplain in this reach is largely contained within it.

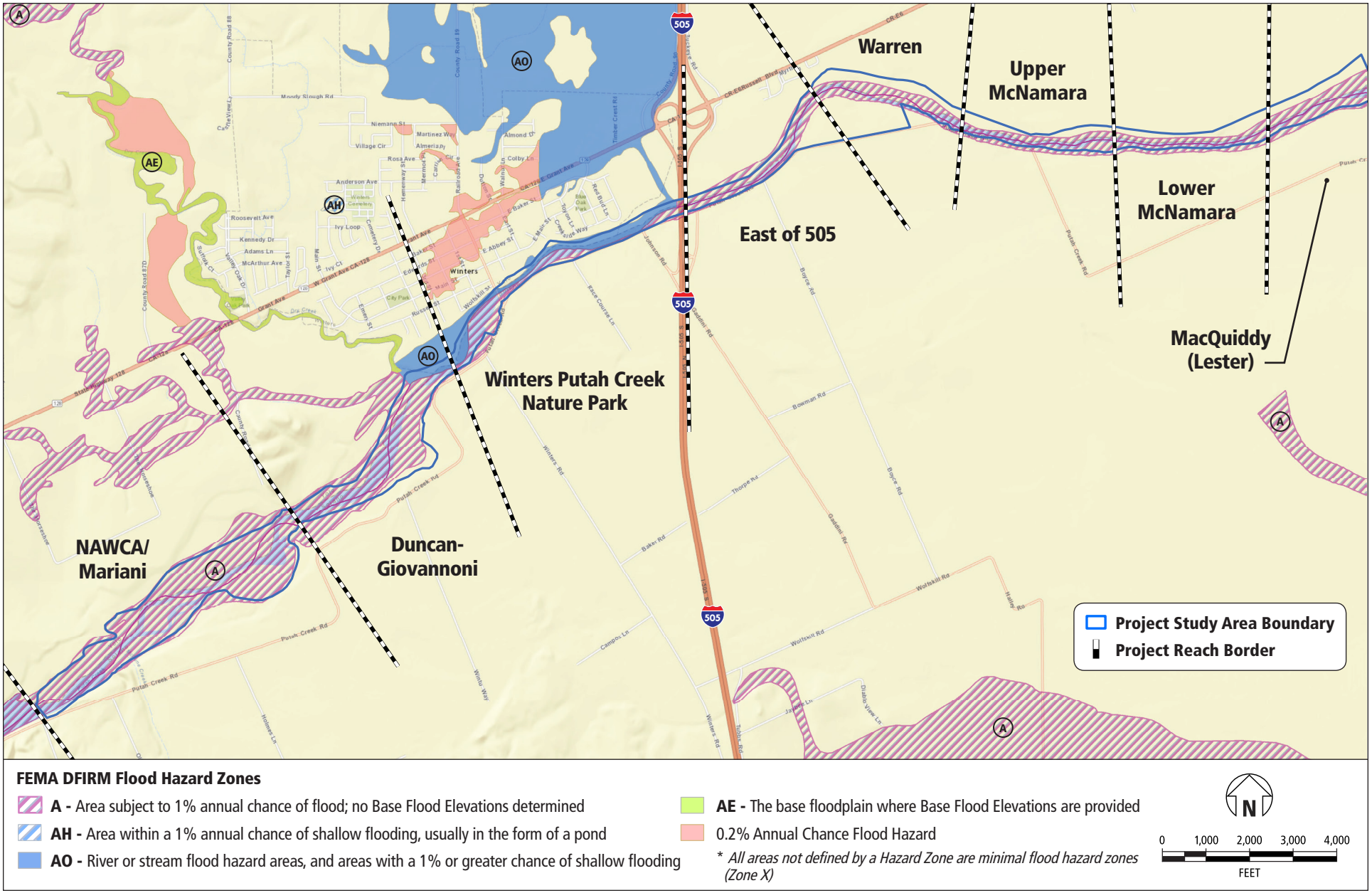


Figure 3.1-1A

FEMA Mapped Flood Zones

Source: FEMA

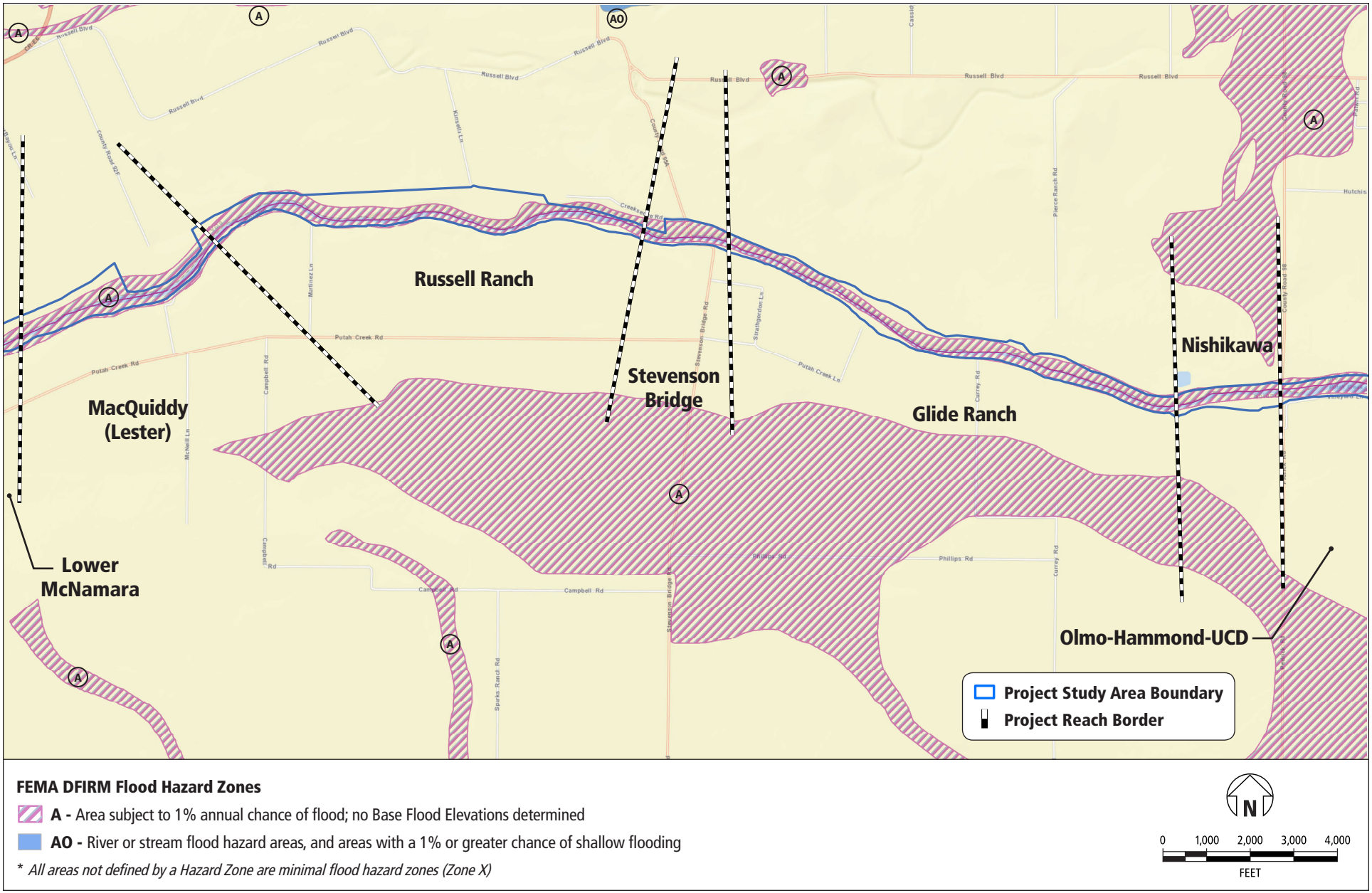


Figure 3.1-1B

FEMA Mapped Flood Zones

Source: FEMA

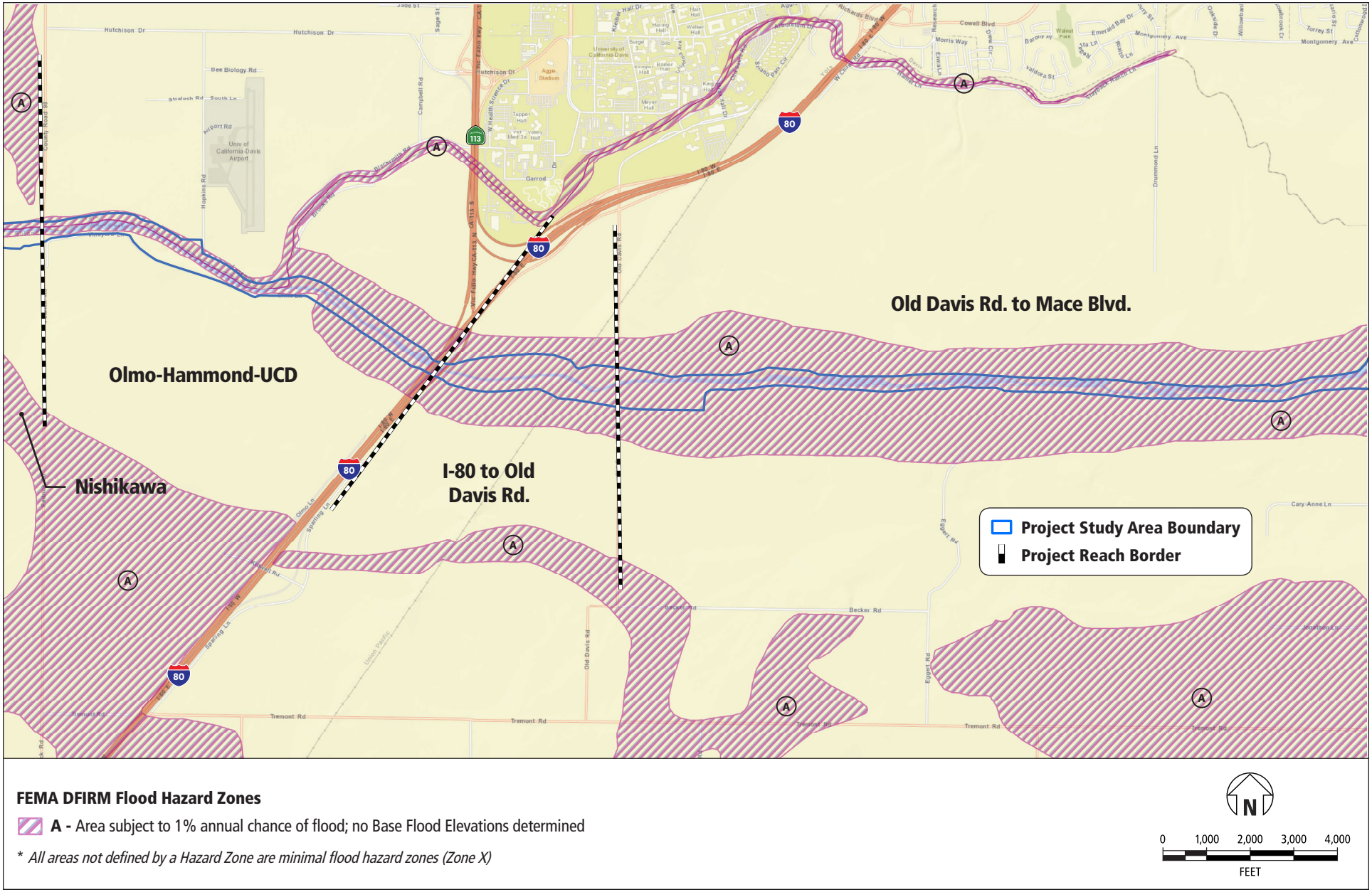


Figure 3.1-1C

FEMA Mapped Flood Zones

Source: FEMA

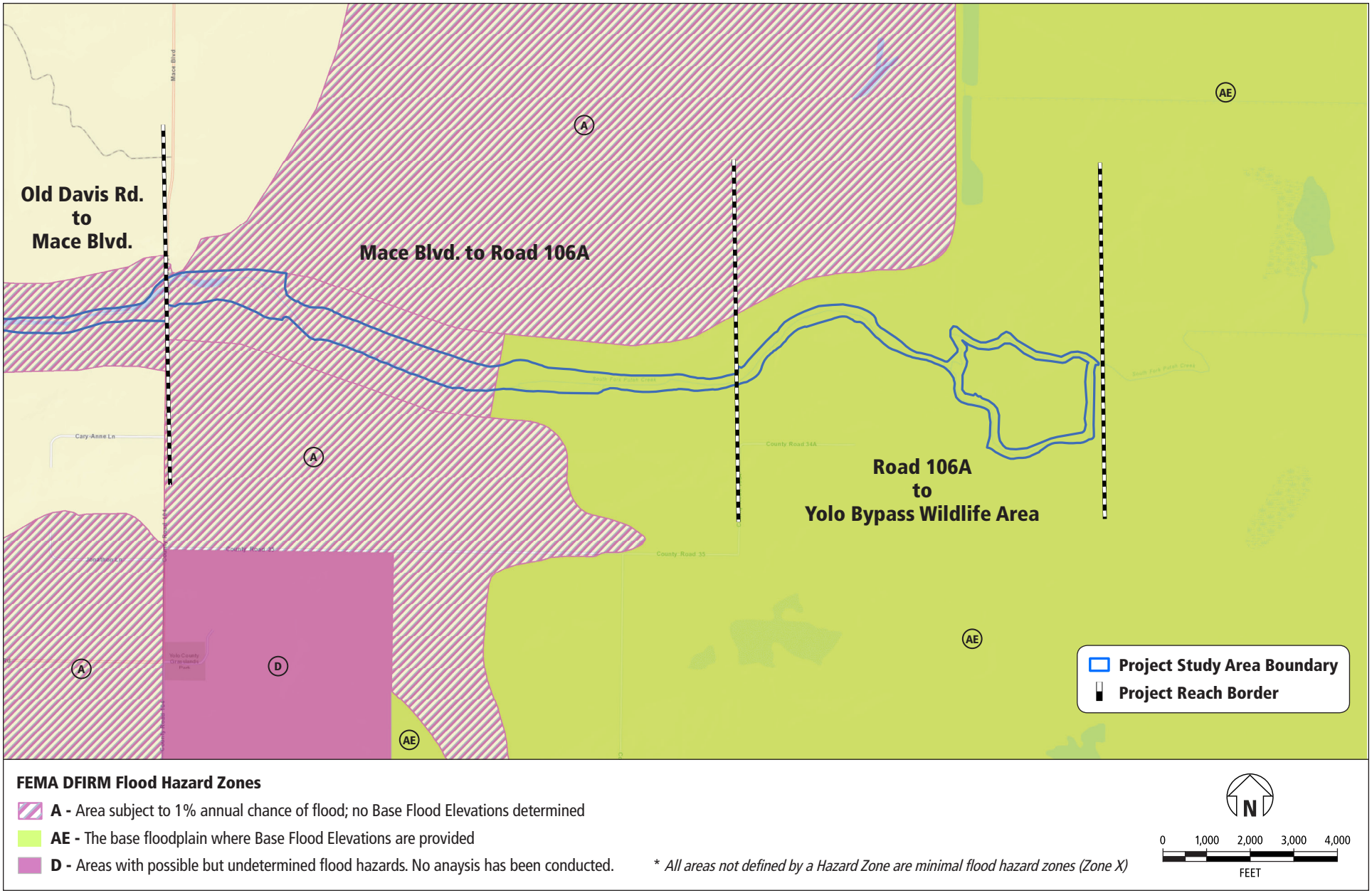


Figure 3.1-1D

FEMA Mapped Flood Zones

Source: FEMA

In the northeastern, downstream portion of this reach, the FEMA mapped floodplain extends beyond the top of the bank in three locations. These locations include land used as orchards and a large private residence with agricultural outbuildings that extends downstream into the vicinity of the Duncan-Giovannoni reach.

Duncan-Giovannoni

This is a transitional reach from the wider floodplains to what was one of the sections of the creek with the greatest pools and most incised floodplains. Dry Creek, a major tributary that flows from northwest and west of the Project Area, enters Putah Creek near the southwest corner of the City of Winters. Dry Creek's seasonal flows are flashy, with brief periods of high flows followed by long periods of no flow. A prior restoration on Dry Creek has stabilized downcutting in the reach, and Dry Creek is now one of the leading contributors of sediment to naturally rebuild the floodplain. However, approximately 5 acres of in-channel pools remain in the reach, increasing water temperatures.

The mapped floodplain is largely within the creek banks in this reach because the channel is highly entrenched and evolved to handle much higher pre-dam flows. This is not a leveed reach. Flood risk is minimal on the southern boundary of the reach. In the southwestern, upstream portion of this reach, the mapped floodplain extends beyond the top of the bank and beyond the Project Area. Areas mapped as subject to 100-year flooding include orchards and a large private residence with agricultural outbuildings (same as described above for NAWCA/Mariani reach).

Mapped 100-year flood plains occur in the northern part of this reach, due to the influence of McCune/Pleasant Creek and Dry Creek, which back up at their confluences with Putah Creek under 100-year flood conditions. Within the Project Area, 100-year flood flows remain within the incised Putah Creek channel, but just upstream on the tributaries, flooding occurs due to backed-up water.

Winters Putah Creek Nature Park

Through previous restoration activities, previously mined pools have been filled and the floodplain in this reach has been recontoured to design grades. Under non-flood conditions, there are no significant contributors to creek flow within this reach. The channel in this reach is incised and evolved to handle the higher pre-dam flows.

In most of the reach, 100-year flood flows remain within the channel. However, as in the Duncan-Giovannoni reach, the FEMA map for this reach depicts a backwater effect at

the confluence of Dry Creek and Putah Creek, south of the City of Winters, which leads to shallow flooding outside of the channel in the upstream end of the reach. During 100-year flood events, there is also shallow flooding along an intermittent channel at the northeast end of the reach, west of Interstate 505 (I-505). In both the cases of Dry Creek and the unnamed shallow upland runoff drainage, Putah Creek's flood remains in the channel, and flooding backs up along the tributary channels.

East of 505

There are no significant contributors to seasonal flow or runoff within this reach. The channel in this reach is deeply incised and not leveed.

The mapped 100-year floodplain in this reach extends somewhat outside of the top of the bank, outside of the Project boundaries, on the north bank of the creek, directly east of I-505 and south of an agricultural packing facility. In this reach, 100-year flood flows remain within the incised, confined channel.

Warren, Upper McNamara, Lower McNamara

There are no significant contributors to seasonal flow or runoff within these reaches. Because the creek channel is deeply incised, the mapped floodplain is largely contained within the creek channel. The 100-year mapped floodplain does not appreciably extend beyond the top of the channel in these reaches, which are all un-leveed. The Upper McNamara Reach contains approximately 5 acres of in-channel pools and Lower McNamara contains approximately 7 acres, increasing water temperatures in these reaches.

MacQuiddy (Lester)

There are no significant contributors to seasonal flow or runoff in this reach. Because the creek channel is deeply incised, the 100-year flood flows remain within the channel. This is not a leveed reach.

The mapped 100-year floodplain in this reach extends somewhat outside of the Project Area on a portion of the north bank of the creek. The Project Area boundaries have been narrowed in this area due to the presence of private property, including an orchard and a rural residence abutting the creek.

Russell Ranch

There are no significant contributors to seasonal flow or runoff in this reach. The creek channel is deeply incised, and so the 100-year floodplain is largely within the channel.

This is not a leveed reach. This reach contains approximately 7 acres of in-channel pools, which have resulted in increased water temperatures.

The mapped 100-year floodplain extends somewhat outside of the Project Area on a portion of the north bank of the creek in the far eastern, downstream end of the reach. The Project Area boundaries have been narrowed in this area due to the presence of a rural subdivision that extends eastward.

Stevenson Bridge

There are no significant contributors to seasonal flow or runoff in this un-leveed reach. The creek channel is deeply incised, keeping the 100-year flood flows remain within the channel. This reach contains approximately 1.5 acres of in-channel pools, which have resulted in increased water temperatures.

As in the Russell Ranch reach, the mapped 100-year floodplain extends somewhat outside of the Project Area on a portion of the north bank of the creek in the western (upstream) end of the reach. The Project Area boundaries have been narrowed in this area due to the presence of a rural subdivision.

Glide Ranch, Nishikawa

There are no significant contributors to seasonal flow or runoff in either of these reaches. In both reaches, the100-year floodplain is largely within the creek banks because the creek channel is deeply incised. The 100-year mapped floodplain does not appreciably extend beyond the Project Area in these reaches. The Glide Reach contains approximately 7 acres of in-channel pools, which have resulted in increased water temperatures.

Olmo-Hammond-UCD

There are no significant contributors to seasonal flow or runoff in this reach. In the upstream half of this reach, the creek is in an unleveed, incised channel, so the FEMA mapped floodplain is mostly within the creek banks, and 100-year flood flows remain within the channel. This reach contains approximately 17 acres of in-channel pools, which have resulted in increased water temperatures.

On the north bank, somewhat east of the middle of the reach, a smaller side branch of the creek splits off along the north bank of the creek. This northern side branch, which runs through the southern edge of the campus of the University of California, Davis (UC Davis) and then the City of Davis, is part of the historic channel of Putah Creek (not part

of the Project). From this divergence point eastward, the main branch of the creek, including the Project Area, enters an engineered, leveed channel. In this area, the 100-year mapped floodplain extends considerably beyond both leveed banks of the creek. Shallow flooding occurs in this area about one out of every 3 years.

I-80 to Old Davis Road, Old Davis Road to Mace

Both of these reaches are located in an area of flatter topography in which the channel is less incised. These reaches are located within the engineered, leveed channel, which ends at Mace Boulevard/Road 104. The 100-year mapped floodplain extends considerably beyond both banks of the creek in these reaches. The Old Davis Road to Mace Reach contains approximately 27 acres of in-channel pools, which have resulted in increased water temperatures.

These reaches receive treated wastewater from the UC Davis Wastewater Treatment Plant (UCD WWTP), which discharges treated wastewater from an outfall east of Old Davis Road, on the border between the two reaches (UC Davis, 2004, pp. 3-3 to 3-4 and Exhibit 3-2). The plant also discharges treated wastewater to the Arboretum Waterway on the UC Davis campus, outside of the Project Area (CVRWQCB, 2014, pp. 24 and F-2 to F-3). This waterway is located in the historical channel of the former North Fork of Putah Creek and is confined at both ends and used for stormwater management. The flow from the Arboretum Waterway is blended with stormwater and then pumped to Putah Creek (CVRWQCB, 2014, p. F-4).

The plant discharges a continuous flow to Putah Creek that averages approximately 2.5 cfs (EDAW, 2005, pp. 4-12 and 4-27; SWRCB, 2015a, p. 3; SWRCB, 2015b, p. 3). Under the flow regime instituted under the Putah Creek Accord, during normal, non-drought years, minimum mean daily flows measured at the I-80 gaging station in this section of the creek range from a low of 5 cfs in October to a high of 30 cfs in April (see Table 3.1-1; Sacramento Superior Court 2002, Exhibit A, pp. 1 to 2). Under these conditions, the plant makes a modest contribution to flow in this area of Putah Creek during the wetter months of the year. However, during drought years, the Putah Creek Accord requires minimum mean daily flow of only 2 cfs, and so under drought conditions, the plant makes a sizable contribution to flow in this portion of the creek.

Mace to Road 106A

There are no significant contributors to seasonal flow or runoff in these reaches. This reach is located within the floodplain of the Yolo Bypass and so is subject to flooding both inside and outside of the levee. One hundred-year flood events here are associated

with sheet-flow across the land, towards the Yolo Bypass, as well as shallow flood flow from the north that stops at the levee. At Road 106A at the far eastern edge of the reach, an earthen push-up dam is placed across the stream channel to impound water during the agricultural irrigation season, resulting in a long, wide pool of approximately 17 acres.

Road 106A to Yolo Bypass Wildlife Area

This reach contains approximately 11 acres of in-channel pools, which have resulted in increased water temperatures.

There are no significant contributors to seasonal flow or runoff in this reach. Like the Mace to Road 106A reach, this reach is located entirely within the floodplain of the Yolo Bypass and so is subject to flooding both inside and outside of the leveed channel, and 100-year flood events here are associated with sheet flow across the land, towards the Yolo Bypass. The earthen push-up dam at Road 106A on the far western edge of the reach (the dividing line between this reach and the Mace to Road 106A reach) controls flows into this reach in the summer months. The channel has very stable water levels due to the impoundments caused by the barriers at each end (the Los Rios check dam backs up water into this reach). In the eastern half of the reach, a seasonal overflow channel is located at the point where the channel forks (see Figure 3.1-1d). Shallow flooding in this area occurs about one out of every 3 years.

Regulatory Setting

Federal Regulations

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) implements the federal Clean Water Act Section 404. Any person, firm, or agency planning to alter or work in navigable waters of the U.S., including the discharge of dredged or fill material, must first obtain authorization from the USACE. Section 10 of the Rivers and Harbors Act of 1899 prohibits the obstruction or alteration of navigable waters of the U.S. without a permit from the USACE (33 U.S.C. Section 403). Section 301 of the Federal Water Pollution Control Act and Amendments of 1972 (CWA) prohibits the discharge of pollutants, including dredged or fill material, into waters of the U.S. without a Section 404 permit from USACE (33 U.S.C. Section 1344).

Putah Creek is a first-order tributary to the Sacramento River, and all tributaries to the Sacramento River are considered jurisdictional waters of the U.S. pursuant to Section

404 of the Clean Water Act (CWA) (USACE, 1987, p. 2; 33 CFR Section 328.3; cited in BSK, 2014, p. 4). In order to assess which portions of the Project Area are located within jurisdictional "waters of the US" a field survey was completed to determine the OHWM (BSK, 2014).

USACE Regional General Permits

USACE oversees approval of Regional General Permits (RGPs) and Programmatic General Permits (PGPs) that are developed to avoid unnecessary regulatory control over activities that do not justify individual control or which are adequately regulated by another agency (33 CFR 320.1(a)(3)). These permits are issued for a category or categories of activities when: (a) those activities are substantially similar in nature and cause only minimal individual and cumulative environmental impacts; or (b) the RGP/PGP would result in avoiding unnecessary duplication of the regulatory control exercised by another federal, state, or local agency, provided it has been determined that the environmental consequences of the action are individually and cumulatively minimal.

As part of the permitting process for the proposed Project, a Regional General Permit is being sought for dredge and fill activities and associated maintenance associated with stream channel rehabilitation and riparian restoration activities in waters of the U.S. within the Project Area.

State Regulations

California Department of Fish and Wildlife

The California Department of Fish and Wildlife (CDFW) administers Lake and Streambed Alteration Agreements (LSAAs) pursuant to Fish and Game Code Section 1600 *et seq*. for any activity that will divert or obstruct the natural flow of any river, stream, or lake; change the bed, channel, or bank, including associated riparian or wetland/marsh resources, or use material from the stream channel bed. CDFW may require an LSAA for the proposed Project. CDFW is also a Responsible Agency for the proposed Project under CEQA and will review this PEIR (CDFW, 2015, p. 4).

Central Valley Regional Water Quality Control Board

The Central Valley Regional Water Quality Control Board (CVRWQCB) regulates water quality in the region surrounding the Project Area. CVRWQCB oversees enforcement of Section 401 of the federal Clean Water Act (CWA) through the Section 401 Water Quality Certification process where development results in fill of jurisdictional wetlands

or waters of the U.S. under Section 404 of the CWA. For additional discussion of CVRWQCB regulations, see Section 3.2, *Water Quality*.

Central Valley Flood Protection Board

Under state Water Code Section 8520 *et seq*., the Central Valley Flood Protection Board (CVFPB) administers permits for any project that may encroach upon, improve, alter or affect adopted plans of flood control, including federal/state flood control systems, regulated streams and designated floodways under the Board's jurisdiction (CVFPB, 2014). It is anticipated that a CVFPB Encroachment Permit would be sought for the Project.

Local Regulations

Local regulation of water quality, hydrology, and flood protection is contained in the Solano and Yolo County General Plans, Municipal Codes, and other planning documents.

Solano County General Plan

The following Solano County General Plan objectives, policies, and implementation actions are relevant to the proposed Project (County of Solano, 2008, pp. HS-12).

Policies

HS.P-2: Restore and maintain the natural functions of riparian corridors and water channels throughout the county to reduce flooding, convey stormwater flows, and improve water quality.

HS.P-3: Require new developments to incorporate devices capable of detaining the stormwater runoff caused by a 100-year storm event or to contribute to regional solutions to improve flood control, drainage, and water recharge.

HS.P-6: Work with federal, state, and local agencies to improve flood control and drainage throughout the county.

HS.P-9: Preserve open space and agricultural areas that are subject to natural flooding and are not designated for future urban growth; prohibit permanent structures in a designated floodway where such structures could increase risks to human life or restrict the carrying capacity of the floodway.

Implementation Programs (County of Solano, 2008, pp. HS-12 to HS-19)

HS.I-5: Require periodic stream maintenance by private property owners, and undertake regular stream maintenance by the appropriate public agencies.

HS.I-6: Continue to make regular flood control and drainage improvements as recommended by local agency plans, the U.S. Army Corps of Engineers, and the California Reclamation Board. These actions are independent of and in addition to the development review process.

HS.I-9: Work with the Solano County Water Agency (or successor agency) to review existing developments contributing to increased runoff and to reduce runoff wherever possible.

HS.I-15: Work with the Solano County Water Agency (or successor agency) in preparing a hydrological analysis of uplands, identifying the different watersheds that drain into the county, establishing flood-related objectives and priorities on a study area basis, and translating those into a coordinated series of flood-preventive measures for each watershed.

Yolo County General Plan

The following Yolo County General Plan goals, policies, and implementation actions are relevant to the proposed Project (County of Yolo 2009, pp. HS-17 to HS-18).

Goal HS-2 Flood Hazards. Protect the public and reduce damage to property from flood hazards.

Policy HS-2.1 Manage the development review process to protect people, structures, and personal property from unreasonable risk from flooding and flood hazards.

Policy HS-2.8 Consider and allow for the ecological benefits of flooding within historic watercourses while balancing public safety and the protection of property.

Implementation Programs (County of Yolo, 2009, p. HS-20)

Action HS-A13: Review development proposals to ensure that the need to maintain flood control capacity is balanced with consideration of the environmental health of watercourses that convey floodwaters so as not to cause significant erosion, sedimentation, water quality problems, or loss of habitat.

Action HS-A14: Require a minimum 50-foot setback for all permanent improvements from the toe of any flood control levee.

Action HS-A15: Restrict proposed land uses within 500 feet of the toe of any flood control levee, including but not limited to the items listed below, unless site-specific engineering evidence demonstrates an alternative action that would not jeopardize public health or safety:

- Prohibit permanent unlined excavations; […]
- Engineered specifications for levee penetrations; and
- Require landscape root barriers within 50 feet of the toe.

The Yolo County General Plan has established broad descriptions of buffers for areas within its county that are protected natural resource areas. These buffers protect riparian areas similar to the proposed Project. These buffers are explained in the General Plan policies and actions below.

Policy CO-1.15: Support efforts to acquire either fee title or easements on additional open space areas adjoining existing protected natural resource areas to increase the size, connectivity, and buffering of existing habitat. (County of Yolo 2009, p. CO-15)

Action CO-A27: Protect the habitat value and biological function of oak woodlands, grasslands, riparian areas, and wetland habitats. Avoid activities that remove or degrade these habitats and establish buffers to avoid encroachment into sensitive areas. (County of Yolo 2009, pp. CO-41 to CO-42)

Solano County Code (Ord. No. 865, Section 1; Ord. No. 1427, Section 1)

The following Solano County Code provisions are relevant to analysis of Hydrology and flood risks in the Project Area.

12.2-13 Methods of reducing flood losses.

In order to accomplish its purposes, this ordinance includes methods and provisions for:

(a) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water hazards, or which result in damaging increases in flood heights or velocities;

(b) Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

(c) Controlling the alteration of natural floodplains, stream channels, and natural protective barriers which help accommodate or channel flood waters;

(d) Controlling filling, grading, dredging, and other development which may increase flood damage; and

(e) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Yolo County Code

The following Yolo County Code provisions are relevant to analysis of hydrology and flood risks in the Project Area.

Section 8-3.104: Methods of reducing flood losses.

In order to accomplish its purpose, this section includes methods and provisions to:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities;
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- Control the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
- Control filling, grading, dredging, and other development which may increase flood damage; and
- Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Section 8-3.208: Development.

"Development" means any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials. For the purposes of this section, the following activities shall not be considered development:

- Typical agricultural activities, such as plowing, seeding, cultivating, harvesting, field leveling, contouring, and planting; and
- Residential and commercial landscape maintenance.

Section 8-3.209: Encroachment.

"Encroachment" means the advance or infringement of uses, plant growth, fill, excavation, buildings, permanent structures or development into a floodplain which may impede or alter the flow capacity of a floodplain.

Section 8-3.301: Lands to which this chapter applies.

This chapter shall apply to all areas of special flood hazards within the jurisdiction of Yolo County.

Section 8-3.302: Basis for establishing the areas of special flood hazard.

The areas of special flood hazard identified by the Federal Insurance Administration (FIA) of the Federal Emergency Management Agency (FEMA) in the Flood Insurance Study for Yolo County, dated April 2, 2002 (and all subsequent revisions) and accompanying Flood Insurance Rate Maps (FIRMs), dated December 16, 1980, and all subsequent amendments and/or revisions, are hereby adopted by reference and declared to be a part of this chapter. The flood Insurance Study and FIRMs are on filed at the Yolo County Community Development Agency, 292 West Beamer Street, Woodland, CA, 95695. This Flood Insurance Study and attendant mapping is the minimum area of applicability of this chapter and may be supplemented by studies for other areas which allow implementation of this chapter and which are recommended by the Floodplain Administrator and adopted by the Planning Commission.

Section 8-3.401: Establishment of flood hazard development permit.

A Flood Hazard Development Permit shall be obtained before any construction or other development begins within any area of special flood hazards established in Section 8-3.302. Application for a Flood Hazard Development Permit shall be made on forms furnished by the Floodplain Administrator and may include, but not be limited to: plans in duplicate drawn to scale showing the nature, location, dimensions, and elevation of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing. Specifically, the following information is required:

(1) proposed elevation in relation to mean sea level, of the lowest floor (including basement) of all structures; in Zone AO elevation of highest adjacent grade and proposed elevation of lowest floor of all structures; or

(2) proposed elevation in relation to mean sea level to which any nonresidential structure will be floodproofed, if required in Section 8-3.501(c)(4); and

(3) all appropriate certifications listed in Section 8-3.403(d) of this chapter; and

(4) description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

(5) in the A99 zone, base flood elevation and construction specifications shall be provided by a licensed engineer.

(6) all new proposed development (including proposals for manufactured home parks and subdivisions) greater than 50 lots of 5 acres, whichever is lesser, and located in areas of special flood hazards where base flood elevations have not been provided, shall include base flood elevation data prepared by a registered professional engineer.

In addition to the foregoing, the Floodplain Administrator may require such other information relevant to the Project as needed in order to enforce this chapter.

Other Requirements

Putah Creek Accord

On May 23, 2000, the Putah Creek Accord (Accord) between various parties from Solano County and Yolo County resulted from settlement of litigation between the Putah Creek Council (and other Yolo County-based parties), and the Solano County Water Agency, Solano Irrigation District, and other Solano County-based entities (EDAW, 2005, p. 5-31). The Accord set up a permanent dam release schedule based on the following goals:

(a) Flows for resident native fish, which include important spawning and rearing components and guarantee a continuous flow to the Yolo Bypass;

(b) Flows that will attract and support salmon and steelhead;

(c) A drought schedule that provides enough water to maintain Putah Creek as living stream but provides water users relief from other flow requirements;

(d) Creation of the Lower Putah Creek Coordinating Committee (LPCCC);

(e) Habitat restoration and monitoring funds for the creek; and

(f) A term requiring Solano County Water Agency to notify riparian water users of the amount of riparian water available in any given year and to prevent illegal water diversions in excess of the amount of riparian water available. (EDAW, 2005, p. 5-32)

The LPCCC promotes the adequacy of flows to protect fish and wildlife resources of Putah Creek and consists of representatives of Solano and Yolo counties with interests in the protection of Putah Creek resources. The LPCCC represents the Boards of Supervisors of Solano and Yolo counties; cities of Davis, Fairfield, Suisun, Vacaville, Vallejo, and Winters; Solano County Water Agency; Solano Irrigation District; Maine Prairie Water District; UC Davis; Putah Creek Council; and riparian landowners (EDAW, 2005, p. iii).

3.1.2 Significance Criteria

The following thresholds for measuring a project's environmental impacts are drawn from CEQA Guidelines Appendix G standards (OPR, 2013). An impact to surface hydrology or water quality is considered significant if implementation of the proposed Project will result in any of the following:

1. Substantially increase erosion or siltation on- or off-site.
2. Substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site.
3. Exceed the capacity of existing or planned stormwater drainage systems.

3.1.3 Impacts and Mitigation Measures

Impacts and mitigation measures are described below both generally and by reach. Applicable impacts and mitigation measures for each reach are summarized in **Table 3.1-3**, at the end of this section.

General Impacts and Mitigation Measures

Impact 3.1-1: Potential Erosion and/or Siltation Impacts.

Long-Term Impacts

The Project would not result in long-term adverse impacts to erosion or siltation because Project activities would have no effect on flow regimes that could affect erosion or siltation, and also because flow regimes and resulting velocities are controlled by Monticello Dam and regulated by the Putah Creek Accord, as discussed above. In addition, the Project would include a number of measures to reduce existing erosion problems.

Short-Term Impacts

Project activities could result in potential temporary impacts on erosion and siltation. The activities and effects are summarized below in **Table 3.1-2**, and are analyzed in further detail in below.

Project construction activities would not occur during the rainy season. In order to perform Project activities, occasional short-term diversions of low flows may be necessary to isolate the Project activity area from flowing water during the dry-season construction of channel improvements. However, this would be a portion of the creek; Project activities would not dewater the entire creek. These diversions would typically last no longer than two months and would be accomplished through installation of a temporary coffer dam, diverting stream flows along a portion of a reach either into a pipe, or trench side channel. In areas where the channel is braided, flow may be diverted from one channel to another to allow work in a neighboring segment.

These short-term diversions of flows to newly trenched channels could result in potential erosion and sedimentation impacts including localized minor scour, increased erosion, and localized release of upland sediment that could be deposited downstream. Based on prior restorations on the Creek, potential erosion and sedimentation effects would be most likely to occur during brief periods when establishing or removing the diversion structure, when sediments are released into the water column and a brief pulse of water that had been backed-up behind the dam is released into the newly created channel. These impacts would be minimized or avoided through regulatory compliance (CDFW Lake and Streambed Alteration Agreements, required for all Project activities, and Stormwater Pollution Prevention Plans [SWPPPs], required for Project activities disturbing more than 1 acre) and the application of Mitigation Measure 3.1-1, described below.

Channel reconfiguration activities proposed for the Project, such as construction grading and clearing, could create short-term adverse erosion and siltation impacts to the stream channel by grading and scarifying soil in the active stream channel to create the new channel features.

Table 3.1-2 Summary of Erosion Effects of Project Activities

Project Activity or Action	Effect	Impact Significance
Narrow low-flow channel	Short term: Minor increases in erosion until channel is stabilized. Long term: Potential minor increase in lateral erosion from the average water elevation and velocity	No impact.
Increase creek substrate roughness	Short term: Minor increase in erosion post-construction Long term: Reduce flow velocity from operations	Less than significant.
Temporary flow diversion (pipe, trench, or temporary coffer dam)	Short term: Erosion and siltation from construction	Avoided/reduced to insignificance through regulatory compliance and Measure 3.1-1.
Channel reconfiguration (grading and clearing)	Short term: Erosion and siltation from construction	Avoided/reduced to insignificance through regulatory compliance and Measure 3.1-1.
Construction of access ramps	Short term: Erosion and siltation from construction	Avoided/reduced to insignificance through regulatory compliance and Measure 3.1-1.
Gravel augmentation, scarification, and maintenance	Short term: Erosion and siltation until scarified sediments stabilize; possible short-term impacts during maintenance	Less than significant: limited number of acres per year, activity and impact lasting only a few minutes, de minimus impact.
Project maintenance activities such as weed management	Short term erosion and siltation until revegetation occurs	Avoided/reduced to insignificance through regulatory compliance and Measure 3.1-1.

Construction of ramps for access to the creek also could create short-term adverse erosion and siltation impacts to the stream channel. These impacts would be minimized or avoided through regulatory compliance required for all Project activities, Stormwater Pollution Prevention Plans [SWPPPs] (required for Project activities disturbing more than one acre), and the application of Mitigation Measure 3.1-1. These would require stabilized ramps constructed to minimize erosion and sediment deposition in creek waters.

As described in Chapter 2, *Project Description*, irrigation is expected to be used for up to 3 years at revegetated sites to establish native plantings. Different irrigation methods may be used depending on the site, but all irrigation components would be above-ground and temporary. This could result in short-term erosion impacts, but these potential impacts would be minimized or avoided through regulatory compliance

required for all Project activities, Stormwater Pollution Prevention Plans [SWPPPs] (required for Project activities disturbing more than one acre), and the application of Mitigation Measure 3.1-1.

Short-term erosion or siltation could occur due to Project maintenance activities such as weed management that may expose soils in the channel banks and bottom. However, the CDFW Lake and Streambed Alteration Agreements that would be required for all Project activities would forbid leaving bare ground and would require revegetation of exposed soils, as well as soil stabilization until new vegetation becomes established. Storm Water Pollution Prevention Plans (SWPPPs) required for the Project would also require revegetation before closure of Project work sites. Additionally, for Project activities that that disturb less than one acre of soil, Mitigation Measure 3.1-1 would require the application of SWPPP-type Best Management Practices (BMPs) to avoid leaving exposed ground and prevent erosion. (For example, under Mitigation Measure 3.1-1 below, see BMPs EC-2 Preservation of Existing Vegetation, EC-4 Hydroseeding, and SE-5 Fiber Rolls.)

Gravel augmentation and scarification activities could contribute to erosion or siltation by leading to short-term fine sediment pulses. The gravel augmentation would occurring in a limited number of locations in the creek each year (61 riffles per year, with a maximum of about 10,000 cubic yards of gravel) for very brief periods and would release substantially less sediment than occurs under existing conditions of creek bank failures. Some minor internal channel movement which results in erosion and re-deposition of channel materials is part of the healthy function of the creek, and therefore this is not considered a significant adverse impact.

Short-term erosion or siltation impacts would be further minimized through regulatory compliance and the application of Mitigation Measure 3.1-1. Project activities would be subject to CWA Section 401 Water Quality Certification for discharges of dredged and fill materials through the CVRWQCB (SWRCB, 2014). As part of this certification, CVRWQCB would require erosion controls in all areas disturbed by Project activities, as is discussed in further detail in Section 3.2, *Water Quality,* of this EIR. These regulatory controls would ensure that the Project's erosion and siltation impacts would be less than significant.

SWPPPs would be required for Project activities that disturb one or more acres of soil under the National Pollution Discharge Elimination System (NPDES) General Permit for Construction Storm Water Discharges. The SWPPPs would also incorporate visual,

chemical, and sediment monitoring programs as required. See Section 3.2, *Water Quality,* for additional detail on SWPPP requirements.

A SWPPP may not be required for certain Project activities, such as activities that disturb less than one acre of soil. In those situations, Mitigation Measure 3.1-1 would ensure that Project impacts remain less than significant by implementing BMPs designed to avoid or minimize adverse impacts associated with erosion and siltation.

Mitigation Measure 3.1-1: Implement Erosion and Sediment Control BMPs.

In the cases in which a SWPPP is not required for Project activities, the Project applicant shall implement BMPs selected by a Qualified SWPPP Developer. The BMPs shall be drawn from the Construction BMP Handbook published by the California Stormwater Quality Association (CASQA) or equivalent prior to the start of any ground-disturbing activities. These BMPs may include, but are not restricted to, the menu of measures listed below, and would be applied both during and after construction, until the work site is stabilized according to the same closure requirements that would be applicable were the work area subject to a SWPPP.

In order to ensure that the BMPs implemented are functioning to prevent erosion and sediment impacts, a California-qualified Qualified SWPPP Practitioner (QSP) must inspect functioning of the BMPs on a weekly basis. If the BMPs are insufficient, the QSP shall make recommendations for additional or sufficient BMPs.

Erosion Controls – Menu of Potential BMPs

- Stream Bank and Channel Stabilization: Where creek banks and channels are disturbed by construction, application of the full suite of available BMPs shall be coordinated by the QSP for application during and following construction to reduce the discharge of sediment and other pollutants from stream banks to minimize the impact of construction activities (CASQA, 2009, Fact Sheet EC-12).
- Scheduling: The QSP shall prepare a written plan to sequence construction activities and the implementation of other BMPs to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking. Environmental constraints such as nesting season prohibitions shall also be taken into account in developing a schedule (CASQA, 2009a, Fact Sheet EC-1).
- Preservation of Existing Vegetation: Where possible, existing non-invasive and native vegetation shall be preserved to minimize the potential of removing or injuring

existing trees, vines, shrubs, and grasses that protect soil from erosion (CASQA, 2009, Fact Sheet EC-2).

- Hydroseeding: Where soil has been disturbed by construction and requires temporary protection until permanent stabilization is established, a mixture of hydraulic mulch, seed, fertilizer, and stabilizing emulsion shall be applied to temporarily protect exposed soils from erosion by water and wind (CASQA, 2009, Fact Sheet EC-4).
- Geotextiles and Mats: Where soil has been disturbed by construction on slopes where the erosion hazard is high and vegetation will be slow to establish, mattings shall be used to cover the soil surface to reduce erosion from rainfall, hold soil in place, and absorb and hold moisture near the soil surface (CASQA, 2009, Fact Sheet EC-7).
- Wood Mulching: Where soil has been disturbed by construction and temporary protection is needed until permanent stabilization is established, an applied mixture of shredded wood mulch, bark, or compost shall be applied to disturbed soils to reduce erosion by protecting bare soil from rainfall. This BMP shall not be used on areas exposed to concentrated flows or on slopes steeper than 3:1 (H:V) (CASQA, 2009, Fact Sheet EC-8).
- Velocity Dissipation Devices: Where needed, a physical device composed of rock, grouted riprap, or concrete rubble, shall be placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated high velocity flows. This BMP will be applied to stormwater structures as needed to divert run-on flow during construction (CASQA, 2009, Fact Sheet EC-10).

Sediment Controls– Menu of Potential BMPs

- Silt Fence: Where needed, a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support will be installed temporarily to detain sediment-laden water and promote sedimentation behind the fence. This shall be used in areas disturbed by construction as a perimeter control, above channels, and/or below the toe or downslope of exposed and erodible slopes (CASQA, 2009, Fact Sheet SE-1).
- Fiber Rolls: Where needed, fiber rolls shall be placed at the toe and on the face of slopes along the contours to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (CASQA, 2009, Fact Sheet SE-5).

- Gravel Bag Berm: Where needed, a series of gravel-filled bags shall be placed on a level contour to intercept sheet flow runoff, allow sediment to settle out, and release runoff slowly as sheet flow, preventing erosion (CASQA, 2009, Fact Sheet SE-6).
- Straw Bale Barrier: Where needed, a series of straw bales shall be placed on a level contour to intercept sheet-flow runoff and allow sediment to settle out (CASQA, 2009h).
- Compost Sock and Berm: Where needed, a three-dimensional biodegradable filtering structure shall be used at the site perimeter or at intervals on sloped areas to intercept runoff where sheet flow occurs to retain sediment (CASQA, 2009, Fact Sheet SE-13).
- Stabilized Construction Entrance and Exit: A pad of aggregate underlain with filter cloth shall be constructed at a point where traffic would be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto roadways and help prevent deposition of sediments into local storm drains and production of airborne dust (CASQA, 2009i).
- Stabilized Construction Roadway: Access roads and parking areas shall be stabilized immediately after any grading and maintained to prevent erosion and control dust after grading (CASQA, 2009, Fact Sheet TC-2).

Non-Stormwater Controls

- Temporary Stream Crossing: Where needed, a temporary culvert, ford, or bridge shall be placed across a waterway to provide access for construction purposes for a period of less than 1 year. These crossings are intended to eliminate erosion and downstream sedimentation caused by vehicles (CASQA, 2009, Fact Sheet NS-4).

Erosion and sediment controls implemented to comply with Federal Clean Water Act Section 401 Water Quality Certification, with any required SWPPP(s), and with Mitigation Measure 3.1-1 would ensure that Project impacts from erosion and siltation to the environment would remain **less than significant**. No additional mitigation is required.

Impact 3.1-2: Stream Diversion During Construction.

The Project would change flows in existing stream channels during and after construction. During construction, flows would be diverted in all reaches where channel

reconstruction work is proposed in the existing channel. This diversion may be into temporary excavated bypass channels, existing braided channel segments not proposed for reconstruction, or pipes bypassing the construction areas. During these periods, the existing stream channel would be dewatered for a period of weeks or months. In the long term, flows would either resume in the existing channel areas (reconstructed) or through new channels. Although portions of the existing stream channel would be dewatered during construction, this is not considered a significant impact on hydrology because flows would either be directed into other channels or, if bypass flows are piped, the piped areas would be limited in length, temporary and short-term in duration, and reconnected to upstream and downstream channels when channel work is completed in the reach or sub-reach. The impact would be less than significant.

Impact 3.1-3: Potential Changes to Flood Hazards.

The Project would narrow the low-flow channel. Such narrowing within the entrenched floodplain may cause minor increases in the average water elevation and velocity, but these minor elevations (a matter of a few inches) would not lead to greater out-of-bank flooding. The increased velocity would also increase the transport of coarser sediments downstream, a Project purpose. Thus, this particular type of erosion would be a Project benefit, not a negative impact. In addition, the Project aims to increase sinuosity of the creek, which increases overall channel length, effectively slowing the flow velocity and bringing the channel into "equilibrium".

The Project could result in minor increases to creek substrate roughness¸ also effectively reducing velocity compared to existing conditions. Reduction of velocity has the potential to nominally raise flood elevations. However, this nominal raising of flood elevations would not result in any adverse environmental impacts for several reasons: first, the overall capacity of the channel would remain the same; second, the creek is well-entrenched throughout most of its length, and leveed through the remainder, which tends to confine water to the creek channel both under existing conditions and under projected Project and post-Project conditions; and lastly, invasive riparian vegetation is very rough hydraulically, but the Project is removing these dense thickets and replacing them with much less rough native species.

The Project would have no effect on flow volumes in the creek because flows are controlled by Monticello Dam and regulated by the Putah Creek Accord, as discussed above under Environmental Setting. Therefore the Project would not increase flooding risks or areas of flooding on- or off-site.

Therefore, the Project would have **no impact** on flooding on- or off-site. No mitigation is required.

Impact 3.1-4: Impacts to Existing Stormwater Drainage Systems.

Within the Project Area, occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. If modifications or replacement of these drainage systems were not performed according to current standards, they could be damaged or perform less efficiently or in a substandard manner. Implementation of Mitigation Measure 3.1-2 below would reduce impacts related to stormwater drainage systems to a **less-than-significant** level.

Mitigation Measure 3.1-2: Standards for Modification or Replacement of Storm Drains.

In the event roadway or agricultural storm drains need to be modified or replaced as a result of the channel alignment or other Project activities, such modification or replacement will be done in a manner to bring the drain(s) up to current standards. The Project would replace or upgrade the facility to applicable standards in consultation with property owner. Depending on the funding source or location for a given Project activity, the improvements would be conducted be under city, county, state, or federal standards. For drains in Solano County, the Project would rely on the Solano County Public Works specifications. For portions of the Project occurring exclusively within Yolo County (Mace Road to Road 106A Reach and Road 106A to the YBWA) replacement drains would rely on the Yolo County Public Works specifications.

In the event that roadway or agricultural storm drains within flood levees need to be modified or replaced as a result of Project activities, such modification or replacement shall be performed in strict consultation with the Central Valley Flood Protection Board (CVFPB) and according to CVFPB standards and requirements.

Site-Specific Impacts and Mitigation Measures

NAWCA/Mariani

<u>Erosion/Siltation</u>

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be

significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measures 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Duncan-Giovannoni

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level. No additional mitigation is necessary.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Winters Putah Creek Nature Park

Erosion/Siltation

Except for a small portion of the reach far upstream, restoration activities have already been completed for this reach, so the only activities anticipated in this reach are maintenance, including weed control. The only potential erosion and siltation impacts resulting from the Project could be from mechanical weed-pulling or the inadvertent over-application of herbicide, in the event either of these activities disturbed and exposed soil that could run into the creek. However, the completed restoration project in this area achieved a low gradient floodplain by design, and so there is no mechanism by which unintended sediment could be released. Thus, the proposed Project would have **no impact** related to erosion or siltation. No mitigation is required in this reach.

Flooding

The only Project activities anticipated in this reach are maintenance activities, except for a far upstream portion of the reach. Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The Project would have **no impact** on flood risk related to alterations of the existing drainage pattern.

Stormwater Drainage Systems Impacts

Several municipal drains for the City of Winters are located in this reach, but because restoration activities have already been completed for this reach, proposed Project activities would only involve maintenance and would not alter stormwater drainage systems. In the far upstream portion of the reach, a large municipal drain is located in an area that may be subject to some Project construction activities. However, any

activities will be performed in a manner to avoid any impacts to the drain, which is a 4-foot diameter concrete pipe with a concrete splashway that would not be practical to modify or relocate. Therefore, there would be **no impact** on stormwater drainage systems and no mitigation is required.

East of 505

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level. No additional mitigation is necessary.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Warren

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

A Yolo County Flood Canal return outfall is located in this reach, but will not be moved or affected by the Project. Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Upper McNamara

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be

significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.

Flooding

Project activities in this reach would not substantially alter the amount of water passing through the creek, channel capacity, or increase flooding risks on- or off-site above the current level. The proposed Project would have no effect on surface runoff because it would not affect flows or overall channel capacity in this reach. The Project would have **no impact** on flood risk in this reach.

Stormwater Drainage Systems Impacts

Occasional small roadway or agricultural storm drains may need to be modified or replaced as a result of the channel alignment. Mitigation Measure 3.1-2 would reduce any potential impacts to stormwater drainage systems to a **less-than-significant** level.

Lower McNamara

Erosion/Siltation

As described in Impact 3.1-1, above, potential short-term erosion and/or siltation impacts could result from Project construction activities such as temporary flow diversions; channel reconfiguration (including grading and clearing); gravel augmentation, scarification, and maintenance; and from Project maintenance activities such as weed management. Long-term erosion and siltation impacts would not be significant because Project work sites would have stabilized before long-term impacts could occur. As identified in Impact 3.1-1, erosion and sediment controls implemented to comply with Section 401 Water Quality Certification and any required SWPPP(s) would ensure that short-term construction-related Project erosion and siltation impacts would be **less than significant**. In the event a SWPPP is not required for Project activities, Mitigation Measure 3.1-1 would reduce any potential construction related erosion and siltation impacts to a **less-than-significant** level.