East Sacramento Valley Study Area (Gray Lodge Wildlife Area) Summary Evaluation of Environmental Documentation and Permit/Approval Needs

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Introduction

During the 1990s and early 2000, the East Sacramento Valley Study Area underwent a series of studies and documentation addressing refuge water supply project alternatives. In 1995, the U.S. Bureau of Reclamation (Reclamation) and the U.S. Fish and Wildlife Service (Service) published the *Decision Document: Report of Recommended Alternatives Refuge Water Supply and San Joaquin Basin Action Plan Lands* (Decision Document). The Decision Document summarized the results of planning studies and was a precursor to implementing environmental compliance activities.

Biggs-West Gridley Water District's (BWGWD) existing conveyance system requires improvements to deliver a firm, reliable Level 4 water supply of suitable quality to the boundary of Gray Lodge Wildlife Area (WA) to fulfill the obligations of Central Valley Project Improvement Act (CVPIA) Section 3406(d)(2). The *Final Environmental Assessment/ Initial Study for the Conveyance of Refuge Water Supply Project, East Sacramento Valley Study Area* (EA/IS) was completed in 1997. The EA/IS evaluated the potential environmental impacts of implementing conveyance improvements that were required to convey water through BWGWD and to the Gray Lodge WA.

In 2003, BWGWD and Reclamation entered into Cooperative Agreement 03-FC-20-2049 (Cooperative Agreement) in support of the CVPIA Refuge Water Supply Program. The Cooperative Agreement covers long-term wheeling of water by BWGWD to the Gray Lodge WA, including the funding and implementation of improvements to the BWGWD distribution system for reliable conveyance of Level 4 refuge water to support full habitat development as required by Section 3406(d)(2) of the CVPIA.

The December 2008 *Draft Design Data Report for Conveyance of Refuge Water Supply to Gray Lodge Wildlife Area* (Design Data Report) was developed to compile, summarize, update, and build upon the information developed from 1998 to the present. The Design Data Report identifies system improvements that would enable BWGWD to deliver a firm, reliable water

supply to the boundary of Gray Lodge WA. The Design Data Report recommends facility improvements, establishes design flows, and updates capital cost estimates to support the next steps of the project, which include design and construction. Many of the facilities proposed in the Design Data Report to ensure firm, reliable supplies and obtain BWGWD acceptance were not included in the project evaluated in the 1997 EA/IS. This technical memorandum addresses the anticipated approvals required to implement the Composite Alternative presented in the Design Data Report, and the differences between facilities and associated impacts identified in the 1997 EA/IS.

Current Project Description and 1997 Environmental Assessment/Initial Study Evaluation

Attachment 1 identifies the facilities that were evaluated in the 1997 EA/IS and those that are currently proposed. Four of the facility improvements identified in the 1997 EA/IUS (removal of the Razorback and Garcia Siphons, and replacement of the Nugent Flume and Colusa Highway Bridge) were identified in the Design Data Report. In addition, the Design Data Report identified 62 facility improvements (major structure, minor structure, and canal) not included in the 1997 EA/IS.

As part of the evaluation process, a field review was conducted on March 20, 2009. The following observations were made:

- Approximately 11 acres of potential giant garter snake (*Thamnophis gigas*) habitat could be impacted by the project, the majority of which would be classified as low- to moderate-quality aquatic or upland given the poor vegetative cover. One portion of the proposed impact area along the Schwind Lateral adjacent to the Gray Lodge WA would be considered good quality, as previously identified in 1997 EA/IS.
- Presence of rodent holes and small cracks in the levee along the canal that potentially could be occupied by giant garter snake during the period of inactivity from October 1 through May 1.
- Potential wetland area along the Belding Lateral.

It is recommended that a more in-depth field survey by a Service-approved biologist confirm the findings of the March 20, 2009 field review. It is recommended that this biologist identify and classify areas of giant garter snake habitat in the project area, using the project footprint to calculate temporarily disturbed and permanent loss of upland and aquatic areas. The biologist would also need to conduct a wetland delineation and determine if the burrows along the canal could be potentially used by giant garter snakes during their hibernation or other species of concern. This effort would be required to support the necessary National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) documentation and federal and state Endangered Species Act consultation.

Recommended Environmental Documentation Approach

The need to evaluate the impacts of numerous additional facilities requires that the lead NEPA (Reclamation) and CEQA (California Department of Fish and Game [CDFG]) agencies determine how to procedurally evaluate potential new impacts. CEQA Guidelines Section 15162 (http://ceres.ca.gov/ceqa/guidelines/art11.html) addresses the preparation of a supplemental negative declaration, stating that a supplemental document is appropriate if "…on the basis of substantial evidence in the light of the whole record":

> "(1) Substantial changes are proposed in the project which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects";
>
> "(2) Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or Negative Declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects"; or
>
> "(3) New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete or the Negative Declaration was adopted…
>
> "Section 15164 of the CEQA Guidelines identifies that an "addendum" may be prepared "(a)… if some changes or additions are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent EIR have occurred," and "(b) … if only minor technical changes or additions are necessary or none of the conditions described in Section 15162 calling for the preparation of a subsequent EIR or negative declaration have occurred."

Reclamation's NEPA Handbook is currently under revision, but the decision as to whether to prepare a supplemental environmental assessment/finding of significant impact is generally driven by the same factors as whether to prepare a new initial study/negative declaration.

On the basis of the approach used in the 1997 document with respect to the identification of mitigation to address potential impacts, it is likely that any new significant impacts could be mitigated to a less-than-significant level. Although numerous new facilities are required, construction-related impacts would likely be either generally minor, or would impact the same types of habitats identified in the original EA/IS. Therefore, a supplemental CEQA document might not be required, and an addendum could potentially be prepared to address the proposed additional facilities. CDFG would need to provide input because they are the lead CEQA agency and the EA/IS was issued more that 10 years ago.

Current Project Description and 1998 Biological Opinion

On December 7, 1998, the Service issued a Programmatic *Biological Opinion on Conveyance of Refuge Water Supply Project, West and East Sacramento Valley, California* (BO). The Service BO the effects of the proposed project on the giant garter snake, in accordance with Section 7 of the Endangered Species Act of 1973, as amended. The consultation addressed the effects of improvements to water conveyance facilities that are necessary to deliver Level 4 water to the refuge boundaries.

Surveys of the project area were conducted during the fall of 1995 and 1996 to determine whether the project would affect any federally listed or species proposed for listing. The Service BO determined the following were not found in the area to be impacted by the structural modifications:

- Elderberry bushes
- Vernal pool habitat
- Palmate-bracted bird's beak habitat
- Sacramento splittail

The Service BO identified a 5.5-acre maximum of permanent loss of upland and aquatic giant garter snake habitat at the Gray Lodge WA, but the 2009 field review identified a potential disturbance of giant garter snake habitat twice that size. A majority of the observed approximate 11 acres would be only temporarily disturbed and would need to be restored to a level of quality that is equal to, or greater than, pre-project conditions following the guidelines listed in the *Mitigation Criteria for Restoration and/or Replacement of Giant Garter Snake Habitat.* Permanent loss would need to be compensated through habitat preservation at a 3:1 replacement ratio.

A cumulative permanent loss of up to 24.5 acres of giant garter snake upland habitat and 29.5 acres of aquatic habitat can be authorized for the 25 modifications identified under the Service BO. If permanent loss of giant garter snake upland habitat or aquatic habitat exceeds the 5.5 acres allotted to Gray Lodge WA, it would be potentially feasible to use the acreage allotment of Sutter WA (16.5 acres upland habitat/21.5 acres aquatic habitat). Service consultation would then need to be re-initiated for activities associated with Sutter WA.

Programmatic Consultation Guidelines

Appendix A of the Service BO (see Attachment 2) identifies 25 additional major structural modifications, which have not yet been designed. The Service BO uses a programmatic approach for authorizing take for these modifications. The following criteria must be met for take of giant garter snake to be authorized under the Service BO, for each major structural modification:

1. Habitat loss at each site will not exceed the amount specified for that site in Appendix A of the Service BO.

2. The total cumulative amount of permanent giant garter snake habitat loss for all projects listed in Appendix A of the Service BO has not exceeded 24.5 acres of upland habitat or 29.5 acres of aquatic habitat (as identified above).

3. The activity has been designed to minimize impacts to giant garter snakes and their habitat to the maximum extent practicable, through consultation between design engineers and a Service-approved biologist familiar with giant garter snake habitat needs.

4. The activity will comply with the terms and conditions of the Service BO.

The Service BO authorized take for the 4 major modifications that were at 50 percent design level, and for the 83 minor modifications along the Glenn-Colusa Irrigation District Main Canal. Accordingly, the 4 structure improvements (removal of the Razorback and Garcia Siphons, and replacement of the Nugent Flume and Colusa Highway Bridge) still included as part of the proposed project are already addressed in the Service BO.

The Service BO can authorize take for the 25 currently undesigned major modifications only after those activities have been appended to the Service BO. Although the revised proposed project would include 62 new improvements, the total acreage to be disturbed appears to be within the bounds of what was considered in the Service BO. This would need to be verified with the Service to ensure their acceptance. The following procedure is identified to authorize take for 25 major structural modifications using a programmatic approach under the Service BO:

1. Reclamation will submit a letter requesting that the proposed activity be appended to the Service BO and provide the Service with the following:

    a. A site plan scaled 1-inch = 20-feet with an overlay showing habitat types at the site (open water, marsh, rice field, and disturbed upland), and differentiating areas to be temporarily and permanently impacted.

    b. Information on the number of acres of habitat to be temporarily and permanently impacted for each habitat type.

    c. A project description, including details related to the types of disturbance, project timing, and a discussion as to how impacts are minimized to the maximum extent practicable relative to the Service's *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake Habitat*.

2. The Service will review the information provided to determine whether the activity meets the criteria for being appended to the Service BO, or whether a separate BO is necessary.

3. If the Service determines that the activity is appropriate for inclusion under the Service BO, then the Service will provide a letter appending the activity to the Service BO.

California Environmental Quality Act California Department of Fish and Game Coordination

Section 2080 of the Fish and Game Code prohibits "take" of any species that is determined to be an endangered species or a threatened species, including the giant garter snake, which is considered "threatened" by CDFG. Because the Service has already consulted on the impacts of the project, CDFG might determine that a consistency determination is all that is needed to comply with the incidental take already approved by the Service. Consistency

determinations are written under Section 2080.1 of the Fish and Game Code. Reclamation will need to coordinate with CDFG regarding the necessary consultation process.

Permitting

The permits listed in Table 1 are anticipated to be required for the implementation of facility improvements. Permitting is anticipated to require a minimum of 6 to 12 months.

TABLE 1
Permits Required for the Conveyance of Level 4 Refuge Water Supply

Agency	Requirement	Applicability	Compliance Procedure
U.S. Army Corps of Engineers	Nationwide or Individual Permit	Work requiring discharge of fill to surface waters	Submit Preconstruction Notification or (if necessary) Section 404 Permit Application. Wetland delineation should be performed to determine if impacts are greater than 0.5 acres of jurisdictional wetlands. An individual permit application could take from 18 to 24 months to complete if required.
U.S. Fish and Wildlife Service	Endangered Species Act	All project activities	Confirm applicability of existing Programmatic Biological Opinion. If not applicable, Section 7 consultation would be required prior to U.S. Army Corps of Engineers' Section 404 permit approval.
California Department of Fish and Game	Streambed Alteration Agreement (Level 1 Stability Analysis [LSAA] or 1600 permit)	Alteration to a stream channel	Submit LSAA application.
California Department of Fish and Game	California Endangered Species Act (CESA) compliance	CESA (2081) compliance may be required if endangered species are present or potentially effected	CESA compliance is initiated by CDFG and usually takes 30 to 60 days if required.
State Water Resources Control Board	General Construction Activity Stormwater Permit	Projects with disturbance to greater than 1 acre	Submit Notice of Intent. Require contractor to implement Stormwater Pollution Prevention Plan.
Central Valley Regional Water Quality Control Board	Water Quality Certification	Work requiring discharge of fill to surface waters	Submit Section 401 Water Quality Certification application, including best management practices.
State Historic Preservation Officer (SHPO)	National Historic Preservation Act consultation	Alteration of structures that could be eligible for the National Register of Historic Places	Review of archeological and historical resources information by SHPO. Section 106 consultation

TABLE 1
Permits Required for the Conveyance of Level 4 Refuge Water Supply

Agency	Requirement	Applicability	Compliance Procedure
			with SHPO also will be required for Section 404 permit will be issued.
Butte County Air Quality Management District (AQMD)	Air quality permit	Contractor equipment and fugitive dust	Submit application to AQMD.
Various	Encroachment permits	Construction within rights-of-way or property	Coordinate with Union Pacific Railroad, Butte County Public Works, and potentially other agencies, and seek permits as needed.

Conclusion

It appears that although numerous facilities in addition to those addressed in the 1997 EA/IS are required to implement the project, the resultant level of impact might remain less than significant. The potential for impacts will need to be verified through a full biological resources survey. Reclamation will need to coordinate with both the Service and CDFG to ensure that all federal Endangered Species Act and California Endangered Species Act–related impacts, including those to giant garter snake, are either addressed through the existing Service BO or additional consultation. It is anticipated that this consultation will be a multi-month process; therefore, it is recommended that the process be started immediately to prevent unnecessary delay while designs are completed.

Attachment 1
Summary of Proposed Gray Lodge System Improvements

Summary of Proposed Gray Lodge System Improvements

The system improvements identified in the 1997 EA/IS are italicized

Number	Name	Improvement	Detail/Notes
B-1	*Razorback Siphon*	*Remove existing siphon. Construct new siphon to take Dietzler Ditch flows under BWG main canal.*	Remove existing siphon. Install 2 cross-drainage box siphons, each 50 ft long, 8 ft wide, 6 ft deep.
B-2	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 384 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
B-3	Railroad Culverts	Improve canal capacity under railroad crossing by installing 2 additional culverts.	Bore and jack two 8-ft-diameter pipe culverts adjacent to existing culverts.
B-4	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 515 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
B-5	Garcia Check	Replace structure with long-crested weir.	Remove existing check and replace with 70-ft long-crested weir. Weir to be 7-ft high and Include three 3.3-ft wide overshot gates, max opening 6.5 ft.
B-6	*Garcia Siphon*	*Remove existing canal siphon. Construct new siphon to take RD 833 flow under BWG main canal.*	Remove existing canal siphon and replace with trapezoidal earthen canal section. Reconfigure RD 833 drainage by installing two cross-drainage box siphons, each 100 ft long by 8 ft wide by 6 ft deep.
B-7	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 982 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
B-8	Biggs/Princeton (Afton) Bridge	Replace bridge with higher deck height and larger culvert opening.	Replace with 2-ft-thick flat slab bridge deck with at least 7-ft culvert opening. Assumes asphalt concrete (AC) driving surface will be applied.
B-9	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 1,134 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
B-10	Banion Check	Replace structure with long-crested weir.	Remove existing check and replace with 70-ft long-crested weir. Weir to be 6.4-ft high and Include three 4.5-ft wide overshot gates, max opening 6.25 ft.
B-11	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 1,040 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.

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Number	Name	Improvement	Detail/Notes
B-12	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 11,050 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
B-13	Fields Flume	Replace flume.	Replace with 26-ft-long flume with 8.5-ft-high embankment walls, each 6 inches thick. Install 2-ft-wide walkways. During final design, consider wasteway at this location to spill excess water.
B-14	Canal Section	Widen canal to improve hydraulics.	Widen 13,008 LF of canal to 30-ft bottom width, 10-ft depth, 2:1 side slopes. (Approximately 160 sq ft of excavated dirt for every linear foot of canal.) Provide 14-ft minimum top width for canal banks.
B-15	North Weir	Replace structure with long-crested weir.	Replace with 67-ft long-crested weir. Weir to be 6.7-ft high and include two 4-ft-wide overshot gates, max opening of 6.5 ft.
B-16	Division 2 Head gate (Belding/Traynor Split)	Replace with 3-bay sluice gate and relocate farm crossing bridge nearby.	Replace farm crossing with 2-ft-thick flat slab deck and 7-ft opening to canal bottom. Replace existing headgate structure with 3-bay sluice gate, each 4-ft wide by 7-ft depth. Increase height of adjacent canal banks to achieve 18 inches of freeboard.
B-17	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 3,500 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
B-18	Check #1889	Replace structure with long-crested weir.	Replace with 45-ft long-crested weir. Weir to be 5.3-ft high and Include one 4-ft wide overshot gate, max opening 5 ft.
B-19	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 3,338 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
B-20	Check #1845	Replace structure with long-crested weir.	Replace with 83-ft long-crested weir. Weir to be 4.7-ft high and include 2 3.5-ft wide overshot gates, max opening 4.5 ft.
B-21	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 8,861 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.

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Number	Name	Improvement	Detail/Notes
B-22	Farm Crossing # 1786	Replace farm crossing to improve capacity and meet freeboard requirement.	Replace farm crossing with 2-ft-thick flat slab bridge deck and 8-ft opening to canal bottom. Assume deck and soffit will be raised by 1 ft to improve freeboard. Assume aggregate base backfill for driving surface.
B-23	Farm Crossing #1719	Replace farm crossing to improve capacity and meet freeboard requirement.	Replace farm crossing with 2-ft-thick flat slab bridge deck and 8.5-ft opening to canal bottom. Assumes deck will be raised by 0.7 ft and soffit by 1 ft to improve freeboard. Assume AC driving surface.
B-24	Farris Rd. Bridge	Replace farm crossing to improve capacity and meet freeboard requirement.	Replace bridge with open span, 1.7-ft thick slab deck with aggregate base backfill driving surface and 8.5-ft opening to canal bottom.
B-25	Bonslett Bridge	Replace bridge and replace control structure with long-crested weir.	Replace bridge with bridge-box culvert structure, with 2-ft thick slab deck and 6-ft by 5-ft culvert. Install 50-ft long-crested weir. Weir to be 7-ft high and include one 4-ft wide overshot gate with max opening 6.5 ft.
B-26	Seepage Drains	Replace seepage drains impacted by canal modifications.	Replace 84,400 LF of seepage drains.
Schwind Lateral			
S-1	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 1,530 LF of canal banks to achieve 12 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
S-2	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 9,282 LF of canal banks to achieve 12 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
S-3	Farm Crossing #7137	Replace with concrete box culvert and farm crossing.	Replace with concrete box culvert, 24-ft long by 9-ft wide by 4-ft high, with integrated farm crossing.
S-4	Schwind Flume	Replace flume, 8-ft wide by 5-ft deep.	Replace with 60-ft long by 8-ft wide by 5-ft deep flume. Install check bays on both sides of flume to allow for spill.
S-5	Bridge #1522	Replace with long-crested weir and farm crossing.	Replace with 37-ft ong crested weir. Weir to be 6.6-ft high and include one 3-ft-wide overshot gate, max opening 6.5 ft.

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Number	Name	Improvement	Detail/Notes
S-6	Farm Crossing #1491	Replace with concrete box culvert and farm crossing.	Replace with concrete box culvert, 20-ft long by 9-ft wide by 4-ft high, with integrated farm crossing.
S-7	Canal Section	Widen canal to improve hydraulics.	Widen 1,705 LF of canal to 14-ft bottom width, 8-ft depth, 2:1 side slopes. (Approximately 64 sq ft of excavated dirt for every linear foot of canal.) Provide 14-ft minimum top width for canal banks. Includes reconstruction or modifications of turnouts, as needed.
S-8	Farm Crossing #1438	Replace with concrete box culvert.	Replace with concrete box culvert, 19-ft long by 7-ft wide by 4-ft high, with integrated farm crossing.
S-9	Farm Crossing #5021	Replace existing structure with siphon.	Remove existing structure and install 162-ft-long by 6-ft-diam siphon. Single siphon will replace structures and accommodate flow between Farm Crossing #5021 and W. Liberty Road crossing.
S-10	Culverts #5006	Remove existing structure.	Remove two 140-ft-long by 3-ft-diam CMP culverts.
S-11	Culvert South of W. Liberty Rd.	Remove existing structure.	Remove 26-ft-long by 4-ft-diam CMP culvert.
S-12	Seepage Drains	Replace seepage drains impacted by canal modifications.	Replace 5,970 LF of seepage drains.
Traynor Lateral			
T-1	Canal Section: Head of Traynor to Nugent Flume	Widen canal to improve hydraulics.	Widen 2,630 LF of canal to 30-ft bottom width, 11-ft depth, 2:1 side slopes. (Approximately 329 sq ft of excavated dirt for every linear foot of canal.) Provide 14-ft minimum top width for canal banks.
T-2	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 2,931 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
T-3	Traynor Headgates	Replace structure with long-crested weir.	Replace with 62-ft long-crested weir. Weir to be 7.4-ft high and include two 3-ft-wide overshot gates, max opening 6.5 ft.
T-4	*Nugent Flume*	*Replace flume to improve freeboard and capacity.*	Replace with 60-ft long by 22-ft wide by 10.5-ft deep flume. Install 2 check bays, one on either side of flume, to allow for spill.

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Number	Name	Improvement	Detail/Notes
T-5	Canal Section: Nugent Flume to Farm Crossing	Widen canal to improve hydraulics.	Widen 3,867 LF of canal to 34-ft bottom width, 11-ft depth, 2:1 side slopes. (Approximately 291 sq ft of excavated dirt for every linear foot of canal.) Provide 14-ft minimum top width for canal banks.
T-6	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 3,255 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
T-7	Canal Section: Farm Crossing to Colusa Hwy Bridge	Widen canal to improve hydraulics.	Widen 2,622 LF of canal to 16-ft bottom width, 10-ft depth, 2:1 side slopes. (Approximately 291 sq ft of excavated dirt for every linear foot of canal.) Provide 14-ft minimum top width for canal banks.
T-8	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 1,060 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
T-9	Structure #2633: Farm Crossing	Replace farm crossing.	Replace with 2-ft-thick flat slab bridge deck. Assumes asphalt concrete (AC) driving surface will be applied.
T-10	New Structure	Construct long-crested weir.	Construct 48-ft long-crested weir. Weir to be 8.7-ft high and include two 3-ft-wide overshot gates, max opening 7-ft.
T-11	Canal Section	*Raise canal banks to meet freeboard requirements.*	Increase height of 118 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
T-12	*Colusa Hwy Bridge*	*Replace bridge with larger culvert opening.*	Replace bridge with flat slab, 3-ft deck height and 2-ft wide center pier. Maintain existing road height. Consider siphon under bridge. Assume AC driving surface.
T-13	Canal Section: Colusa Hwy Bridge to West Liberty Rd Bridge	Widen canal to improve hydraulics.	Widen 5,317 LF of canal to 16-ft bottom width, 10-ft depth, 2:1 side slopes. (Approximately 50 sq ft of excavated dirt for every linear foot of canal.) Provide 14-ft minimum top width for canal banks.
T-14	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 4,462 LF of canal banks to achieve 18 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.

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Number	Name	Improvement	Detail/Notes
T-15	Canal Section: Traynor Extension (West Liberty Rd Bridge to Rising River Headgates)	Widen canal to improve hydraulics.	Widen 2,725 LF of canal to 12-ft bottom width, 10-ft depth, 2:1 side slopes. (Approximately 170 sq ft of excavated dirt for every linear foot of canal.) Provide 14-ft minimum top width for canal banks. Cut bottom channel slope linearly decreasing from upstream to downstream.
T-16	Seepage Drains	Replace seepage drains impacted by canal modifications.	Replace 29,300 LF of seepage drains.
Rising River Lateral			
R-1	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 4,929 LF of canal banks to achieve 12 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
R-2	#2808 - Flashboard Check	Replace structure with long-crested weir.	Long-crested weir will be 19-ft long and 3.1-ft high. Include one 4-ft-wide gate, max opening 3-ft
R-3	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 570 LF of canal banks to achieve 12 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
R-4	Evans Reimer Bridge	Replace bridge	Replace with bridge having 1-ft-thick center pier, 2-ft-thick slab with 7-ft opening to canal base. Bridge deck should have 2-3/8-inch thick AC road surface.
Cassady Lateral			
C-1	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 8,607 LF of canal banks to achieve 12 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
C-2	Structure #1226, Farm Crossing	Replace box culvert/crossing.	Replace with concrete box culvert, 8-ft-wide by 4-ft-deep by 24-ft-long, with integrated farm crossing.
C-3	Structure #1199, Bonslett's Driveway	Replace box culvert/crossing.	Replace with concrete box culvert, 4-ft-wide by 6-ft-deep by 7-ft-long. Structure to have 6-ft-high sidewalls and wingwalls adjacent to driveway.
C-4	Bonslett Weir	Replace structure with long-crested weir.	Replace with 56-ft long-crested weir. Weir to be 2.7-ft high and include one 3-ft-wide overshot gate, max opening 2.5 ft .

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Number	Name	Improvement	Detail/Notes
C-5	Structure #1163	Replace structure with long-crested weir.	Replace with 27-ft long-crested weir. Weir to be 6.3-ft high and include one 3-ft wide gate, max opening 3.5 ft.
C-6	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 1,714 LF of canal banks to achieve 12 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
C-7	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 980 LF of canal banks to achieve 12 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.
C-8	Canal Section	Raise canal banks to meet freeboard requirements.	Increase height of 1,982 LF of canal banks to achieve 12 inches of freeboard and reshape to provide 14-ft minimum top width for canal banks.

Attachment 2

***Biological Opinion on Conveyance of Refuge Water Supply Project, West and East Sacramento Valley, California* – Appendix A**

Table 5
Estimates of Permanent Upland and Aquatic Habitat Loss and Creation for 25 Other West and East Sacramento Valley Areas Project Site Without Design Documents

Site Description and Location (Figure and Site Number)	Refuge or WMA Served/ USGS Quad	Existing Habitat for Giant Garter Snake	Maximum Acreage Permanent Loss Upland/Aquatic	Maximum Acreage Permanent Created Upland/Aquatic
Install flow measurement device. Fig. 1, No.5	Sacramento NWR/Logandale	Moderate quality aquatic and upland	0.5/0.5	0.0/0.0
Install new turnout. Fig. 1, No. 6	Sacramento NWR/Logandale	Good quality aquatic and upland. Known snake population present.	0.5/0.5	0.0/0.0
Install flow measurement device. Fig.1, No.7	Delevan NWR/Moulton Weir	Good quality aquatic and upland. Known snake population present in this NWR	0.5/0.5	0.0/0.0
Install flow measurement device. Fig. 1, No. 8	Colusa NWR/Colusa	Moderate quality aquatic (no water present in August 98) and upland. Known snake population present in this NWR.	0.5/0.5	0.0/0.0
Enlarge culvert under Ware Rd. Fig. 1, No. 9	Colusa NWR/Arbuckle	Moderate quality aquatic and upland. Known snake population present in this NWR.	0.05/0.05	0.0/0.0
Enlarge Nugent Flume. Fig. 2, No.1	Gray Lodge WMA/Biggs	Low to moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge Garcia Siphon. Fig. 2, No. 2	Gray Lodge WMA/Biggs	Low to moderate quality aquatic and upland	0.5/0.5	0.0/0.0
Enlarge Razorback Siphon. Fig. 2, No. 3	Gray Lodge WMA/ Biggs	Low to moderate quality aquatic and upland	0.5/0.5	0.0/0.0
Enlarge Colusa Hwy Culvert Fig. 2, No. 4	Gray Lodge WMA/Gridley	Low to moderate quality aquatic and upland	0.5/0.5	0.0/0.0
Replace Schwind Pump Station. Fig. 2, No. 5	Gray Lodge WMA/ Pennington	Low to moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Install/enlarge water delivery point. Fig 2., No. 6	Gray Lodge WMA/ Pennington	Low to moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Install/enlarge water delivery point on Cassidy Lateral. Fig.2, No. 7	Gray Lodge WMA/ Pennington	Moderate to good quality aquatic and upland	0.5/0.5	0.0/0.0
Install/enlarge water delivery point on Jakey Lateral. Fig. 2, No. 8	Gray Lodge WMA/ Pennington	Moderate to good quality aquatic and upland	0.5/0.5	0.0/0.0

Table 5
Estimates of Permanent Upland and Aquatic Habitat Loss and Creation for 25 Other West and East Sacramento Valley Areas Project Site Without Design Documents

Site Description and Location (Figure and Site Number)	Refuge or WMA Served/ USGS Quad	Existing Habitat for Giant Garter Snake	Maximum Acreage Permanent Loss Upland/Aquatic	Maximum Acreage Permanent Created Upland/Aquatic
Increase Sunset Pumping Station Capacity. Fig 3. No. 9	Sutter NWR/ Sutter	Low to moderate quality aquatic and upland	0.5/0.5	0.0/0.0
Enlarge Sanders Road culvert. Fig. 3, No. 10	Sutter NWR/ Sutter	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Install Sand Creek Siphon. Fig. 3, No. 11	Sutter NWR/ Sutter	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge Butte House Road siphon. Fig. 3, No. 12	Sutter NWR/ Sutter	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge siphon at Humphrey and South Butte. Fig.3, No. 13	Sutter NWR/ Sutter	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge siphon at abandoned RR. Fig. 3, No. 14	Sutter NWR/ Sutter	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge Hwy 20 siphon. Fig 3, No. 15	Sutter NWR/ Sutter	Low to moderate quality aquatic and upland	2.0/2.0	0.0/0.0
Enlarge Humphrey Road siphon D/S of Hwy 20 culvert. Fig. 3, No.16	Sutter NWR/ Sutter	Moderate to good quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge Franklin Clements siphon. Fig 3. No. 17	Sutter NWR/ Sutter	Low to moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Enlarge Lincoln Road siphon. Fig 3. No. 18	Sutter NWR/ Gilsizer Slough	Moderate quality aquatic and upland	1.0/1.0	0.0/0.0
Install refuge supply pipeline along McClatchy Road to Sutter Bypass. Fig. 3, No. 19	Sutter NWR/ Tisdale Weir	Moderate to good quality aquatic and upland. Dense *Ludwigia* present along approx 150 feet of existing drain	4.0/9.0 including approx. 0.09 acres *Ludwigia*	0.0/0.0
Install siphon to Sutter NWR	Sutter NWR/ Tisdale Weir	Low to moderate quality aquatic and upland	2.0/2.0	0.0/0.0
Install toe drains along Farrington Lateral Sutter. Figure 3, shaded labeled area	Sutter NWR/ aquatic and upland	Moderate quality	0.0/0.0	0.0/2.5
Total			24.5/29.5	0.0/2.5