

# RECLAMATION

*Managing Water in the West*

## DRAFT FINDING OF NO SIGNIFICANT IMPACT

# San Luis Drainage Feature Reevaluation Demonstration Treatment Facility at Panoche Drainage District

**FONSI-10-030**

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# Introduction

In accordance with section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969, as amended, the South-Central California Area Office of the Bureau of Reclamation (Reclamation), has determined that the construction of a Demonstration Treatment Facility (Facility) near Firebaugh, California within Panoche Drainage District's San Joaquin River Water Quality Implementation Program (SJ RIP) reuse area is not a major federal action that will significantly affect the quality of the human environment and an environmental impact statement is not required. This draft Finding of No Significant Impact is supported by Reclamation's draft Environmental Assessment (EA) Number EA-10-030, *San Luis Drainage Feature Reevaluation Demonstration Treatment Facility at Panoche Drainage District*, and is hereby incorporated by reference.

## Background

In 1960, Public Law No. 88-488 authorized the construction, operation, and maintenance of the San Luis Unit of the Central Valley Project, including the construction of San Luis Dam, San Luis Canal, Coalinga Canal, San Luis Drain, distribution systems, drains, pumping facilities, and other related works. The San Luis Unit serves 700,000 acres of irrigated agriculture and includes the Westlands, Broadview, Pacheco, and Panoche Water Districts and the southern portion of the San Luis Water District.

Since the closure of the Kesterson Reservoir in the mid-1980s, adequate drainage service has not been available for irrigation waters from agricultural lands served by the San Luis Unit. By court order (*Sumner Peck Ranch v. Reclamation*) Reclamation is re-evaluating options for providing agricultural drainage service to achieve long-term, sustainable salt and water balance in the root zone of irrigated lands in the San Luis Unit.

Reclamation released a Final Environmental Impact Statement (FEIS) for the *San Luis Drainage Feature Re-evaluation* to the public on June 8, 2006. The FEIS evaluated seven action alternatives in addition to the no action alternative for implementing drainage service within the San Luis Unit. The Record of Decision (ROD) for the FEIS was signed March 9, 2007. Subsequently, Reclamation prepared the *San Luis Drainage Feature Re-Evaluation Feasibility Report* (Feasibility Report) to evaluate the feasibility of implementing the preferred alternative. The FEIS, ROD, and Feasibility Report are hereby incorporated by reference.

Drainage service is needed to achieve a long-term, sustainable salt and water balance in the root zone of irrigated lands in the San Luis Unit and adjacent areas. The Federal action to supply drainage services is required by Public Law 86-488 and the *Sumner Peck Ranch v. Reclamation* Court Order.

The primary purpose of the Facility is to demonstrate and operate the reverse osmosis (RO) and selenium biotreatment technologies described in the Feasibility Report in order to collect cost

and performance data required for final design of the corresponding full-scale drainage service treatment components to be constructed in the northern sub-area of Westlands Water District.

In accordance with the 2007 ROD for the FEIS, and contingent upon available funding, a secondary purpose of the Facility is to evaluate other innovative technologies, which may reduce the cost and environmental impacts as compared to the technologies evaluated in the Feasibility Report, while meeting the requirements for drainage service. At this point it is uncertain which innovative technologies will be installed and evaluated; however, the Facility footprint includes adequate land area to incorporate these additional systems if and when they are built.

### **Proposed Action**

Reclamation proposes to construct, operate, and maintain for 18 months a Facility for drainage treatment within the geographical boundaries of the existing SJRIP reuse area. The Facility will occupy a rectangular area approximately four acres in size, adjacent to and immediately north and east of Panoche Drainage District's existing perpendicular drainage distribution canals. Additional pipelines will be constructed to convey drainage water from the seven existing reuse sumps to the Facility. Proposed drainage water treatments will include RO, ultrafiltration (UF), and potentially up to two innovative technologies. At this point it is uncertain which innovative technologies will be installed; however, the Facility footprint includes adequate land area to incorporate these additional systems if and when they are built. Subsequent environmental analysis may be required for the addition of these technologies depending upon the type of treatment systems or equipment to be installed.

The treatment demonstration systems may be operated by, but not limited to, Reclamation staff, contractors, and for at least 18 months to collect data for final designs. Subsequently, Reclamation may elect to continue operating the Facility indefinitely or delegate it to their designated operating partner for treating reuse drainage. Disposition of the facility after the Proposed Action time period is unknown at this time and may require additional environmental analysis.

Discharge permits from the California Regional Water Quality Control Board (RWQCB) will be required for discharge of drainage water from the Facility. The SJRIP currently operates under a discharge permit (Order Number 5-01-234) from the RWQCB, Central Valley Region. Operation of the Facility will require a new National Pollutant Discharge Elimination System (NPDES) permit issued by the RWQCB. Reclamation will acquire the permit prior to operation of the Facility. The Facility will not be operated until the discharge permit has been acquired.

### ***Environmental Commitments***

Reclamation shall implement the following environmental protection measures to reduce environmental consequences associated with the Proposed Action (Table 1). Environmental consequences for resource areas assume the measures specified will be fully implemented.

**Table 1 Environmental Protection Measures and Commitments**

<b>Resource</b>	<b>Protection Measure</b>
Biological Resources	Preconstruction surveys and implementation of avoidance and minimization measures for San Joaquin kit fox (SJKF, USFWS 2011a; see Appendix C).
Biological Resources	Preconstruction surveys and implementation of avoidance and minimization measures for Giant garter snake (GGS, see Appendix C)

<b>Resource</b>	<b>Protection Measure</b>
Biological Resources (migratory birds)	Preconstruction surveys and implementation of avoidance and minimization measures for burrowing owl (CDFG 1995; see Appendix D).
Biological Resources	Surveys (USFWS 2000; see Appendix E) will be conducted for nesting migratory birds on land that will be disturbed for construction. One eucalyptus trees ( <i>Eucalyptus</i> sp.) located at the Facility construction/staging site will likely be removed for construction. This tree will be removed either before nesting season commences, or if removal must occur during the bird breeding season, only after it is has been surveyed by a biologist and found not to support nesting birds.
Biological Resources	A biologist will be present at the inception of the construction and other times as required to insure that measures for avoidance of effects to species are implemented. Additionally, if a listed species is observed, work at the site will immediately stop and Reclamation biologists shall be notified. No work will continue without additional approval from Reclamation environmental staff, following further consultation with wildlife agencies, as appropriate.

Reclamation's finding that implementation of the Proposed Action will result in no significant impact to the quality of the human environment is supported by the following factors:

## **FINDINGS**

### **Water Resources**

Water for the Facility will be provided from existing drainage water collected for use in the SJRIP. No additional drainage water will be created for the Proposed Action. Approximately 50 percent of drainage water brought into the Facility will be concentrated into a waste stream that will be fed into the selenium biotreatment system for up to 99 percent selenium removal (selenium concentrations are estimated to be 2.5 microgram per liter after biotreatment). The other 50 percent will be recovered as low salinity product water (total dissolved solids estimated to be 340 milligram per liter after RO treatment). However, no salts will be removed from the concentrated waste stream during biotreatment. Consequently, salt concentrations in the water discharged back into the SJRIP will be similar to that of the feed water sent into the Facility as the low-salinity RO water and the biotreated water will be blended prior to discharge. Drainage water will continue to be reused within the SJRIP until it is discharged into the Grassland Bypass Project under a new RWQCB NPDES discharge permit.

### **Land Use**

The Proposed Action will include construction of a Facility for treating drainage water to remove selenium. The Facility will not change land use designations nor will it impede existing uses. A small portion of an existing field will be removed for temporary staging during construction of the Facility; however, once construction is complete the field will be returned to its current use. Drainage water treated in the Facility will be returned to the SJRIP drainage system for continued use; however, this water will have improved water quality as selenium will be reduced prior to its return. Consequently, there will be no impacts to land use as a result of the Proposed Action.

### **Biological Resources**

Effects to biological resources from the Proposed Action could occur from construction of the Facility, pipelines and appurtenances, or from operation or maintenance of the facilities during the Proposed Action. However, because the SJRIP reuse area is heavily affected by intense agriculture activity, and weed and pest species are controlled or eliminated, the habitat available

is little used by wildlife and fish species. The reduced value of habitat may also relate to the relatively high concentrations of selenium in water applied to the landscape and the salt tolerant vegetation, which can be exploited by a relatively small suite of species. With implementation of avoidance measures as described in Section 2.2 and Appendices C through E of EA-10-030, the Proposed Action is not expected to adversely affect federally-listed and other protected species.

Construction activities will occur over approximately 14 months. The largest area of temporary disturbance (approximately 20 acres in roadways) will result from excavation and laying of pipelines to carry water from existing sumps, which collect in-ground water, to the Facility. The roadways that will be disturbed are heavily traveled by agricultural workers and are of limited use to wildlife.

Operations occurring within the compound housing the Facility are not anticipated to measurably affect biological resources. The primary effect of Facility operation will be production of treated water which will be released to an irrigation ditch. The treated water will be a minor fraction of the SJRIP reuse water pool carried in the irrigation ditch, and it will minimally affect the SJRIP reuse water. The total volume of SJRIP reuse area water leaving the area will minimally be affected by the Facility and concentrations of salts and elements other than selenium in SJRIP reuse water will remain similar if not slightly lower than current concentrations (see Table 2-1). Although the concentration of selenium in post treatment SJRIP reuse water will be reduced, including for bioactive forms, the change will be minor, and likely imperceptible or immeasurable beyond the SJRIP reuse area. As such, it will not meaningfully affect the quality of the water or biological resources beyond the SJRIP reuse area.

The facility will be operated year-round and will be lighted for safety and security. The effects to wildlife resources from this light source are expected to be negligible because of the existing low value of the area to wildlife.

Hazardous material (e.g. concentrated selenium) generated from the experimental treatment will be stored on site, within the secured, fenced, lighted compound as described previously. The material stored will be “solids” and will have little opportunity to spread outside the secured area. Purposeful transport will occur to a waste disposal site approximately quarterly, where any effects of disposal will already be addressed.

Transport vehicles traveling on county roads, state highways, and federal highways (e.g. Interstates) will not be expected to affect biological resources. Similarly, staff traveling to and from the site for work on existing roads will not be expected to affect biological resources.

Besides effects from facilities construction and operation, some, minimal maintenance is anticipated over the period of operation of the Facility. Maintenance required for the Facility will be expected to be conducted within fenced compound surrounding the Facility and the perimeter fencing. Maintenance within the compound should have no effect to biological resources.

If necessary, “exclusion devices” such as netting or physical barriers will be installed to prevent access by breeding birds that could disrupt operation of the Facility. The Facility will be retrofitted during the bird non-breeding to exclude migratory birds.

Vermin, pests posing a human health hazard, or pests otherwise affecting the effective operation of the Facility inside the perimeter fencing will be controlled employing integrated pest management techniques. The potential for harm to listed species will be minimized when practicing control. Pesticides approved for use in California, as determined by the California Department of Pesticide Regulations will be utilized. Application of pesticides will follow recommendations of a Licensed Pest Control Operator and be applied by a Licensed Pest Control Applicator. Approval will be required from Reclamation prior to use.

***Effects to listed wildlife species and designated critical habitat***

The potential for habitat, specific to listed species, to be affected by the Proposed Action was discussed with biologists from the Service and private industry. Two federally listed species considered possible candidates to occur in the area which may be affected by the Proposed Action are SJKF and GGS. Potential effects to these species could result from construction activities in the Proposed Action footprint or from operation or maintenance of the Facility. Reclamation has initiated consultation with the Service under Section 7 of the ESA for these species. The draft EA will not be finalized until consultation is complete.

**Effects to Giant Garter Snake** GGS inhabits agricultural wetlands and other waterways such as irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands in the Central Valley (USFWS 1999). Habitat requirements for GGS consist of (1) adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for cover and refuge from flood waters during the snake's dormant season in the winter (USFWS 2009).

Potential habitat in the Proposed Action footprint includes irrigation ditches and adjacent uplands in the SJRIP reuse area, as well as the Outside Canal located adjacent to the area. The suitability of the aquatic habitat adjacent to construction areas is poor. The irrigation ditches adjacent to the roadways where trenching will occur have steep-sided banks and are virtually devoid of vegetation, including emergent vegetation. There is limited algal growth and submersed aquatic vegetation in some portions of ditches, and prey such as bullfrogs (*Rana catesbeiana*) and minnows (Cyprinidae) occur there. Although prey are present, they are not abundant and there is considerable risk to GGS from predators. Herons and egrets forage along the ditches and easily could prey on GGS in the ditches because no escape cover is present for the snakes. Additionally, bullfrogs could prey on young GGS. Bullfrogs have reduced the suitability of nearly all permanent and semi-permanent waters in the Central Valley for GGS (USFWS 1993).

The habitat for GGS adjacent to the Proposed Action footprint is also poor, and dispersal to the SJRIP reuse area will not be favored. There are only a few records for GGS within about 5 miles of the Proposed Action footprint and these are over 30 years old (CNDDDB 2011). Valley garter snakes (*T. sirtalis*) have been found on areas surveyed north of the Outside Canal and west of Russell Avenue, but no GGS were recorded in the surveys of this area (Harvey and Associates

2008). Although Valley garter snakes were recorded from that area, this species is a broad ranging generalist, capable of utilizing terrestrial habitats to a far greater extent than GGS, which is essentially an aquatic obligate dependent exclusively on aquatic prey (Harvey & Associates 2008). In over 5 years of biological monitoring at the SJRIP reuse area, no GGS have been observed (J. Seay, pers. comm.).

The Outside Canal borders the northern edge of the Proposed Action footprint adjacent to Sump #1 and #7. Levees of the Outside Canal are earthen and the internal prism of the western (southern) levee is sparsely covered with a thin layer of crushed concrete (approximately 1 inch up to 6-inches in depth). Vegetation on this internal prism and also along the earthen service roads is controlled and largely lacking. Emergent vegetation in the Outside Canal also is virtually non-existent in the section bordering the Proposed Action footprint. Because of these conditions and the likely presence of predatory fish in the Outside Canal, this waterway will be considered relatively poor habitat. It will be unlikely to facilitate dispersal of GGS to the SJRIP reuse area.

The DMC is approximately 1,000 feet south of construction areas on the SJRIP reuse area at its closest. The DMC provides permanent water, which is needed by GGS. However, the portion of the DMC closest to the Proposed Action footprint is concrete lined and is poorly suited for GGS. Access to construction areas on the SJRIP reuse area by GGS via the DMC, will require overland movement, and this will be unlikely to occur.

Because there are no records from the area, quality of habitat is poor both on the SJRIP reuse area and in the nearby landscape, dispersal into the Proposed Action footprint is unlikely and the probability of occurrence for GGS is low.

The trenching from sumps will occur in roadways from late April to early October, during the active period of GGS. Because work will not occur in aquatic areas, any GGS that might be present during the pipeline construction will be expected to be in aquatic habitat and will not be harmed. Additionally the construction area will be surveyed for GGS before construction and work will not occur without further consultation with Service if GGS was observed.

Effects to GGS in uplands will be unlikely because few burrows or other overwintering sites are present in the Proposed Action footprint and so GGS are not likely present on the affected area. Most of the construction work conducted during the GGS inactive period will occur at the Facility site. This site is a relatively small in area with limited adjacency to ditches. Once initial earth work is completed at the Facility, work will be focused inside an approximate four acre compound and it is unlikely to be used by GGS.

The operation of the Facility could slightly improve water quality on the SJRIP reuse area through reduced selenium concentrations in post treatment water discharged back into the SJRIP reuse area water pool and might benefit GGS. However, because the change to water quality will decline with dilution from the discharge ditch when pooling with other SJRIP reuse water, any benefit will likely be limited to areas close the discharge site. The significance of any benefit to GGS will be minimal, especially since GGS will not likely be present in the area during the experimental period owing to its rarity in the area. Consequently, with

implementation of the avoidance measures, effects from the Proposed Action to GGS are unlikely.

### **Effects to San Joaquin kit fox**

The Proposed Action could potentially affect SJKF during construction and maintenance activities; however, treatment of SJRIP reuse area water will not affect this species. Terrestrial habitat in the SJRIP reuse area is intensively managed for agriculture and the landscape is highly disturbed (e.g. through land preparation, planting, irrigation and harvesting). Workers utilize the numerous earthen roads running throughout the SJRIP reuse area and this is a considerable disturbance factor. Areas that are not cropped are kept barren and free of weeds, limiting areas for potential prey species. Those fields not in production are finely disked and lack vegetation. Together, these conditions, along with the limited diversity of vegetation and high selenium concentrations may limit invertebrate prey, which seemed to be relatively scarce in crop fields. There are few opportunities for rodents to burrow in fields and for burrows to persist because of frequent haying and flood irrigation. Pests such as California ground squirrel (*Spermophilus beecheyi*) are controlled and little evidence of burrowing activity by other rodents (possibly *Thomomys* sp.) occurs in the Proposed Action footprint. Because few burrowing mammals are likely present, and there are few existing burrows for SJKF to exploit for shelter, the attractiveness of the site is limited.

The high intensity agriculture practices also likely limits the suitability of the site for prey for SJKF, such as kangaroo rats (*Dipodomys* spp.) or invertebrates. During site visits, little evidence of potential prey was observed in the Proposed Action footprint.

The nearest records for SJKF are about 5 or more miles away and these are relatively old (CNDDDB 2011); they include records mostly from 1920. More recent records from the 1990's are located mostly east of the San Joaquin River, and separated from the Proposed Action footprint by the San Joaquin River and/or major canals. Other records are found west of the Proposed Action footprint, in the foothills of the Coast Range. During considerable field work on site from April to June, from 2003 through 2010, no SJKF or their sign or other evidence of SJKF has been observed on the SJRIP reuse area (J. Seay, pers. comm). SJKF might move through the site, but for lack of burrows and prey they will not be expected to reside or remain at the site. The paucity of observations in the open landscape over many years supports the suggestion that SJKF is not resident at the site. However, given records within 10 miles, and dispersal capabilities of the species, SJKF could move through the area. Incorporation of preconstruction surveys and avoidance measures, coupled with the relatively short-term required to construct the Facility and the relatively small Facility footprint, the construction for the Proposed Action will not likely affect SJKF.

Maintenance activities practiced at the Facility will occur over a relatively short time period and will be restricted primarily within a fenced compound. Maintenance activities at the Facility that could affect SJKF, such as control of vermin, will be done to minimize risk to SJKF. The fencing will be expected to effectively preclude access to the area where maintenance occurs, and therefore maintenance will not likely affect SJKF. Maintenance of the perimeter fencing that involve ground disturbance will require avoidance measures applied to ground disturbance for construction, such as standardized avoidance measures for San Joaquin kit fox (USFWS 2011a), or as appropriate for other listed species or migratory birds. If a listed species is



detected, further consultation with Service will be conducted, as appropriate. There is little chance lighting will affect listed species such as SJKF, because of the low likelihood for this species to be present at the site or nearby and any temporary exposure to an animal passing through the area will be minimal.

***Effects to listed fish species and designated critical habitat***

The Proposed Action will not affect the quality of water leaving the SJRIP reuse area. Waters reaching the San Joaquin River and Delta will not be measurably different and the Proposed Action will not affect listed species inhabiting these waterways.

The Magnuson-Stevens Fishery Conservation and Management Act as amended (16 U.S.C. 1801 et seq.) requires evaluation of the Proposed Action on Essential Fish habitat. The Proposed Action will not affect the quality of water leaving the SJRIP reuse area and waters entering the San Joaquin River or the Delta that comprise essential fish habitat. Consequently, there will be no effect to essential fish habitat.

***Effects to Designated Critical Habitat***

No designated critical habitat exists in the SJRIP reuse area. No designated critical habitat will be converted or modified. The Proposed Action will not affect the quality of water leaving the SJRIP reuse area and waters entering the San Joaquin River or the Delta that comprise critical habitat for listed species. Consequently, there will be no effect to critical habitat.

**Cultural Resources**

Reclamation has determined that the Proposed Action will not adversely affect qualities that will make the Outside Canal eligible for listing on the National Register of Historic Places as there will be no modifications to the canal itself or change in its functions and any visual effects due to the installation of an underground pipeline will be temporary. On August 16, 2010, SHPO concurred with Reclamation's determination that there will be no adverse impact to cultural resources as a result of the Proposed Action.

**Indian Trust Assets**

There will be no impact to Indian Trust Assets as there are none within the Proposed Action area.

**Hazardous Waste**

No additional hazardous waste will be generated from the construction of the Facility. However, selenium already present within the existing drainage water will be concentrated into solid waste after treatment. As the concentration of selenium present in the solid waste will be considered hazardous waste, Reclamation will comply with Resource Conservation and Recovery Act (RCRA) including temporary storage and containment requirements. This waste will be disposed of on a quarterly basis within a Class 1 Hazardous Waste Landfill. Therefore, it is not anticipated that the Proposed Action will have impacts resulting from hazardous waste.

**Environmental Justice**

The Proposed Action is a pilot program to test mechanisms to remove selenium from drainage water in Panoche Drainage District. Staff to operate the Facility will come from existing employees within the district and Reclamation. Consequently, the Proposed Action will not

cause dislocation, changes in employment, or increase flood, drought, or disease nor will it disproportionately impact economically disadvantaged or minority populations.

### **Socioeconomic Resources**

The Facility will not increase or decrease socioeconomic opportunities with the SJRIP. No changes in use of the SJRIP are needed for construction or operation of the Facility. A small portion of an adjacent field will be removed during construction of the Facility for staging. However, after construction the field will be replanted. Consequently, there will be no impacts to socioeconomic resources as a result of the Proposed Action.

### **Air Quality**

Operation of the Facility will not contribute to criteria pollutant emissions, as power for operation and movement of water will be electrical. The air quality emissions from electrical power have been considered in environmental documentation for the generating power plant which found that there are no emissions from electrical engines. However, emissions will be associated with construction activities. Construction is expected to take approximately one year to complete. Construction equipment will include: grader, excavator, dozer, front end loader, roller, flatbed truck, crane, and compactor. Estimated construction emissions are well below the *de minimis* thresholds established by the San Joaquin Valley Air Pollution Control District. In addition, Reclamation will employ best management practices to reduce fugitive dust emissions during ground disturbance. Consequently, the Proposed Action will not result in a significant impact upon air quality.

### **Global Climate Change**

Estimated annual emissions of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) from construction of the Facility are 151.31 and 0.01 tons (137.3 and 0.009 metric tons), respectively. The Facility will operate 24 hours a day for 1.5 years requiring the use of electricity for power. In addition, the 17 pumps used for moving water to the Facility will require the use of power as they cycle on and off to pump water. This will result in approximately 53.5 metric tons of CO<sub>2</sub>. Calculated CO<sub>2</sub> and CH<sub>4</sub> emissions for the construction and operation of the Proposed Action alternatives are estimated to be well below the EPA's 25,000 metric tons per year threshold for annually reporting greenhouse gas (GHG) emissions. Accordingly, the Proposed Action will result in below *de minimis* impacts to global climate change.

### **Cumulative Impacts**

Facility treatment of drainage water will have a cumulatively beneficial impact on drainage water used within the SJRIP and/or discharged into the Grassland Bypass Project as selenium concentrations within treated drainage water will be substantially reduced. Although, there will still be selenium present within the treated drainage water discharged into the Grassland Bypass Project and ultimately into the San Joaquin River, the amounts will be much less than untreated drainage water discharged without the Facility.

No state or local actions in the area of the Proposed Action are currently known which could affect listed species or their critical habitat. Agriculture, as currently practiced, is assumed to continue in the area and these activities limit the availability of habitat suitable for listed species. Agricultural land is generally hospitable for most listed species, especially for most crops and

practices applied in the vicinity of the SJRIP reuse area. Recently, there is a slight trend to converting from lower value row crops to higher value nut crops. In general, this change is occurring on the west side of the valley where water supplies are sufficient to ensure requirements of perennial crops can be met.

The impact of the conversion is probably minimal for most species, although the SJKF could benefit slightly from this change, as more ground level “open” habitat is created, compared with denser row crops such as cotton and tomatoes. Greater visibility may minimize predation on SJKF by coyotes (*Canis latrans*). Additionally, almond and pistachio orchards generally have an open understory that may harbor ground squirrels which may be used as prey by SJKF. However, the overall benefit to SJKF from the changes occurring will be expected to be minimal.

The Grassland Bypass Project (GBP) has been extended through 2019, permitting drainage water to be diverted away from wetland habitats in the Grasslands area to Mud Slough and the San Joaquin River. The minimal change to water quality in the SJRIP reuse area as a result of the Proposed Action will not measurably influence water quality beyond the SJRIP reuse area, and thus will not affect biological resources “downstream” of the SJRIP project and is not expected to cumulatively impact water quality released through the GBP.

As the Proposed Action will not result in any direct or indirect impacts on land use, cultural resources, Indian Trust Assets, economically disadvantage or minority populations, it will not contribute cumulatively to impacts on these resources.

As Reclamation will comply with all RCRA requirements for the storage, containment, and disposal of hazardous waste, it is not anticipated that the Proposed Action will have cumulative impacts resulting from hazardous waste.

Panoche Drainage District could elect to operate the Facility indefinitely for treatment of drainage water. Over the long term, treated drainage water will reduce the amount of selenium discharged to the Grassland Bypass Project which could save Panoche Drainage District some of the cost for discharge pursuant to their discharge permit and agreements for the Grassland Bypass Project.

The Proposed Action, when added to other existing and proposed actions, will not contribute to cumulative impacts to air quality since construction activities are short-term and operations will not result in air quality impacts. GHG emissions are considered cumulatively significant; however, the estimated annual CO<sub>2</sub> and CH<sub>4</sub> emissions required to construct and operate the Facility for the Proposed Action is 210.31 and 0.01 tons (190.8 and 0.009 metric tons) per year, respectively, which is well below the 25,000 metric tons per year threshold for reporting GHG emissions. As a result, the Proposed Action is not expected to contribute to cumulative impacts to global climate change.

# RECLAMATION

*Managing Water in the West*

**Draft Environmental Assessment**

## **San Luis Drainage Feature Reevaluation Demonstration Treatment Facility at Panoche Drainage District**

**EA-10-030**



**U.S. Department of the Interior  
Bureau of Reclamation  
Mid Pacific Region  
South Central California Area Office  
Fresno, California**

**September 2011**

## **Mission Statements**

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

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

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# List of Acronyms and Abbreviations

AF	Acre-feet
APE	Area of Potential Effect
Authority	San Luis Delta-Mendota Water Authority
CAA	Clean Air Act
CARB	California Air Resources Board
CEC	Categorical Exclusion Checklist
CFR	Code of Federal Regulations
CH <sub>4</sub>	Methane
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
CVP	Central Valley Project
CWA	Clean Water Act
Delta	Sacramento-San Joaquin Delta
DMC	Delta-Mendota Canal
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
Facility	Demonstration Treatment Facility
Feasibility Report	<i>San Luis Drainage Feature Re-Evaluation Feasibility Report</i>
FEIS	Final Environmental Impact Statement
FWCA	Fish and Wildlife Coordination Act
GBP	Grassland Bypass Project
GGG	Giant garter snake
GHG	greenhouse gases
GPM	Gallons per minute
HDPE	High density polyethylene
kV	Kilovolt
ITA	Indian Trust Asset
MBTA	Migratory Bird Treaty Act
mg/L	Milligram per liter
mg/m <sup>3</sup>	Milligram per cubic meter
National Register	National Register of Historic Places
NHPA	National Historic Preservation Act
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
O <sub>3</sub>	Ozone
PM <sub>2.5</sub>	Particulate matter less than 2.5 microns in diameter
PM <sub>10</sub>	Particulate matter between 2.5 and 10 microns in diameter
ppm	Parts per million
PWD	Panoche Water District
RCRA	Resource Conservation and Recovery Act
Reclamation	Bureau of Reclamation
RO	Reverse Osmosis



ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SCADA	Supervisory Control and Data Acquisition
Service	U.S. Fish and Wildlife Service
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SJKF	San Joaquin kit fox
SJRIP	San Joaquin River Improvement Project
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO <sub>2</sub>	Sulfur dioxide
SO <sub>x</sub>	Sulfur oxides
TDS	Total Dissolved Solids
UF	Ultrafiltration
µg/L	Microgram per liter
µg/m <sup>3</sup>	Microgram per cubic meter
VOC	Volatile organic compounds
1995 Use Agreement	<i>Agreement for Use of the San Luis Drain</i> (Agreement No. 6-07-20-w1319) between Reclamation and the Authority

# Section 1 Purpose and Need for Action

## 1.1 Background

In 1960, Public Law No. 88-488 authorized the construction, operation, and maintenance of the San Luis Unit of the Central Valley Project (CVP), including the construction of San Luis Dam, San Luis Canal, Coalinga Canal, San Luis Drain, distribution systems, drains, pumping facilities, and other related works. The San Luis Unit serves 700,000 acres of irrigated agriculture and includes the Westlands Water District, Broadview Water District, Pacheco Water District, and Panoche Water District (PWD) and the southern portion of the San Luis Water District.

Since the closure of the Kesterson Reservoir in the mid-1980s, adequate drainage service has not been available for irrigation waters from agricultural lands served by the San Luis Unit. By court order (*Sumner Peck Ranch v. Reclamation*) the Bureau of Reclamation (Reclamation) is re-evaluating options for providing agricultural drainage service to achieve long-term, sustainable salt and water balance in the root zone of irrigated lands in the San Luis Unit.

Reclamation released a Final Environmental Impact Statement (FEIS) for the *San Luis Drainage Feature Re-evaluation* to the public on June 8, 2006. The FEIS evaluated seven action alternatives in addition to the no action alternative for implementing drainage service within the San Luis Unit. The Record of Decision (ROD) for the FEIS was signed March 9, 2007. Subsequently, Reclamation prepared the *San Luis Drainage Feature Re-Evaluation Feasibility Report* (Feasibility Report) to evaluate the feasibility of implementing the preferred alternative. The FEIS, ROD, and Feasibility Report are hereby incorporated by reference.

As part of the Feasibility Report, Reclamation is preparing to construct a Demonstration Treatment Facility (Facility) near Firebaugh, California within Panoche Drainage District's San Joaquin River Improvement Project (SJRIP) reuse area a component of the Grasslands Drainage Area (Figure 1-1).

## 1.2 Purpose and Need

Drainage service is needed to achieve a long-term, sustainable salt and water balance in the root zone of irrigated lands in the San Luis Unit and adjacent areas. The Federal action to supply drainage services is required by Public Law 86-488 and the *Sumner Peck Ranch v. Reclamation* Court Order.

The primary purpose of the Facility is to demonstrate and operate the reverse osmosis (RO) and selenium biotreatment technologies described in the Feasibility Report in order to collect cost and performance data required for final design of the corresponding full-scale drainage service treatment components to be constructed in Westlands Water District (Reclamation 2008).

In accordance with the 2007 ROD for the FEIS (Reclamation 2007), and contingent upon available funding, a secondary purpose of the Facility is to evaluate other innovative

technologies, which may reduce the cost and environmental impacts as compared to the technologies evaluated in the Feasibility Report, while meeting the requirements for drainage service. At this point it is uncertain which innovative technologies would be installed and evaluated; however, the Facility footprint includes adequate land area to incorporate these additional systems if and when they are built.

### **1.3 Scope**

This Environmental Assessment (EA) has been prepared to examine the potential impacts on environmental resources as a result of construction and operation of the Facility. It has also been prepared to examine the impacts of the No Action Alternative.

In order to determine the geological feasibility of the Proposed Action site and to gather information for Proposed Action design, Reclamation conducted geotechnical explorations at the Proposed Action site. Due to timing concerns, Reclamation prepared a separate environmental analysis under a Categorical Exclusion Checklist (CEC) entitled *San Luis Drainage Feature Reevaluation Implementation Demonstration Treatment Facility Geotechnical Surveys* (CEC-10-037) which is hereby incorporated by reference. CEC-10-037 was approved on September 2, 2010 with work to begin on September 15, 2010.

The Proposed Action site is located in Fresno County within Sections 10, 11, 12, 13, and 14 of Township 12 South, Range 12 East and Sections 7 and 18 of Township 12 South, Range 13 East, MDB&M (Figures 1 and 2 in Appendix A).

### **1.4 Potential Issues**

This EA will analyze the affected environment of the Proposed Action and No Action Alternative in order to determine the potential impacts and cumulative effects to the following resources:

- Water Resources
- Land Use
- Biological Resources
- Cultural Resources
- Indian Sacred Sites
- Indian Trusts Assets (ITA)
- Hazardous Material
- Environmental Justice
- Socioeconomic Resources
- Air Quality
- Global Climate

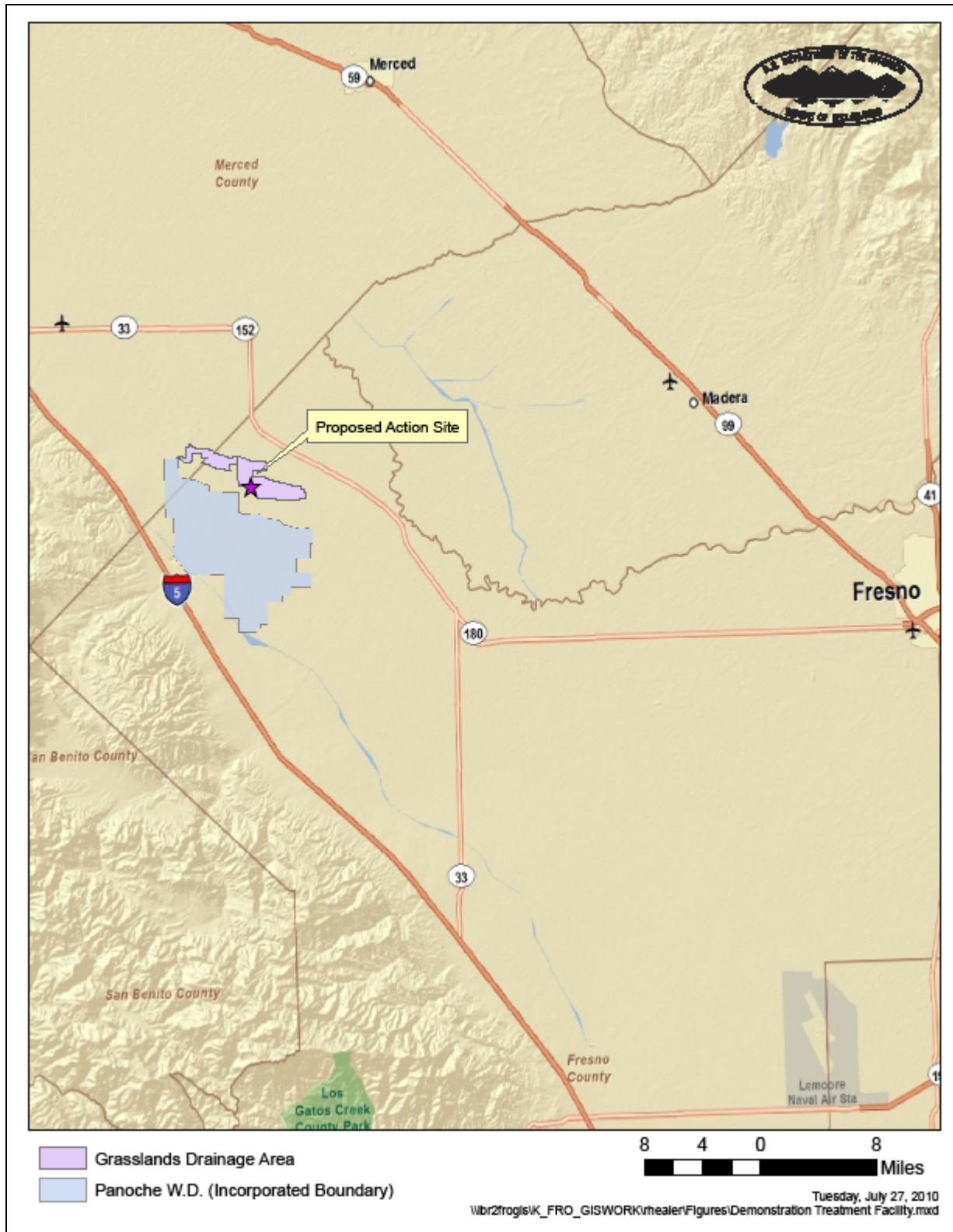


Figure 1-1 Proposed Action Location

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## Section 2 Alternatives Including the Proposed Action

This EA considers two possible actions: the No Action Alternative and the Proposed Action. The No Action Alternative reflects future conditions without the Proposed Action and serves as a basis of comparison for determining potential effects to the human environment.

### 2.1 No Action Alternative

Reclamation would not construct a Facility for drainage treatment within the SJRIP. Selenium concentrations within the drainage water used in the SJRIP would remain the same and would continue to be reused in the SJRIP and ultimately discharged to the Grassland Bypass Project (GBP) consistent with current practices and permits. Reclamation would continue pursuing options for providing drainage service to the San Luis Unit.

### 2.2 Proposed Action

Reclamation proposes to construct, operate, and maintain for 18 months a Facility for drainage treatment within the geographical boundaries of the existing SJRIP reuse area after receiving easement(s) from Panoche Drainage District. The Facility would occupy a rectangular area approximately four acres in size, adjacent to and immediately north and east of Panoche Drainage District's existing perpendicular drainage distribution canals (Figure 2-1). Additional pipelines would be constructed to convey drainage water from the seven existing reuse sumps to the Facility. See Appendix A for preliminary project designs. Proposed drainage water treatments would include RO, ultrafiltration (UF), and potentially up to two innovative technologies. At this point it is uncertain which innovative technologies would be installed; however, the Facility footprint includes adequate land area to incorporate these additional systems if and when they are built. Subsequent environmental analysis may be required for the addition of these technologies depending upon the type of treatment systems or equipment to be installed.

#### 2.2.1 Treatment Facility

An 11,600 square-foot pre-engineered metal building would be constructed on a three-foot thick concrete slab to house water treatment and associated mechanical and electrical equipment (Appendix A). Building equipment and facilities would include: domestic water and sanitary waste systems, compressor equipment, wet pipe fire suppression system, 5-ton moveable gantry crane, split system heat pump, chemical storage alarm system, laboratory bench and exhaust hood, lavatory, emergency eye wash and shower system, electrical control panel with Supervisory Control and Data Acquisition (SCADA) system. A 21-foot by 71-foot covered multi-purpose concrete slab would be constructed along the east side of the building. A concrete parking area and walkway would be constructed along the south side of the building.

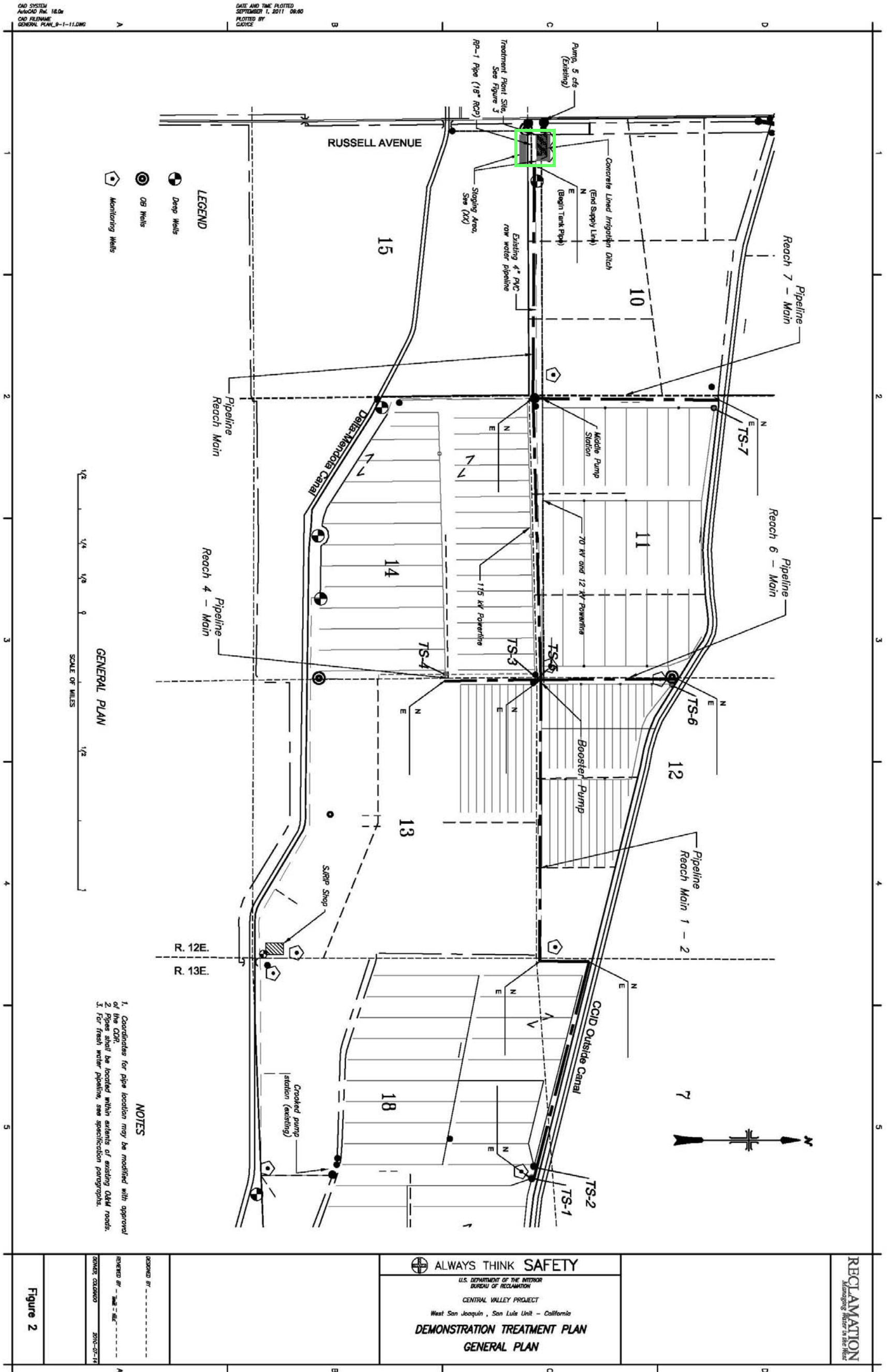


Figure 2-1 Proposed Action area (approximate 4-acre Facility footprint and 8-acre temporary staging area outlined in green)

Fourteen steel and plastic tanks ranging from 8 to 65 feet in diameter and 10 to 26 feet in height would be constructed adjacent to the building(Appendix A). The tanks would be supported by concrete raft foundations approximately five feet deep.

Six inches of gravel would be placed across the Facility yard and for the existing access road between Russell Avenue and the southeast corner of the Facility footprint. The yard would be sloped and graded to carry precipitation runoff to the adjacent drainage ditches.

Two areas within the Facility yard would be reserved for alternative treatment equipment. These include: (1) Conventional pretreatment equipment (flocculation, clarification, and filtration) that would be located next to the north Feed Tank, and (2) Trailer or skid mounted innovative technology equipment that would be located east of the building (Appendix A).

### ***Site Security***

An eight-foot high, approximately 1,500 feet long, chain-link, barbed-wire fence would be constructed around the site perimeter (Appendix A). Posts for the chain-link fence would be spaced 10 feet apart and embedded in nine-inch diameter concrete footings to a depth of 36 inches. Exterior lighting, video surveillance, door and gate sensors, and an intrusion alert notification system would also be installed for additional site security.

### ***Pipelines***

Between six and eight inch diameter high density polyethylene (HDPE) pipelines would be installed underground to convey drainage water from the seven existing SJRIP reuse sumps to the Facility (Appendix A). Pipelines would be placed within existing access roads owned by Panoche Drainage District. Installation would require trenching two feet wide by three feet deep for approximately 5.4 miles. The trench would be over-excavated to 0.5 foot below the pipe using a Ditch Witch trencher or similar equipment. The pipe would be embedded in pea gravel and the trench would be backfilled with compacted native material. Pipeline construction activity would require up to a 30-foot-wide temporary construction easement along the length of the alignment. A maximum total temporarily affected pipeline construction area would be about 20 acres. The pipelines would discharge drainage water into the above-ground, 65-foot diameter, steel regulating tank located within the treatment plant area. This tank would serve as the untreated drainage water (feed) supply to the Facility (Appendix A).

A separate 800-foot-long, eight-inch-diameter, HDPE pipeline would be constructed to convey surface drainage water from the ditch along Russell Avenue, south of the Access Road, at the RP-1 location to the 46-foot diameter steel regulating tank in the treatment plant area (Appendix A). This surface drainage would be a supplemental source of water for treatment operations, if needed, during seasonal low-flow periods from the drainage sumps.

### ***Drainage Sumps***

There are seven existing sumps in the SJRIP reuse area (TS-1 thru TS-7) which would provide drainage flows to the Facility treatment plant (Appendix A). Each sump collects drainage flow from tile drains in adjacent reuse farm lands within the SJRIP. Each sump contains a float-actuated pump, which discharges the drainage into existing adjacent open drainage ditches. Seven submersible pumps and motor drives would be added to each of the seven existing pumps



in order to meet pumping needs for conveyance of drainage water to the Facility. The existing sump pumps would remain in place in order to maintain the capability for discharge of excess drainage flows into the adjacent drainage ditches when flows exceed the Facility demands or during temporary plant shutdowns.

Two parallel 250 gallon per minute (GPM) booster pumps with motors would also be installed along the Main Reach (Appendix A). A six-foot wide by eight-foot long concrete pump vault would be installed for the sump pumps. The vault would be installed in the ground to a depth of about five feet. A SCADA system would be installed at the Facility to control the sump and booster pumps using remote telemetry stations.

### ***Irrigation Drainage Ditches***

An existing 1,000 foot long concrete-lined irrigation ditch that currently bisects the Facility footprint would be removed from the site. Panoche Drainage District may construct a new ditch around the perimeter of the Facility to replace this ditch once construction of the Facility is complete.

The existing irrigation drainage ditch that runs along the southern edge of the Facility footprint would be replaced by approximately 650 feet of 48-inch diameter reinforced concrete pipe. The pipe would run underground from the existing RP-1 pump station into the existing drainage ditch and to the southeast corner of the Facility. The portion of the pipe within the existing drainage ditch would be covered with native soil from a borrow area in the SJRIP located approximately one mile away.

A 500 GPM vertical turbine pump would be installed in the Russell Avenue drainage ditch, adjacent to the site access road, to convey untreated drainage water to the Facility feed tank. Pump installation would require the construction of a concrete pump vault with trash rack approximately four-foot wide by six-foot long by six-foot deep within the existing Russell Avenue ditch.

### ***Facility Infrastructure***

**Water Supply** An existing 2-inch diameter pipeline carries non-potable water from the Delta-Mendota Canal (DMC) Turnout 97.7A, continues north along the east side of Russell Avenue, and ends at the southwest corner of the Facility footprint. A packaged water filtration and disinfection system (perhaps 6 feet by 10 feet) would be installed within the treatment building at the Facility to provide potable water for plant operators working at the site.

**Sanitary System** A conventional septic system (septic tank and leach field) would be installed within the southeast corner of the Facility footprint area (Appendix A). The septic tank capacity would be up to 1,000 gallons and the size of the leach field would be approximately 20 feet wide by 40 feet long and 30 inches deep. Local regulations require a five-foot vertical separation between the bottom of the leach field and the water table. Therefore, it is assumed that the leach field would be constructed about two feet below existing grade and imported fill would be used to provide a mounded cover and cap.

**Power Supply** An existing 300 kilovolt ampere (kV) electrical pad-mounted transformer located at the southwest corner of the Facility would be replaced with a 500 kV secondary

substation transformer and 600-ampere switchgear. Approximately 3,600 linear feet of electrical conduit would be installed at a depth of 30 inches to carry electrical power from the transformer to the Facility service switchgear, the biotreatment equipment building, and appurtenant electrical equipment. The Facility service switchgear would include a 480-volt, 60-hertz, 3-phase, 600-ampere distribution panel board. A 75 kilowatt, 480-volt, three-phase backup engine generator would also be installed near the transformer along with a 500 gallon fuel tank. The tank would be installed within a lined containment area to contain potential fuel spills.

Transformer upgrades for drainage sumps are required at two locations: TS-1/TS-2 and TS3/TS-5. A three-phase, 45-kV, 12-kV triplex pole-type transformer would be installed at each location. Approximately 600 linear feet of 600-volt, No. 2 American Wire Gage conductor wire would be dropped from the existing power lines to the transformer at each location.

### **2.2.2 Construction Details**

Access to the Facility construction site would be provided by Russell Avenue. Access for constructing drainage pipelines would be provided via existing earthen or gravel roads. No new roads would be needed for access to the site.

A temporary eight acre staging area would be placed to the north, east, and south of the Facility (Figure 2-1). The staging area would provide temporary office space, parking area, equipment and material storage, and stockpiling of excavated materials. The temporary staging area would be restored to its existing condition when the Facility construction is complete.

During construction, it is anticipated that 10 to 45 people would travel to and from the site on any given day. Construction equipment would include: grader, excavator, dozer, front end loader, roller, flatbed truck, crane, trencher and compactor. Pile driving equipment would be used if geotechnical investigations determine that pile support foundations are required for Facility tanks. Construction is expected to take approximately 14 months to complete and would likely begin around April 2012.

### **2.2.3 Facility Operation**

Drainage pipelines would provide up to 400 GPM of flow from the tile drain sumps (TS-1 to TS-7) to the 65-foot diameter regulating feed/equalizing tank for Facility treatment operations. From the feed tank, drainage flows would be pretreated to remove suspended particles that could clog or foul RO membranes. The Facility would evaluate two options for removal of suspended solids: (1) conventional pretreatment (i.e., flocculation, sedimentation, and sand/anthracite media filtration) and (2) membrane pretreatment (microfiltration or UF). The pretreatment equipment locations are shown in Appendix A. The flow schematic for each option and the subsequent treatment operations are provided in Appendix B.

After pretreatment, approximately 200 GPM of drainage flows would be fed into the RO treatment system. Once through the RO treatment system, approximately 50 percent of the feed water (about 100 GPM) would be recovered as low salinity product water. The remaining 50 percent of the feed water (about 100 GPM) would exit the RO treatment system as a concentrated waste stream and be fed into the selenium biotreatment system. The concentrated waste stream produced after RO treatment would contain all the salts and selenium from the drainage feed water; therefore, concentration is approximately double that of the feed flow.

The RO concentrated waste stream would then be treated in bioreactor tanks to remove about 99 percent of the selenium. In general, only selenium would be removed from this waste stream (Table 2-1). The residual selenium in the treated water would be oxidized to ensure that it is converted to inorganic selenate and/or selenite ions prior to discharge (Appendix B). The water quality of the biotreatment discharge water would be approximately the same as the water quality of the RO concentrate stream (Table 2-1), except that the selenium concentration would not exceed 10 micrograms per liter ( $\mu\text{g/L}$ ) in the biotreatment effluent. Post-biotreatment water would be recombined with the low-salinity RO treated water (product stream) and discharged into the existing drainage ditch adjacent to the western edge of the Facility footprint (Appendix A), where it would be blended with other drainage waters and used by the SJRIP for irrigation in the reuse areas. The water quality of the post-treated discharge water from the Facility would be substantially the same as the current untreated drainage discharge water, except that 99 percent of the selenium would have been removed from the treated discharge water.

**Table 2-1 Water Quality Projections for RO Treatment Facility**

Constituents	Units	Pre-treatment drainage water Constituent Concentration	Percent of Constituent Rejection During Pretreatment	RO Concentrated Waste Stream	Post-biotreatment Concentration
Conductance		17,908	--	32,468	--
TDS	mg/L	14,828	--	29,318	340
<i>Major Components</i>					
Bicarbonate	mg/L	161	96.70	314.16	7.8
Bromide	mg/L	4	98.00	7.88	0.12
Calcium	mg/L	113	99.00	224.31	1.69
Carbonate	mg/L	0	98.00	0	0
Chloride	mg/L	3,386	98.00	6,671.43	100.00
Magnesium	mg/L	309	99.50	615.69	2.3
Nitrate (as N)	mg/L	179	88.50	328.8	29
Potassium	mg/L	23.7	98.20	46.77	0.63
Silica	mg/L	6.7	97.00	13.1	0.3
Sodium	mg/L	5,750	98.20	11,346.13	150.00
Sulfate	mg/L	4,853	99.50	9,669.69	36.00
pH		7.4	--	7.55	7.3
<i>Minor Components</i>					
Ammonia	$\mu\text{g/L}$	3,400	95.00	6,551.22	250.00
Aluminum	$\mu\text{g/L}$	0	95.00	0	0
Arsenic	$\mu\text{g/L}$	8	98.00	15.76	0.24
Boron	$\mu\text{g/L}$	33,000	90.00	61,285.71	4,700.00
Cadmium	$\mu\text{g/L}$	3	99.50	5.98	0.02
Chromium	$\mu\text{g/L}$	84	98.00	165.5	2.5
Copper	$\mu\text{g/L}$	26	98.00	51.23	0.77
Fluoride	$\mu\text{g/L}$	900	98.00	1,773.27	26.00
Iron	$\mu\text{g/L}$	391	99.00	776.16	5.8
Lead	$\mu\text{g/L}$	3	99.00	5.96	0.04
Manganese	$\mu\text{g/L}$	26	99.00	51.61	0.39
Mercury	$\mu\text{g/L}$	0.3	98.00	0.59	0.01
Molybdenum	$\mu\text{g/L}$	150	98.00	295.54	4.5
Nickel	$\mu\text{g/L}$	52	99.00	103.22	0.78
Selenium	$\mu\text{g/L}$	330	99.50	657.53	2.5
Silver	$\mu\text{g/L}$	3	98.00	5.91	0.09
Strontium	$\mu\text{g/L}$	4,300	98.00	8,472.28	130.00
Zinc	$\mu\text{g/L}$	26	98.00	51.23	0.77

Note: Drainage feedflow to the system is 200 GPM. Reject feed flow (flow leaving the initial treatment) is 100 GPM.  
mg/L = milligram per liter  $\mu\text{g/L}$  = microgram per liter TDS = Total Dissolved Solids

The bioreactor tanks would be periodically backwashed to remove accumulated solids and selenium. The backwash water would be sent to a clarifier tank to provide gravity separation of the water and solids. The clarified water would be returned to the bioreactor feed tank for re-processing. Prior to transport by truck to an off-site waste disposal facility the separated solids would be combined with solids from pretreatment backwashing and de-watered using a belt press. Up to 55,000 pounds of waste solids would be generated per year, which would be stored on site in closed steel “roll-off” containers until transported to a disposal facility on a quarterly basis. Title 22 of the California Code of Regulations (§66261.24) defines acceptable quantities of selenium associated with solids as less than 100 parts per million (ppm). Since selenium concentrations in the waste solids will have over 2,000 ppm, the waste solids are defined as hazardous and as such, must be disposed of at a Class 1 Hazardous Waste Landfill. The closest Class 1 landfill is the Kettleman Hills Landfill in Kings County.

### ***Treatment Chemicals***

The RO, pretreatment, and biotreatment processes are expected to add the following chemical treatments to the drainage water during treatment operations:

- **Coagulants:** One or more of the following chemicals would be added to coagulate suspended solids in the raw drainage to form larger floc particles that can be removed through gravity settling or filtration: ferric chloride, Alum (potassium aluminum sulfate), and/or polyaluminum chloride. All of these coagulants are currently used in municipal water treatment plants.
- **Acids:** Potential acids used during treatment include hydrochloric acid, sulphuric acid, and/or citric acid. Acids may be used during treatment to lower the pH of drainage water to reduce scaling (salt deposition) or to clean scale from membrane and equipment surfaces.
- **Bases:** Sodium hydroxide may be added to the drainage water to raise the pH to increase rejection of boron by the RO membranes, or to adjust/neutralize the pH of treatment discharge streams.
- **Disinfectants:** Sodium hypochlorite (as found in common bleach) may be used as a disinfectant as part of pretreatment operations to reduce the potential for biological fouling of membranes.
- **Dechlorination:** Sodium bisulfate may be used to dechlorinate the drainage after pretreatment disinfection and prior to RO treatment.

### ***Innovative Technologies***

Up to 200 GPM of raw drainage water would be available to evaluate alternative treatment technologies within the treatment plant footprint and would utilize the same treatment plant infrastructure (i.e., pipelines, sumps, storage tanks) as the RO/UF systems.

### ***Facility Staffing***

Up to three full-time treatment operators would be required to operate and maintain the Facility treatment systems: one full-time treatment plant operator would be required to operate the combined pretreatment, RO, and biotreatment systems; and one treatment plant operator would be required for each of two potential innovative treatment technology systems. The drainage

sumps and conveyance pipelines located outside the Facility would be operated and maintained by Panoche Drainage District staff.

**Facility Disposition**

The treatment demonstration systems may be operated by, but not limited to, Reclamation staff, contractors, and for at least 18 months to collect data for final designs. Subsequently, Reclamation may elect to continue operating the Facility indefinitely or delegate it to their designated operating partner for treating reuse drainage. Disposition of the facility after the Proposed Action time period is unknown at this time and may require additional environmental analysis.

**Permitting**

Discharge permits from the California Regional Water Quality Control Board (RWQCB) would be required for discharge of drainage water from the Facility. The SJRIP currently operates under a discharge permit (Order Number 5-01-234) from the RWQCB, Central Valley Region. Operation of the Facility would require a new National Pollutant Discharge Elimination System (NPDES) permit issued by the RWQCB. Reclamation would acquire the permit prior to operation of the Facility. The Facility would not be operated until the discharge permit has been acquired.

**2.2.4 Environmental Commitments**

Reclamation shall implement the following environmental protection measures to reduce environmental consequences associated with the Proposed Action (Table 2-2). Environmental consequences for resource areas assume the measures specified would be fully implemented.

**Table 2-2 Environmental Protection Measures and Commitments**

<b>Resource</b>	<b>Protection Measure</b>
Biological Resources	Preconstruction surveys and implementation of avoidance and minimization measures for San Joaquin kit fox (SJKF, USFWS 2011a; see Appendix C).
Biological Resources	Preconstruction surveys and implementation of avoidance and minimization measures for Giant garter snake (GGS, see Appendix C)
Biological Resources (migratory birds)	Preconstruction surveys and implementation of avoidance and minimization measures for burrowing owl (CDFG 1995; see Appendix D).
Biological Resources	Surveys (USFWS 2000; see Appendix E) will be conducted for nesting migratory birds on land that would be disturbed for construction. One eucalyptus trees ( <i>Eucalyptus</i> sp.) located at the Facility construction/staging site would likely be removed for construction. This tree would be removed either before nesting season commences, or if removal must occur during the bird breeding season, only after it is has been surveyed by a biologist and found not to support nesting birds.
Biological Resources	A biologist will be present at the inception of the construction and other times as required to insure that measures for avoidance of effects to species are implemented. Additionally, if a listed species is observed, work at the site would immediately stop and Reclamation biologists shall be notified. No work would continue without additional approval from Reclamation environmental staff, following further consultation with wildlife agencies, as appropriate.

## Section 3 Affected Environment and Environmental Consequences

This section identifies the potentially affected environment and the environmental consequences involved with the Proposed Action and the No Action Alternative, in addition to environmental trends and conditions that currently exist.

### 3.1 Water Resources

#### 3.1.1 Affected Environment

In March 1996, the Grassland Area Farmers formed a regional drainage entity under the umbrella of the San Luis and Delta-Mendota Water Authority (Authority) to implement the GBP and manage subsurface drainage within the Grassland Drainage Area. Participants included the Broadview Water District, Charleston Drainage District, Firebaugh Canal Water District, Pacheco Water District, Panoche Drainage District, Widren Water District, and the Camp 13 Drainers (an association of landowners located in the Central California Irrigation District). The Grassland Area Farmers' drainage area consists of approximately 97,400 gross acres of irrigated farmland on the west side of San Joaquin Valley and is known as the Grassland Drainage Area. Discharges of subsurface drainage from this area contain elevated levels of salt, selenium, and boron (Reclamation 2009a).

The original GBP was implemented in November 1995 through an *Agreement for Use of the San Luis Drain* (Agreement No. 6-07-20-w1319) between Reclamation and the Authority (1995 Use Agreement). The 1995 Use Agreement allowed the Authority to use a portion of the San Luis Drain to convey agricultural drainage water through adjacent wildlife management areas to Mud Slough, a tributary to the San Joaquin River. The 1995 Use Agreement allowed for use of the San Luis Drain through September 30, 2001. This agreement was extended through December 31, 2009 through a second Use Agreement. On December 21, 2009, Reclamation signed a ROD to extend the Use Agreement to December 31, 2019 (Reclamation 2009a).

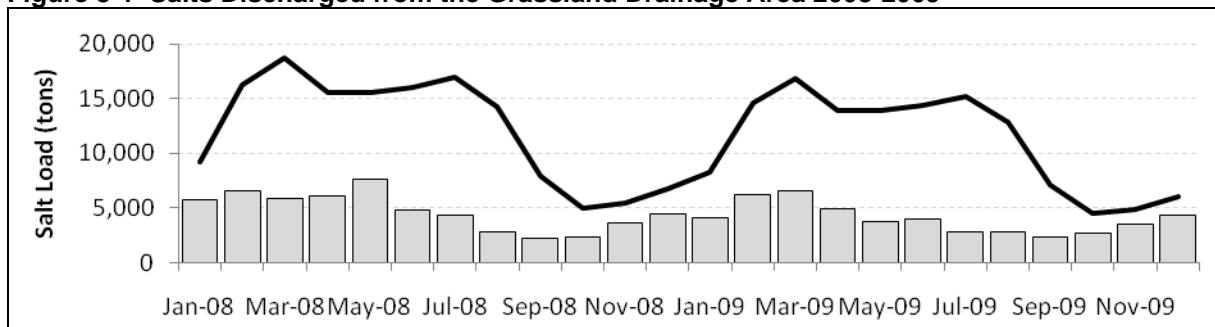
#### ***San Joaquin River Improvement Project***

In December of 2000, Panoche Drainage District began implementation of the SJRIP as a tool to help manage subsurface drainage water generated throughout the Grassland Drainage Area. Drainage flows collected from the Grassland Drainage Area are used to irrigate salt tolerant crops within the approximately 6,000 acre SJRIP which has reduced the volume of agricultural subsurface drain water discharged to the San Joaquin River.

**Drainage Water Quality** Between 1986 and 1996 (pre-SJRIP), average annual flow discharged for the Grassland Drainage Area was 49,760 acre-feet (AF). Selenium concentrations averaged 67.4 µg/L with a range between 52.3 µg/L and 80.5 µg/L. TDS averaged 2,910 mg/L with a range of 2,351 mg/L and 3,307 mg/L. Boron concentrations averaged 5.5 mg/L with a range of 4.3 mg/L to 6.8 mg/L. Between 1997 and 2008 (post implementation of the SJRIP), the average annual flow discharged to the Grassland Drainage Area was reduced to 27,080 AF. Average selenium concentrations averaged 59.9 µg/L with a range between 46.6 µg/L and 70.6

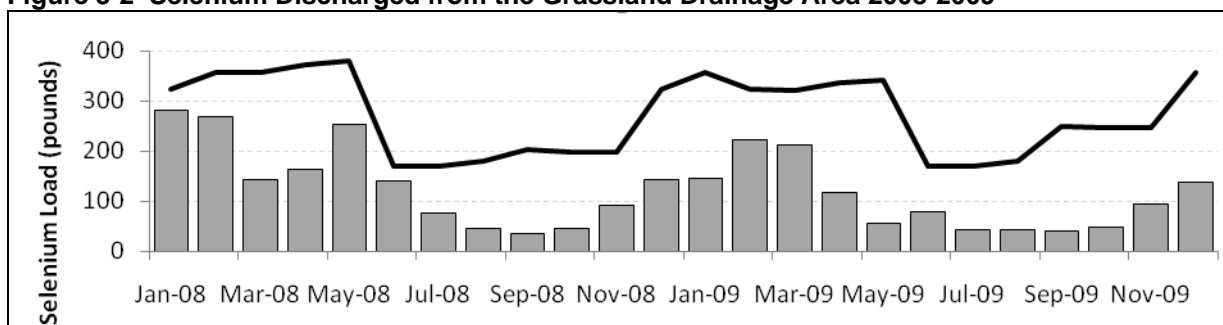
µg/L. TDS annual averages increased to 3,387 mg/L with a range of 3,072 mg/L and 3,580 mg/L. Boron concentrations also increased to 7.6 mg/L with a range of 7.0 mg/L and 8.1 mg/L (see Appendix F for a summary table of these annual flows). Figures 3-1 and 3-2 below show variation in salt and selenium loads discharged from the Grassland Drainage Area from January 2008 to November 2009.

**Figure 3-1 Salts Discharged from the Grassland Drainage Area 2008-2009**



Source: Reclamation 2009b

**Figure 3-2 Selenium Discharged from the Grassland Drainage Area 2008-2009**



Source: Reclamation 2009b

### 3.1.2 Environmental Consequences

#### **No Action**

Water quality within the SJRIP would remain the same as existing conditions. No treatment to remove selenium would occur. Discharge of drainage water would continue under the current operating parameters analyzed under the GBP. Reclamation would continue pursuing options for providing drainage service to the San Luis Unit.

#### **Proposed Action**

Water to be treated by the Facility would be removed from existing drainage water collected for use in the SJRIP. No additional drainage water would be created for the Proposed Action. As described in Section 2.2.3, approximately 50 percent of drainage water brought into the Facility would be concentrated into a waste stream that would be fed into the selenium biotreatment system for up to 99 percent selenium removal (selenium concentrations are estimated to be 2.5 µg/L after biotreatment). The remaining 50 percent would be recovered as low salinity product water (TDS estimated to be 340 mg/L after RO treatment). However, only selenium would be removed from the concentrated waste stream during biotreatment. Consequently, salt concentrations in the treated water discharged back into the SJRIP would be similar to that of the

pre-treated drainage water sent into the Facility as the low-salinity RO water and the biotreated water would be blended prior to discharge. Drainage water would continue to be reused within the SJRIP until it is discharged into the GBP under a new RWQCB NPDES discharge permit.

### ***Cumulative Impacts***

Facility treatment of drainage water would have a cumulatively beneficial impact on drainage water used within the SJRIP and/or discharged into the GBP as selenium concentrations within treated drainage water would be substantially reduced. Although, there would still be selenium present within the treated drainage water discharged into the GBP and ultimately into the San Joaquin River, the amounts would be much less than untreated drainage water discharged without the Facility.

## **3.2 Land Use**

### **3.2.1 Affected Environment**

Agriculture is the primary land use within the SJRIP. Crops that are generally grown in the SJRIP by the Panoche Drainage District include salt tolerant crops such as Jose tall wheatgrass, alfalfa, and pistachios.

### **3.2.2 Environmental Consequences**

#### ***No Action***

There would be no change in land use as conditions would remain the same as existing conditions.

#### ***Proposed Action***

The Proposed Action would include construction of a Facility for treating drainage water to remove selenium. The Facility would not change land use designations nor would it impede existing uses. A small portion of an existing field would be removed for temporary staging during construction of the Facility; however, once construction is complete the field would be returned to its current use. Drainage water treated in the Facility would be returned to the SJRIP drainage system for continued use; however, this water would have improved water quality as selenium would be reduced prior to its return. Consequently, there would be no adverse impacts to land use as a result of the Proposed Action.

#### ***Cumulative Impacts***

There would be no change in land use or land use designations as a result of the Proposed Action. Consequently, there would be no cumulative change in land use.

## **3.3 Biological Resources**

### **3.3.1 Affected Environment**

Historically, lands on the valley floor in the vicinity of the SJRIP reuse area likely included prairie grassland, along with alkali sink and saltbush scrub habitat. Some low lying areas may have included wetlands or vernal pools, and areas along the San Joaquin River, east of the SJRIP reuse area, provided riparian habitat. West of the SJRIP reuse area, the Panoche Hills and the



base of the Coast Range rise from the edge of the valley floor. The foothills provided open grasslands and shrub lands. The foothill areas remain predominantly undeveloped and support introduced annual grasslands and native shrub lands. Higher elevation and wetter sites in the Coast Range support shrubs and trees.

The SJRIP reuse area covers approximately 6,000 acres of PWD. It utilizes subsurface drainage water as an irrigation source for salt tolerant crops to reduce the volume of drainage that must be discharged into the San Joaquin River (LAFCO 2011). Salt laden SJRIP reuse water is commonly applied to fields of Jose tall wheatgrass (*Agropyron elgongatum*), bermudagrass (*Cynodon dactylon*) and seashore paspalum (*Paspalum vaginatum*). Fields in the SJRIP reuse area are bordered by open ditches that supply irrigation water. The terrain is flat and the agriculture practiced there is intensive. Fields are plowed, disked and prepared for planting. The current landscape is highly utilized for agricultural purposes. Lands not used for agricultural infrastructure are used to produce crops. Irrigation, maintenance and harvesting frequently occur throughout the area.

The footprint for the Proposed Action is within that portion of the SJRIP reuse area south of the Outside Canal, north of the DMC, and immediately east of Russell Avenue, extending to Sump TS1. The Proposed Action footprint covers approximately 5 acres of cropland adjacent to Russell Avenue, approximately 3 acres of compacted, bare earthen staging area and roadway used for drying hay prior to shipment, and about 20 acres of compacted, bladed, roadway through the SJRIP reuse area leading to sumps TS1 through TS7. Crops grown in the areas that would be disturbed include Jose tall wheatgrass and alfalfa. Construction of pipelines from the seven existing sumps (TS1-TS7) to the Facility would affect compacted, bladed, earthen roadway. Plantings along these roadways commonly include bermudagrass, seashore paspalum, alfalfa, or fallowed land. The fallowed lands are frequently finely disced and lack vegetative cover.

The crop fields within the Proposed Action footprint are subdivided by earthen roads and open field irrigation ditches which may contain water, depending on current water reuse management and delivery of water for irrigated crops. Typically small (approximately one to three feet across) earthen (or in one case a concrete lined section) field ditches, devoid of vegetation, exist immediately adjacent to crop fields. The ditches are used to supply irrigation water directly to croplands. Slightly larger (approximately 4 to 10 foot wide and sometimes quite deep (approximately 4 to 8 feet from bottom to crest) ditches run parallel to, and between adjacent earthen roadways. The larger ditches also lack terrestrial vegetation on their steep sided banks. In contrast to the small field ditches, some of the larger ditches hold water for periods long enough to support filamentous green algae, and in some places, submerged aquatic plants (e.g. pondweed [*Potamogeton* sp.]). Emergent vegetation is essentially lacking from all waterways. Only one small clump of cattail (*Typha* sp.) and one small clump of bulrush (*Scirpus* sp.) were observed in waterways during an August 2010 site survey that traversed approximately 5 miles of roadway where pipe would be placed. The waterways are periodically dried depending on the need to move water around the SJRIP reuse area, and conditions are not favorable for establishment of emergent vegetation in them.

As a consequence of human activities over the last century, the grasslands and shrub habitat, along with other San Joaquin Valley habitats, have largely been converted to other uses such as agriculture, housing, commerce, transportation, water projects, and utility services. Today the SJRIP reuse area lands and surrounding lands in PWD are devoted primarily to agriculture. Typical crops grown in PWD include almonds, tomatoes, cotton, wheat, asparagus, pistachios and alfalfa (PWD 2011).

In addition to croplands, small acreages are devoted to farm support facilities, processing centers, and a limited number of rural residences. Recently, there has been interest in developing lands on the west side of the San Joaquin Valley for energy production, especially solar power. Under the GBP Biological Opinion (USFWS 2010), several thousand acres of agricultural lands in the vicinity of the SJRIP reuse area have been idled from irrigated agricultural use. These idled lands may be grazed, utilized for dry-land farming, or fallowed. Fallowed lands are sometimes plowed or disked to reduce weed establishment, but seasonally can be colonized by weedy annual vegetation. Additionally, limited remnant alkali/saltbush scrub habitat may remain within PWD.

Because the Proposed Action would temporarily remove a fraction of SJRIP reuse area water (i.e. from the sumps), treat it experimentally, and then return it to the larger pool of SJRIP reuse water, lands that receive the water and the areas the water flows through, are included in the Action Area covered under Reclamation's Endangered Species Act (ESA) Section 7 consultation with the U.S. Fish and Wildlife Service (Service). The treated water would be discharged to an existing ditch east of Russell Avenue, near the Facility. SJRIP reuse water in this ditch is either re-applied onto SJRIP reuse area lands, or is directed away from the SJRIP reuse area and discharged to the San Luis Drain as part of the GBP. GBP water leaves the San Luis Drain, enters Mud Slough and the San Joaquin River, and then flows to the Sacramento-San Joaquin Delta (Delta). Consequently, water treated in the Facility would expectedly reach the Delta via this path.

As the Proposed Action would produce waste solids that require disposal as described in Section 2.2, roadways and lands used to transport and dispose of this material are also included as part of the Action Area. The disposal site for waste from the Facility has not yet been determined, but a facility, near Buttonwillow, California, has been identified as a possible disposal site. Access to this or other disposal sites would be via paved roads leading from the Facility. If disposal were to occur near Buttonwillow, waste solids would likely be transported via Russell Avenue, U.S. Interstate 5, Buttonwillow Drive, State Highway 58, and Lokern Road, west of Buttonwillow. If another site is used, existing Interstate Highway, State Highways, and County Roads would be used. It is possible that transport near the terminus of the disposal site would occur over a short distance of unpaved roadway, though presumably the roadway would customarily host vehicles delivering waste products.

### ***Special-Status Species***

On August 15, 2011 a list of species and designated critical habitat protected under the ESA (16 U.S.C. §1531 et. seq.) was obtained (document #110815104800) for the Proposed Action from the Service (USFWS 2011b). The list covers the SJRIP reuse and surrounding areas, including the following USGS 7.5 minute Quads: Bliss Ranch (401C), Broadview Farms (382D), Delta Ranch (402C), Dos Palos (382B), Firebaugh (381C), Hammonds Ranch (382C), Oxalis (382A),

Poso Farm (381B) and Santa Rita Bridge (402D). The status and determination of effects from the Proposed Action on federally listed species and their critical habitats, and a summary of the rationale supporting the determination are provided in Table 3-1.

**Table 3-1 Federally-listed species and designated critical habitat**

Species	Status <sup>1</sup>	Effects <sup>2</sup>	Summary basis for ESA determination <sup>3</sup>
<b>AMPHIBIANS</b>			
California red-legged frog ( <i>Rana aurora draytonii</i> )	T	NE	<b>Absent.</b> Species absent from San Joaquin Valley floor and from vicinity of the project. No suitable habitat in Project footprint <sup>4</sup> . No change to wetland or riparian habitat.
California tiger salamander, central population ( <i>Ambystoma californiense</i> )	T	NE	<b>Absent.</b> No vernal pool habitat or other suitable wetland habitat in the Facility footprint. No species records within 15 miles. No disturbance to wetland habitat or change to water quality of their habitat.
<b>FISH</b>			
Central Valley Spring-run Chinook salmon ( <i>Oncorhynchus tshawytscha</i> )	T, X (NMFS)	NE	<b>Present.</b> No stream habitat present in Project footprint. No change to quality of inhabited waters, including the Delta.
Central Valley steelhead ( <i>Oncorhynchus mykiss</i> )	T, X (NMFS)	NE	<b>Present.</b> No stream habitat present in Project footprint. No disturbance to waters inhabited by this species. No change to quality of inhabited waters, including the San Joaquin River and Delta.
Delta smelt ( <i>Hypomesus transpacificus</i> )	T, X	NE	<b>Present.</b> No suitable habitat in Project footprint. No disturbance of aquatic habitat for this species. No change to quality of water in the Delta.
North American Green Sturgeon So.DPS ( <i>Acipenser medirostris</i> )	T, X	NE	<b>Present.</b> No suitable habitat in Project footprint. No change to aquatic habitat for this species, including quality of water in the Delta.
Sacramento River Winter-run Chinook Salmon ( <i>Oncorhynchus tshawytscha</i> )	E, X (NMFS)	NE	<b>Present.</b> No stream habitat present in Project footprint. No change to quality of inhabited waters, including the Delta.
<b>INVERTEBRATES</b>			
Longhorn fairy shrimp ( <i>Branchinecta longiantenna</i> )	E	NE	<b>Absent.</b> No vernal pool habitat in Project footprint. No vernal pool habitat would be disturbed. Water quality of vernal pools would not be affected.
valley elderberry longhorn beetle ( <i>Desmocerus californicus dimorphus</i> )	T	NE	<b>Absent.</b> No suitable habitat in the Project footprint. No elderberry shrubs would be disturbed.
vernal pool fairy shrimp ( <i>Branchinecta lynchi</i> )	T	NE	<b>Absent.</b> No vernal pool habitat in Project footprint. No vernal pool habitat would be disturbed. Water quality of vernal pools would not be affected.
vernal pool tadpole shrimp ( <i>Lepidurus packardii</i> )	E	NE	<b>Absent.</b> No vernal pool habitat in Project footprint. No vernal pool habitat would be disturbed. Water quality of vernal pools would not be affected.
<b>MAMMALS</b>			
Fresno kangaroo rat ( <i>Dipodomys nigratoides exilis</i> )	E	NE	<b>Absent.</b> Possibly extirpated; no records for this subspecies recorded since 1992. No suitable habitat in Project footprint. No disturbance of suitable habitat.
Giant kangaroo rat ( <i>Dipodomys ingens</i> )	E	NE	<b>Absent.</b> No records from the Project footprint. No suitable habitat in Project footprint. No disturbance of suitable habitat.

Species	Status <sup>1</sup>	Effects <sup>2</sup>	Summary basis for ESA determination <sup>3</sup>
San Joaquin kit fox ( <i>Vulpes macrotis mutica</i> )	E	NLAA	<b>Possible.</b> No records exist in the Project footprint. Closest records on the valley floor are mostly old (ca. 1920). Those further from the Project footprint date to the 1990's, although only one record from within 10 miles is from west of the San Joaquin River. Newer records are more located in the hills mostly west of Interstate 5. No SJKF recorded in recent surveys of SJRIP reuse lands. However, there would be temporary disturbance to bladed, compacted earthen roadway and agricultural land for staging and construction and about 4 acres of agricultural lands and roadway would be used for treatment Facilities for the duration of the pilot project. In addition, infrequent transport of solid waste material would occur within the San Joaquin Valley. Unlikely presence on roads traveled by staff. Standard avoidance measures would be implemented and fencing would be placed around the Facility during construction (Appendix C).
<b>PLANTS</b>			
Palmate-bracted bird's beak ( <i>Cordylanthus palmatus</i> )	E	NE	<b>Absent.</b> No suitable habitat in Project footprint. No suitable habitat affected.
<b>REPTILES</b>			
Blunt-nosed leopard lizard ( <i>Gambelia (=Crotaphytus) sila</i> )	E	NE	<b>Absent.</b> No suitable habitat in Project footprint. No suitable habitat would be disturbed.
Giant garter snake ( <i>Thamnophis gigas</i> )	T	NLAA	<b>Possible.</b> No disturbance to aquatic habitat would occur. Records for GGS within 5 miles of the Project footprint are more than 30 years old. There are no records of GGS from surveys or monitoring in the SJRIP reuse area. Quality of SJRIP reuse water would improve minimally from a slight reduction in the concentration of selenium, including bioactive forms. This improvement would be small and likely of minimal benefit. Avoidance measures would be applied during construction (Appendix C). Temporary disturbance to bladed, compacted earthen roadway and agricultural land for staging and construction would occur. About 4 acres of agricultural and roadway would be used for treatment facilities for the duration of the pilot project.
<sup>1</sup> Status= Status of federally protected species protected under federal ESA. E: Listed as Endangered under the federal ESA. T: Listed as Threatened under the federal ESA. X: Critical habitat designated under the federal ESA. NMFS: Species under the Jurisdiction of the National Marine Fisheries Service. <sup>2</sup> Effects = ESA determination NE: No Effect anticipated from the Proposed Action to federally listed species. NLAA: May affect, but not likely to adversely affect federally listed species. <sup>3</sup> Definition Of Occurrence Indicators Present: Species known to occur within the Action Area. Possible: Species recorded in area but habitat of actively cultivated lands of poor quality Absent: Species not recorded in study area and/or habitat requirements not met <sup>4</sup> Project footprint is a term used to describe the action area under ESA consultation and is larger than the Facility footprint described under the Proposed Action as defined in Section 3.3.			

In addition to federally listed species and designated critical habitat from the SJRIP reuse area, state listed and other species of interest from the broader Action Area were considered (Table 3-2).

**Table 3-2 State-listed and other Species of Special Concern**

Common Name	Listing <sup>1</sup>	Determination of Effects from the Proposed Action
<b>AMPHIBIANS</b>		
California tiger salamander, central population ( <i>Ambystoma californiense</i> )	ST	See Table 3-1
<b>BIRDS</b>		
Burrowing owl ( <i>Athene cunicularia</i> )	MBTA	MBTA avoidance measures will be applied during construction (Appendix D and E). Temporary disturbance to bladed, compacted earthen roadway and agricultural land for staging and construction would occur. About 4 acres of agricultural and roadway would be used for treatment Facility for the duration of the pilot project.
California least tern ( <i>Sternula antillarum browni</i> )	SE	No records were found for this species within the Facility footprint and occurrence of this species is improbable. MBTA avoidance measures will be implemented to reduce potential impacts (Appendix E). There would be no disturbance of aquatic habitat under the Proposed Action and no change in water quality in the Delta.
Mountain plover ( <i>Charadrius montanus</i> )	MBTA	There are recorded occurrences of this species on SJRIP reuse area lands. There would be no disturbance to wetlands under the Proposed Action. There would be temporary disturbance to bladed, compacted earthen roadway and agricultural land. About 4 acres of agriculture and roadway to be used for treatment Facility for the duration of the pilot project. MBTA avoidance measures will be implemented to reduce potential impacts from these activities (Appendix E).
<b>FISH</b>		
Delta smelt ( <i>Hypomesus transpacificus</i> )	SE	See Table 3-1
Longfin smelt ( <i>Spirinchus thaleichthys</i> )	SE	No effects are expected as there is no suitable habitat within the Facility footprint and there would be no change to aquatic habitat for this species, including quality of water in the Delta.
<b>PLANTS</b>		
Palmate-bracted bird's-beak ( <i>Cordylanthus palmatus</i> )	SE	No effects are expected as there is no suitable habitat within the Facility footprint and no suitable habitat would be affected by the Proposed Action.
<b>REPTILES</b>		
Blunt-nosed leopard lizard ( <i>Gambelia [=Crotaphytu] sila</i> )	SE	No effects are expected as there is no suitable habitat within the Facility footprint and no suitable habitat would be affected by the Proposed Action.
Giant garter snake ( <i>Thamnophis gigas</i> )	ST	See Table 3-1
Fresno kangaroo rat ( <i>Dipodomys nitratoides exilis</i> )	SE	See Table 3-1
Giant kangaroo rat ( <i>Dipodomys ingens</i> )	SE	See Table 3-1
San Joaquin antelope squirrel ( <i>Ammospermophilus nelson</i> )	ST	No effects are expected as are no records of this species within the Facility footprint. There are only two known records within the vicinity of the Proposed action area that are about 100 years old.
San Joaquin kit fox ( <i>Vulpes macrotis mutica</i> )	ST	See Table 3-1
<sup>1</sup> Status= Status of protected species SE: Listed as Endangered under the California ESA. ST: Listed as Threatened under the California ESA. MBTA: Protected under the Migratory Birds Treaty Act.		

### 3.3.2 Environmental Consequences

#### ***No Action***

The No Action Alternative would not result in construction and no water from the SJRIP reuse area would be treated. Current activities would continue as is and no new affects to biological resources would occur.

#### ***Proposed Action***

Effects to biological resources from the Proposed Action could occur from construction of the Facility, pipelines and appurtenances, or from operation or maintenance of the facilities during the Proposed Action. However, because the SJRIP reuse area is heavily affected by intense agriculture activity, and weed and pest species are controlled or eliminated, the habitat available is little used by wildlife and fish species. The reduced value of habitat may also relate to the relatively high concentrations of selenium in water applied to the landscape and the salt tolerant vegetation, which can be exploited by a relatively small suite of species. With implementation of avoidance measures as described in Section 2.2 and Appendices C through E, the Proposed Action is not expected to adversely affect federally-listed and other protected species.

Construction activities would occur over approximately 14 months. The largest area of temporary disturbance (approximately 20 acres in roadways) would result from excavation and laying of pipelines to carry water from existing sumps, which collect in-ground water, to the Facility. The roadways that would be disturbed are heavily traveled by agricultural workers and are of limited use to wildlife.

Operations occurring within the compound housing the Facility are not anticipated to measurably affect biological resources. The primary effect of Facility operation would be production of treated water which would be released to an irrigation ditch. The treated water would be a minor fraction of the SJRIP reuse water pool carried in the irrigation ditch, and it would minimally affect the SJRIP reuse water. The total volume of SJRIP reuse area water leaving the area would minimally be affected by the Facility and concentrations of salts and elements other than selenium in SJRIP reuse water would remain similar if not slightly lower than current concentrations (see Table 2-1). Although the concentration of selenium in post treatment SJRIP reuse water would be reduced, including for bioactive forms, the change would be minor, and likely imperceptible or immeasurable beyond the SJRIP reuse area. As such, it would not meaningfully affect the quality of the water or biological resources beyond the SJRIP reuse area.

The facility would be operated year-round and would be lighted for safety and security. The effects to wildlife resources from this light source are expected to be negligible because of the existing low value of the area to wildlife.

Hazardous material (e.g. concentrated selenium) generated from the experimental treatment would be stored on site, within the secured, fenced, lighted compound as described previously. The material stored would be “solids” and would have little opportunity to spread outside the secured area. Purposeful transport would occur to a waste disposal site approximately quarterly, where any effects of disposal would already be addressed.

Transport vehicles traveling on county roads, state highways, and federal highways (e.g. Interstates) would not be expected to affect biological resources. Similarly, staff traveling to and from the site for work on existing roads would not be expected to affect biological resources.

Besides effects from facilities construction and operation, some, minimal maintenance is anticipated over the period of operation of the Facility. Maintenance required for the Facility would be expected to be conducted within fenced compound surrounding the Facility and the perimeter fencing. Maintenance within the compound should have no effect to biological resources.

If necessary, "exclusion devices" such as netting or physical barriers would be installed to prevent access by breeding birds that could disrupt operation of the Facility. The Facility would be retrofitted during the bird non-breeding to exclude migratory birds.

Vermin, pests posing a human health hazard, or pests otherwise affecting the effective operation of the Facility inside the perimeter fencing would be controlled employing integrated pest management techniques. The potential for harm to listed species would be minimized when practicing control. Pesticides approved for use in California, as determined by the California Department of Pesticide Regulations would be utilized. Application of pesticides would follow recommendations of a Licensed Pest Control Operator and be applied by a Licensed Pest Control Applicator. Approval would be required from Reclamation prior to use.

**Effects to listed wildlife species and designated critical habitat** The potential for habitat, specific to listed species, to be affected by the Proposed Action was discussed with biologists from the Service and private industry. Two federally listed species considered possible candidates to occur in the area which may be affected by the Proposed Action are SJKF and GGS. Potential effects to these species could result from construction activities in the Proposed Action footprint or from operation or maintenance of the Facility. Reclamation has initiated consultation with the Service under Section 7 of the ESA for these species. The draft EA will not be finalized until consultation is complete.

*Effects to Giant Garter Snake* GGS inhabits agricultural wetlands and other waterways such as irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands in the Central Valley (USFWS 1999). Habitat requirements for GGS consist of (1) adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for cover and refuge from flood waters during the snake's dormant season in the winter (USFWS 2009).

Potential habitat in the Proposed Action footprint includes irrigation ditches and adjacent uplands in the SJRIP reuse area, as well as the Outside Canal located adjacent to the area. The suitability of the aquatic habitat adjacent to construction areas is poor. The irrigation ditches adjacent to the roadways where trenching would occur have steep-sided banks and are virtually devoid of vegetation, including emergent vegetation. There is limited algal growth and submersed aquatic vegetation in some portions of ditches, and prey such as bullfrogs (*Rana catesbeiana*) and

minnows (Cyprinidae) occur there. Although prey are present, they are not abundant and there is considerable risk to GGS from predators. Herons and egrets forage along the ditches and easily could prey on GGS in the ditches because no escape cover is present for the snakes. Additionally, bullfrogs could prey on young GGS. Bullfrogs have reduced the suitability of nearly all permanent and semi-permanent waters in the Central Valley for GGS (USFWS 1993).

The habitat for GGS adjacent to the Proposed Action footprint is also poor, and dispersal to the SJRIP reuse area would not be favored. There are only a few records for GGS within about 5 miles of the Proposed Action footprint and these are over 30 years old (CNDDDB 2011). Valley garter snakes (*T. sirtalis*) have been found on areas surveyed north of the Outside Canal and west of Russell Avenue, but no GGS were recorded in the surveys of this area (Harvey and Associates 2008). Although Valley garter snakes were recorded from that area, this species is a broad ranging generalist, capable of utilizing terrestrial habitats to a far greater extent than GGS, which is essentially an aquatic obligate dependent exclusively on aquatic prey (Harvey & Associates 2008). In over 5 years of biological monitoring at the SJRIP reuse area, no GGS have been observed (J. Seay, pers. comm.).

The Outside Canal borders the northern edge of the Proposed Action footprint adjacent to Sump #1 and #7. Levees of the Outside Canal are earthen and the internal prism of the western (southern) levee is sparsely covered with a thin layer of crushed concrete (approximately 1 inch up to 6-inches in depth). Vegetation on this internal prism and also along the earthen service roads is controlled and largely lacking. Emergent vegetation in the Outside Canal also is virtually non-existent in the section bordering the Proposed Action footprint. Because of these conditions and the likely presence of predatory fish in the Outside Canal, this waterway would be considered relatively poor habitat. It would be unlikely to facilitate dispersal of GGS to the SJRIP reuse area.

The DMC is approximately 1,000 feet south of construction areas on the SJRIP reuse area at its closest. The DMC provides permanent water, which is needed by GGS. However, the portion of the DMC closest to the Proposed Action footprint is concrete lined and is poorly suited for GGS. Access to construction areas on the SJRIP reuse area by GGS via the DMC, would require overland movement, and this would be unlikely to occur.

Because there are no records from the area, quality of habitat is poor both on the SJRIP reuse area and in the nearby landscape, dispersal into the Proposed Action footprint is unlikely and the probability of occurrence for GGS is low.

The trenching from sumps would occur in roadways from late April to early October, during the active period of GGS. Because work would not occur in aquatic areas, any GGS that might be present during the pipeline construction would be expected to be in aquatic habitat and would not be harmed. Additionally the construction area would be surveyed for GGS before construction and work would not occur without further consultation with Service if GGS was observed.

Effects to GGS in uplands would be unlikely because few burrows or other overwintering sites are present in the Proposed Action footprint and so GGS are not likely present on the affected area. Most of the construction work conducted during the GGS inactive period would occur at



the Facility site. This site is a relatively small in area with limited adjacency to ditches. Once initial earth work is completed at the Facility, work would be focused inside an approximate four acre compound and it is unlikely to be used by GGS.

The operation of the Facility could slightly improve water quality on the SJRIP reuse area through reduced selenium concentrations in post treatment water discharged back into the SJRIP reuse area water pool and might benefit GGS. However, because the change to water quality would decline with dilution from the discharge ditch when pooling with other SJRIP reuse water, any benefit would likely be limited to areas close the discharge site. The significance of any benefit to GGS would be minimal, especially since GGS would not likely be present in the area during the experimental period owing to its rarity in the area. Consequently, with implementation of the avoidance measures, effects from the Proposed Action to GGS are unlikely.

**Effects to San Joaquin kit fox** The Proposed Action could potentially affect SJKF during construction and maintenance activities; however, treatment of SJRIP reuse area water would not affect this species. Terrestrial habitat in the SJRIP reuse area is intensively managed for agriculture and the landscape is highly disturbed (e.g. through land preparation, planting, irrigation and harvesting). Workers utilize the numerous earthen roads running throughout the SJRIP reuse area and this is a considerable disturbance factor. Areas that are not cropped are kept barren and free of weeds, limiting areas for potential prey species. Those fields not in production are finely disked and lack vegetation. Together, these conditions, along with the limited diversity of vegetation and high selenium concentrations may limit invertebrate prey, which seemed to be relatively scarce in crop fields. There are few opportunities for rodents to burrow in fields and for burrows to persist because of frequent haying and flood irrigation. Pests such as California ground squirrel (*Spermophilus beecheyi*) are controlled and little evidence of burrowing activity by other rodents (possibly *Thomomys* sp.) occurs in the Proposed Action footprint. Because few burrowing mammals are likely present, and there are few existing burrows for SJKF to exploit for shelter, the attractiveness of the site is limited.

The high intensity agriculture practices also likely limits the suitability of the site for prey for SJKF, such as kangaroo rats (*Dipodomys* spp.) or invertebrates. During site visits, little evidence of potential prey was observed in the Proposed Action footprint.

The nearest records for SJKF are about 5 or more miles away and these are relatively old (CNDDDB 2011); they include records mostly from 1920. More recent records from the 1990's are located mostly east of the San Joaquin River, and separated from the Proposed Action footprint by the San Joaquin River and/or major canals. Other records are found west of the Proposed Action footprint, in the foothills of the Coast Range. During considerable field work on site from April to June, from 2003 through 2010, no SJKF or their sign or other evidence of SJKF has been observed on the SJRIP reuse area (J. Seay, pers. comm). SJKF might move through the site, but for lack of burrows and prey they would not be expected to reside or remain at the site. The paucity of observations in the open landscape over many years supports the suggestion that SJKF is not resident at the site. However, given records within 10 miles, and dispersal capabilities of the species, SJKF could move through the area. Incorporation of preconstruction surveys and avoidance measures, coupled with the relatively short-term required

to construct the Facility and the relatively small Facility footprint, the construction for the Proposed Action would not likely affect SJKF.

Maintenance activities practiced at the Facility would occur over a relatively short time period and would be restricted primarily within a fenced compound. Maintenance activities at the Facility that could affect SJKF, such as control of vermin, would be done to minimize risk to SJKF. The fencing would be expected to effectively preclude access to the area where maintenance occurs, and therefore maintenance would not likely affect SJKF. Maintenance of the perimeter fencing that involve ground disturbance would require avoidance measures applied to ground disturbance for construction, such as standardized avoidance measures for San Joaquin kit fox (USFWS 2011a), or as appropriate for other listed species or migratory birds. If a listed species is detected, further consultation with Service would be conducted, as appropriate. There is little chance lighting would affect listed species such as SJKF, because of the low likelihood for this species to be present at the site or nearby and any temporary exposure to an animal passing through the area would be minimal.

**Effects to listed fish species and designated critical habitat** The Proposed Action would not affect the quality of water leaving the SJRIP reuse area. Waters reaching the San Joaquin River and Delta would not be measurably different and the Proposed Action would not affect listed species inhabiting these waterways.

The Magnuson-Stevens Fishery Conservation and Management Act as amended (16 U.S.C. 1801 et seq.) requires evaluation of the Proposed Action on Essential Fish habitat. The Proposed Action would not affect the quality of water leaving the SJRIP reuse area and waters entering the San Joaquin River or the Delta that comprise essential fish habitat. Consequently, there would be no effect to essential fish habitat.

**Effects to Designated Critical Habitat** No designated critical habitat exists in the SJRIP reuse area. No designated critical habitat would be converted or modified. The Proposed Action would not affect the quality of water leaving the SJRIP reuse area and waters entering the San Joaquin River or the Delta that comprise critical habitat for listed species. Consequently, there would be no effect to critical habitat.

### **Cumulative Impacts**

No state or local actions in the area of the Proposed Action are currently known which could affect listed species or their critical habitat. Agriculture, as currently practiced, is assumed to continue in the area and these activities limit the availability of habitat suitable for listed species. Agricultural land is generally inhospitable for most listed species, especially for most crops and practices applied in the vicinity of the SJRIP reuse area. Recently, there is a slight trend to converting from lower value row crops to higher value nut crops. In general, this change is occurring on the west side of the valley where water supplies are sufficient to ensure requirements of perennial crops can be met.

The impact of the conversion is probably minimal for most species, although the SJKF could benefit slightly from this change, as more ground level “open” habitat is created, compared with denser row crops such as cotton and tomatoes. Greater visibility may minimize predation on SJKF by coyotes (*Canis latrans*). Additionally, almond and pistachio orchards generally have an

open understory that may harbor ground squirrels which may be used as prey by SJKF. However, the overall benefit to SJKF from the changes occurring would be expected to be minimal.

The GBP has been extended through 2019, permitting drainage water to be diverted away from wetland habitats in the Grasslands area to Mud Slough and the San Joaquin River. The minimal change to water quality in the SJRIP reuse area as a result of the Proposed Action would not measurably influence water quality beyond the SJRIP reuse area, and thus would not affect biological resources “downstream” of the SJRIP project and is not expected to cumulatively impact water quality released through the GBP.

### **3.4 Cultural Resources**

Cultural resources is a broad term that includes prehistoric, historic, architectural, and traditional cultural properties. The National Historic Preservation Act (NHPA) of 1966 is the primary Federal legislation that outlines the Federal Government’s responsibility to cultural resources. Section 106 of the NHPA requires the Federal Government to take into consideration the effects of an undertaking on cultural resources listed on or eligible for inclusion in the National Register of Historic Places (National Register). Those resources that are on or eligible for inclusion in the National Register are referred to as historic properties.

The Section 106 process is outlined in the Federal regulations at 36 Code of Federal Regulations (CFR) Part 800. These regulations describe the process that the Federal agency (Reclamation) takes to identify cultural resources and the level of effect that the proposed undertaking will have on historic properties. In summary, Reclamation must first determine if the action is the type of action that has the potential to affect historic properties. If the action is the type of action to affect historic properties, Reclamation must identify the area of potential effects (APE), determine if historic properties are present within that APE, determine the effect that the undertaking will have on historic properties, and consult with the State Historic Preservation Office (SHPO), to seek concurrence on Reclamation’s findings. In addition, Reclamation is required through the Section 106 process to consult with Indian Tribes concerning the identification of sites of religious or cultural significance, and consult with individuals or groups who are entitled to be consulting parties or have requested to be consulting parties.

#### **3.4.1 Affected Environment**

In 1992, a cultural resources survey was conducted within and adjacent to the Proposed Action area which found no cultural resources (Bissonnette 1992). On June 24, 2010, Reclamation archaeologists conducted a pedestrian archaeological survey of the entire APE for the Proposed Action. No cultural resources were found during the survey. However, the Central California Irrigation District’s Outside Canal is located on the northern boundary of the Proposed Action’s APE. The Outside Canal was originally constructed in 1890 by the San Joaquin and Kings River Canal Company for Miller and Lux, Incorporated for irrigation purposes. The canal is still in use delivering irrigation and municipal and industrial water supplies. To date, the Outside Canal has not been evaluated for listing on the National Register. Since evaluating the Outside Canal in its entirety is outside the scope of the Proposed Action, Reclamation assumes, for the purposes of this undertaking, that the Outside Canal is eligible for inclusion on the National Register under

Criterion A because of its contribution to broad patterns of history, specifically its association and contribution in water development and agricultural development of California's Central Valley.

### **3.4.2 Environmental Consequences**

#### ***No Action***

There would be no impact to cultural resources as there would be no ground disturbing or construction activities.

#### ***Proposed Action***

Reclamation has determined that the Proposed Action would not adversely affect qualities that would make the Outside Canal eligible for listing on the National Register as there would be no modifications to the canal itself or change in its functions and any visual effects due to the installation of an underground pipeline would be temporary. On August 16, 2010, SHPO concurred with Reclamation's determination (Appendix G) that there would be no adverse impact to cultural resources as a result of the Proposed Action.

#### ***Cumulative Impacts***

There would be no cumulative impact to cultural resources as there would be no direct or indirect impacts associated with the Proposed Action.

## **3.5 Indian Sacred Sites**

Executive Order 13007 requires Federal land managing agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites. "Sacred Sites" means any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian Tribe, or Indian individual determined to be an appropriate authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion.

### **3.5.1 Affected Environment**

On July 14, 2010, Reclamation sent Proposed Action notification letters and requests for consultation to Big Sandy Rancheria, Cold Springs Rancheria of Mono Indians, Santa Rosa Rancheria, and Table Mountain Rancheria. To date, no responses have been received regarding the Proposed Action.

### **3.5.2 Environmental Consequences**

#### ***No Action***

There would be no impacts to sacred sites as conditions would remain the same as existing conditions.

***Proposed Action***

At this time, no Indian sacred sites have been identified. In addition, the Proposed Action would not impede access to or ceremonial use of Indian sacred sites. If sites are identified in the future, Reclamation would comply with Executive Order 13007.

***Cumulative Impacts***

Should any sacred sites be identified in the future, Reclamation would comply with Executive Order 13007. This would ensure that no cumulative impacts would occur that could impede access to or ceremonial use of Indian sacred sites due to the Proposed Action.

### **3.6 Indian Trust Assets**

ITA are legal interests in assets that are held in trust by the United States Government for federally recognized Indian tribes or individuals. The trust relationship usually stems from a treaty, executive order, or act of Congress. The Secretary of the interior is the trustee for the United States on behalf of federally recognized Indian tribes. “Assets” are anything owned that holds monetary value. “Legal interests” means there is a property interest for which there is a legal remedy, such a compensation or injunction, if there is improper interference. Assets can be real property, physical assets, or intangible property rights, such as a lease, or right to use something. ITA cannot be sold, leased or otherwise alienated without United States’ approval. Trust assets may include lands, minerals, and natural resources, as well as hunting, fishing, and water rights. Indian reservations, rancherias, and public domain allotments are examples of lands that are often considered trust assets. In some cases, ITA may be located off trust land.

Reclamation shares the Indian trust responsibility with all other agencies of the Executive Branch to protect and maintain ITA reserved by or granted to Indian tribes, or Indian individuals by treaty, statute, or Executive Order.

#### **3.6.1 Affected Environment**

The nearest ITA is the Table Mountain Rancheria located approximately 52 miles east-northeast of the Proposed Action location.

#### **3.6.2 Environmental Consequences**

***No Action***

Without construction activities there would be no potential to impact ITA.

***Proposed Action***

There would be no impact to ITA as there are none within the Proposed Action area. See Appendix H for Reclamation’s determination.

***Cumulative Impacts***

There would be no cumulative impacts to ITA as there are none in the Proposed Action area that could be impacted.

### 3.7 Hazardous Material

Hazardous waste is waste that is dangerous or potentially harmful to human health or the environment and can be liquids, solids, gases, or sludges (EPA 2010a). As defined by 40 CFR 260.10, a hazardous waste generator is any person or site that produces or generates hazardous waste. Hazardous waste generators are divided into three categories based on production of waste: large (more than 2,205 pounds [lbs] per month), small (more than 220 lbs per month but less than 2,205 lbs per month), and conditionally exempt small [220 lbs per month or less] (EPA 2010b).

The Resource Conservation and Recovery Act (RCRA) Subtitle C establishes a federal program to manage hazardous wastes for its entire existence in order to protect human health and the environment (EPA 2010c). Section 3010 of Subtitle C of RCRA requires any person who generates, transports, or recycles regulated wastes or who owns or operates a facility for the treatment, storage, or disposal of regulated wastes to notify the Environmental Protection Agency (EPA) of their activities, including the location and general description of the activities and the regulated wastes handled. RCRA only addresses active or future facilities not abandoned or historical sites. EPA has established regulations and procedures for the generation, transportation, storage and disposal of hazardous waste handlers. EPA also has established technical standards for the design and safe operation of treatment, storage and disposal facilities to minimize the release of hazardous waste into the environment. These standards serve as the basis for developing and issuing permits. The EPA has delegated authority and responsibility for enforcement of RCRA to the State of California's Department of Toxic Substance Control.

Hazardous waste is commonly stored prior to treatment or disposal, and must be stored in containers, tanks, containment buildings, drip pads, waste piles, or surface impoundments that comply with the RCRA regulations (EPA 2010c).

#### 3.7.1 Affected Environment

Up to 55,000 pounds of waste solids containing selenium would be generated per year at the Facility. Treated solids would be stored on site in closed steel roll-off containers until transported to a qualified disposal facility on a quarterly basis. Title 22 of the California Code of Regulations (§66261.24) defines acceptable quantities of selenium associated with solids as less than 100 ppm. Since selenium concentrations in the wasted solids would have over 2,000 ppm, the wasted solids are defined as hazardous and as such, must be disposed at a Class 1 Hazardous Waste Landfill. The closest Class 1 landfill is the Kettleman Hills Landfill in Kings County.

#### 3.7.2 Environmental Consequences

##### ***No Action***

There would be no changes to existing conditions under the No Action Alternative. Selenium would continue to be present within drainage water used within the SJRIP and discharged under the GBP.

##### ***Proposed Action***

No additional hazardous waste would be generated from the construction of the Facility. However, selenium already present within the existing drainage water would be concentrated

into solid waste after treatment (see Section 2.2.3). As the concentration of selenium present in the solid waste would be considered hazardous waste, Reclamation would comply with RCRA including temporary storage and containment requirements. This waste would be disposed of on a quarterly basis within a Class 1 Hazardous Waste Landfill. Therefore, it is not anticipated that the Proposed Action would have adverse impacts resulting from hazardous waste.

### ***Cumulative Impacts***

As Reclamation would comply with all RCRA requirements for the storage, containment, and disposal of hazardous waste, it is not anticipated that the Proposed Action would have cumulative adverse impacts resulting from hazardous waste.

## **3.8 Environmental Justice**

Executive Order 12898 (February 11, 1994) mandates Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

### **3.8.1 Affected Environment**

Panoche Drainage District is an agricultural district located within San Joaquin County. The Hispanic community within San Joaquin County is slightly greater than the California average (U.S. Census Bureau 2010). The market for seasonal workers on local farms draws thousands of migrant workers, commonly of Hispanic origin from Mexico and Central America. Population changes for San Joaquin County between 2000 and 2009 are shown in Table 3-3. A notable trend within San Joaquin County was the Hispanic population increase of 47.5 percent nearly double the trend for the state during the same time period (U.S. Census Bureau 2010).

**Table 3-3 San Joaquin County Demographics**

<b>County</b>	<b>Total population</b>	<b>Non-Hispanic population</b>	<b>Hispanic population</b>	<b>Percent Hispanic</b>
San Joaquin County – 2000	563,598	391,525	172,073	30.5%
San Joaquin County – 2009	674,860	421,113	253,747	37.6%
Numerical Change	+ 111,262	+ 29,588	+ 81,674	
Percent Change	+19.7%	+7.6%	+47.5%	
Source: U.S. Census Bureau 2010				

### **3.8.2 Environmental Consequences**

#### ***No Action***

There would be no impacts to minority or disadvantaged populations as conditions would remain the same as existing conditions.

#### ***Proposed Action***

The Proposed Action is a pilot program to test mechanisms to remove selenium from drainage water in Panoche Drainage District. Staff to operate the Facility would come from existing employees within the district and Reclamation. Consequently, the Proposed Action would not cause dislocation, changes in employment, or increase flood, drought, or disease nor would it disproportionately impact economically disadvantaged or minority populations.

***Cumulative Impacts***

There would be no cumulative impacts to economically disadvantaged or minority populations as the Facility would be temporary and would not remove or create new employment opportunities.

**3.9 Socioeconomic Resources****3.9.1 Affected Environment**

Panoche Drainage District operates the SJRIP in order to reduce the amount of discharge released from the Grassland Drainage Area. Crops grown within the SJRIP include salt tolerant crops described under Section 3.2.

**3.9.2 Environmental Consequences*****No Action***

There would be no impact to socioeconomics as conditions would remain the same as existing conditions.

***Proposed Action***

The Facility would not increase or decrease socioeconomic opportunities with the SJRIP. No changes in use of the SJRIP are needed for construction or operation of the Facility. A small portion of an adjacent field would be removed during construction of the Facility for staging. However, after construction the field would be replanted. Consequently, there would be no adverse impacts to socioeconomic resources as a result of the Proposed Action.

***Cumulative Impacts***

As described in Section 2.2.3, Panoche Drainage District could elect to operate the Facility indefinitely for treatment of drainage water. Over the long term, treated drainage water would reduce the amount of selenium discharged to the Grassland Bypass Project which could save Panoche Drainage District some of the cost for discharge pursuant to their discharge permit and agreements for the Grassland Bypass Project.

**3.10 Air Quality**

Section 176 (C) of the Clean Air Act [CAA] (42 U.S.C. 7506 (C)) requires any entity of the federal government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate that the action conforms to the applicable State Implementation Plan (SIP) required under Section 110 (a) of the Federal CAA (42 U.S.C. 7401 [a]) before the action is otherwise approved. In this context, conformity means that such federal actions must be consistent with SIP's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards and achieving expeditious attainment of those standards. Each federal agency must determine that any action that is proposed by the agency and that is subject to the regulations implementing the conformity requirements would, in fact conform to the applicable SIP before the action is taken.

On November 30, 1993, the EPA promulgated final general conformity regulations at 40 CFR 93 Subpart B for all federal activities except those covered under transportation conformity. The



general conformity regulations apply to a proposed federal action in a non-attainment or maintenance area if the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutant caused by the Proposed Action equal or exceed certain *de minimis* amounts thus requiring the federal agency to make a determination of general conformity.

### 3.10.1 Affected Environment

The Proposed Action area lies within the San Joaquin Valley Air Basin (SJVAB) under the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). The pollutants of greatest concern in the San Joaquin Valley are carbon monoxide (CO), ozone (O<sub>3</sub>), O<sub>3</sub> precursors such as volatile organic compounds (VOC), inhalable particulate matter between 2.5 and 10 microns in diameter (PM<sub>10</sub>) and particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>). The SJVAB has reached Federal and State attainment status for CO, nitrogen dioxide (NO<sub>2</sub>), and sulfur dioxide (SO<sub>2</sub>). Federal attainment status has been reached for PM<sub>10</sub> but is in non-attainment for O<sub>3</sub>, PM<sub>2.5</sub>, and VOC (Table 3-4). There are no established standards for nitrogen oxides (NO<sub>x</sub>); however, NO<sub>x</sub> does contribute to NO<sub>2</sub> standards (SJVAPCD 2010).

**Table 3-4 San Joaquin Valley Attainment Status**

Pollutant	Averaging Time	California Standards		National Standards	
		Concentration	Attainment Status	Concentration	Attainment Status
O <sub>3</sub>	8 Hour	0.070 ppm (137 µg/m <sup>3</sup> )	<b>Nonattainment</b>	0.075 ppm	<b>Nonattainment</b>
	1 Hour	0.09 ppm (180 µg/m <sup>3</sup> )	<b>Nonattainment</b>	--	--
CO	8 Hour	9.0 ppm (10 mg/m <sup>3</sup> )	Attainment	9.0 ppm (10 mg/m <sup>3</sup> )	Attainment
	1 Hour	20.0 ppm (23 mg/m <sup>3</sup> )	Unclassified	35.0 ppm (40 mg/m <sup>3</sup> )	Unclassified
NO <sub>2</sub>	Annual arithmetic mean	0.030 ppm (56 µg/m <sup>3</sup> )	Attainment	0.053 ppm (100 µg/m <sup>3</sup> )	Attainment
	1 Hour	0.18 ppm (338 µg/m <sup>3</sup> )	Attainment	--	--
SO <sub>2</sub>	Annual average	--	--	0.03 ppm (80 µg/m <sup>3</sup> )	Attainment
	24 Hour	0.04 ppm (105 µg/m <sup>3</sup> )	Attainment	0.14 ppm (365 µg/m <sup>3</sup> )	Attainment
	1 Hour	0.25 ppm (655 µg/m <sup>3</sup> )	Attainment	--	--
PM <sub>10</sub>	Annual arithmetic mean	20 µg/m <sup>3</sup>	<b>Nonattainment</b>	--	--
	24 Hour	50 µg/m <sup>3</sup>	<b>Nonattainment</b>	150 µg/m <sup>3</sup>	Attainment
PM <sub>2.5</sub>	Annual Arithmetic mean	12 µg/m <sup>3</sup>	<b>Nonattainment</b>	15 µg/m <sup>3</sup>	<b>Nonattainment</b>
	24 Hour	--	--	35 µg/m <sup>3</sup>	Attainment
Lead	30 day average	1.5 µg/m <sup>3</sup>	Attainment	--	--
	Rolling-3 month average	--	--	0.15 µg/m <sup>3</sup>	Unclassified

Source: CARB 2010; SJVAPCD 2010; 40 CFR 93.153  
mg/m<sup>3</sup> = milligram per cubic meter  
µg/m<sup>3</sup> = microgram per cubic meter  
-- = No standard established

### 3.10.2 Environmental Consequences

#### **No Action**

There would be no change in air quality impacts as conditions would remain the same as existing conditions.

#### **Proposed Action**

Operation of the Facility would not contribute to criteria pollutant emissions, as power for operation and movement of water would be electrical. The air quality emissions from electrical power have been considered in environmental documentation for the generating power plant which found that there are no emissions from electrical engines. However, emissions would be associated with construction activities. As described previously, construction is expected to take approximately one year to complete. Construction equipment would include: grader, excavator, dozer, front end loader, roller, flatbed truck, crane, and compactor. Estimated air quality emissions for construction activities associated with the Proposed Action were calculated utilizing the South Coast Air Quality Management District's *EMFAC2007 Version 2.3* emission factors (Appendix I). Annual estimated emissions can be found in Table 3-5 below.

**Table 3-5 Estimated Emissions due to Construction of the Proposed Action**

Source	Total Emission (Tons per Year)							
	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>	CH <sub>4</sub>
Site Preparation/Ground Disturbance	0.02	0.01	0.07	0.01	11.60	2.41	7.19	0.00
Building Construction	0.78	0.15	1.90	0.21	0.12	0.03	122.00	0.01
Concrete Paving Operations	0.18	0.03	0.42	0.05	0.03	0.03	22.12	0.00
<b>Total Emissions</b>	<b>0.98</b>	<b>0.19</b>	<b>2.39</b>	<b>0.27</b>	<b>11.75</b>	<b>2.47</b>	<b>151.31</b>	<b>0.01</b>
<b>Conformity Thresholds (SJVAPCD)</b>	<b>100</b>	<b>NA</b>	<b>100</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>

NA = not applicable. SO<sub>x</sub> = sulfur oxides. CO<sub>2</sub> = carbon dioxide. CH<sub>4</sub> = methane.

Estimated emissions for construction and operation of the Facility are well below the *de minimis* thresholds established by the SJVAPCD; therefore, a conformity analysis is not required. In addition, Reclamation would employ best management practices to reduce fugitive dust emissions during ground disturbance. Consequently, the Proposed Action would not result in an adverse impact upon air quality.

#### **Cumulative Impacts**

Construction, operation and maintenance emissions for the Proposed Action are well below the *de minimis* thresholds established by the SJVAPCD and are expected to be temporary in duration. As a result, the Proposed Action is not expected to contribute to cumulative adverse impacts to air quality.

### 3.11 Global Climate

Climate change refers to significant change in measures of climate (e.g., temperature, precipitation, or wind) lasting for decades or longer and is considered a cumulative impact. Many environmental changes can contribute to climate change [changes in sun's intensity, changes in ocean circulation, deforestation, urbanization, burning fossil fuels, etc.] (EPA 2010c)

Gases that trap heat in the atmosphere are often called greenhouse gases (GHG). Some GHG, such as CO<sub>2</sub>, occur naturally and are emitted to the atmosphere through natural processes and human activities. Other GHG (e.g., fluorinated gases) are created and emitted solely through human activities. The principal GHG that enter the atmosphere because of human activities are: CO<sub>2</sub>, CH<sub>4</sub>, nitrous oxide, and fluorinated gasses (EPA 2010c). Between 1990 and 2009, CO<sub>2</sub> was the primary GHG (approximately 85 percent) produced in the U.S. due to the combustion of fossil fuels. Methane steadily declined within the same time period (EPA 2010d).

During the past century humans have substantially added to the amount of GHG in the atmosphere by burning fossil fuels such as coal, natural gas, oil and gasoline to power our cars, factories, utilities and appliances. The added gases, primarily CO<sub>2</sub> and CH<sub>4</sub>, are enhancing the natural greenhouse effect, and likely contributing to an increase in global average temperature and related climate changes (EPA 2010e). While there is general consensus in their trend, the magnitudes and onset-timing of impacts are uncertain and are scenario-dependent (Anderson et al. 2008).

Climate change has only recently been widely recognized as an imminent threat to the global climate, economy, and population. As a result, the national, state, and local climate change regulatory setting is complex and evolving.

In 2006, the State of California issued the California Global Warming Solutions Act of 2006, widely known as Assembly Bill 32, which requires the California Air Resources Board (CARB) to develop and enforce regulations for the reporting and verification of statewide GHG emissions. CARB is further directed to set a GHG emission limit, based on 1990 levels, to be achieved by 2020.

In addition, the EPA has issued regulatory actions under the CAA as well as other statutory authorities to address climate change issues (EPA 2010f). In 2009, the EPA issued a rule (40 CFR Part 98) for mandatory reporting of GHG by large source emitters and suppliers that emit 25,000 metric tons or more of GHG per year (EPA 2009). The rule is intended to collect accurate and timely emissions data to guide future policy decisions on climate change and has undergone and is still undergoing revisions (EPA 2010f).

### **3.11.1 Affected Environment**

More than 20 million Californians rely on the State Water Project and CVP. Increases in air temperature may lead to changes in precipitation patterns, runoff timing and volume, sea level rise, and changes in the amount of irrigation water needed due to modified evapotranspiration rates. These changes may lead to impacts to California's water resources and project operations.

### **3.11.2 Environmental Consequences**

#### ***No Action***

There would be no impacts to global climate change from this alternative as conditions would remain the same as existing conditions.

#### ***Proposed Action***

Estimated annual emissions of CO<sub>2</sub> and CH<sub>4</sub> from construction of the Facility are 151.31 and 0.01 tons (137.3 and 0.009 metric tons), respectively (see Table 3-5 above). The Facility would

operate 24 hours a day for 1.5 years requiring the use of electricity for power. In addition, the 17 pumps used for moving water to the Facility would require the use of power as they cycle on and off to pump water. Estimated annual CO<sub>2</sub> emissions for the operation of the Facility and pumps can be found in Table 3-6.

**Table 3-6 Calculated Annual CO<sub>2</sub> Emissions**

Emission Source	Annual hours of operation	Annual CO <sub>2</sub> Emissions (tons)	Annual CO <sub>2</sub> Emissions (metric tons)
Facility operation	8,760	6.3	5.7
Pump operation (17 pumps)	4,380	52.7	47.8
<b>Total</b>	<b>13,140</b>	<b>59</b>	<b>53.5</b>

Note: CO<sub>2</sub> was calculated using the EPA's GHG Equivalencies Calculator (EPA 2010g) which can estimate CO<sub>2</sub> emissions based on number of kilowatt hours of electricity used. This is an estimate of emissions and is not meant to determine actual emissions. Although estimated emissions are based on the pumps being run continuously, they are likely to only run half the time.

Calculated CO<sub>2</sub> and CH<sub>4</sub> emissions for the construction and operation of the Proposed Action alternatives are estimated to be well below the EPA's 25,000 metric tons per year threshold for annually reporting GHG emissions (EPA 2009). Accordingly, the Proposed Action would result in below *de minimis* impacts to global climate change.

#### **Cumulative Impacts**

GHG emissions are considered cumulatively significant; however, the estimated annual CO<sub>2</sub> and CH<sub>4</sub> emissions required to construct and operate the Facility for the Proposed Action is 210.31 and 0.01 tons (190.8 and 0.009 metric tons) per year, respectively, which is well below the 25,000 metric tons per year threshold for reporting GHG emissions. As a result, the Proposed Action is not expected to contribute to cumulative adverse impacts to global climate change.

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## **Section 4 Consultation and Coordination**

### **4.1 Public Review Period**

Reclamation intends to provide the public with an opportunity to comment on the draft Finding of No Significant Impact and draft EA during a public comment period.

### **4.2 Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.)**

The Fish and Wildlife Coordination Act (FWCA) requires that Reclamation consult with fish and wildlife agencies (federal and state) on all water development projects that could affect biological resources. The amendments enacted in 1946 require consultation with the Service and State fish and wildlife agencies “whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the United States, or by any public or private agency under Federal permit or license”. Consultation is to be undertaken for the purpose of “preventing the loss of and damage to wildlife resources”.

The Proposed Action does not involve any new impoundment, channel deepening, or other control or modification of a stream or body of water as described in the statute. Water would be piped from sumps to an experimental Facility where attempts to reduce the concentration of selenium in total and its various forms would be tested. The movement of SJRIP reuse water taken from sumps through pipes to the proposed Facility is not a water development project. Therefore, Reclamation has determined that FWCA does not apply to the Proposed Action. Additionally, Reclamation has been in consultation with Service through Section 7 of the ESA and has incorporated measures to reduce potential impacts to wildlife resources.

### **4.3 Endangered Species Act (16 U.S.C. § 1531 et seq.)**

Section 7 of the ESA requires Federal agencies, in consultation with the Secretary of the Interior and/or Commerce, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species.

Reclamation is consulting with Service on effects from the Proposed Action to terrestrial species and non-anadromous fish. Reclamation will not finalize the draft EA until consultation is complete.

For anadromous fish and their designated critical habitat, Reclamation has determined that the Proposed Action would not affect species or critical habitat under jurisdiction of the National Marine Fisheries Service.

#### **4.4 National Historic Preservation Act (16 U.S.C. § 470 et seq.)**

The NHPA of 1966, as amended (16 U.S.C. 470 et seq.), requires that federal agencies give the Advisory Council on Historic Preservation an opportunity to comment on the effects of an undertaking on historic properties, properties that are eligible for inclusion in the National Register. The 36 CFR Part 800 regulations implement Section 106 of the NHPA.

Section 106 of the NHPA requires federal agencies to consider the effects of federal undertakings on historic properties, properties determined eligible for inclusion in the National Register. Compliance with Section 106 follows a series of steps that are designed to identify interested parties, determine the APE, conduct cultural resource inventories, determine if historic properties are present within the APE, and assess effects on any identified historic properties.

Reclamation has determined that the Proposed Action would not adversely affect qualities that would make the Outside Canal eligible for listing on the National Register as there would be no modifications to the canal itself or change in its functions and any visual effects due to the installation of an underground pipeline would be temporary. On August 16, 2010, SHPO concurred with Reclamation's determination (Appendix G).

During consultation with SHPO, temporary and permanent disturbance for the Proposed Action was originally identified as seven and four acres, respectively, for a total of 12 acres (Appendix D). Since completion of consultation, Reclamation has increased the temporary staging area to eight acres and decreased permanent disturbance to four within the same APE analyzed during consultation. The total area of disturbance is the same 12 acres that SHPO concurred with on August 16, 2010.

#### **4.5 Migratory Bird Treaty Act (16 U.S.C. § 703 et seq.)**

The MBTA implements various treaties and conventions between the United States and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Unless permitted by regulations, the Act provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Subject to limitations in the Act, the Secretary of the Interior may adopt regulations determining the extent to which, if at all, hunting, taking, capturing, killing, possessing, selling, purchasing, shipping, transporting or exporting of any migratory bird, part, nest or egg will be allowed, having regard for temperature zones, distribution, abundance, economic value, breeding habits and migratory flight patterns.

Avoidance measures would be implemented for protection of migratory birds and no take is expected to occur from Proposed Action activities.

## **4.6 Executive Order 11988 – Floodplain Management and Executive Order 11990 – Protection of Wetlands**

Executive Order 11988 requires Federal agencies to prepare floodplain assessments for actions located within or affecting flood plains, and similarly, Executive Order 11990 places similar requirements for actions in wetlands. The Proposed Action would not affect either concern as there are no floodplains or wetlands within the action area.

## **4.7 Clean Water Act (33 U.S.C. § 1251 et seq.)**

Section 401 of the Clean Water Act [CWA] (33 U.S.C. § 1311) prohibits the discharge of any pollutants into navigable waters, except as allowed by permit issued under sections 402 and 404 of the CWA (33 U.S.C. § 1342 and 1344). If new structures (e.g., treatment plants) are proposed, that would discharge effluent into navigable waters, relevant permits under the CWA would be required for the project applicant(s). Section 401 requires any applicant for an individual U. S. Army Corps of Engineers dredge and fill discharge permit (Section 404) to first obtain certification from the state that the activity associated with dredging or filling will comply with applicable state effluent and water quality standards. This certification must be approved or waived prior to the issuance of a permit for dredging and filling. No activities such as dredging or filling of wetlands or surface waters would be required for implementation of the Proposed Action, therefore permits obtained in compliance with CWA section 404 and 401 are not required.

Discharges from the operation of the Facility would require a NPDES permit (Section 402 CWA) issued by the RWQCB. Reclamation would obtain and comply with all requirements of the NPDES permit prior to operation of the Facility.

## **Section 5 List of Preparers and Reviewers**

Rain Healer, Natural Resources Specialist, SCCAO  
 Ned Gruenhagen, PhD., Wildlife Biologist, SCCAO  
 Dawn Ramsey, Archaeologist, MP-153  
 Patricia Rivera, ITA, MP-400  
 Scott Irvine, Environmental Engineer, Reclamation Technical Services Center – reviewer  
 Sheryl Carter, Supervisory Land Management Specialist, SCCAO – reviewer  
 Chuck Siek, Supervisory Natural Resources Specialist, SCCAO – reviewer  
 Michael Inthavong, Natural Resources Specialist, SCCAO – reviewer



## Section 6 References

Anderson, J, F Chung, M Anderson, L Brekke, D Easton, M Ejetal, R Peterson, and R Snyder. 2008. Progress on Incorporating Climate Change into Management of California's Water Resources. *Climatic Change* 87(Suppl 1):S91–S108 DOI 10.1007/s10584-007-9353-1

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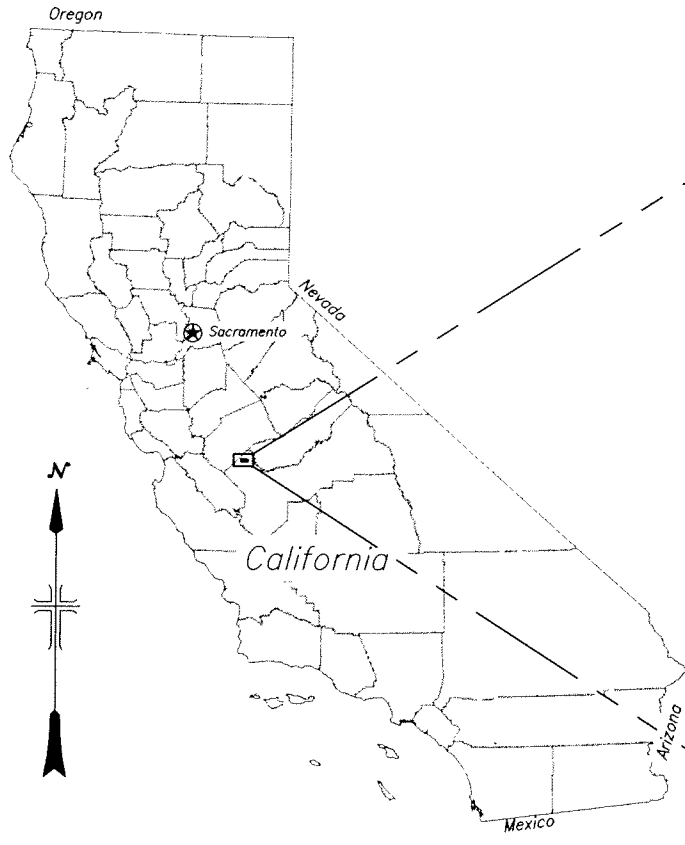
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FACILITY AT PANOCHÉ DRAINAGE DISTRICT*

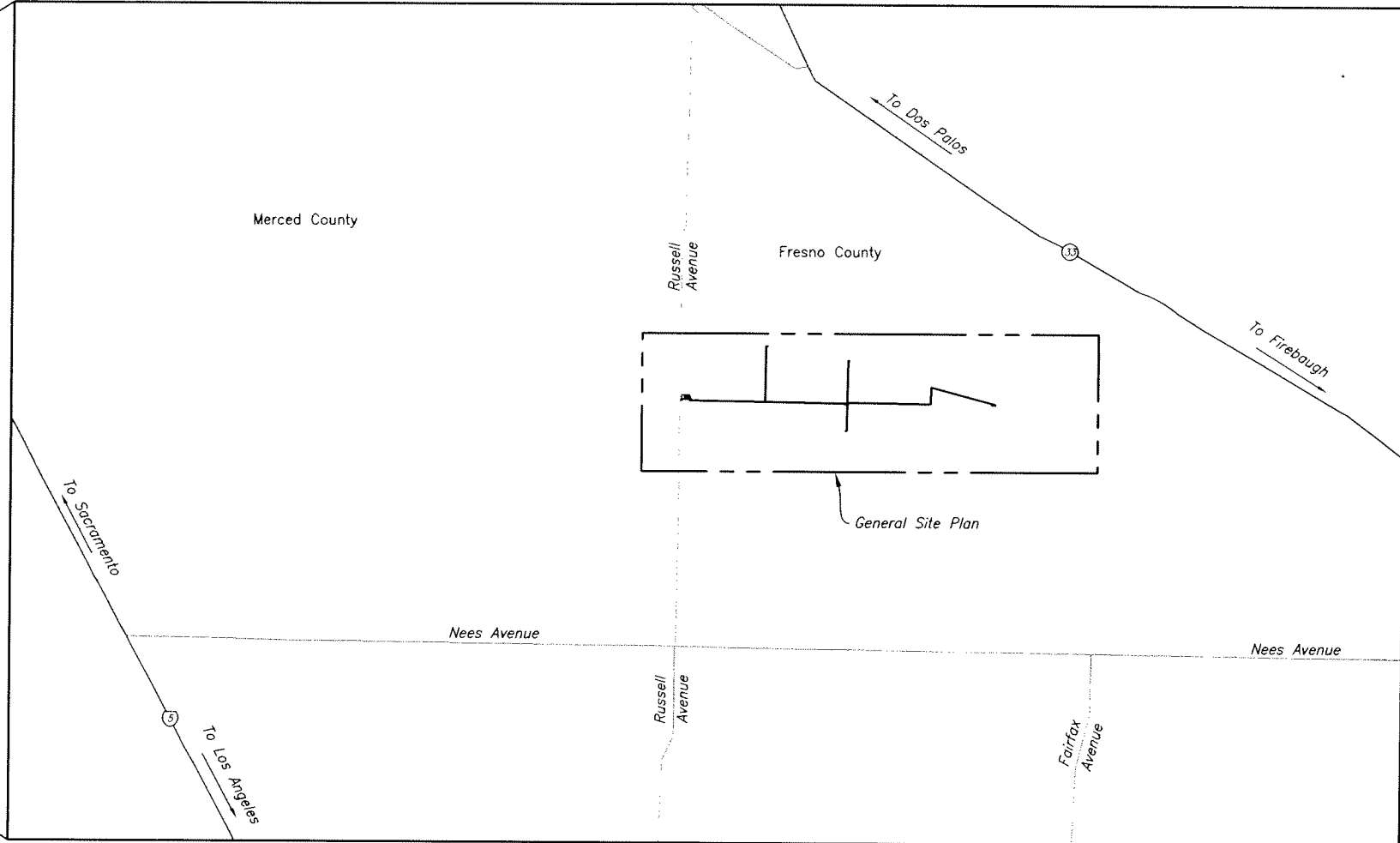
**Appendix A**  
**Preliminary Project Designs**

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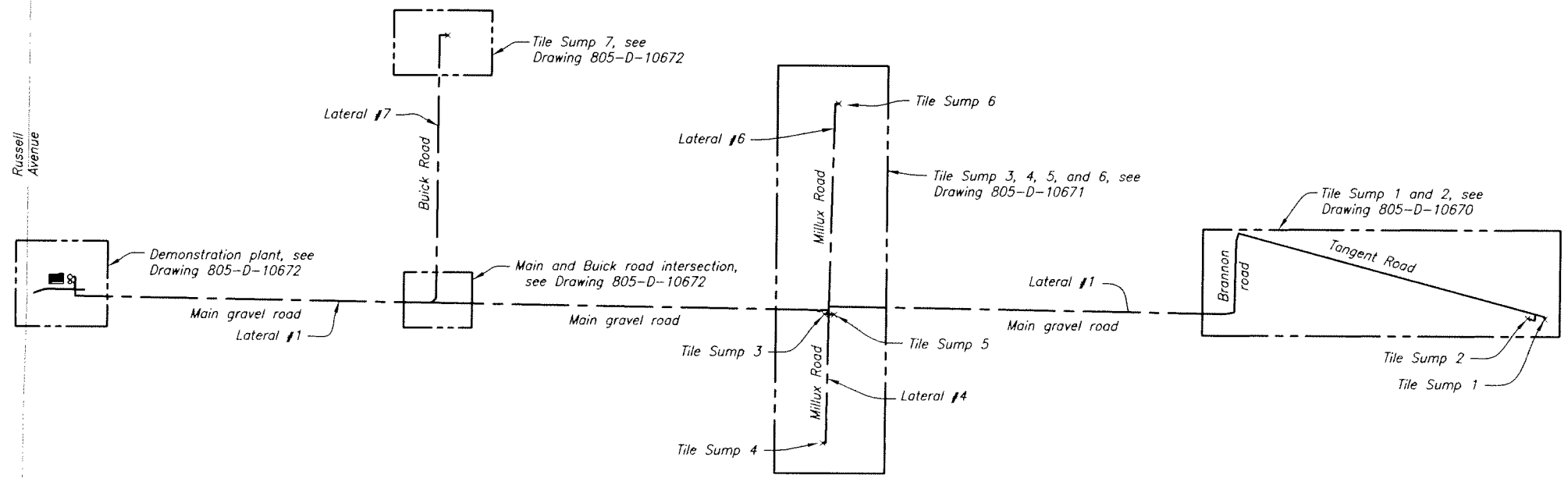
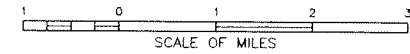
September 2011



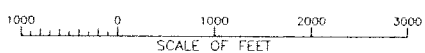
KEY MAP



VICINITY MAP



GENERAL SITE PLAN



NOTES

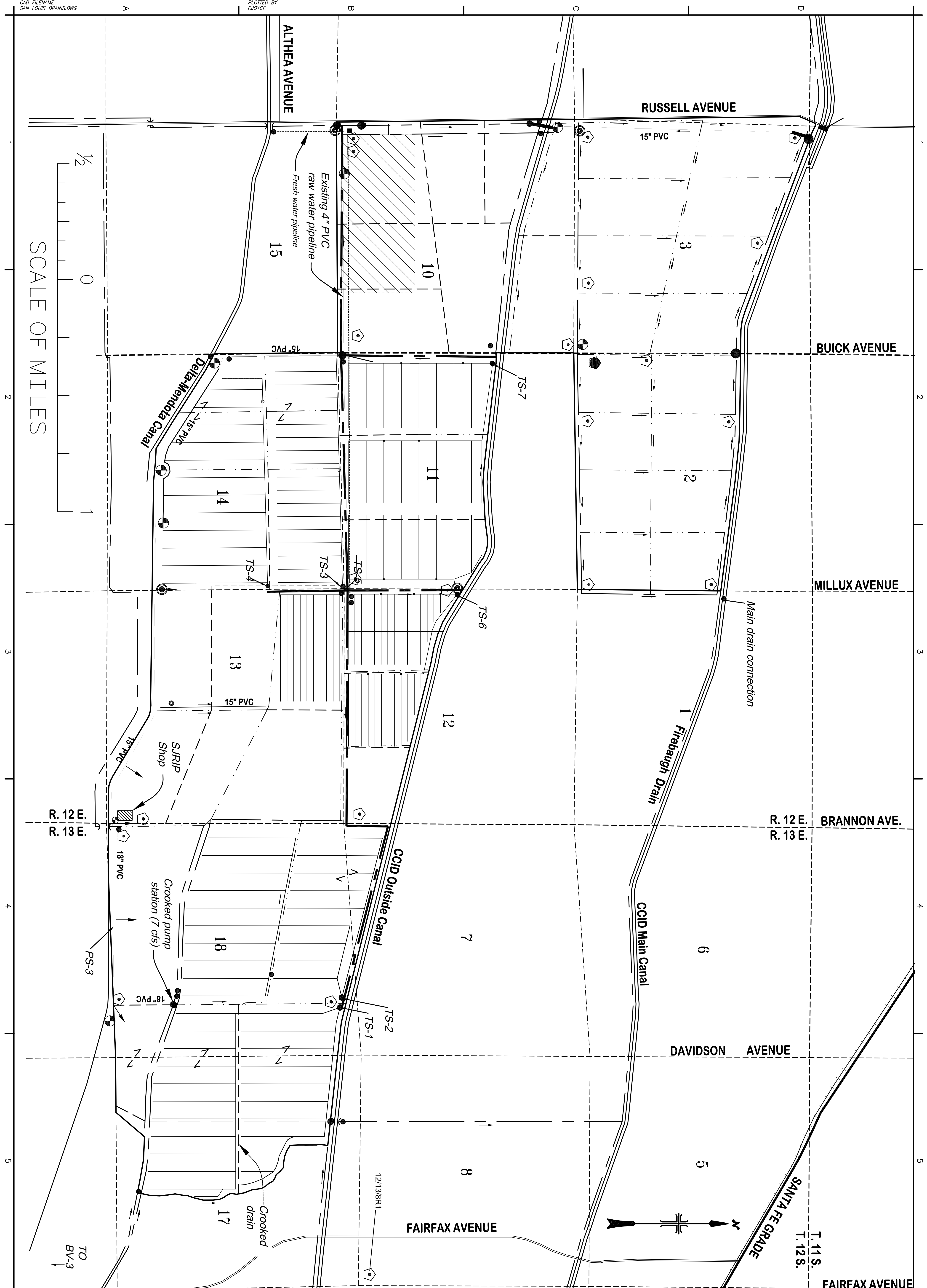
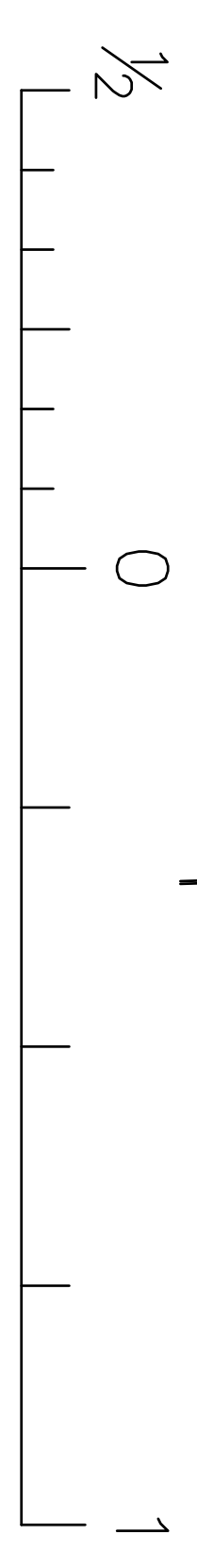
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DRAWN	
CHECKED	
TECH. APPR.	NAME - TITLE
APPROVED	DAVID K. EDWARDS, MANAGER WATER CONSERVATION GROUP
DENVER, COLORADO	2011-5-5

SCALE OF MILES



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U.S. DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION

SAN LUIS PROJCT - CALIFORNIA

**SAN LUIS DRAINS DEMONSTRATION PROJECT**

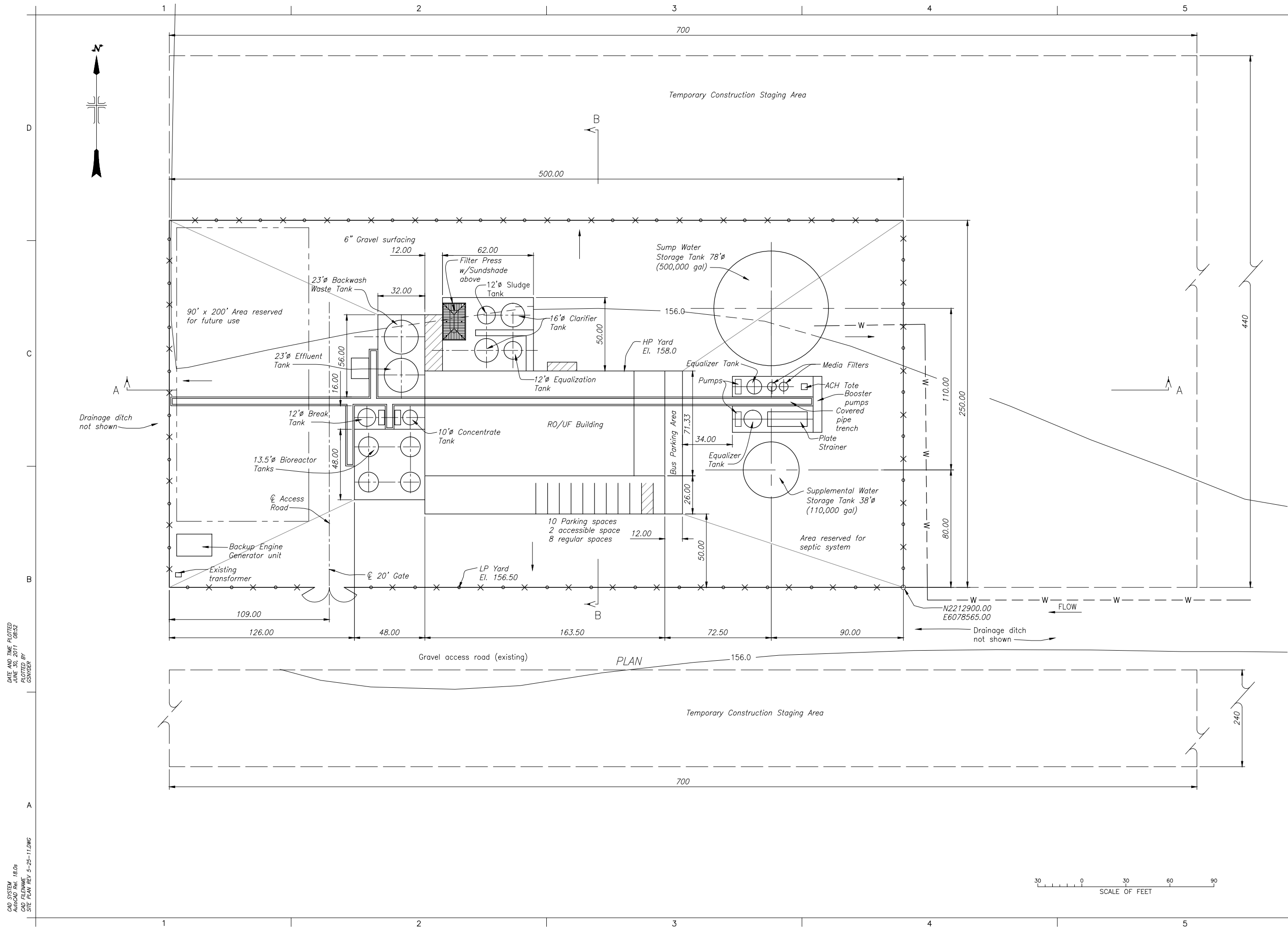
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**RECLAMATION**  
Managing Water in the West

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DRAWN  
CHECKED  
TECH. APPR.  
APPROVED AND RETURNED TO DRAWING  
DENVER, COLORADO  
7-7-2010

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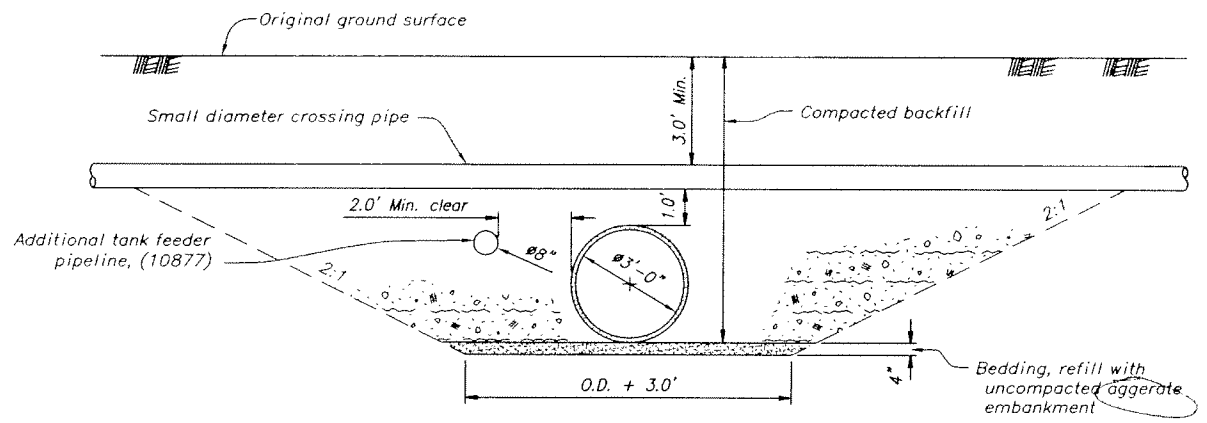
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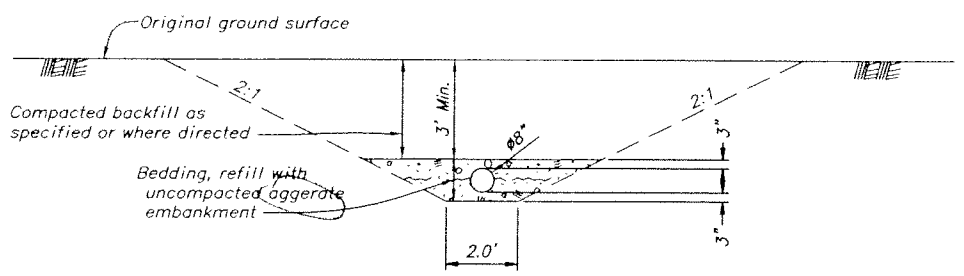
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 CENTRAL VALLEY PROJECT  
 WEST SAN JOAQUIN DIVISION - SAN LUIS UNIT - CALIFORNIA  
**SAN LUIS DRAINAGE IMPLEMENTATION**  
 DEMONSTRATION TREATMENT PLANT  
 PRELIMINARY DESIGN  
**SITE PLAN**  
**TWO TANK OPTION**  
**ONE LARGE AND ONE SMALL**

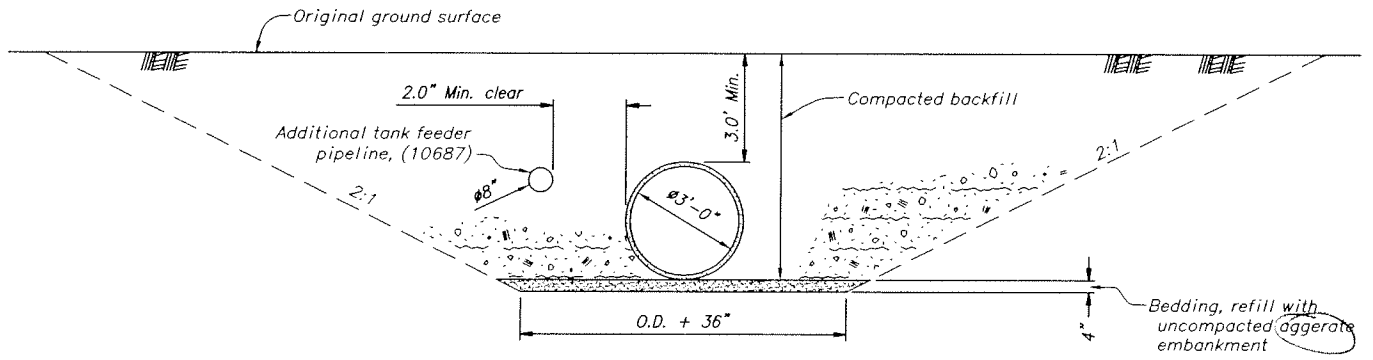
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 REVIEWED BY: \_\_\_\_\_  
 DENVER, COLORADO



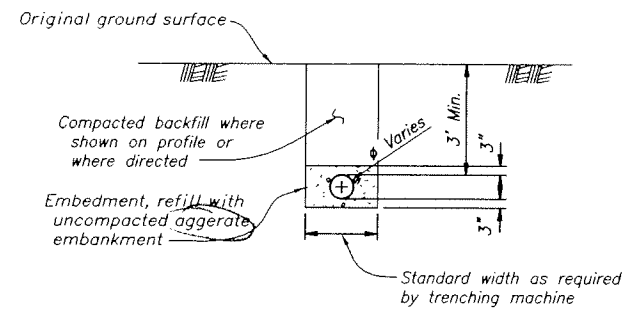
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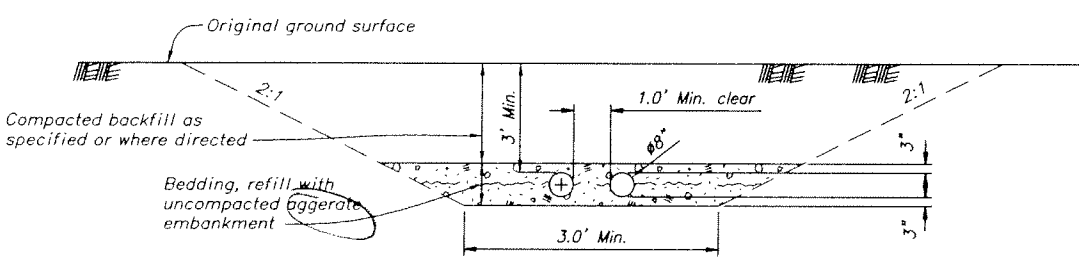
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TYPICAL TRENCH SECTION  
(Concrete and HDPE Parallel)

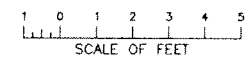


TYPICAL VERTICAL TRENCH SECTION  
(HDPE)



TYPICAL TRENCH SECTION  
(HDPE Parallel)

NOTES  
1. Support and protect crossing utility pipes until backfill is completed.



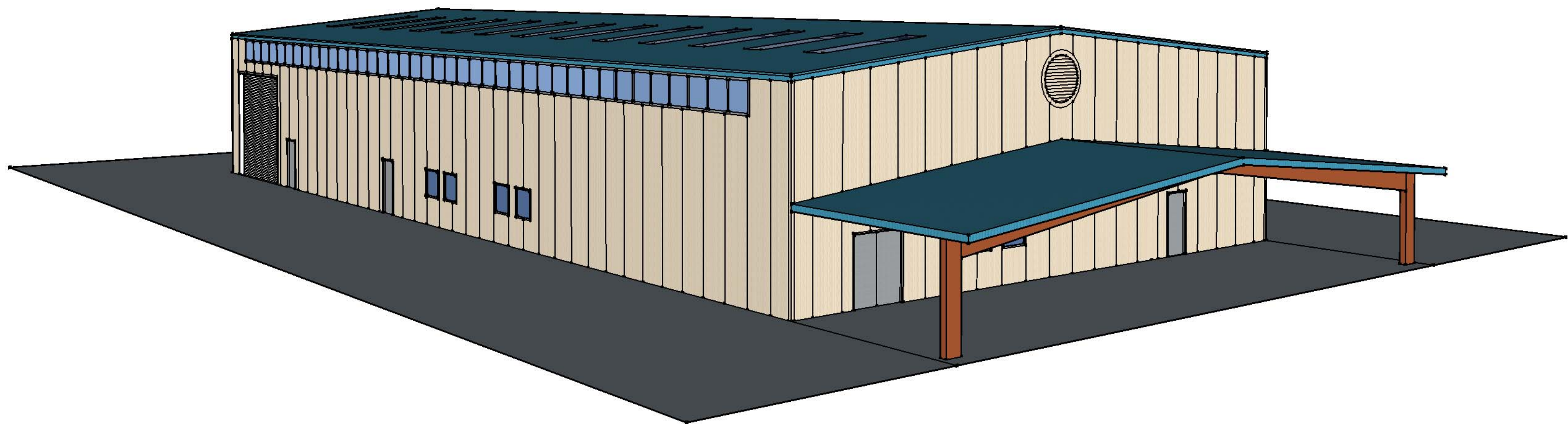
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 CENTRAL VALLEY PROJECT  
 WEST SAN JOAQUIN DIVISION - SAN LUIS UNIT - CALIFORNIA

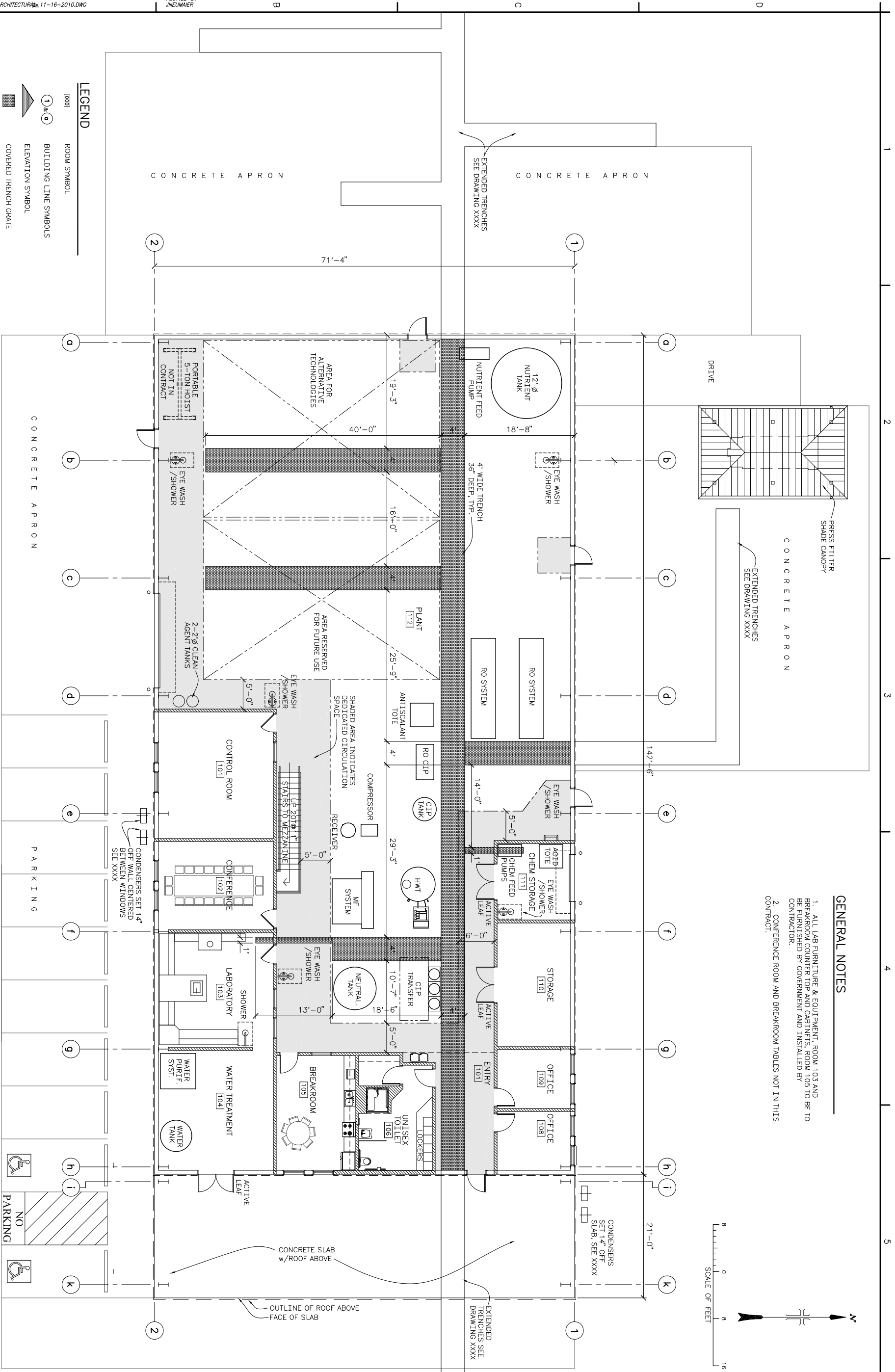
SAN LUIS DRAINAGE IMPLEMENTATION  
 DEMONSTRATION TREATMENT PLANT  
 TYPICAL PIPE TRENCH SECTIONS

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APPROVED	-----
DAVID K. EDWARDS, MANAGER, WATER COMPLIANCE GROUP	
DENVER, COLORADO	DATE

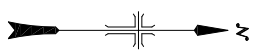




LEGEND	
	ROOM SYMBOL
	BUILDING LINE SYMBOLS
	ELEVATION SYMBOL
	COVERED TRENCH GRATE
	METAL INSULATED STUD WALLS
	STEEL BUILDING GIRTS WITH PRE-INSULATED METAL PANELS ATTACHED
	STEEL FRAME COLUMN
	CIRCULATION AREAS TO REMAIN CLEAR OF EQUIPMENT



- GENERAL NOTES**
1. ALL LAB FURNITURE & EQUIPMENT, ROOM 103 AND BREAKROOM COUNTER TOP AND CABINETS, ROOM 105 TO BE TO BE FURNISHED BY GOVERNMENT AND INSTALLED BY CONTRACTOR.
  2. CONFERENCE ROOM AND BREAKROOM TABLES NOT IN THIS CONTRACT.



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BUREAU OF RECLAMATION  
CENTRAL VALLEY PROJECT  
WEST SAN JOAQUIN DIVISION - SAN LUIS UNIT - CALIFORNIA  
**SAN LUIS DRAINAGE IMPLEMENTATION  
DEMONSTRATION TREATMENT PLANT**  
ARCHITECTURAL - PRELIMINARY DESIGN  
RO/UF BUILDING  
EQUIPMENT LAYOUT PLAN

DESIGNED	_____
DRAWN	_____
CHECKED	_____
TECH. APPR.	_____
APPROVED FOR RECORD	_____
DENVER, COLORADO	_____

**805-D-XXXX**  
SHEET 1 OF 1

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DRAFT ENVIRONMENTAL ASSESSMENT

*SAN LUIS DRAINAGE FEATURE REEVALUATION DEMONSTRATION TREATMENT  
FACILITY AT PANOCHÉ DRAINAGE DISTRICT*

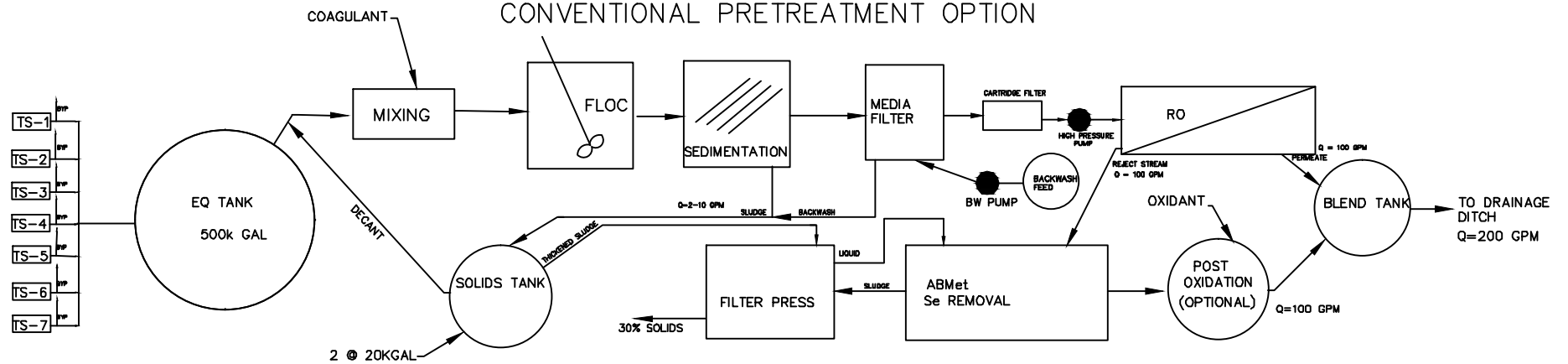
**Appendix B**  
**Proposed Biotreatment Flow Diagrams**

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September 2011

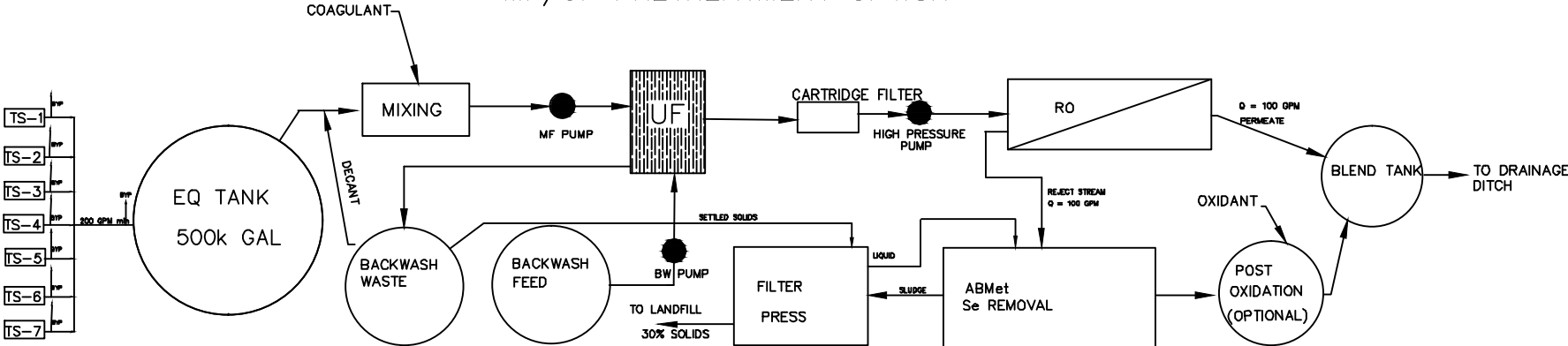
# SAN LUIS DRAINAGE DEMONSTRATION TREATMENT PLANT

## CONVENTIONAL PRETREATMENT OPTION



# SAN LUIS DRAINAGE DEMONSTRATION TREATMENT PLANT

## MF/UF PRETREATMENT OPTION



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DRAFT ENVIRONMENTAL ASSESSMENT

*SAN LUIS DRAINAGE FEATURE REEVALUATION DEMONSTRATION TREATMENT  
FACILITY AT PANOCHÉ DRAINAGE DISTRICT*

**Appendix C**

**San Joaquin kit fox and Giant garter snake avoidance measures**

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September 2011

## **Measures to Be Implemented for Avoidance of Listed Species for the Project: San Luis Drainage Implementation Proposed Demonstration Treatment Facility at Panoche Drainage District (SLDFR Pilot Project)**

Prior to ground disturbance an environmental awareness training session shall be provided to construction workers by a Reclamation or other designated biologist. The training shall address listed species from the vicinity and cover recognition of listed species, their habitat requirements, natural history and ecology, protections afforded species by the ESA (16 U.S.C. Sect 1531 et seq.), and penalties for take (as defined below). Information shall be presented for species including, at a minimum, the San Joaquin kit fox (SJKF; *Vulpes macrotis mutica*) and giant garter snake (GGS; *Thamnophis gigas*). For personnel working on construction of the project unable to attend the training session, written material shall be provided for self study. Prior to conducting field work at the site all construction personnel shall either attend a training session in person, or review written material independently, and sign a participation form stating they have either attended the training session or have read and understand the written material presented.

A laminated sheet displaying image(s) of SJKF and GGS and presenting information on their identification, habitat requirements, behavior, and protection status shall be provided to the person in charge of construction at the site. The sheets shall also be made available at the construction site and shall remain on site during construction and operation of the facilities.

The person in charge of activities at the construction site (e.g. construction foreman) shall be identified before construction begins, and shall be designated as the point of contact (POC) and as a liaison between construction personnel and Reclamation and Fish and Wildlife Service (Service) biologists for issues related to fish and wildlife species at the site. Contact information, including the name and mobile telephone number for the POC shall be identified and provided to Reclamation and Service biologists before construction begins. The POC shall maintain the availability of the fact sheets at the construction site during the period of construction.

Should a listed species be encountered during construction, the POC shall be responsible for communicating this information to Reclamation and Service biologists. Communication regarding the presence of a listed species shall be reported immediately to Reclamation and Service. Further construction work may not proceed if take would occur. Take is defined as:

**Take** ... The term “take” means to **harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct.**[Section 3 of the ESA -16 USC 1532(3)(19)]

**Harass** – in the definition of “take” in the Act means an intentional or negligent **act or omission** which **creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal** behavioral patterns which include, but are **not limited to, breeding, feeding, or sheltering**(50 CFR 17.3).

**Harm** – in the definition of “take” in the Act means an act which **actually kills or injures** wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by **significantly impairing essential** behavior patterns, including **breeding, feeding or sheltering**(50 CFR 17.3).

The Following specific avoidance measures for SJKF and GGS, as identified below, shall be implemented for the project.

***San Joaquin kit fox***

A survey of the area affected and buffer zone shall be conducted by a biologist, following the recommendations of the Service (2011). The preconstruction/preactivity surveys shall be conducted no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities or any project activity likely to impact the SJKF.

Written results of preconstruction/preactivity surveys must be received by Reclamation and the Service within five days after survey completion and prior to the start of ground disturbance and/or construction activities. If evidence of the presence of SJKF is obtained, findings will be discussed with Service and further consultation and avoidance measures may be required.

During construction a welded wire fence shall be erected around the perimeter of the area where the Pilot Project water treatment facility will be constructed. The bottom edge of the fencing shall be buried from 3 to 6 inches (deeper depth preferred) below the surface of the ground and the top of the fence shall not be less than 4 feet above the ground (therefore fencing must be at least 4.5 feet tall prior to installation).

At locations of ingress and egress, where gates in the fencing are required, a metal or other substantive curtain shall be installed so that SJKF access to the compound underneath gate(s) is precluded.

Measures identified in *U.S. Fish and Wildlife Service Standardized Recommendations For Protection Of The Endangered San Joaquin Kit Fox Prior To Or During Ground Disturbance* (Service 2011) for “Construction and On-Going Operational Requirements”, shall be implemented during project construction. Habitat subject to permanent and temporary construction disturbances and other types of ongoing project-related disturbance activities should be minimized by adhering to the following activities.

Project designs should limit or cluster permanent project features to the smallest area possible while still permitting achievement of project goals.

To minimize temporary disturbances, all project-related vehicle traffic should be restricted to established roads, construction areas, and other designated areas. These areas should also be included in preconstruction surveys and, to the extent possible, should be established in locations disturbed by previous activities to prevent further impacts.

Additionally, the following measures, as described in Service (2011) shall be implemented:

1. Project-related vehicles should observe a daytime speed limit of 20-mph throughout the site in all project areas, except on county roads and State and Federal highways; this is particularly important at night when SJKF are most active. Night-time construction should be minimized to the extent possible. However if it does occur, then the speed limit should be reduced to 10-mph. Off-road traffic outside of designated project areas should be prohibited.



2. To prevent inadvertent entrapment of SJKF or other animals during the construction phase of a project, all excavated, steep-walled holes or trenches more than 2-feet deep should be covered at the close of each working day by plywood or similar materials. If the trenches cannot be closed, one or more escape ramps constructed of earthen-fill or wooden planks shall be installed. Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the Service and the California Department of Fish and Game (CDFG) shall be contacted as noted under measure 13 referenced below.

3. SJKF are attracted to den-like structures such as pipes and may enter stored pipes and become trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods should be thoroughly inspected for SJKF before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe should not be moved and should be left alone until the Service has been consulted; no further action may be taken until Reclamation biologists have been notified and guidance has been provided by Service.

4. All food-related trash items such as wrappers, cans, bottles, and food scraps should be disposed of in securely closed containers and removed at least once a week from the construction or project site.

5. No firearms shall be allowed on the project site.

6. No pets, such as dogs or cats, should be permitted on the project site to prevent harassment, mortality of SJKF, or destruction of dens.

7. Use of rodenticides and herbicides in project areas should be restricted. This is necessary to prevent primary or secondary poisoning of SJKF and the depletion of prey populations on which they depend. All uses of such compounds should observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other State and Federal legislation, as well as additional project-related restrictions deemed necessary by the Service. If rodent control must be conducted, zinc phosphide should be used because of a proven lower risk to kit fox.

8. A representative shall be appointed by the project proponent (see POC description above) who will be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured or entrapped kit fox. The POC will be identified during the employee education program and their name and telephone number shall be provided to Reclamation and the Service.

9. An employee education program should be conducted for any project that has anticipated impacts to kit fox or other endangered species. The program should consist of a brief presentation by persons knowledgeable in kit fox biology and legislative protection to explain endangered species concerns to contractors, their employees, and military and/or agency personnel involved in the project. The program should include the following: A

description of the San Joaquin kit fox and its habitat needs; a report of the occurrence of kit fox in the project area; an explanation of the status of the species and its protection under the Endangered Species Act; and a list of measures being taken to reduce impacts to the species during project construction and implementation. A fact sheet conveying this information should be prepared for distribution to the previously referenced people and anyone else who may enter the project site.

10. Upon completion of the project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, etc. should be re-contoured if necessary, and revegetated to promote restoration of the area to preproject conditions. An area subject to "temporary" disturbance means any area that is disturbed during the project, but after project completion will not be subject to further disturbance and has the potential to be revegetated. Appropriate methods and plant species used to revegetate such areas should be determined on a site-specific basis in consultation with the Service, CDFG, and revegetation experts.

11. In the case of trapped animals, escape ramps or structures should be installed immediately to allow the animal(s) to escape, or if a protected species is involved Reclamation and the Service should be contacted for guidance.

12. Any contractor, employee, or military or agency personnel who are responsible for inadvertently killing or injuring a San Joaquin kit fox shall immediately report the incident to their POC. This representative shall contact Reclamation and the CDFG immediately in the case of a dead, injured or entrapped kit fox. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045. They will contact the local warden or Mr. Paul Hoffman, the wildlife biologist, at (530) 934-9309. The Service should be contacted as well..

13. The Sacramento Fish and Wildlife Office and CDFG shall be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during project related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information. The Service contact is the Chief of the Division of Endangered Species, at the addresses and telephone numbers below. The CDFG contact is Mr. Paul Hoffman at 1701 Nimbus Road, Suite A, Rancho Cordova, California 95670, (530) 934-9309.

14. New sightings of kit fox shall be reported to the California Natural Diversity Database (CNDDDB). A copy of the reporting form and a topographic map clearly marked with the location of where the kit fox was observed should also be provided to the Service at the address below.

### ***Giant Garter Snake***

The following measures shall be implemented for avoidance of effects to GGS from the project:

1. Movement of heavy equipment shall be confined to existing roadways to the extent possible.

2. To the extent possible, construction activity adjacent to canals or ditches should be conducted between May 1 and October 1. This is the active period for giant garter snakes.
3. Confine clearing to the minimal area necessary to facilitate construction activities.
4. If construction activities would occur between May 1 and October 1 and the canal is wetted or has not been dry for 15 consecutive days a biologist shall survey (24-hours prior to initiating construction activities) construction areas adjacent to open ditches/or canals for GGS. Survey of the project area should be repeated if a lapse in construction activity of two weeks or greater has occurred. If a GGS is encountered during construction, activities shall cease until appropriate corrective measures have been completed, the POC has communicated this information to the Reclamation and Service biologists and it has been determined that the snake will not be harmed.

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DRAFT ENVIRONMENTAL ASSESSMENT

*SAN LUIS DRAINAGE FEATURE REEVALUATION DEMONSTRATION TREATMENT  
FACILITY AT PANOCHÉ DRAINAGE DISTRICT*

**Appendix D**  
**Burrowing Owl avoidance measures**

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September 2011

## Memorandum

: "Div. Chiefs - IFD, BDD, NED, & WMD  
Reg. Mgrs. - Regions 1, 2, 3, 4, & 5

Date : October 17, 1995

From : Department of Fish and Game

Subject :  
Staff Report on Burrowing Owl Mitigation

I am hereby transmitting the Staff Report on Burrowing Owl Mitigation for your use in reviewing projects (California Environmental Quality Act [CEQA] and others) which may affect burrowing owl habitat. The Staff Report has been developed during the last several months by the Environmental Services Division (ESD) in cooperation with the Wildlife Management Division (WMD) and regions 1, 2, and 4. It has been sent out for public review and redrafted as appropriate.

Either the mitigation measures in the staff report may be used or project specific measures may be developed. Alternative project specific measures proposed by the Department divisions/regions or by project sponsors will also be considered. However, such mitigation measures must be submitted to ESD for review. The review process will focus on the consistency of the proposed measure with Department, Fish and Game Commission, and legislative policy and with laws regarding raptor species. ESD will coordinate project specific mitigation measure review with WMD.

If you have any questions regarding the report, please contact Mr. Ron Rempel, Supervising Biologist, Environmental Services Division, telephone (916) 654-9980.

**COPY** Original signed by  
C.F. Raysbrook

C. F. Raysbrook  
Interim Director

Attachment

cc: Mr. Ron Rempel  
Department of Fish and Game  
Sacramento

# STAFF REPORT ON BURROWING OWL MITIGATION

## Introduction

The Legislature and the Fish and Game Commission have developed the policies, standards and regulatory mandates to protect native species of fish and wildlife. In order to determine how the Department of Fish and Game (Department) could judge the adequacy of mitigation measures designed to offset impacts to burrowing owls (*Speotyto cunicularia*; A.O.U. 1991) staff (WMD, ESD, and Regions) has prepared this report. To ensure compliance with legislative and commission policy, mitigation requirements which are consistent with this report should be incorporated into: (1) Department comments to Lead Agencies and project sponsors pursuant to the California Environmental Quality Act (CEQA); and (2) other authorizations the Department gives to project proponents for projects impacting burrowing owls.

This report is designed to provide the Department (including regional offices and divisions), CEQA Lead Agencies and project proponents the context in which the Environmental Services Division (ESD) will review proposed project specific mitigation measures. This report also includes preapproved mitigation measures which have been judged to be consistent with policies, standards and legal mandates of the Legislature, the Fish and Game Commission and the Department's public trust responsibilities. Implementation of mitigation measures consistent with this report are intended to help achieve the conservation of burrowing owls and should compliment multi-species habitat conservation planning efforts currently underway. The *Burrowing Owl Survey Protocol and Mitigation Guidelines* developed by The California Burrowing Owl Consortium (CBOC 1993) were taken into consideration in the preparation of this staff report as were comments from other interested parties.

A range-wide conservation strategy for this species is needed. Any range-wide conservation strategy should establish criteria for avoiding the need to list the species pursuant to either the California or federal Endangered Species Acts through preservation of existing habitat, population expansion into former habitat, recruitment of young into the population, and other specific efforts.

California's burrowing owl population is clearly declining and, if declines continue, the species may qualify for listing. Because of the intense pressure for urban development within suitable burrowing owl nesting and foraging habitat (open, flat and gently rolling grasslands and grass/shrub lands) in California, conflicts between owls and development projects often occur. Owl survival can be adversely affected by disturbance and foraging habitat loss even when impacts to individual birds and nests/burrows are avoided. Adequate information about the presence of owls is often unavailable prior to project approval. Following project approval there is no legal mechanism through which to seek mitigation other than avoidance of occupied burrows or nests. The absence of standardized survey methods often impedes consistent impact assessment.

## **Burrowing Owl Habitat Description**

Burrowing owl habitat can be found in annual and perennial grasslands, deserts, and arid scrublands characterized by low-growing vegetation (Zarn 1974). Suitable owl habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface. Burrows are the essential component of burrowing owl habitat. Both natural and artificial burrows provide protection, shelter, and nests for burrowing owls (Henny and Blus 1981). Burrowing owls typically use burrows made by fossorial mammals, such as ground squirrels or badgers, but also may use man-made structures such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement.

## **Occupied Burrowing Owl Habitat**

Burrowing owls may use a site for breeding, wintering, foraging, and/or migration stopovers. Occupancy of suitable burrowing owl habitat can be verified at a site by detecting a burrowing owl, its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance. Burrowing owls exhibit high site fidelity, reusing burrows year after year (Rich 1984, Feeney 1992). A site should be assumed occupied if at least one burrowing owl has been observed occupying a burrow there within the last three years (Rich 1984).

## **CEQA Project Review**

The measures included in this report are intended to provide a decision-making process that should be implemented whenever there is potential for an action or project to adversely affect burrowing owls. For projects subject to the California Environmental Quality Act (CEQA), the process begins by conducting surveys to determine if burrowing owls are foraging or nesting on or adjacent to the project site. If surveys confirm that the site is occupied habitat, mitigation measures to minimize impacts to burrowing owls, their burrows and foraging habitat should be incorporated into the CEQA document as enforceable conditions. The measures in this document are intended to conserve the species by protecting and maintaining viable populations of the species throughout their range in California. This may often result in protecting and managing habitat for the species at sites away from rapidly urbanizing/developing areas. Projects and situations vary and mitigation measures should be adapted to fit specific circumstances.

Projects not subject to CEQA review may have to be handled separately since the legal authority the Department has with respect to burrowing owls in this type of situation is often limited. The burrowing owl is protected from "take" (Section 3503.5 of the Fish and Game Code) but unoccupied habitat is likely to be lost for activities not subject to CEQA.

## Legal Status

The burrowing owl is a migratory species protected by international treaty under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 C.F.R. Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 C.F.R. 21). Sections 3505, 3503.5, and 3800 of the California Department of Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs. To avoid violation of the take provisions of these laws generally requires that project-related disturbance at active nesting territories be reduced or eliminated during the nesting cycle (February 1 to August 31). Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young) may be considered “take” and is potentially punishable by fines and/or imprisonment.

The burrowing owl is a Species of Special Concern to California because of declines of suitable habitat and both localized and statewide population declines. Guidelines for the Implementation of the California Environmental Quality Act (CEQA) provide that a species be considered as endangered or “rare” regardless of appearance on a formal list for the purposes of the CEQA (Guidelines, Section 15380, subsections b and d). The CEQA requires a mandatory findings of significance if impacts to threatened or endangered species are likely to occur (Sections 21001 (c), 2103; Guidelines 15380, 15064, 15065). To be legally adequate, mitigation measures must be capable of “avoiding the impact altogether by not taking a certain action or parts of an action”; “minimizing impacts by limiting the degree or magnitude of the action and its implementation”; “rectifying the impact by repairing, rehabilitating or restoring the impacted environment”; “or reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action” (Guidelines, Section 15370). Avoidance or mitigation to reduce impacts to less than significant levels must be included in a project or the CEQA lead agency must make and justify findings of overriding considerations.

## Impact Assessment

### Habitat Assessment

The project site and a 150 meter (approximately 500 ft.) buffer (where possible and appropriate based on habitat) should be surveyed to assess the presence of burrowing owls and their habitat (Thomsen 1971, Martin 1973). If occupied habitat is detected on or adjacent to the site, measures to avoid, minimize, or mitigate the project’s impacts to the species should be incorporated into the project, including burrow preconstruction surveys to ensure avoidance of direct take. It is also recommended that preconstruction surveys be conducted if the species was not detected but is likely to occur on the project site.



## **Burrowing Owl and Burrow Surveys**

Burrowing owl and burrow surveys should be conducted during both the wintering and nesting seasons, unless the species is detected on the first survey. If possible, the winter survey should be conducted between December 1 and January 31 (when wintering owls are most likely to be present) and the nesting season survey should be conducted between April 15 and July 15 (the peak of the breeding season). Surveys conducted from two hours before sunset to one hour after, or from one hour before to two hours after sunrise, are also preferable.

Surveys should be conducted by walking suitable habitat on the entire project site and (where possible) in areas within 150 meters (approx. 500 ft.) of the project impact zone. The 150-meter buffer zone is surveyed to identify burrows and owls outside of the project area which may be impacted by factors -such as noise and vibration (heavy equipment, etc.) during project construction. Pedestrian survey transects should be spaced to allow 100 percent visual coverage of the ground surface. The distance between transect center lines should be no more than 30 meters (approx. 100 ft.) and should be reduced to account for differences in terrain, vegetation density, and ground surface visibility. To effectively survey large projects (100 acres or larger), two or more surveyors should be used to walk adjacent transects. To avoid impacts to owls from surveyors, owls and/or occupied burrows should be avoided by a minimum of 50 meters (approx. 160 ft.) wherever practical. Disturbance to occupied burrows should be avoided during all seasons.

### **Definition of Impacts**

The following should be considered impacts to the species:

- Disturbance within 50 meters (approx. 160 ft.) Which may result in harassment of owls at occupied burrows;
- Destruction of natural and artificial burrows (culverts, concrete slabs and debris piles that provide shelter to burrowing owls); and
- Destruction and/or degradation of foraging habitat adjacent (within 100 m) of an occupied burrow(s).

### **Written Report**

A report for the project should be prepared for the Department and copies should be submitted to the Regional contact and to the Wildlife Management Division Bird and Mammal Conservation Program. The report should include the following information:

- Date and time of visit(s) including name of the qualified biologist conducting surveys, weather and visibility conditions, and survey methodology;
- Description of the site including location, size, topography, vegetation communities, and animals observed during visit(s);
- Assessment of habitat suitability for burrowing owls;
- Map and photographs of the site;
- Results of transect surveys including a map showing the location of all burrow(s) (natural or artificial) and owl(s), including the numbers at each burrow if present and tracks, feathers, pellets, or other items (prey remains, animal scat);
- Behavior of owls during the surveys;
- Summary of both winter and nesting season surveys including any productivity information and a map showing territorial boundaries and home ranges; and
- Any historical information (Natural Diversity Database, Department regional files? Breeding Bird Survey data, American Birds records, Audubon Society, local bird club, other biologists, etc.) regarding the presence of burrowing owls on the site.

## **Mitigation**

The objective of these measures is to avoid and minimize impacts to burrowing owls at a project site and preserve habitat that will support viable owls populations. If burrowing owls are detected using the project area, mitigation measures to minimize and offset the potential impacts should be included as enforceable measures during the CEQA process.

Mitigation actions should be carried out from September 1 to January 31 which is prior to the nesting season (Thomsen 1971, Zam 1974). Since the timing of nesting activity may vary with latitude and climatic conditions, this time frame should be adjusted accordingly. Preconstruction surveys of suitable habitat at the project site(s) and buffer zone(s) should be conducted within the 30 days prior to construction to ensure no additional, burrowing owls have established territories since the initial surveys. If ground disturbing activities are delayed or suspended for more than 30 days after the preconstruction survey, the site should be resurveyed.

Although the mitigation measures may be included as enforceable project conditions in the CEQA process, it may also be desirable to formalize them in a Memorandum of Understanding (MOU) between the Department and the project sponsor. An MOU is needed when lands (fee title or conservation easement) are being transferred to the Department.

## Specific Mitigation Measures

1. Occupied burrows should not be disturbed during the nesting season (February 1 through August 31) unless a qualified biologist approved by the Department verifies through non-invasive methods that either: (1) the birds have not begun egg-laying and incubation; or (2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.
2. To offset the loss of foraging and burrow habitat on the project site, a minimum of 6.5 acres of foraging habitat (calculated on a 100 m {approx. 300 ft.} foraging radius around the burrow) per pair or unpaired resident bird, should be acquired and permanently protected. The protected lands should be adjacent to occupied burrowing owl habitat and at a location acceptable to the Department. *Protection of additional habitat acreage per pair or unpaired resident bird may be applicable in some instances.* The CBOC has also developed mitigation guidelines (CBOC 1993) that can be incorporated by CEQA lead agencies and which are consistent with this staff report.
3. When destruction of occupied burrows is unavoidable, existing unsuitable burrows should be enhanced (enlarged or cleared of debris) or new burrows created (by installing artificial burrows) at a ratio of 2:1 on the protected lands site. One example of an artificial burrow design is provided in Attachment A.
4. If owls must be moved away from the disturbance area, passive relocation techniques (as described below) should be used rather than trapping. At least one or more weeks will be necessary to accomplish this and allow the owls to acclimate to alternate burrows.
5. The project sponsor should provide funding for long-term management and monitoring of the protected lands. The monitoring plan should include success criteria, remedial measures, and an annual report to the Department.

## Impact Avoidance

If avoidance is the preferred method of dealing with potential project impacts, then no disturbance should occur within 50 meters (approx. 160 ft.) of occupied burrows during the nonbreeding season of September 1 through January 31 or within 75 meters (approx. 250 ft.) during the breeding season of February 1 through August 31. Avoidance also requires that a minimum of 6.5 acres of foraging habitat be *permanently* preserved contiguous with occupied burrow sites for each pair of breeding burrowing owls (with or without dependent young) or single unpaired resident bird. The configuration of the protected habitat should be approved by the Department.

### **Passive Relocation - With One-Way Doors**

Owls should be excluded from burrows in the immediate impact zone and within a 50 meter (approx. 160 ft.) buffer zone by installing one-way doors in burrow entrances. One-way doors (e.g., modified dryer vents) should be left in place 48 hours to insure owls have left the burrow before excavation. Two natural or artificial burrows should be provided for each burrow in the project area that will be rendered biologically unsuitable. The project area should be *monitored daily for one* week to confirm owl use of burrows before excavating burrows in the immediate impact zone. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.

### **Passive Relocation - Without One-Way Doors**

Two natural or artificial burrows should be provided for each burrow in the project area that will be rendered biologically unsuitable. The project area should be *monitored daily until the owls have relocated to the new burrows*. The formerly occupied burrows may then be excavated. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into burrows during excavation to maintain an escape route for any animals inside the burrow.

## **Projects Not Subject to CEQA**

The Department is often contacted regarding the presence of burrowing owls on construction sites, parking lots and other areas for which there is no CEQA action or for which the CEQA process has been completed. In these situations, the Department should seek to reach agreement with the project sponsor to implement the specific mitigation measures described above. If they are unwilling to do so, passive relocation without the aid of one-way doors is their only option based upon Fish and Game Code 3503.5.

## Literature Cited

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# Reproductive Success of Burrowing Owls Using Artificial Nest Burrows in Southeastern Idaho

by Bruce Olenick

Artificial nest burrows were implanted in southeastern Idaho for burrowing owls in the spring of 1986. These artificial burrows consisted of a 12" x 12" x 8" wood nesting chamber with removable top and a 6 foot corrugated and perforated plastic drainage pipe 6 inches in diameter (Fig. 1). Earlier investigators claimed that artificial burrows must provide a natural dirt floor to allow burrowing owls to modify the nesting tunnel and chamber. Contrary to this, the artificial burrow introduced here does not allow owls to modify the entrance or tunnel. The inability to change the physical dimensions of the burrow tunnel does not seem to reflect the owls' breeding success or deter them from using this burrow design.

In 1936, 22 artificial burrows were inhabited. Thirteen nesting attempts yielded an average clutch size of 8.3 eggs per breeding pair. Eight nests successfully hatched at least 1 nestling. In these nests, 67 of 75 eggs hatched (59.3%) and an estimated 61 nestlings (91.0%) fledged. An analysis of the egg laying and incubation periods showed that incubation commenced well after egg lay-

ing began. Average clutch size at the start of incubation was 5.6 eggs. Most eggs tended to hatch synchronously in all successful nests.

Although the initial cost of constructing this burrow design may be slightly higher than a burrow consisting entirely of wood, the plastic pipe burrow offers the following advantages: (1) it lasts several field seasons without rotting or collapsing; (2) it may prevent or retard predation; (3) construction time is min-

imal; (4) it is easy to transport, especially over long distances; and (5) the flexible tunnel simplifies installation. The use of this artificial nest burrow design was highly successful and may prove to be a great resource technique for future management of this species.

*For additional information on constructing this artificial nest burrow, contact Bruce Olenick, Department of Biology, Idaho State University, Pocatello, ID 83209.*

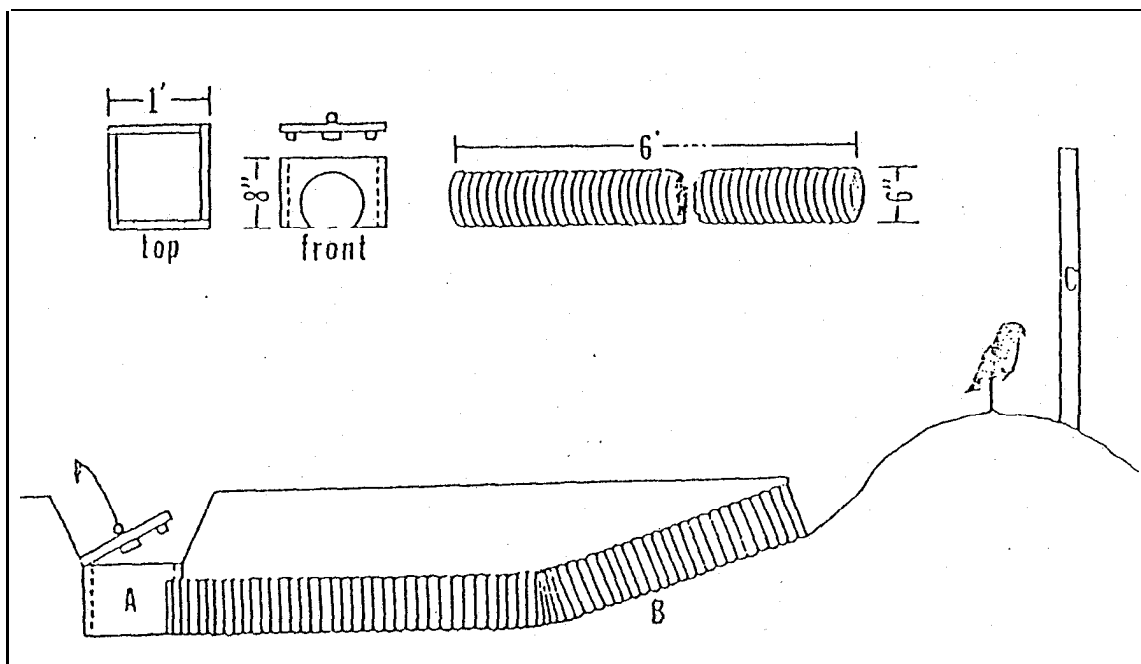


fig. 1 Artificial nest burrow design for burrowing owls. Entire unit (including nest chamber) is buried 12" -- 18" below ground for maintaining thermal stability of the nest chamber. A = nest chamber, B = plastic pipe. C = perch.

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DRAFT ENVIRONMENTAL ASSESSMENT

*SAN LUIS DRAINAGE FEATURE REEVALUATION DEMONSTRATION TREATMENT  
FACILITY AT PANOCHÉ DRAINAGE DISTRICT*

**Appendix E**  
**Nesting Migratory Bird avoidance measures**

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September 2011

## **Interim Empty Nest Policy of the U. S. Fish and Wildlife Service, Region 2**

Effective May 2000. Revised November 15, 2000

The following is the Interim policy of the Region 2 Migratory Bird Office regarding the need for permits to remove/destroy nuisance empty bird nests. Under this interpretation, empty nests are those nests that contain no live eggs or nestlings. Empty nests include nests under construction by adult birds. This interim policy is in effect pending review by the D.O.I. Solicitors Office of the scope of applicability of the Migratory Bird Treaty Act (MBTA) to empty nests. Possession of nests in the absence of a valid permit continues to fall under the prohibitions of the MBTA.

1. **Solitary-Nesting Birds** (species that do not cluster nests in colonies - all species except the groups listed under Colonial-Nesting Birds below).

A permit is not needed for any individual to remove or destroy nuisance empty nests of non-colonial species of birds. If live eggs or nestlings are present in the nest, or if recently fledged birds are returning to roost in the nest at night until they achieve complete independence from the adult birds, then those nests may not be destroyed.

2. **Colonial-Nesting Birds** (species placing nests in dense multiple nest colonies - eared, western, and Clark's grebes; pelicans; cormorants; herons; egrets; ibis; spoonbills; storks; gulls; terns; skimmers; swifts; cave, cliff, and bank swallows).

- A.) **Inactive or Abandoned Colonies**. In cases where a colony is no longer active (*i.e.* no evidence of the colonial species using the colony site for nesting purposes in the current year), then those old nests may be destroyed at any time without the need for a permit.

In cases where a colony that was active during the current year abandons the site for some reason (*e.g.* weather; harassment), the colony should be considered ACTIVE; those nests may not be removed without permit until after the nesting season would normally be over (*i.e.* October through February). Reasons: (a) Birds may resume nesting after responsible weather factor abates; (b) in cases where abandonment is due to deliberate harassment to reduce depredation damages, the colony is often only partially abandoned and is therefore still (partially) active. Take of nests in partially or fully active colonies must be done by trained Wildlife Services personnel (see below). If all birds abandon the colony (which may be difficult to determine), the depredation problem is resolved and there should be no need to rush to remove the nests. Removal can commence after nesting would normally be over for the year.

- B.) **Active or Partially Active Colonies**. Empty nests may be destroyed without permit at the beginning of the nesting season, up until such time as the first egg is laid by any bird in that colony. Once egg laying has commenced by any of those birds, all nest destruction must cease. Destruction of empty nests in an active or partially active colony will likely threaten surrounding nests that contain eggs or



nestlings; therefore it will not be allowed except on a case-by-case basis as determined by the Migratory Bird Permits Office. Nest destruction may resume at the end of the nesting season without a permit only after all nesting activities by all birds in the colony have ceased, which should be by October 1 (*i.e.* after all nestlings have fledged and left the site and no eggs are being incubated by late nesters). At such time nests containing infertile/abandoned/dead eggs or long-dead nestlings may also be destroyed without permit.

### **Permitting and Related Nest Issues.**

Permits will not be issued for activities constituting unintentional (incidental) take (*i.e.* when take of the nest contents is not the ultimate purpose of the activity, but is an incidental result of an otherwise legal activity, such as construction of buildings or roads). Unintentional take of nests with live eggs or nestlings remains a violation of the MBTA.

Permits to take active nests (containing eggs or nestlings) of colonial species for Depredation Control purposes will not be issued by the Migratory Bird Permits Office. Destruction of such active nests must be done by trained personnel of the U.S.D.A. - Wildlife Services.

Please direct questions to the Region 2 Migratory Bird Permits Office (505-248-7882).

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DRAFT ENVIRONMENTAL ASSESSMENT

*SAN LUIS DRAINAGE FEATURE REEVALUATION DEMONSTRATION TREATMENT  
FACILITY AT PANOCHÉ DRAINAGE DISTRICT*

**Appendix F**  
**Grassland Drainage Area Summary Table 1986-2009**

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September 2011

Grassland Drainage Area - Water Years 1986 - 2008

Water Year (1)	Flow acre-feet	Flow Weighted Loads			Flow Weighted Concentration				Reference
		Selenium pounds	Boron 1000 pounds	TDS tons	Selenium µg/L	Boron mg/L	EC µS/cm	TDS mg/L	
WY 1986	67,006	9,524	787	214,250	52.3	4.3		2,351	(2)
WY 1987	74,902	10,959	889	241,526	53.8	4.4		2,371	(2)
WY 1988	65,327	10,097	821	236,301	56.8	4.6		2,660	(2)
WY 1989	54,186	8,718	743	202,420	59.2	5.0		2,747	(2)
WY 1990	41,662	7,393	672	171,265	65.2	5.9		3,023	(2)
WY 1991	29,290	5,858	544	129,899	73.5	6.8		3,261	(2)
WY 1992	24,533	5,083	435	110,327	76.2	6.5		3,307	(2)
WY 1993	41,197	8,856	730	183,021	79.0	6.5		3,267	(2)
WY 1994	38,670	8,468	645	171,495	80.5	6.1		3,261	(2)
WY 1995	57,574	11,875	868	237,530	75.8	5.6		3,034	(2)
WY 1996	52,978	10,034	723	197,526	69.6	5.0		2,742	(3)
<b>Pre-Project Averages</b>	<b>49,760</b>	<b>8,806</b>	<b>714</b>	<b>190,510</b>	<b>67.4</b>	<b>5.5</b>		<b>2,910</b>	
WY 1997	37,800	7,418	772	176,750	67.5	7.3	4,480	3,315	(4)
WY 1998	43,574	8,436	868	211,340	70.6	7.7	4,838	3,580	(4)
WY 1999	30,510	5,178	620	143,910	65.3	7.7	4,820	3,567	(4)
WY 2000	29,330	4,685	583	135,250	61.3	7.4	4,614	3,414	(4)
WY 2001	27,050	4,509	538	125,080	62.8	7.4	4,605	3,408	(4)
WY 2002	25,816	3,815	509	111,220	58.3	7.4	4,397	3,254	(4)
WY 2003	25,246	3,865	543	113,600	61.6	8.1	4,552	3,368	(4)
WY 2004	25,372	3,813	513	110,700	60.9	7.6	4,445	3,290	(4)
WY 2005	27,540	3,701	613	126,990	49.0	8.2	4,584	3,392	(4)
WY 2006	23,080	3,612	508	111,070	58.2	8.1	4,782	3,538	(4)
WY 2007	16,480	2,581	309	77,140	57.3	7.0	4,660	3,449	(4)
WY 2008	13,210	1,740	281	55,280	46.6	7.7	4,152	3,072	(4)
<b>Project Averages</b>	<b>27,080</b>	<b>4,446</b>	<b>555</b>	<b>124,860</b>	<b>59.9</b>	<b>7.6</b>	<b>4,577</b>	<b>3,387</b>	

References:

(1) Water Year: October - September

(2) CVRWQCB, February 1998. Loads of Salt, Boron, and Selenium in the Grassland Watershed and Lower San Joaquin River, October 1985 to September 1995; Volume I: Load Calculations. Table 16.

(3) CVRWQCB, December 1998. Agricultural Drainage Contribution to Water Quality in the Grassland Watershed of Western Merced County, California: October 1995 - September 1997 (Water Years 1996 and 1997). Table 20

(4) Concentrations and loads calculated from data for GBP Site A

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DRAFT ENVIRONMENTAL ASSESSMENT

*SAN LUIS DRAINAGE FEATURE REEVALUATION DEMONSTRATION TREATMENT  
FACILITY AT PANOCHÉ DRAINAGE DISTRICT*

**Appendix G**  
**State Historic Preservation Officer Concurrence Memo**

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September 2011

**OFFICE OF HISTORIC PRESERVATION  
DEPARTMENT OF PARKS AND RECREATION**

1725 23<sup>rd</sup> Street, Suite 100  
SACRAMENTO, CA 95816-7100  
(916) 445-7000 Fax: (916) 445-7053  
calshpo@parks.ca.gov  
www.ohp.parks.ca.gov



August 16, 2010

In Reply Refer To: BUR100804D

Michael A. Chotkowski  
Regional Environmental Officer  
United States Department of the Interior  
Bureau of Reclamation  
Mid-Pacific Regional Office  
2800 Cottage Way  
Sacramento, CA 95825-1898

BUREAU OF RECLAMATION  
OFFICIAL FILE COPY  
APPROVED

AUG 19 2010

CODE	ACTION	SURNAME & DATE
150	✓	
150		Byng 8/19/2010

Re: San Luis Drainage Demonstration Facility Project, Fresno County, California  
(Project No. 03-SCAO-240.1).

Dear Mr. Chotkowski:

Thank you for consulting with me regarding the above noted undertaking. Pursuant to 36 CFR Part 800 (as amended 8-05-04) regulations implementing Section 106 of the National Historic Preservation Act (NHPA), the Bureau of Reclamation (BUR) is the lead Federal agency for this undertaking and is seeking my comments on the effects that the proposed project will have on historic properties. The undertaking, the San Luis Drainage Demonstration Facility Project consists of the demonstration and operation of test treatment technologies (e.g. reverse osmosis and selenium bio-treatment) designed to collect data required for the development of full-scale treatment facilities. The locations of these test facilities will include a basic project footprint of 4 acres, approximately 7 acres for temporary construction staging, and a 5.5-mile pipeline route with a 30-foot wide right-of-way. The BUR has determined that the area of potential effects (APE) consists of the entirety of these project locations, totaling approximately 31 acres.

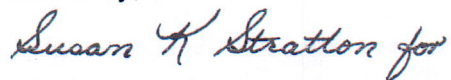
Historic property identification efforts by the BUR, which included a records search, Native American consultation, and an archaeological field survey, conclude that there is one historic property in the APE, the Central California Irrigation District's (CCID) Outside Canal. Originally built in 1890, the Outside Canal was constructed for private irrigation uses, becoming a public facility when the CCID purchased it with bond funds in 1953. The Outside Canal has not been evaluated under National Register of Historic Places (NRHP) criteria, and the BUR cannot fully evaluate it under the constraints of this undertaking. However, the BUR is proposing to treat it as eligible for the NRHP under criterion A, for the purposes of this undertaking only, due to its importance in the development of cattle ranching and irrigated agriculture in this portion of the San Joaquin Valley. Under this strategy, the BUR has determined that the proposed undertaking will have only a temporary visual impact to the Outside Canal during

Classification Project	ENV 3,00 214
Control No.	10062337
Folder I.D.	1114652
Date Input & Initials	8-18-10 <i>B</i>

pipeline installation and that it will retain its same appearance and function post-project. The BUR has consequently determined that this undertaking can be constructed with a finding of No Adverse Effect pursuant to 36 CFR Part 800.5(b).

After having reviewed your letter of August 4, 2010, and supporting documentation, I have no objection to your finding of No Adverse Effect. Be advised that under certain circumstances, such as unanticipated discovery or a change in project description, the BUR may have additional future responsibilities for this undertaking under 36 CFR Part 800. Thank you for seeking my comments and for considering historic properties in planning your project. If you require further information, please contact William Soule, Associate State Archeologist, at phone 916-445-7022 or email [wsoule@parks.ca.gov](mailto:wsoule@parks.ca.gov).

Sincerely,



Milford Wayne Donaldson, FAIA  
State Historic Preservation Officer

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DRAFT ENVIRONMENTAL ASSESSMENT

*SAN LUIS DRAINAGE FEATURE REEVALUATION DEMONSTRATION TREATMENT  
FACILITY AT PANOCHÉ DRAINAGE DISTRICT*

**Appendix H**  
**Reclamation's Environmental Determinations (Cultural  
resources and ITA)**

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September 2011

## Healer, Rain L

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**From:** Ramsey, Dawn  
**Sent:** Friday, August 20, 2010 10:24 AM  
**To:** Irvine, Scott R  
**Cc:** Mongano, Gregory S; Healer, Rain L; McDonald, Shauna A; Barnes, Amy J; Bruce, Brandee E; Fogerty, John A; Goodsell, Joanne E; Leigh, Anastasia T; Nickels, Adam M; Overly, Stephen A; Perry, Laureen (Laurie) M  
**Subject:** San Luis Drainage Demonstration Facility Section 106 Complete (03-SCAO-240.1)  
**Attachments:** 03-SCAO-240.1\_SHPOConcur.pdf

Tracking No. 03-SCAO-240.1

Project: San Luis Drainage Demonstration Facility Project, Fresno County, California

Scott:

The proposed project to construct the San Luis Drainage demonstration treatment facility has the potential to affect historic properties. Based on information from efforts to identify historic properties, Reclamation entered into consultation with the California State Historic Preservation Officer (SHPO) on a finding of no adverse effect to historic properties as outlined in the 36 CFR Part 800 regulations describing the Section 106 process.

The consultation package was sent to the SHPO on August 8, 2010. On August 16, 2010, SHPO concurred with Reclamation's findings. Reclamation received the SHPO consensus letter on June 19, 2010. Please find a copy of the letter attached for your convenience.

After receiving SHPO concurrence, the Section 106 process has been completed. Please retain a copy of this e-mail and the SHPO letter for your files. Please note that if project plans or actions change, these revisions may require additional Section 106 consideration including consultation with the SHPO.

Sincerely,  
Dawn

Dawn Ramsey Ford  
Archaeologist  
U.S. Bureau of Reclamation  
Mid-Pacific Region  
2800 Cottage Way, MP-153  
Sacramento, CA 95825  
916-978-5042  
[dramsey@usbr.gov](mailto:dramsey@usbr.gov)



## Healer, Rain L

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**From:** Rivera, Patricia L  
**Sent:** Wednesday, September 15, 2010 1:08 PM  
**To:** Healer, Rain L  
**Subject:** RE: EA-10-30 SLDFR Demonstration Treatment Facility

Rain,

I reviewed the proposed action to construct a Demonstration Treatment Facility (Facility) for drainage treatment within the geographical boundaries of the existing San Joaquin River Implementation Program reuse area. The Facility would occupy a rectangular area approximately four acres in size, adjacent to and immediately north and east of Panoche Drainage District's existing perpendicular drainage distribution canals. Additional pipelines would be constructed to convey drainage water from the seven existing reuse sumps to the Facility.

The proposed action does not have a potential to affect Indian Trust Assets. The nearest ITA is Table Mountain Rancheria, which is approximately .52 miles ENE of the project location.

Patricia

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DRAFT ENVIRONMENTAL ASSESSMENT

*SAN LUIS DRAINAGE FEATURE REEVALUATION DEMONSTRATION TREATMENT  
FACILITY AT PANOCHE DRAINAGE DISTRICT*

**Appendix I**  
**Air Quality Emission Factors**

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September 2011

## SCAB Fleet Average Emission Factors (Diesel)

2012
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Air Basin	SC
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Equipment	MaxHP	(lb/hr) ROG	(lb/hr) CO	(lb/hr) NOX	(lb/hr) SOX	(lb/hr) PM	(lb/hr) CO2	(lb/hr) CH4
Aerial Lifts	15	0.0102	0.0528	0.0642	0.0001	0.0030	8.7	0.0009
	25	0.0175	0.0517	0.0957	0.0001	0.0055	11.0	0.0016
	50	0.0650	0.1822	0.1916	0.0003	0.0169	19.6	0.0059
	120	0.0607	0.2451	0.4012	0.0004	0.0324	38.1	0.0055
	500	0.1276	0.4941	1.6553	0.0021	0.0491	213	0.0115
	750	0.2379	0.8930	3.0795	0.0039	0.0903	385	0.0215
Aerial Lifts Composite		0.0576	0.1976	0.3249	0.0004	0.0219	34.7	0.0052
Air Compressors	15	0.0129	0.0494	0.0768	0.0001	0.0052	7.2	0.0012
	25	0.0286	0.0779	0.1337	0.0002	0.0087	14.4	0.0026
	50	0.1010	0.2646	0.2310	0.0003	0.0239	22.3	0.0091
	120	0.0891	0.3287	0.5333	0.0006	0.0492	47.0	0.0080
	175	0.1135	0.5074	0.8954	0.0010	0.0512	88.5	0.0102
	250	0.1066	0.3052	1.2194	0.0015	0.0379	131	0.0096
	500	0.1709	0.5726	1.9077	0.0023	0.0623	232	0.0154
	750	0.2681	0.8849	3.0371	0.0036	0.0980	358	0.0242
	1000	0.4533	1.5617	5.4098	0.0049	0.1589	486	0.0409
Air Compressors Composite		0.0984	0.3445	0.6494	0.0007	0.0469	63.6	0.0089
Bore/Drill Rigs	15	0.0120	0.0632	0.0754	0.0002	0.0029	10.3	0.0011
	25	0.0194	0.0658	0.1233	0.0002	0.0054	16.0	0.0017
	50	0.0351	0.2335	0.2768	0.0004	0.0149	31.0	0.0032
	120	0.0514	0.4724	0.5026	0.0009	0.0328	77.1	0.0046
	175	0.0750	0.7538	0.7479	0.0016	0.0366	141	0.0068
	250	0.0838	0.3435	0.8722	0.0021	0.0268	188	0.0076
	500	0.1354	0.5526	1.3152	0.0031	0.0437	311	0.0122
	750	0.2685	1.0916	2.6320	0.0062	0.0865	615	0.0242
	1000	0.4491	1.6773	6.6123	0.0093	0.1699	928	0.0405
Bore/Drill Rigs Composite		0.0854	0.5068	0.9013	0.0017	0.0367	165	0.0077
Cement and Mortar	15	0.0075	0.0386	0.0475	0.0001	0.0023	6.3	0.0007
	25	0.0293	0.0852	0.1548	0.0002	0.0091	17.6	0.0026
Cement and Mortar Mixers Composite		0.0093	0.0425	0.0564	0.0001	0.0029	7.2	0.0008
Concrete/Industrial	25	0.0199	0.0678	0.1261	0.0002	0.0050	16.5	0.0018
	50	0.1047	0.3015	0.2972	0.0004	0.0268	30.2	0.0094
	120	0.1155	0.4880	0.7625	0.0009	0.0639	74.1	0.0104
	175	0.1685	0.8723	1.4507	0.0018	0.0767	160	0.0152
Concrete/Industrial Saws Composite		0.1090	0.4148	0.5910	0.0007	0.0491	58.5	0.0098
Cranes	50	0.1101	0.2979	0.2478	0.0003	0.0258	23.2	0.0099
	120	0.0982	0.3650	0.5844	0.0006	0.0533	50.1	0.0089
	175	0.1089	0.4838	0.8259	0.0009	0.0479	80.3	0.0098
	250	0.1103	0.3103	1.0712	0.0013	0.0388	112	0.0100
	500	0.1635	0.5691	1.5327	0.0018	0.0571	180	0.0148
	750	0.2767	0.9554	2.6486	0.0030	0.0974	303	0.0250
	9999	0.9905	3.5715	10.9484	0.0098	0.3384	971	0.0894
Cranes Composite		0.1425	0.4946	1.2753	0.0014	0.0553	129	0.0129
Crawler Tractors	50	0.1262	0.3333	0.2713	0.0003	0.0289	24.9	0.0114
	120	0.1374	0.4906	0.8120	0.0008	0.0729	65.8	0.0124
	175	0.1758	0.7491	1.3245	0.0014	0.0765	121	0.0159
	250	0.1854	0.5225	1.7044	0.0019	0.0667	166	0.0167
	500	0.2659	1.0217	2.3914	0.0025	0.0942	259	0.0240
	750	0.4784	1.8248	4.3817	0.0047	0.1705	465	0.0432
	1000	0.7229	2.8959	7.7626	0.0066	0.2503	658	0.0652

Crawler Tractors Composite		0.1671	0.6051	1.2309	0.0013	0.0752	114	0.0151
Crushing/Proc. Equip	50	0.1927	0.5215	0.4545	0.0006	0.0462	44.0	0.0174
	120	0.1525	0.5829	0.9172	0.0010	0.0851	83.1	0.0138
	175	0.2088	0.9654	1.6343	0.0019	0.0946	167	0.0188
	250	0.1953	0.5592	2.1896	0.0028	0.0682	245	0.0176
	500	0.2733	0.8961	2.9457	0.0037	0.0972	374	0.0247
	750	0.4361	1.3892	4.8387	0.0059	0.1560	589	0.0394
	9999	1.2112	4.0327	14.2648	0.0131	0.4203	1,308	0.1093
Crushing/Proc. Equipment Comp		0.1872	0.6911	1.2633	0.0015	0.0819	132	0.0169
Dumpers/Tenders	25	0.0100	0.0324	0.0614	0.0001	0.0031	7.6	0.0009
Dumpers/Tenders Composite		0.0100	0.0324	0.0614	0.0001	0.0031	7.6	0.0009
Excavators	25	0.0198	0.0677	0.1253	0.0002	0.0048	16.4	0.0018
	50	0.0912	0.2933	0.2568	0.0003	0.0237	25.0	0.0082
	120	0.1183	0.5220	0.7300	0.0009	0.0657	73.6	0.0107
	175	0.1288	0.6678	0.9613	0.0013	0.0569	112	0.0116
	250	0.1301	0.3630	1.2438	0.0018	0.0415	159	0.0117
	500	0.1805	0.5493	1.6112	0.0023	0.0574	234	0.0163
	750	0.3013	0.9096	2.7605	0.0039	0.0969	387	0.0272
Excavators Composite		0.1300	0.5401	0.9817	0.0013	0.0536	120	0.0117
Forklifts	50	0.0514	0.1682	0.1488	0.0002	0.0136	14.7	0.0046
	120	0.0489	0.2195	0.3017	0.0004	0.0277	31.2	0.0044
	175	0.0624	0.3304	0.4664	0.0006	0.0278	56.1	0.0056
	250	0.0595	0.1638	0.5872	0.0009	0.0187	77.1	0.0054
	500	0.0806	0.2241	0.7257	0.0011	0.0252	111	0.0073
Forklifts Composite		0.0585	0.2257	0.4330	0.0006	0.0231	54.4	0.0053
Generator Sets	15	0.0157	0.0698	0.1063	0.0002	0.0061	10.2	0.0014
	25	0.0276	0.0951	0.1632	0.0002	0.0096	17.6	0.0025
	50	0.0959	0.2734	0.2966	0.0004	0.0255	30.6	0.0087
	120	0.1206	0.4956	0.8099	0.0009	0.0640	77.9	0.0109
	175	0.1460	0.7413	1.3131	0.0016	0.0644	142	0.0132
	250	0.1372	0.4502	1.8047	0.0024	0.0508	213	0.0124
	500	0.1952	0.7617	2.5896	0.0033	0.0756	337	0.0176
	750	0.3257	1.2296	4.3019	0.0055	0.1241	544	0.0294
9999	0.8673	3.0642	10.8871	0.0105	0.3104	1,049	0.0783	
Generator Sets Composite		0.0832	0.3121	0.5779	0.0007	0.0351	61.0	0.0075
Graders	50	0.1182	0.3365	0.2882	0.0004	0.0286	27.5	0.0107
	120	0.1348	0.5355	0.8223	0.0009	0.0740	75.0	0.0122
	175	0.1554	0.7363	1.1931	0.0014	0.0688	124	0.0140
	250	0.1575	0.4508	1.5344	0.0019	0.0547	172	0.0142
	500	0.1947	0.6639	1.8193	0.0023	0.0671	229	0.0176
	750	0.4147	1.4022	3.9602	0.0049	0.1439	486	0.0374
Graders Composite		0.1533	0.6129	1.2503	0.0015	0.0649	133	0.0138
Off-Highway Tractors	120	0.2224	0.7269	1.2964	0.0011	0.1143	93.7	0.0201
	175	0.2135	0.8404	1.6085	0.0015	0.0923	130	0.0193
	250	0.1718	0.4896	1.5282	0.0015	0.0644	130	0.0155
	750	0.6814	3.0883	6.1417	0.0057	0.2515	568	0.0615
	1000	1.0246	4.8137	10.5080	0.0082	0.3620	814	0.0924
Off-Highway Tractors Composite		0.2170	0.7878	1.7969	0.0017	0.0871	151	0.0196
Off-Highway Trucks	175	0.1533	0.7593	1.1072	0.0014	0.0666	125	0.0138
	250	0.1469	0.3944	1.3513	0.0019	0.0461	167	0.0133
	500	0.2263	0.6661	1.9463	0.0027	0.0705	272	0.0204
	750	0.3695	1.0792	3.2612	0.0044	0.1164	442	0.0333
	1000	0.5790	1.7854	6.4025	0.0063	0.1933	625	0.0522
Off-Highway Trucks Composite		0.2241	0.6635	2.0158	0.0027	0.0715	260	0.0202
Other Construction	15	0.0118	0.0617	0.0737	0.0002	0.0028	10.1	0.0011
	25	0.0160	0.0544	0.1019	0.0002	0.0044	13.2	0.0014
	50	0.0842	0.2740	0.2707	0.0004	0.0228	28.0	0.0076
	120	0.1104	0.5320	0.7540	0.0009	0.0633	80.9	0.0100
	175	0.1008	0.5880	0.8599	0.0012	0.0467	107	0.0091

	500	0.1517	0.5426	1.6573	0.0025	0.0545	254	0.0137
Other Construction Equipment Composite		0.0925	0.3847	0.8599	0.0013	0.0366	123	0.0083
Other General Industrial Equipment	15	0.0066	0.0391	0.0466	0.0001	0.0018	6.4	0.0006
	25	0.0185	0.0632	0.1170	0.0002	0.0045	15.3	0.0017
	50	0.1085	0.2856	0.2332	0.0003	0.0253	21.7	0.0098
	120	0.1274	0.4542	0.7277	0.0007	0.0703	62.0	0.0115
	175	0.1349	0.5757	1.0001	0.0011	0.0599	95.9	0.0122
	250	0.1235	0.3281	1.2983	0.0015	0.0417	136	0.0111
	500	0.2232	0.6772	2.2367	0.0026	0.0758	265	0.0201
	750	0.3707	1.1162	3.8016	0.0044	0.1273	437	0.0334
	1000	0.5621	1.8453	6.4018	0.0056	0.1947	560	0.0507
Other General Industrial Equipment Composite		0.1635	0.5362	1.4520	0.0016	0.0632	152	0.0148
Other Material Handling Equipment	50	0.1506	0.3950	0.3243	0.0004	0.0352	30.3	0.0136
	120	0.1239	0.4423	0.7103	0.0007	0.0684	60.7	0.0112
	175	0.1703	0.7292	1.2706	0.0014	0.0759	122	0.0154
	250	0.1305	0.3496	1.3863	0.0016	0.0443	145	0.0118
	500	0.1590	0.4876	1.6124	0.0019	0.0545	192	0.0143
	9999	0.7467	2.4395	8.4619	0.0073	0.2565	741	0.0674
Other Material Handling Equipment Composite		0.1566	0.5108	1.4125	0.0015	0.0613	141	0.0141
Pavers	25	0.0255	0.0811	0.1531	0.0002	0.0080	18.7	0.0023
	50	0.1451	0.3680	0.3038	0.0004	0.0327	28.0	0.0131
	120	0.1467	0.5107	0.8788	0.0008	0.0776	69.2	0.0132
	175	0.1864	0.7833	1.4495	0.0014	0.0819	128	0.0168
	250	0.2182	0.6365	2.0698	0.0022	0.0818	194	0.0197
	500	0.2383	0.9957	2.2418	0.0023	0.0883	233	0.0215
Pavers Composite		0.1596	0.5445	0.8980	0.0009	0.0642	77.9	0.0144
Paving Equipment	25	0.0153	0.0520	0.0974	0.0002	0.0042	12.6	0.0014
	50	0.1239	0.3124	0.2591	0.0003	0.0279	23.9	0.0112
	120	0.1150	0.3997	0.6897	0.0006	0.0610	54.5	0.0104
	175	0.1455	0.6114	1.1384	0.0011	0.0640	101	0.0131
	250	0.1349	0.3946	1.2976	0.0014	0.0507	122	0.0122
Paving Equipment Composite		0.1204	0.4365	0.8114	0.0008	0.0570	68.9	0.0109
Plate Compactors	15	0.0050	0.0263	0.0314	0.0001	0.0013	4.3	0.0005
Plate Compactors Composite		0.0050	0.0263	0.0314	0.0001	0.0013	4.3	0.0005
Pressure Washers	15	0.0075	0.0334	0.0509	0.0001	0.0029	4.9	0.0007
	25	0.0112	0.0385	0.0662	0.0001	0.0039	7.1	0.0010
	50	0.0349	0.1074	0.1339	0.0002	0.0102	14.3	0.0032
	120	0.0332	0.1458	0.2385	0.0003	0.0172	24.1	0.0030
Pressure Washers Composite		0.0173	0.0635	0.0921	0.0001	0.0063	9.4	0.0016
Pumps	15	0.0133	0.0508	0.0790	0.0001	0.0054	7.4	0.0012
	25	0.0386	0.1051	0.1803	0.0002	0.0117	19.5	0.0035
	50	0.1155	0.3229	0.3362	0.0004	0.0299	34.3	0.0104
	120	0.1250	0.5036	0.8226	0.0009	0.0669	77.9	0.0113
	175	0.1498	0.7431	1.3164	0.0016	0.0664	140	0.0135
	250	0.1357	0.4345	1.7375	0.0023	0.0501	201	0.0122
	500	0.2089	0.8032	2.6861	0.0034	0.0803	345	0.0188
	750	0.3557	1.3279	4.5700	0.0057	0.1350	571	0.0321
	9999	1.1456	4.0641	14.2305	0.0136	0.4081	1,355	0.1034
Pumps Composite		0.0813	0.2983	0.4999	0.0006	0.0351	49.6	0.0073
Rollers	15	0.0074	0.0386	0.0461	0.0001	0.0018	6.3	0.0007
	25	0.0162	0.0549	0.1029	0.0002	0.0045	13.3	0.0015
	50	0.1105	0.2994	0.2677	0.0003	0.0263	26.0	0.0100
	120	0.1054	0.4098	0.6619	0.0007	0.0574	59.0	0.0095
	175	0.1320	0.6220	1.0725	0.0012	0.0591	108	0.0119
	250	0.1347	0.4083	1.4103	0.0017	0.0498	153	0.0122
	500	0.1755	0.6752	1.8093	0.0022	0.0652	219	0.0158
Rollers Composite		0.1038	0.4107	0.6936	0.0008	0.0488	67.1	0.0094
Rough Terrain Forklifts	50	0.1315	0.3910	0.3455	0.0004	0.0330	33.9	0.0119
	120	0.1038	0.4364	0.6425	0.0007	0.0585	62.4	0.0094

	175	0.1444	0.7268	1.1204	0.0014	0.0652	125	0.0130
	250	0.1353	0.3896	1.4082	0.0019	0.0458	171	0.0122
	500	0.1894	0.5985	1.8577	0.0025	0.0642	257	0.0171
Rough Terrain Forklifts Composite		0.1093	0.4680	0.6995	0.0008	0.0587	70.3	0.0099
Rubber Tired Dozers	175	0.2209	0.8528	1.6304	0.0015	0.0945	129	0.0199
	250	0.2545	0.7124	2.1985	0.0021	0.0942	183	0.0230
	500	0.3345	1.5220	2.8822	0.0026	0.1210	265	0.0302
	750	0.5042	2.2809	4.4100	0.0040	0.1832	399	0.0455
	1000	0.7807	3.6654	7.7816	0.0060	0.2729	592	0.0704
Rubber Tired Dozers Composite		0.3114	1.2491	2.6866	0.0025	0.1137	239	0.0281
Rubber Tired Loaders	25	0.0205	0.0697	0.1295	0.0002	0.0052	16.9	0.0018
	50	0.1315	0.3756	0.3242	0.0004	0.0319	31.1	0.0119
	120	0.1045	0.4187	0.6404	0.0007	0.0576	58.9	0.0094
	175	0.1312	0.6288	1.0135	0.0012	0.0583	106	0.0118
	250	0.1330	0.3838	1.3129	0.0017	0.0462	149	0.0120
	500	0.1961	0.6755	1.8555	0.0023	0.0677	237	0.0177
	750	0.4044	1.3812	3.9115	0.0049	0.1408	486	0.0365
	1000	0.5480	1.9543	6.3337	0.0060	0.1909	594	0.0494
Rubber Tired Loaders Composite		0.1272	0.4855	1.0034	0.0012	0.0558	109	0.0115
Scrapers	120	0.1990	0.7011	1.1749	0.0011	0.1054	93.9	0.0180
	175	0.2172	0.9158	1.6429	0.0017	0.0945	148	0.0196
	250	0.2367	0.6699	2.1849	0.0024	0.0859	209	0.0214
	500	0.3333	1.3000	3.0162	0.0032	0.1190	321	0.0301
	750	0.5779	2.2380	5.3231	0.0056	0.2075	555	0.0521
Scrapers Composite		0.2916	1.0984	2.5680	0.0027	0.1087	262	0.0263
Signal Boards	15	0.0072	0.0377	0.0450	0.0001	0.0017	6.2	0.0006
	50	0.1270	0.3587	0.3564	0.0005	0.0324	36.2	0.0115
	120	0.1284	0.5269	0.8360	0.0009	0.0703	80.2	0.0116
	175	0.1661	0.8370	1.4268	0.0017	0.0750	155	0.0150
	250	0.1746	0.5516	2.1599	0.0029	0.0639	255	0.0158
Signal Boards Composite		0.0203	0.0940	0.1470	0.0002	0.0083	16.7	0.0018
Skid Steer Loaders	25	0.0211	0.0635	0.1189	0.0002	0.0067	13.8	0.0019
	50	0.0596	0.2332	0.2402	0.0003	0.0180	25.5	0.0054
	120	0.0482	0.2769	0.3536	0.0005	0.0286	42.8	0.0043
Skid Steer Loaders Composite		0.0534	0.2360	0.2686	0.0004	0.0207	30.3	0.0048
Surfacing Equipment	50	0.0513	0.1441	0.1411	0.0002	0.0128	14.1	0.0046
	120	0.1040	0.4251	0.6895	0.0007	0.0557	63.8	0.0094
	175	0.0950	0.4745	0.8195	0.0010	0.0422	85.8	0.0086
	250	0.1095	0.3526	1.1993	0.0015	0.0413	135	0.0099
	500	0.1631	0.6813	1.7819	0.0022	0.0622	221	0.0147
	750	0.2601	1.0660	2.8642	0.0035	0.0986	347	0.0235
Surfacing Equipment Composite		0.1362	0.5467	1.3678	0.0017	0.0512	166	0.0123
Sweepers/Scrubbers	15	0.0124	0.0729	0.0870	0.0002	0.0034	11.9	0.0011
	25	0.0237	0.0808	0.1501	0.0002	0.0060	19.6	0.0021
	50	0.1195	0.3565	0.3179	0.0004	0.0302	31.6	0.0108
	120	0.1233	0.5204	0.7534	0.0009	0.0706	75.0	0.0111
	175	0.1575	0.8008	1.2212	0.0016	0.0717	139	0.0142
	250	0.1205	0.3447	1.3019	0.0018	0.0402	162	0.0109
Sweepers/Scrubbers Composite		0.1278	0.5215	0.7403	0.0009	0.0576	78.5	0.0115
Tractors/Loaders/Backhoes	25	0.0199	0.0662	0.1250	0.0002	0.0061	15.9	0.0018
	50	0.1006	0.3305	0.3030	0.0004	0.0267	30.3	0.0091
	120	0.0760	0.3557	0.4910	0.0006	0.0432	51.7	0.0069
	175	0.1058	0.5866	0.8294	0.0011	0.0478	101	0.0095
	250	0.1264	0.3755	1.2813	0.0019	0.0415	172	0.0114
	500	0.2386	0.7714	2.2621	0.0039	0.0784	345	0.0215
	750	0.3611	1.1563	3.5105	0.0058	0.1199	517	0.0326
Tractors/Loaders/Backhoes Composite		0.0862	0.3824	0.5816	0.0008	0.0435	66.8	0.0078
Trenchers	15	0.0099	0.0517	0.0617	0.0001	0.0024	8.5	0.0009
	25	0.0398	0.1355	0.2519	0.0004	0.0101	32.9	0.0036

	50	0.1656	0.4176	0.3536	0.0004	0.0374	32.9	0.0149
	120	0.1354	0.4732	0.8257	0.0008	0.0709	64.9	0.0122
	175	0.2050	0.8694	1.6306	0.0016	0.0901	144	0.0185
	250	0.2483	0.7418	2.3854	0.0025	0.0951	223	0.0224
	500	0.3135	1.4011	3.0220	0.0031	0.1190	311	0.0283
	750	0.5949	2.6307	5.8034	0.0059	0.2259	587	0.0537
Trenchers Composite		0.1507	0.4749	0.6995	0.0007	0.0582	58.7	0.0136
Welders	15	0.0111	0.0425	0.0660	0.0001	0.0045	6.2	0.0010
	25	0.0224	0.0609	0.1044	0.0001	0.0068	11.3	0.0020
	50	0.1071	0.2854	0.2637	0.0003	0.0260	26.0	0.0097
	120	0.0708	0.2687	0.4376	0.0005	0.0387	39.5	0.0064
	175	0.1183	0.5475	0.9688	0.0011	0.0531	98.2	0.0107
	250	0.0909	0.2704	1.0791	0.0013	0.0329	119	0.0082
	500	0.1154	0.4072	1.3538	0.0016	0.0431	168	0.0104
Welders Composite		0.0703	0.2150	0.2702	0.0003	0.0243	25.6	0.0063



## Highest (Most Conservative) EMFAC2007 (version 2.3) Emission Factors for On-Road Passenger Vehicles & Delivery Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)  
Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

### Vehicle Class:

### Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)

The following emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model, taking the weighted average of vehicle types and simplifying into two categories:  
**Passenger Vehicles & Delivery Trucks.**

These emission factors can be used to calculate on-road mobile source emissions for the vehicle categories listed in the tables below, by use of the following equation:

$$\text{Emissions (pounds per day)} = N \times TL \times EF$$

where N = number of trips, TL = trip length (miles/day), and EF = emission factor (pounds per mile)

This methodology replaces the old EMFAC emission factors in Tables A-9-5-J-1 through A-9-5-L in Appendix A9 of the current SCAQMD CEQA Handbook. All the emission factors account for the emissions from start, running and idling exhaust. In addition, the ROG emission factors include diurnal, hot soak, running and resting emissions, and the PM10 & PM2.5 emission factors include tire and brake wear.

#### Scenario Year: 2007

All model years in the range 1965 to 2007

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.01155158	CO	0.02407553
NOx	0.00121328	NOx	0.02508445
ROG	0.00118234	ROG	0.00323145
SOx	0.00001078	SOx	0.00002626
PM10	0.00008447	PM10	0.00091020
PM2.5	0.00005243	PM2.5	0.00078884
CO2	1.10672236	CO2	2.72245619
CH4	0.00010306	CH4	0.00016030

#### Scenario Year: 2008

All model years in the range 1965 to 2008

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.01054844	CO	0.02194915
NOx	0.00110288	NOx	0.02371258
ROG	0.00107919	ROG	0.00299270
SOx	0.00001075	SOx	0.00002565
PM10	0.00008505	PM10	0.00085607
PM2.5	0.00005293	PM2.5	0.00073933
CO2	1.09953226	CO2	2.71943400
CH4	0.00009465	CH4	0.00014769

#### Scenario Year: 2009

All model years in the range 1965 to 2009

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00968562	CO	0.02016075
NOx	0.00100518	NOx	0.02236636
ROG	0.00099245	ROG	0.00278899
SOx	0.00001066	SOx	0.00002679
PM10	0.00008601	PM10	0.00080550
PM2.5	0.00005384	PM2.5	0.00069228
CO2	1.09755398	CO2	2.72330496
CH4	0.00008767	CH4	0.00013655

#### Scenario Year: 2010

All model years in the range 1966 to 2010

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00826276	CO	0.01843765
NOx	0.00091814	NOx	0.02062460
ROG	0.00091399	ROG	0.00258958
SOx	0.00001077	SOx	0.00002701
PM10	0.00008698	PM10	0.00075121
PM2.5	0.00005478	PM2.5	0.00064233
CO2	1.09568235	CO2	2.73222199
CH4	0.00008146	CH4	0.00012576





## Highest (Most Conservative) EMFAC2007 (version 2.3) Emission Factors for On-Road Passenger Vehicles & Delivery Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)  
Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

### Vehicle Class:

### Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)

Scenario Year: **2011**

All model years in the range 1967 to 2011

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00826276	CO	0.01693242
NOx	0.00084460	NOx	0.01893366
ROG	0.00085233	ROG	0.00241868
SOx	0.00001077	SOx	0.00002728
PM10	0.00008879	PM10	0.00070097
PM2.5	0.00005653	PM2.5	0.00059682
CO2	1.10235154	CO2	2.75180822
CH4	0.00007678	CH4	0.00011655

Scenario Year: **2012**

All model years in the range 1968 to 2012

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00765475	CO	0.01545741
NOx	0.00077583	NOx	0.01732423
ROG	0.00079628	ROG	0.00223776
SOx	0.00001073	SOx	0.00002667
PM10	0.00008979	PM10	0.00064975
PM2.5	0.00005750	PM2.5	0.00054954
CO2	1.10152540	CO2	2.76628414
CH4	0.00007169	CH4	0.00010668

Scenario Year: **2013**

All model years in the range 1969 to 2013

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00709228	CO	0.01407778
NOx	0.00071158	NOx	0.01577311
ROG	0.00074567	ROG	0.00206295
SOx	0.00001072	SOx	0.00002682
PM10	0.00009067	PM10	0.00059956
PM2.5	0.00005834	PM2.5	0.00050174
CO2	1.10087435	CO2	2.78163459
CH4	0.00006707	CH4	0.00009703

Scenario Year: **2014**

All model years in the range 1970 to 2014

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00660353	CO	0.01284321
NOx	0.00065484	NOx	0.01425162
ROG	0.00070227	ROG	0.00189649
SOx	0.00001069	SOx	0.00002754
PM10	0.00009185	PM10	0.00054929
PM2.5	0.00005939	PM2.5	0.00045519
CO2	1.10257205	CO2	2.79845465
CH4	0.00006312	CH4	0.00008798

Scenario Year: **2015**

All model years in the range 1971 to 2015

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00614108	CO	0.01169445
NOx	0.00060188	NOx	0.01285026
ROG	0.00066355	ROG	0.00173890
SOx	0.00001070	SOx	0.00002741
PM10	0.00009259	PM10	0.00050307
PM2.5	0.00006015	PM2.5	0.00041268
CO2	1.10192837	CO2	2.81247685
CH4	0.00005923	CH4	0.00008076

Scenario Year: **2016**

All model years in the range 1972 to 2016

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00575800	CO	0.01080542
NOx	0.00055658	NOx	0.01172881
ROG	0.00063254	ROG	0.00161521
SOx	0.00001071	SOx	0.00002767
PM10	0.00009392	PM10	0.00046606
PM2.5	0.00006131	PM2.5	0.00037868
CO2	1.10677664	CO2	2.83134285
CH4	0.00005623	CH4	0.00007355



## Highest (Most Conservative) EMFAC2007 (version 2.3) Emission Factors for On-Road Passenger Vehicles & Delivery Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)  
Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

### Vehicle Class:

### Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)

Scenario Year: **2017**

All model years in the range 1973 to 2017

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00537891	CO	0.00998101
NOx	0.00051297	NOx	0.01070034
ROG	0.00060109	ROG	0.00150242
SOx	0.00001079	SOx	0.00002723
PM10	0.00009446	PM10	0.00043131
PM2.5	0.00006192	PM2.5	0.00034605
CO2	1.10627489	CO2	2.84005015
CH4	0.00005300	CH4	0.00006663

Scenario Year: **2018**

All model years in the range 1974 to 2018

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00502881	CO	0.00923234
NOx	0.00047300	NOx	0.00979416
ROG	0.00057178	ROG	0.00139856
SOx	0.00001071	SOx	0.00002749
PM10	0.00009494	PM10	0.00040110
PM2.5	0.00006234	PM2.5	0.00031792
CO2	1.10562643	CO2	2.84646835
CH4	0.00005003	CH4	0.00006203

Scenario Year: **2019**

All model years in the range 1975 to 2019

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00471820	CO	0.00857192
NOx	0.00043716	NOx	0.00900205
ROG	0.00054654	ROG	0.00130563
SOx	0.00001072	SOx	0.00002706
PM10	0.00009523	PM10	0.00037393
PM2.5	0.00006259	PM2.5	0.00029276
CO2	1.10496100	CO2	2.85060182
CH4	0.00004743	CH4	0.00005619

Scenario Year: **2020**

All model years in the range 1976 to 2020

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00444247	CO	0.00799617
NOx	0.00040506	NOx	0.00831802
ROG	0.00052463	ROG	0.00122382
SOx	0.00001073	SOx	0.00002733
PM10	0.00009550	PM10	0.00035054
PM2.5	0.00006279	PM2.5	0.00027128
CO2	1.10456157	CO2	2.85148109
CH4	0.00004495	CH4	0.00005330

Scenario Year: **2021**

All model years in the range 1977 to 2021

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00421218	CO	0.00748303
NOx	0.00037757	NOx	0.00773500
ROG	0.00050573	ROG	0.00115568
SOx	0.00001073	SOx	0.00002755
PM10	0.00009640	PM10	0.00033125
PM2.5	0.00006364	PM2.5	0.00025331
CO2	1.11009559	CO2	2.86434187
CH4	0.00004322	CH4	0.00004905

Scenario Year: **2022**

All model years in the range 1978 to 2022

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00397866	CO	0.00699290
NOx	0.00035150	NOx	0.00722470
ROG	0.00048658	ROG	0.00108569
SOx	0.00001072	SOx	0.00002774
PM10	0.00009661	PM10	0.00031501
PM2.5	0.00006389	PM2.5	0.00023906
CO2	1.11019931	CO2	2.87006769
CH4	0.00004121	CH4	0.00004557



## Highest (Most Conservative) EMFAC2007 (version 2.3) Emission Factors for On-Road Passenger Vehicles & Delivery Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)  
Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

### Vehicle Class:

### Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)

Scenario Year: **2023**

All model years in the range 1979 to 2023

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00377527	CO	0.00658123
NOx	0.00032851	NOx	0.00679147
ROG	0.00046900	ROG	0.00102852
SOx	0.00001070	SOx	0.00002790
PM10	0.00009676	PM10	0.00030109
PM2.5	0.00006405	PM2.5	0.00022582
CO2	1.11023373	CO2	2.87466338
CH4	0.00003951	CH4	0.00004218

Scenario Year: **2024**

All model years in the range 1980 to 2024

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00358611	CO	0.00625076
NOx	0.00030721	NOx	0.00647083
ROG	0.00045136	ROG	0.00096578
SOx	0.00001080	SOx	0.00002807
PM10	0.00009676	PM10	0.00029407
PM2.5	0.00006410	PM2.5	0.00021880
CO2	1.11061572	CO2	2.88010717
CH4	0.00003781	CH4	0.00004019

Scenario Year: **2025**

All model years in the range 1981 to 2025

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00342738	CO	0.00595363
NOx	0.00028846	NOx	0.00615945
ROG	0.00043545	ROG	0.00092178
SOx	0.00001070	SOx	0.00002761
PM10	0.00009679	PM10	0.00028425
PM2.5	0.00006418	PM2.5	0.00020958
CO2	1.11078571	CO2	2.88143570
CH4	0.00003641	CH4	0.00003765

Scenario Year: **2026**

All model years in the range 1982 to 2026

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00328779	CO	0.00569435
NOx	0.00027141	NOx	0.00589869
ROG	0.00042052	ROG	0.00088403
SOx	0.00001076	SOx	0.00002716
PM10	0.00009687	PM10	0.00027657
PM2.5	0.00006415	PM2.5	0.00020187
CO2	1.11105829	CO2	2.88298299
CH4	0.00003518	CH4	0.00003581