RECLAMATION
Managing Water in the West

Geotechnical and Geophysical Investigations for the Solano Project Terminal Reservoir

Draft Environmental Assessment (EA)

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U.S. Bureau of Reclamation, Mid-Pacific Region
Central California Area Office, CC-400

Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

Introduction

Under the Proposed Action, the United States Bureau of Reclamation (Reclamation) proposes to perform geotechnical and geophysical investigations at the Terminal Dam Facility which consists of a small reservoir and two earthen embankment dams, the Northeast Auxiliary Dam and Terminal Dam (also known as South Dam). The purpose of the investigation is to collect geotechnical data of the dam embankments and their foundations, and geophysical data on the Green Valley Fault mapped in the vicinity of the Terminal Dam Facility. The proposed investigations are part of Reclamation's current Corrective Action Study of Terminal Reservoir.

The Terminal and Northeast Auxiliary Dams are earthen dams located on Reclamation land in Solano County adjacent to the western part of the city of Fairfield. The dams form a 92 acre-foot reservoir (Terminal Reservoir) operated by the Solano Irrigation District under contract with the Solano County Water Agency. The reservoir provides drinking water to the city of Vallejo and the city of Benicia. Terminal Reservoir is part of the Solano Project, and water impounded at this facility is transported from the Putah Creek watershed via the Putah South Canal.

Purpose and Need for the Proposed Action

The proposed investigations are part of Reclamation's current Corrective Action Study of Terminal Reservoir. Branches of the Green Valley Fault lie in the vicinity of Terminal Reservoir. The proposed action would provide geologic information as to fault activity in the area and the possible risk posed to Terminal Reservoir, its two embankment dams and appurtenant structures. Information obtained from these field studies will be used to devise safety improvements if determined to be necessary.

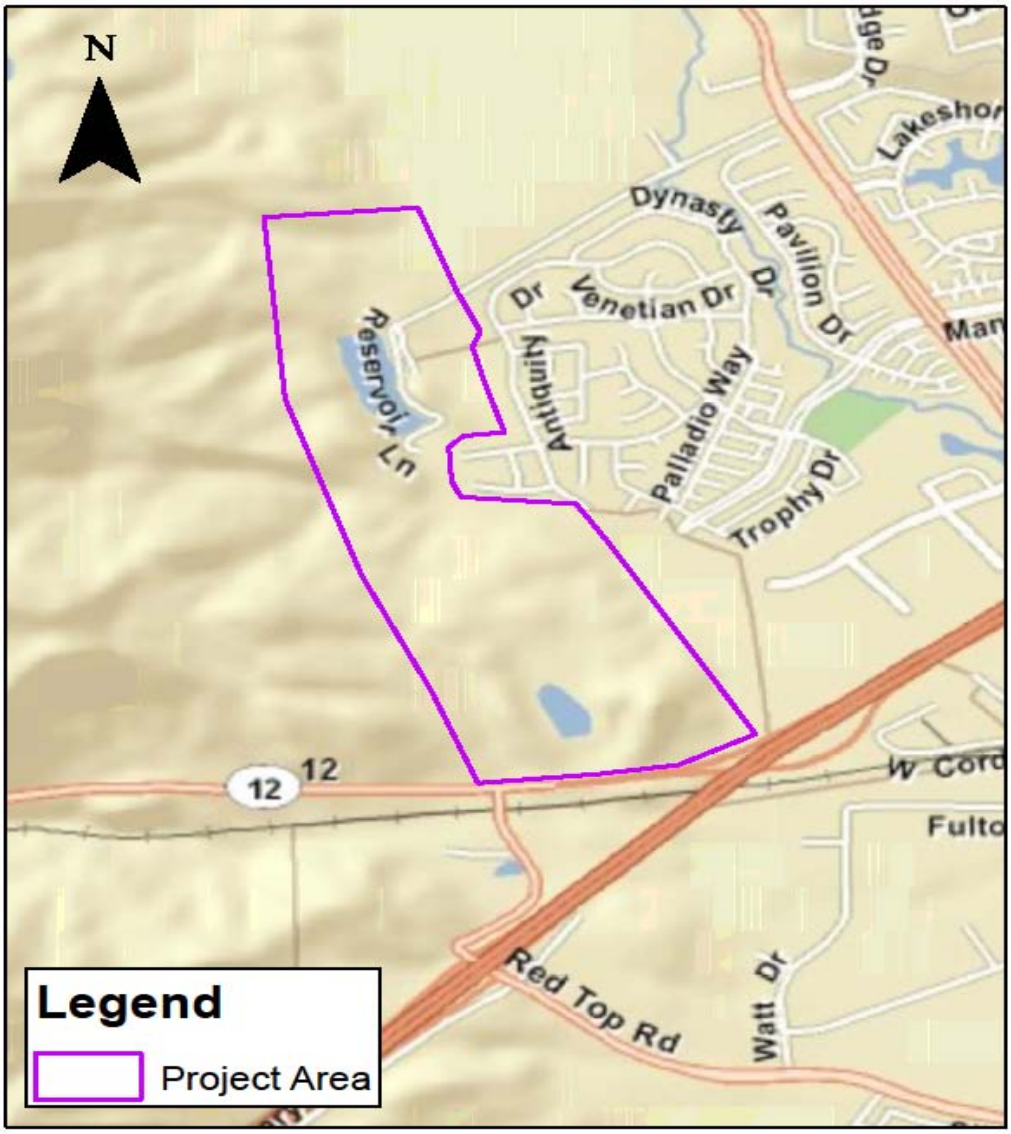
Proposed Action

Geotechnical and geophysical investigations are planned to investigate Terminal Reservoir and its two embankment dams, the Northeast Auxiliary Dam and Terminal Dam (the South Dam) and their foundations, and the Green Valley Fault. The planned investigations include geophysical investigations and geotechnical drilling. Field exploration is anticipated to take 45-90 days to complete. It will occur during the dry season of 2012, between May and the end of October, depending on availability of work crews and ground conditions. All work will be conducted during daylight hours: 7:00 am to 7:00 pm. Drilling sites are accessed via Reservoir Lane, unnamed dirt roads, and the O&M road around Terminal Reservoir, therefore no access road construction is required. All staging and vehicle parking will occur on the Operations and Maintenance (O&M) road surrounding Terminal Reservoir, Reclamation land, or on private land with land owner approval. No storage or parking will occur on public roads.

Geophysical investigations of the Green Valley Fault will be divided into two phases, surface mapping and geophysical surveys. These activities will take place on the approximately 230 acres surrounding Terminal Reservoir (see Figure 1). The project area will be accessed primarily from Reservoir Lane and the O&M road surrounding Terminal Reservoir. Vehicle access will be limited to existing paved and dirt roads. Off-road travel and transportation of equipment will be by foot and light-footprint all-terrain vehicles (ATVs). Surface mapping

consists of examining the ground, within the project area, for fault trace evidence. Existing geologic exposures, if present, may be examined. This task does not include any invasive methods and there will be minimal field disturbance. No vegetation will be cleared unless approved by a biologist. Access to wetted areas, including wetlands and ponds, will be by foot-traffic only; ATVs will not enter any wetted area except at preexisting road crossings. Construction of access roads is not required.

Figure 1: Project Area



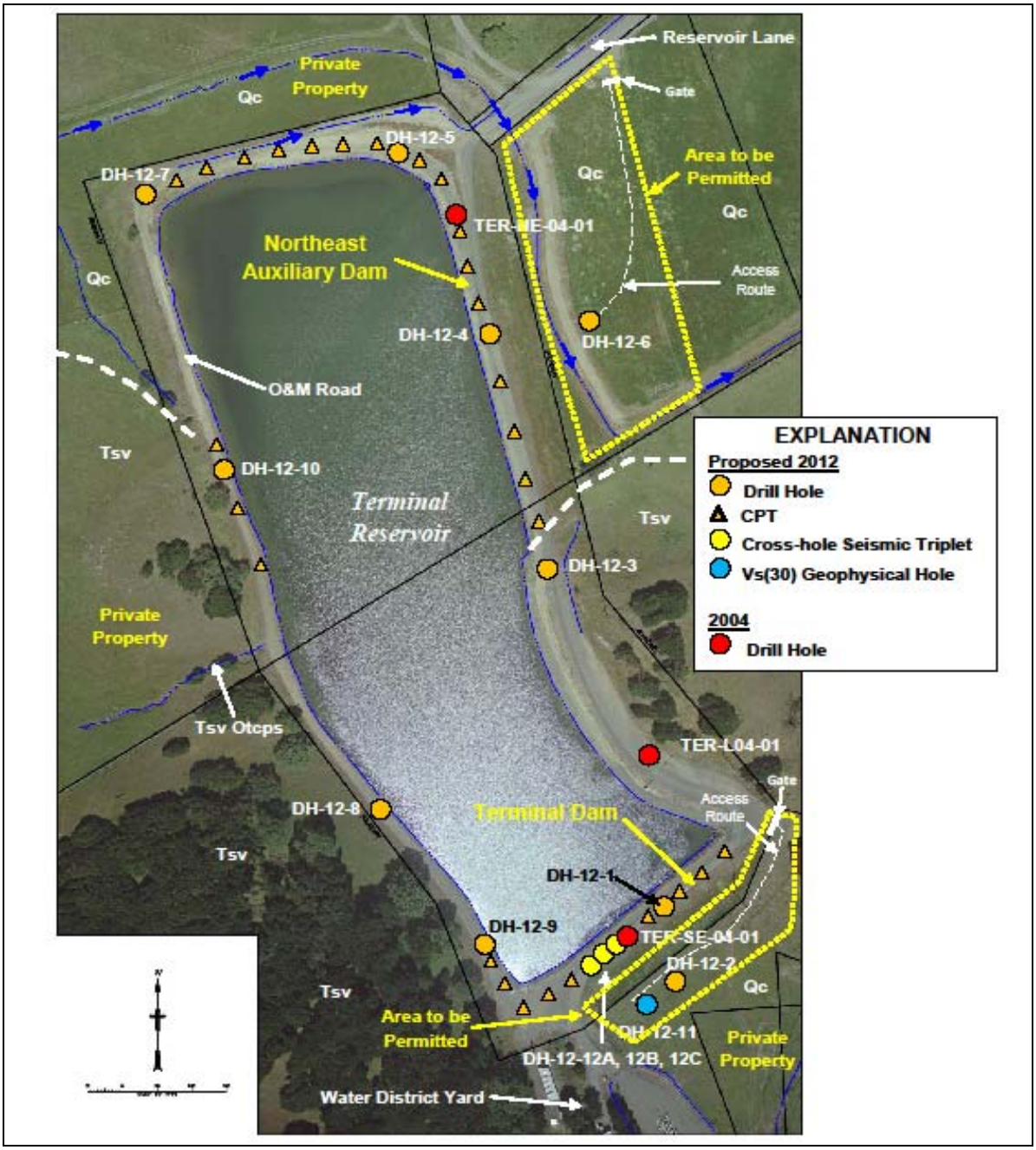
The three types of geophysical surveys to be conducted are seismic refraction (SR), multichannel analysis of surface waves (MASW) and earth resistivity imaging (ERI). Data collection for the SR and MASW methods consists of placing a series of geophones into the ground, and connecting all the geophones to a computer and power source (normally two 12 volt car batteries) using specialized cables. The seismic source for the MASW method uses ambient noise only. The seismic source for the SR method consists of a vehicle mounted

accelerated weight drop. The weight drop impacts a metal plate to generate seismic waveforms in the subsurface. The geophones have a metal spike, which is inserted into the ground by hand. The metal spike is approximately 4 inches long and less than ½ inch in diameter. Equipment will be located so that no clearing of vegetation will be required, unless approved by a biologist. Upon survey completion, all equipment is removed, leaving minimal evidence of ground disturbance where geophones were inserted and the accelerated weight drop was deployed. The duration of the SR and MASW data collection activities is expected to be approximately seven days with a three-person crew.

Data collection for the ERI method consists of inserting a series of electrodes into the ground, and connecting all of these electrodes to a computer and power source (normally two 12 volt car batteries) using specialized cables. Electricity is passed through various pairs of electrodes in the series, and an electrical potential difference is then measured through other pairs of electrodes in the set up. The typical current injection for an ERI survey is less than an ampere, and occurs for a fraction of a second. The electrodes are metal spikes approximately 18 inches long and less than ½ inch in diameter. They are inserted into the ground to a depth of roughly 12 inches using a small sledge hammer. ERI surveys will not be conducted during periods or within areas of saturated soil conditions. Equipment will be located so that no clearing of vegetation will be required, unless approved by a biologist. Upon survey completion, all electrodes will be removed, leaving minimal evidence of ground disturbance where electrodes were inserted. The duration of the ERI data collection activities is expected to be approximately seven days with a three-person crew.

Geotechnical drill holes are planned at fourteen sites to determine soil and subsurface conditions around Terminal Reservoir. Borings will be drilled with a truck-mounted drilling rig to diameters between 4 and 8 inches and depths between 100 and 200 feet. Each hole resulting from the geotechnical drilling will be backfilled with cement grout or completed as an observation well. Figure 2 shows the approximate location of the planned drilling sites. All drilling locations are located on Reclamation land except for two drill sites located on private property to the south of South Dam (DH-12-2 and DH-12-11), and one drill site located on private property to the east of Northeast Auxiliary Dam (DH-12-6). Drilling sites are accessed via Reservoir Lane, unnamed dirt roads, and the O&M road around Terminal Reservoir, therefore construction of access roads is not required. Solano Irrigation District vehicles may not be able to pass the drill rig while drilling is in progress. Traffic barriers will be placed ahead of and behind the area of drilling operations. Since the O& M road is located around the perimeter of the reservoir, alternative routes will be available at all times. No clearing, grading or placement of fill to construct drill pads is required. All drilling will be accomplished by Reclamation personnel (drill crew and geologists). A Reclamation geologist will be onsite, at all times, while drilling is in progress. The duration of the geotechnical drilling activities is expected to be approximately 30 to 60 days with a four-person crew.

Figure 2: Locations of Geologic Explorations of Terminal Reservoir



The geotechnical drilling portion of the Proposed Action also includes twenty-eight cone penetrometer tests (CPT). The CPT method collects data by advancing a metal probe into the subsurface at a controlled rate. The probe is approximately 2 inches in diameter, is hydraulically pushed into the ground by a specialized drilling rig to approximately 80 feet. Figure 2 shows the approximate location of the planned CPT sites. All CPT locations are on or adjacent to the unpaved O&M road that crosses both dams and runs along the reservoir rim, therefore construction of access roads is not required. Water district vehicles may not be able to pass the drill rig while drilling is in progress. Traffic barriers will be placed ahead of and

behind the area of drilling operations. Since the O&M road is located around the perimeter of the reservoir, alternative routes will be available at all times. No clearing, grading or placement of fill to construct drill pads is required. The duration of the CPT activities is expected to be approximately nine days with a three-person crew.

No Action Alternative

Under the No Action Alternative, Reclamation would not perform the geotechnical and geophysical investigations. Site-specific geotechnical and geophysical information would not be available for Terminal Reservoir and its two embankment dams, and therefore no possible safety improvements would be identified.

National Environmental Policy Act Compliance

The purpose of this document is to meet Reclamation's obligations pursuant to the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] 4321 et seq.), Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA(40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Departmental Manual (DM) 516 DM 1-7.

Environmental Consequences

This EA describes the affected environment and the environmental consequences of the resource area for the Geotechnical and Geophysical Investigations for the Solano Project, Terminal Reservoir. This EA does not analyze resources for which it would be reasonable to assume that impacts do not occur.

Resources Not Analyzed in Detail

Based on review of the Proposed Action, the following resources were determined to have no impacts as a result of the Proposed Action and are not analyzed in this EA. These resources category are:

Cultural Resources- There will be no adverse effect to historical properties associated with the Proposed Action. Reclamation began consultation with the State Historic Preservation Officer with this finding on March 20, 2012 pursuant to National Historic Preservation Act (NHPA) Section 106 and 36 CFR Section 800.5(b). The proposed action will not begin until Reclamation achieves compliance with NHPA Section 106.

Environmental Justice – Minority or low income populations would not be differentially affected within the project area and therefore no environmental justice impacts would occur.

Hydrology, Water Quality, and Groundwater – The Proposed Action would not be expected to impact local or regional hydrology, water quality or groundwater.

Hydropower – Terminal Reservoir does not generate hydropower, thus there would be no change in hydropower. No changes to Terminal Reservoir storage or the releases made from the reservoir would occur as part of the Proposed Action; therefore, there would be no impact on hydropower.

Indian Trust Assets (ITAs) – Reclamation determined that the nearest ITA is Lytton Rancheria, located approximately 21 miles southwest of the project site (Rivera 2012). Therefore, implementation of the proposed action will have no impact on ITA.

Land use, Planning, and Zoning – The Proposed Action would not be expected to change the land use or zoning for the Project Area, nor is it associated with any changes to the general plan for the area.

Public Services and Utilities – The Proposed Action would not be expected to increase the demand for public services in the area or otherwise affect public service providers.

Recreation – The Project Area is not open to the public for recreation so the proposed action will not affect recreation.

Socioeconomics, Population, and Housing – The drill crew, geologists, and other required staff are expected to come from the surrounding local communities and would not require new housing or services. The Proposed Action would not result in any impacts that would create population or housing changes.

Transportation and Circulation - All vehicles will park on the O&M road surrounding Terminal Reservoir, Reclamation land, or on private land with land owner approval. No storage or parking will occur on public roads and none of the unnamed dirt roads will be blocked without either providing notice to the land owner or providing an alternate route, therefore the Proposed Action will have no impact to transportation and circulation.

Affected Environment

This section described the potential environmental consequences (i.e. potential impacts) for the Proposed Action and the No Action Alternative. The resources and issues described in this document include:

- Air Quality and Climate Change
- Biological Resources
- Noise
- Public Health and Safety
- Soils, Minerals, and Geological Resources
- Visual Resources
- Water Resources

Air Quality and Climate Change

Current Conditions: The Project Area is located in the western portion of Solano County and is part of the San Francisco Bay Air Basin (SFBAB), where air quality is monitored and regulated by the Bay Area Air Quality Management District (BAAQMD). Air quality in the SFBAB is heavily influenced by weather conditions, particularly climate and wind patterns. The Project Area is within the subregion of the Carquinez Strait, which has many industrial facilities with significant air pollutant emission. In summer and fall, a westerly wind often originates off the coast and is drawn inland through the Carquinez Strait, improving air quality

in the area and causing elevated levels to move to the east. Elevated pollutant levels occur during periods of low wind speed, or when winds travel east from the Sacramento Valley (BAAQMD 2010).

The U.S. Environmental Protection Agency and the State have designated National and California Ambient Air Quality Standards, respectively, to protect public health and welfare. The California standards are more stringent than the national standards. Because of the buildup of high concentrations of pollutants, Solano County is designated as nonattainment for ozone under the national standards and is designated nonattainment for ozone, PM2.5, and PM10 under the California standards. The nonattainment status means that air quality exceeds the national or California standards.

For any individual project, the Threshold of Significance for project operations are described in Table 1.

Table 1: Thresholds of Significance for Project-Level Activities (from BAAQMD 2010: Table 2-4)

Pollutant	**Construction-Related**	**Operational-Related**	
Criteria Air Pollutants and Precursors (Regional)	**Average Daily Emissions (lb/day)**	**Average Daily Emissions (lb/day)**	**Maximum Annual Emissions (tpy)**
ROG	54	54	10
NOX	54	54	10
PM10	82 (exhaust)	82	15
PM2.5	54 (exhaust)	54	10
PM10/PM2.5 (fugitive dust)	Best Management Practices	None	
Local CO	None	9.0 ppm (8-hour average), 20.0 ppm (1-hour average)	
GHGs – Projects other than Stationary Sources	None	Compliance with Qualified GHG Reduction Strategy OR 1,100 MT of CO2e/yr OR 4.6 MT CO2e/SP/yr (residents+employees)	
GHGs –Stationary Sources	None	10,000 MT of CO2e/yr	
Risk and Hazards for new sources and receptors (Individual Project)	Same as Operational Thresholds**	Compliance with Qualified Community Risk Reduction Plan OR Increased cancer risk of >10.0 in a million	

		Increased non-cancer risk of > 1.0 Hazard Index (Chronic or Acute) Ambient PM2.5 increase: > 0.3 µg/m3 annual average Zone of Influence: 1,000-foot radius from property line of source or receptor
Risk and Hazards for new sources and receptors (Cumulative Threshold)	Same as Operational Thresholds**	Compliance with Qualified Community Risk Reduction Plan OR Cancer: > 100 in a million (from all local sources) Non-cancer: > 10.0 Hazard Index (from all local sources) (Chronic) PM2.5: > 0.8 µg/m3 annual average (from all local sources) Zone of Influence: 1,000-foot radius from property line of source or receptor
Accidental Release of Acutely Hazardous Air Pollutants	None	Storage or use of acutely hazardous materials locating near receptors or new receptors locating near stored or used acutely hazardous materials considered significant
Odors	None	5 confirmed complaints per year averaged over three years

CEQA = California Environmental Quality Act; CO = carbon monoxide; CO_2e = carbon dioxide equivalent; GHGs = greenhouse gases; lb/day = pounds per day; MT = metric tons; NO_X = oxides of nitrogen; $PM_{2.5}$= fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less; PM_{10} = respirable particulate matter with an aerodynamic resistance diameter of 10 micrometers or less; ppm = parts per million; ROG = reactive organic gases; SO_2 = sulfur dioxide; SP = service population; TACs = toxic air contaminants; TBP = toxic best practices; tons/day = tons per day; tpy = tons per year; yr= year; TBD= to be determined.
*It is the Air District's policy that the adopted thresholds apply to projects for which a Notice of Preparation is published, or environmental analysis begins, on or after the applicable effective date. The adopted CEQA thresholds – *except for the risk and hazards thresholds for new receptors* – are effective June 2, 2010. The risk and hazards thresholds for new receptors are effective May 1, 2011.
** The Air District recommends that for construction projects that are less than one year duration, Lead Agencies should annualize impacts over the scope of actual days that peak impacts are to occur, rather than the full year.

Proposed Action: Impacts to air quality and climate change associated with the Proposed Action would result from vehicle emissions from employee commuting to the Project Area, emissions from the drilling rig and CPT rig, and emissions from onsite ATV use. These activities are considered construction-related and would result in the temporary generation of greenhouse gases (GHGs), reactive organic gases (ROGs), oxides of nitrogen (NOX), $PM_{2.5}$ and PM_{10} emissions during the 45 to 90 days duration of the Proposed Action. The Proposed Action will not result in any additional emissions associated with operation as the Terminal Reservoir and Putah South Canal. It is estimated that with the level of construction related activities described in the Proposed Action, the number of staff required, the distance of staff commute, and the duration of the project, the Proposed Action is well below the annual thresholds for air pollutants set by the BAAQMD (Table 1). There are temporary and short-term impacts associated with the Proposed Action causing a temporary increase of GHGs, but do not approach the time scale necessary to negatively impact climate change. No threshold of

significance has been established by the BAAQMD for construction-related GHGs. Therefore the impact of the Proposed Action to air quality and climate change is less than significant. Should activities associated with the Proposed Action change or be determined to approach or exceed the threshold of significance for any of these pollutants, additional environmental analysis will be performed.

Cumulative Effects: Information obtained from the Proposed Action may indicate that safety improvements to Terminal Reservoir and its two dams are required. Should future projects be identified, a separate environmental document will address additional impacts.

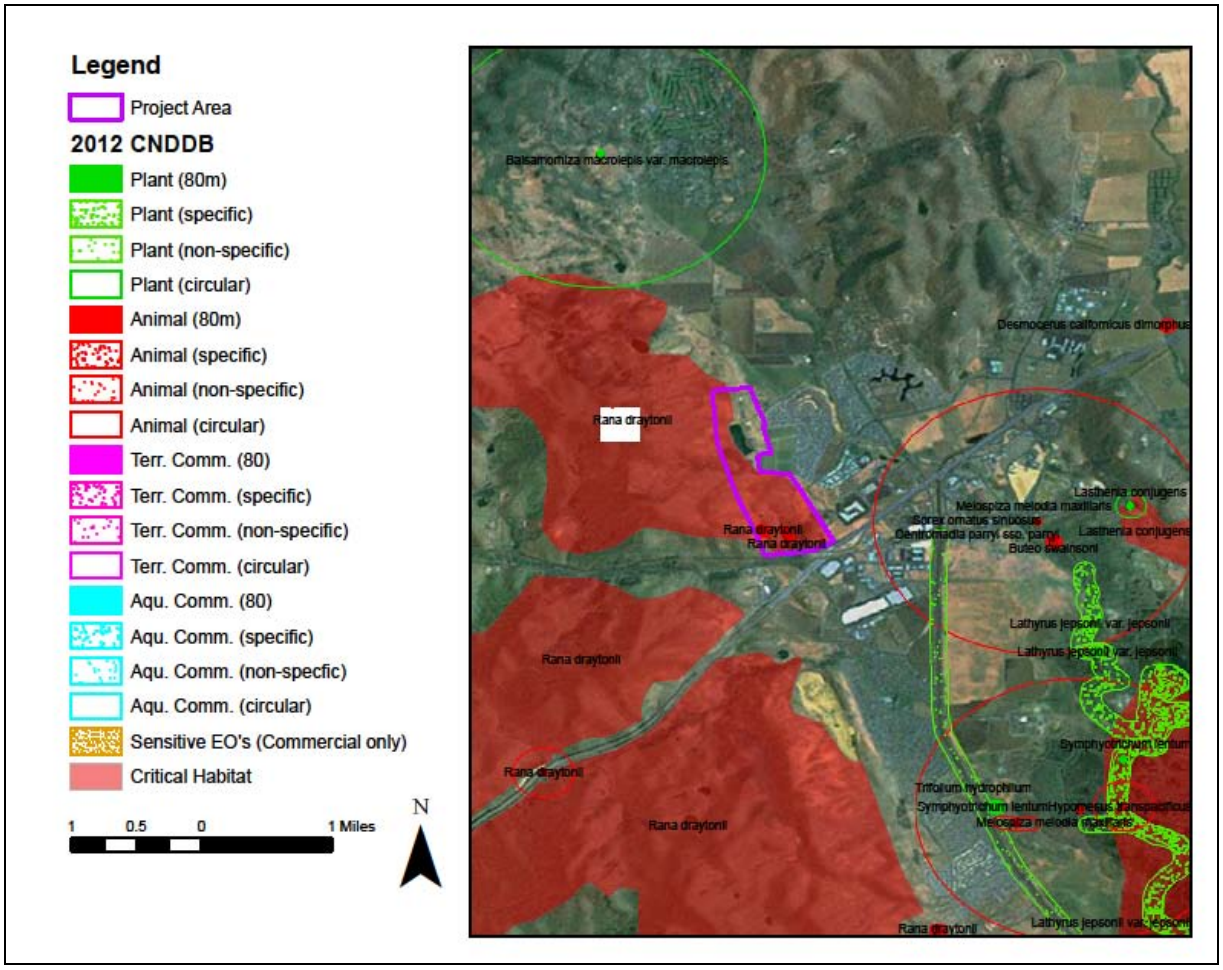
Conclusions: Implementation of the Proposed Action may have a less than significant affect to air quality and climate change. Additional impacts that may occur as part of future activities will be analyzed in a separate environmental document.

Biological Resources

Current Conditions: Migratory birds utilize Terminal Reservoir within the Project Area. Review of existing information, including a search of the California Natural Diversity Database (2012) (CNDDB), the following sensitive species were identified as having potential to occur in or near the project area (see Figure 3):

- American peregrine falcon (*Falco peregrinus anatum*),
- bald eagle (*Haliaeetus leucocephalus*),
- Belding's savannah sparrow (*Passerculus sandwichensis beldingi*),
- California black rail (*Laterallus jamaicensis coturniculus*),
- California clapper rail (*Rallus longirostris obsoletus*),
- California seablite (*Suaeda californica*),
- California red-legged frog (*Rana draytonii*),
- Contra Costa goldfields (Lasthenia conjugens),
- mountain plover (*Charadrius montanus*),
- salt-marsh harvest mouse (*Reithrodontomys raviventris*),
- soft bird's-beak (*Chloropyron molle ssp. molle*),
- steelhead - central California coast DPS (*Oncorhynchus mykiss irideus*),
- western snowy plover (*Charadrius alexandrinus nivosus*).

Figure 3: Sensitive species in vicinity of Project Area



California red-legged frog (*Rana draytonii* - CRLF) is the only known occurrences of listed, proposed, or candidate threatened or endangered species identified in the CNDDB within or near the project footprint. CRLF are present in many counties in California. This species of frog that can live 8-10 years, is active day or night, and aestivates in mammal burrows during the summer. The species is non-migratory, however can travel over 2 miles between breeding and non-breeding habitat. Non-breeding habitat are ponds and wetted areas, or in grasslands, shrubs and wetlands within a mile of a permanent body of water. Breeding occurs during January-July, most typically in the winter or spring following a precipitation event, in permanent or seasonal bodies of ponds, marshes, slow moving bodies of water, and possibly lakes. Eggs are attached to emergent vegetation or float on the surface of the water, and the larvae emerge within 14 days. Larvae metamorphose at 3.5 to 7 months.

Proposed Action: Critical habitat for the CRLF is located within and adjacent to the Project Area, and the entire site is potentially suitable habitat due to its close proximity to critical habitat, permanent standing water and streams, and undeveloped grasslands in close proximity to sources of permanent water. A documented occurrence of CRLF is listed in the CNDDB within the project area. Suitable breeding habitat is also present within or near the project area in areas of permanent and seasonally standing water. See Table 2 and Figure 4.

Table 2: Suitable Habitat within the Project Area

ID	Habitat Description	Suitability for CRLF
1	Pond	Suitable for all life stages
2	Slow-moving creek	Suitable for all life stages
3	Creek	Suitable for adults and as movement corridor
4	Terminal Reservoir, some areas of emergent vegetation	Possibly suitable for all life stages
5	Pond	Suitable for all life stages, documented occurrence

Figure 4: Suitable and Critical Habitat within the Project Area

Due to the nature of the Proposed Action, the activities cannot be located outside suitable habitat for CRLF. The following Best Management Practices (BMPs) will be implemented to limit impacts to the CRLF.

- All onsite staff will receive mandatory Environmental Awareness Training Program prior to working on the project site. The program will include CRLF species identification information and photographs, an explanation of Federal laws protecting these listed species, and employee's personal responsibility to avoid the take of listed species. All employees will acknowledge that they have received and read the training, and this documentation will be kept on file and will be available on request.
- The Proposed Action will occur during the dry season of 2012, sometime between May 1 and October 31. All work will be conducted during daylight hours: 7:00 am to 7:00 pm. No lights will be left on and no noise will occur outside of these hours, and no trash will be left open to serve as an attractant to species.
- Areas recognized as providing suitable breeding habitat for RLF within the project area will not be used as staging areas. Upon project completion all equipment will be removed, leaving minimal evidence of the action or ground disturbance. Suitable and critical habitat for CRLF will not be permanently impacted by the Proposed Action.
- Access to wetted areas, including wetlands and ponds, will be by foot-traffic only; ATVs will not enter any wetted area except at preexisting road crossings. Vehicle access will be limited to existing paved and dirt roads. Construction of access roads is not required. Off-road travel and transportation of equipment will be by foot and light-footprint all-terrain vehicles (ATVs). All traffic will travel at or less than 15 miles per hour within the Project Area.
- No planned vehicle fueling or maintenance will occur within the Project Area. If unexpected vehicle fueling or maintenance is required and relocation is not feasible, these activities will occur at least 50 feet from any wetted area or on a paved surface.
- Each exploratory drilling hole will be backfilled with cement grout or finished as an observation well. Each hole resulting from the CPT will be covered with dirt to prevent attracting CRLF. No holes, either from the exploratory drilling or CPT, will be left uncovered overnight.
- Equipment will be located so that no clearing of vegetation will be required, unless approved by a biologist.
- If at any time a CRLF or any other listed species is discovered within the project area, the individual will not be disturbed and at least a 25 foot buffer zone will be observed. If work cannot continue without disturbing the individual, work will stop immediately and the onsite Project Manager will be immediately informed. The animal will be allowed to move out of the area on its own volition or a Service-approved biologist will be consulted prior to any further action.
- FWS will be notified within one working day of the discovery of any injured or dead CRLF identified within the Project Area.

Given the temporary impact on suitable and critical habitat within the Project Area and the BMPs outlined above for the Proposed Action, the proposed action will have less than significant impact on special status species, or designated or proposed critical habitat protected under the Endangered Species Act (ESA). Based on the nature and duration of the Proposed Action there is no impact on migratory birds.

No Action: Under the No Action Alternative there would be no new activities onsite, therefore there would be no impact to special status species or other biological resources.

Cumulative Effects: Information obtained from the Proposed Action may indicate that safety improvements to Terminal Reservoir and its two embankment dams are required. Should future projects be identified, a separate environmental document will address additional impacts. Potential impacts to listed species or critical habitat will be mitigated. Therefore, there are no cumulative effects to listed species or critical habitat.

Conclusions: Implementation of the Proposed Action would result in a less than significant impact to special status-species and critical habitat protected under the ESA and migratory birds.

Noise

Current Conditions: The project area encompasses the Terminal Reservoir, the South Dam and the Northwest Auxiliary Dam, and the surrounding rural land, which is used for cattle grazing. Residential homes and rural lands are immediately adjacent to the project site.

A pumping plant south of Terminal Reservoir and within the Project Area produces continuous noise at approximately 50 decibels at 100 feet. Residential homes are approximately 300 feet from these pumps. Minor and temporary noise is generated from general O&M activities by SCWA/SID around Terminal Reservoir. No other noise affects are associated with the operation of Terminal Reservoir.

Proposed Action: Under the Proposed Action, drilling, CPTs, and use of an ATV and other vehicles associated with the proposed action would generate temporary noise. The drilling and CPT activities will generate approximately 50 decibels at 100 feet. These activities will take place on rural land, the auxiliary dams, and the O&M road surrounding Terminal Reservoir. The drilling and CPT activities will be within approximately 300 feet from residential homes located southeast of Terminal Reservoir, and more than 500 feet from all other residential homes. Minor and temporary noise will be generated throughout the Project Area from the use of ATVs and other vehicles. All activities will occur between 7:00 AM and 7:00 PM.

No Action: Under the No Action Alternative, there would be no change to the noise levels. Noise levels related to the onsite pump would remain at approximately 50 decibels at 100 feet.

Cumulative Effects: Information obtained from the Proposed Action may indicate that safety improvements to Terminal Reservoir and its two dams are required. Should future projects be identified, a separate environmental document will address additional impacts.

Conclusions: Given the nature of the additional noise resulting from the Proposed Action and the current noise affects within and adjacent to the Project Area, implementation of the Proposed Action may have a minor but less than significant noise effect. Additional impacts

that may occur as part of future activities will be analyzed in a separate environmental document.

Public Health and Safety

Current Conditions: No hazardous materials are stored onsite or are regularly used as part of O&M activities for Terminal Reservoir, therefore hazardous materials pose no risk to public health and safety.

The Project Area is located in an area of high seismic activity. Active faults in the region include the Concord/Green Valley, Cordelia, West Napa, Great Valley, Hunting Creek-Berryessa, Rodgers Creek, and Hayward faults. The Green Valley Fault has the potential for small and earthquakes. Impacts from an earthquake include fault rupture, ground shaking and ground failure. Due to the presence of multiple active faults in the area, the potential for ground shaking is high. Due to the moderate soil depth, the minor to moderate slopes present, and the seismic activity in the area, the potential for landslides is moderate to high. Fault rupture is possible for the Green Valley fault during a major earthquake (Solano County 2009).

Proposed Action: The Proposed Action would provide geotechnical and geophysical information and the risk future earthquakes may pose to the Terminal Reservoir, its two embankment dams and the surrounding area. All batteries required for the Proposed Action will be stored correctly. No hazardous materials will be transported, used or stored onsite. The Proposed Action will not directly impact the risk to public health and safety.

No Action: Under the No Action Alternative, there would be no new activities onsite. Without the Proposed Action, no possible safety improvements to Terminal Reservoir and its two embankment dams will be identified. The No Action Alternative may, therefore, result in an impact to public health and safety.

Cumulative Effects: Information obtained from the Proposed Action may indicate that safety improvements to Terminal Reservoir and its two embankment dams are required. Should future projects be identified, a separate environmental document will address additional impacts.

Conclusions: Implementation of the Proposed Action will have no direct affect to Public Health and Safety, and may increase public health and safety in the future by identifying possible safety improvements. Implementation of the Proposed Action, when added to other past, present and reasonably foreseeable future actions, may result in a positive benefit to public health and safety.

Soil, Minerals, and Geologic Resources

Current Conditions: Terminal Reservoir is situated in the foothills of the Coast Range, which trend north-south, and are characterized by a series of hill and valleys. The surrounding area primarily consists of rolling hills, trending down to the south and south-east and eventually reaching sea-level at Grizzly Bay, Suisun Bay, and the Carquinez Strait. Geologic maps of the

region characterize the Project Area as Quarternary hillslope deposits, Quarternary landslide deposits, Quarternary alluvium or alluvial fan deposits, Miocene volcanic rocks, and Eocene sedmintary rocks (USGS Geologic Map 1999 and 2005).

Soils of Terminal Reservoir and the project area are part of the Dibble-Los Osos association, characterized by gently sloping to steep, well-drained loams and clay-loams formed from sandstone with mountainous uplands. Soils are moderately deep (US Department of Agriculture 1977). No mineral resources are identified.

The Project Area is located in an area of high seismic activity. Active faults in the region include the Concord/Green Valley, Cordelia, West Napa, Great Valley, Hunting Creek-Berryessa, Rodgers Creek, and Hayward faults. The Green Valley Fault has the potential for small and major earthquakes. Impacts from an earthquake include fault rupture, ground shaking and ground failure. Due to the presence of multiple active faults in the area, the potential for ground shaking is high. Due to the moderate soil depth, the minor to moderate slopes present, and the seismic activity in the area, the potential for landslides is moderate to high. Fault rupture is possible for the Green Valley fault during a major earthquake (Solano County 2009).

Proposed Action: The drilling and CPTs will disturb the soil and subsurface to depths between 100 and 200 feet. Data collection using the MASW, SR and ERI methods will cause surface disturbance of 18 inches or less. Vehicles operating within the Project Area could cause soil compaction and erosion, but all impacts are expected to be minimal.

No Action: Under the No Action Alternative there would be no new activities onsite, therefore there would be no impact to soils, minerals or geologic resources.

Cumulative Effects: Information obtained from the Proposed Action may indicate that safety improvements to Terminal Reservoir and its two dams are required. Should future projects be identified, a separate environmental document will address any additional impacts.

Conclusions: Geology and soil impacts from the Proposed Action are expected to be minimal. Additional impacts that may occur as part of future activities will be analyzed in a separate environmental document.

Visual Resources

Current Conditions: The Project Area is on the boundary between the rural and residential environment. The Terminal Reservoir occupies Reclamation land and is adjacent to land used for cattle grazing. The agricultural land surrounding Terminal Reservoir is infrequently accessed for operations and maintenance and requires approval of private land owners. Residential homes are nearby. The area provides residents and visitors a scenic vista of the surrounding mountains. Because the Terminal Reservoir is elevated, the project area is visible from the surrounding area.

Proposed Action: The Proposed Action is temporary and will last between 45 and 90 days, and therefore is not expected to substantially degrade the existing visual character of the area. No permanent features will be altered as part of the Proposed Action. No substantial adverse effects are expected to impact visual resources.

No Action: Under the No Action Alternative there would be no new activities onsite, therefore there would be no effects to visual resources.

Cumulative Effects: Information obtained from the Proposed Action may indicate that safety improvements to Terminal Reservoir and its two dams are required. Should future projects be identified, a separate environmental document will address any additional impacts.

Conclusions: Implementation of the Proposed Action may have a minor but less than significant effect to visual resources. Additional impacts that may occur as part of future activities will be analyzed in a separate environmental document.

Water Resources

Current Conditions: The Terminal Reservoir is a 92 acre-foot reservoir formed by two earthen embankment dams. The reservoir was constructed and is owned by Reclamation, operated by Solano Irrigation District under contract with Solano County Water Agency, and supplies drinking water to the cities of Vallejo and Benicia. Terminal Reservoir is part of the Solano Project, and is fed by the Putah South Canal with water impounded by the Monticello Dam at Lake Berryessa. Putah Creek is the source of water for the Solano Project. The drainage basin, comprising 576 square miles above Monticello Dam, lies to the northwest of Solano County on the eastern slope of the Coast Range in Napa and Lake Counties (Reclamation 2009 and Reclamation 2011).

Proposed Action: Under the Proposed Action, geotechnical and geophysical investigations will gather data on the Terminal Reservoir, its two embankment dams and the immediate vicinity. As part of the Proposed Action, water from Terminal Reservoir will be required during some of the drilling activities, and to properly complete bore holes once drilling and data collection activities are accomplished. Approximately 50 gallons of water will be needed per drilling day, totaling approximately 3000 gallons, or one hundredth of a percent of the holding capacity of Terminal Reservoir. Any withdrawals from Terminal Reservoir will be approved by Solano Irrigation District and Solano County Water Agency in advance. There would be no change to the dams or operation of Terminal Reservoir that would impact water resources.

No Action: Under the No Action Alterative geotechnical and geophysical information would not be collected and no safety improvements to the Terminal Reservoir and its dams would be recommended. Without necessary safety improvements, water supply from Terminal Reservoir may be impacted during an earthquake. The No Action Alternative may, therefore, result in a less reliable water supply and cause negative impacts.

Cumulative Effects: Information obtained from the Proposed Action may indicate that safety improvements to Terminal Reservoir and its two embankment dams are required. Should future projects be identified, a separate environmental document will address additional impacts.

Conclusions: Implementation of the Proposed Action will have a less than significant effect to present water resources. Implementation of the Proposed Action, when added to other past, present and reasonably foreseeable future actions, may result in a positive benefit to water resources.

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