Appendix 1

Initial Study/Notice of Preparation,
and Public Comments

Initial Study
for the
Rimforest Storm Drain Project

Lead Agency:

San Bernardino County
Flood Control District
825 East Third Street
San Bernardino, California 92415

Technical Assistance Provided by:

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A. Project Description

The County of San Bernardino (County), proposes to construct and maintain a series of drainage facilities to address historic erosion and landsliding in the southern Rimforest community. The remediation approach (proposed project) developed to address slope stability issues, includes rerouting existing drainage patterns away from southern Rimforest and towards the north, into Little Bear Creek, which drains to Lake Arrowhead. The San Bernardino County Flood Control District (SBCFCD), a separate legal entity, is acting in an advisory capacity to the County for this project.

A.1 Background

Highway 18, or State Route 18 (SR-18) was constructed through the community of Rimforest in the 1920s, and included culverts that concentrated historic stormwater runoff within roadside drainage ditches and cross culverts. Subsequent development within the community further altered stormwater runoff patterns in the area. Historic topographic maps dated prior to the construction of SR-18 indicate that a sizable portion of the Rimforest area north of what is now SR-18 and east of Strawberry Peak followed a drainage course that flowed in a southeasterly direction, near the current alignment of Blackfoot Trail West, and then curved in a northeasterly direction towards Lake Arrowhead, within the Mojave River Watershed (Bonadiman, 2010a). Development of the community of Rimforest included installation of a stormwater conveyance system, including two storm drain catch basins and pipes along Apache Trail, which direct surface water off the road and over the cliff in the southern portion of Rimforest, towards Strawberry Creek in the Santa Ana River Watershed, essentially reversing the direction of historic drainage in the area.

Landsliding and erosion in the southern portion of Rimforest was first noted in 1978, when a sewage pump station was damaged. Since 1978, the active landslide area has grown laterally to involve a greater area, and has continued into the southern portion of the community. The pump station, several houses, and a residential street have been damaged or destroyed. Localized over-steepened conditions have made much of the Rimforest area susceptible to additional failure. Over-steepened slopes undermine otherwise more stable areas in the vicinity and produce larger areas that are potentially unstable. In addition to slope steepness, other components that contribute to the stability of the Rimforest area include rock integrity, slope geometry and geomorphology, tectonics, seismicity, bedrock orientation, fractures, faulting, shear zones, groundwater, and surface water runoff. (Bonadiman, 2010b)

Between 1978 and 1993, a period of frequent landslide movement in the area south of Apache Trail occurred. Headward retrogression was estimated to have been up to eight feet per year. Comparison of survey information from 1993 and 2009 indicates an annual slope regression of approximately 0.75 feet per year during this time period. The most notable area of difference is near and immediately below the current storm drain outlet, runoff water falls approximately 200 feet to the eroded slope face. In total, the top edge of the slope receded approximately 26 feet between 1993 and 2009, and approximately 12 feet of vertical material was lost at the pipe outlet. This regression is expected to continue until the storm water can be diverted. (Bonadiman, 2010b)

A Drainage Feasibility Study was prepared for the Rimforest area and finalized in November of 2010; the primary purpose of that study was to estimate how effective controlling surface runoff may be with regards to slowing headward retrogression of landslide activity into the south edge of Rimforest. This study determined that the routing of stormwater runoff into Strawberry Creek has contributed significantly to erosion of the Rimforest slide area, and that high groundwater levels may have an equal or nearly equal effect on slope stability. Preventing stormwater runoff from reaching this area is

expected to reduce the frequency of large slope movement by up to 50 or 75 percent, but will have little effect on groundwater conditions; because there is a clear connection between groundwater and slope instability, the rerouting of flows away from the landslide area will not prevent all future slope movement in the area, but will slow the progression of such movement. (Bonadiman, 2010a/b)

A.2 Purpose and Need

Severe erosion and landsliding over the past 30 years has resulted in significant property loss, with the areas immediately south of Blackfoot Trail West and Apache Trail having been seriously impacted by more than 100 feet of bluff retreat. The rerouting of stormwater flows away from the southern area of Rimforest is necessary to minimize continued slope movement and reduce hazards to existing property in the area. The purpose and need for the proposed project is to divert stormwater flows away from Strawberry Creek and into Little Bear Creek in order to mediate ongoing erosion and landsliding hazards which pose significant risk to property and the public in southern Rimforest.

A.3 Project Location

As shown in Figure 1, the proposed project is located in the community of Rimforest, in the San Bernardino Mountains near Lake Arrowhead, approximately six miles north of the City of San Bernardino in the County of San Bernardino, California. Surrounding land uses and project site specifics are provided below.

A.3.1 Surrounding Land Uses and Setting

Rimforest is an unincorporated community in the San Bernardino Mountains of San Bernardino County, California. SR-18 runs through the community. Residential development and commercial uses are located south of SR-18, within the community of Rimforest, and residential development is also located to the north. Directly south of the residential uses in the community is the San Bernardino National Forest, which is federal land and will remain undeveloped. There are few developed recreational facilities in the proposed project area. A majority of the land to the immediate south of Rimforest is eroding cliff-side, a result of runoff from SR-18. Rim of the World High School is located approximately one mile to the east of the community of Rimforest.

The headwaters of Little Bear Creek drain from the northeastern vicinity of Rimforest, through the communities of Blue Jay and Lake Arrowhead, and into the Lake Arrowhead Reservoir. In addition, the headwaters of Strawberry Creek drain from the southern vicinity of Rimforest, into City Creek, and eventually terminate at the Santa Ana River. The Strawberry Creek watershed is part of the larger watershed of the Santa Ana River, which is within the safe yield of the San Bernardino Valley Municipal Water District (SBVMWD), meaning that the SBVMWD holds water rights to this drainage area. (Bonadiman, 2010a)

A development proposed by the Church of the Woods (COTW) is located in the northeastern area of the community of Rimforest, on the north side of SR-18, and the drainage output point for the proposed project is located on the COTW property. The COTW project would develop approximately 23 acres of a currently undeveloped 37-acre property. Roughly 14 acres of the site would be designated “open

Figure 1

Regional Location

space;" a portion of the proposed project would be located on this open space area. An EIR was prepared for the COTW project.

A.3.2 Project Site and Vicinity

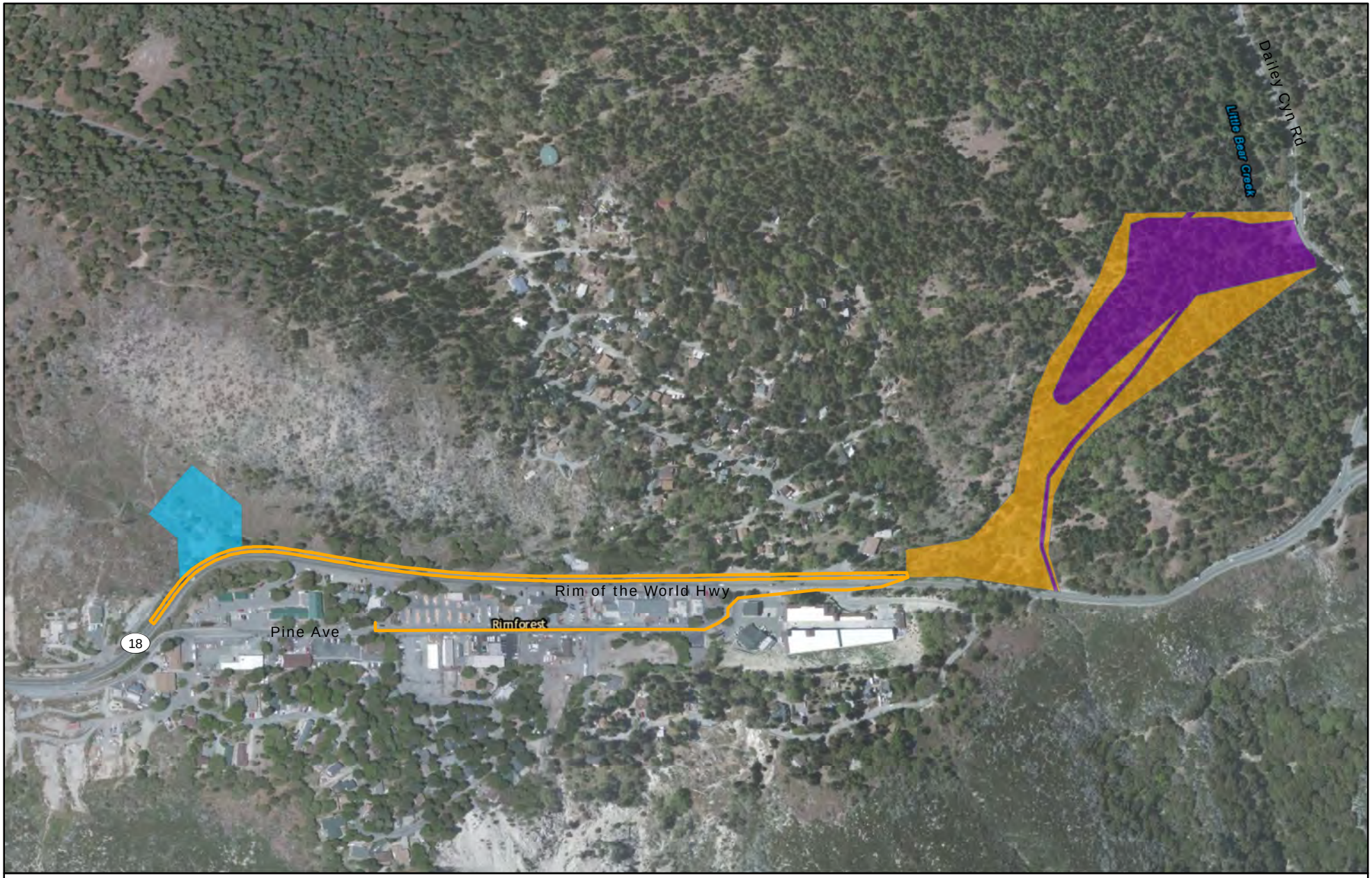
The proposed project site is located in Township 2 North, Range 3 West, Section 30, immediately north of the San Bernardino National Forest, in the community of Rimforest. Access to the site is off SR-18, Rim of the World Highway, which runs in a west-east alignment through the community of Rimforest. Pine Avenue runs parallel to the south of SR-18. Blackfoot Trail West runs in a north-south alignment through the western portion of Rimforest, between Pine Avenue and the landslide area in southern Rimforest. Apache Trail connects to Blackfoot Trail West approximately 250 feet south of Pine Avenue, and continues to the east then south, towards the landslide area in southern Rimforest.

A.4 Proposed Project

The proposed project would divert runoff from its current flow-path through the community of Rimforest and outlet at the landslide area in southern Rimforest, into a new flow-path comprised of channels and pipeline to the north of SR-18, with an outlet into Little Bear Creek on the COTW property. Please see Figure 2 for a site plan. In re-directing this runoff, the proposed project would result in runoff flowing into the Mojave River Watershed instead of the Santa Ana River Watershed; as described in Section A.1 (Background), based on available evidence it is believed this was the historic drainage direction, prior to construction of SR-18 and establishment of the community of Rimforest. The diversion of runoff between watersheds would require approval of the SBVMWD and the State Water Resources Control Board (SWRCB), as well as the Santa Ana River Regional Water Quality Control Board (RWQCB), which has jurisdiction over the Santa Ana River Watershed, and the Lahontan RWQCB, which has jurisdiction over the Mojave River Watershed (Bonadiman, 2010a).

Downstream of the point where the proposed project would contribute flows to Little Bear Creek, the creek continues in a series of stormwater conveyance features through the unincorporated communities of Blue Jay and Lake Arrowhead, terminating at Lake Arrowhead Reservoir. Within the community of Blue Jay, an existing maintenance yard owned and operated by the County Department of Public Works (DPW) is located within the Little Bear Creek drainage; this maintenance yard is referred to as the Blue Jay Maintenance Yard. The maintenance yard is currently equipped with a three-foot-wide storm drain pipe to transmit flow in Little Bear Creek through the facility; however, this system is inadequate to contain the increased storm flow that would occur under the proposed project. The maintenance yard conveyance system may already be inadequate to contain existing storm flows, as asphalt within the yard appears to be damaged by water-related cracking, which occurs when water seeps to the asphalt base, causing the base to soften and form cracks which penetrate the surface, eventually leading to potholes. Therefore, in order to avoid further damage to the Blue Jay Maintenance Yard conveyance system, the proposed project would include a series of retarding basins on a property currently owned by the COTW, near the proposed project's output point into Little Bear Creek. These retarding basins, described further below, would slow the rate of stormwater flows in Little Bear Creek.

As mentioned, Little Bear Creek terminates at the Lake Arrowhead Reservoir. The current water supplier for Lake Arrowhead is the Lake Arrowhead Community Services District (LACSD), which presently purchases Feather River water from the SBVMWD, which is then transferred through Crestline Lake Arrowhead Water Agency (CLAWA). The proposed project would result in approximately 100 more acre-feet per year (afy) of water in Lake Arrowhead, potentially available for treatment and distribution by the LACSD. (Bonadiman, 2010a).



Storm Drain
Temporary Impact Area
Grading Area
Permanent Impact Area

0 250 500 Feet

Figure 2

Proposed Project Site Plan

A.4.1 Project Elements

In order to divert surface waters as proposed, the proposed project includes a series of channels, pipes, and retarding basins. With development of the storm drain systems and retarding basin(s), the proposed project would divert a total of approximately 100 acre-feet per year into Little Bear Creek (MBA, 2010). Primary elements of the project would be implemented in two distinct phases, described below.

Phase 1

Phase 1 of the proposed project would intercept the largest part of runoff to be diverted under the proposed project, and result in a 64 percent reduction (in runoff). Improvements constructed under this phase would convey mountainside runoff from an area of approximately 51 acres, and deliver this runoff to Little Bear Creek. This phase of the proposed project includes approximately 0.8 miles of flood control improvements, comprised of approximately 0.2 miles of channel/basin and approximately 0.6 miles of pipe culvert and appurtenances.

- *Channelized Reach(s).* The proposed channel sections would be of varying width and depth and trapezoidal in configuration. Channelized reaches would be located near the inlet and outlet of the proposed basin(s) and would be armored to prevent erosion. The configuration of the channel sections will be determined by the SBCFCD and designed to be sufficient to convey the mountainside runoff and associated debris.
- *Culvert & Appurtenances.* The culvert system would be aligned along the north side of SR-18 extending from the west end of the community of Rimforest to the east end of the community discharging into the proposed basin via an inlet channel as described above, and would include street inlets to filter debris onto SR-18. Stormwater flows would be directed via the culvert/basin systems into Little Bear Creek. Currently, runoff into Little Bear Creek occurs from an area of approximately 40 acres north of SR-18; diverting runoff from a 50-acre area would therefore increase runoff into the creek. Phase 1 is anticipated to introduce an additional 100-year storm flow of approximately 225 cubic feet per second (CFS) into Little Bear Creek.
- *Basin(s).* Retarding basin(s) would be constructed within the Little Bear Creek channel, downstream of the point where flows diverted by the culvert system described above would enter the drainage. This basin system would be designed to reduce peak storm flows discharging into Little Bear Creek, and would include a drain culvert and armored emergency spillway which would discharge to Little Bear Creek via an armored energy dissipater. The retarding basin(s) are included in the Phase 1 design because downstream stormwater drainage structures in the Little Bear Creek channel would not have sufficient capacity to transmit peak flows with the additional runoff contributed by the diversions described above. Jurisdictional ephemeral and perennial but non-wetland waters of the State and federally jurisdictional "waters of the U.S." will be defined on the COTW property. The EIR will evaluate any of these areas that will be impacted by the proposed project. Any impacts to jurisdictional waters, wetlands, or riparian habitat associated with the proposed project would require authorization from the United States Army Corps of Engineers (USACE), SWRCB, RWQCB and the California Department of Fish and Wildlife (CDFW). Phase 2

Phase 2 of the proposed project would divert runoff from 16 acres of the interior portion of the community of Rimforest and result in a 30 percent reduction (in runoff). This phase includes installation of a culvert system to direct runoff from Pine Avenue, which runs parallel to the south of SR-18, and under SR-18 to join flows diverted by Phase 1 in Little Bear Creek. The Phase 2 culvert system would include street inlets and storm drains within Rimforest to facilitate the diversion of flows along Pine

Avenue. A culvert system would be installed through an existing lumber yard off Pine Avenue, connecting to the main culvert system along Pine Avenue. By diverting Pine Avenue runoff into Little Bear Creek, Phase 2 would introduce an additional 100-year storm flow of 100 CFS. After a confluence with the Phase 1 flow into Little Bear Creek, the peak 100-year flow into Little Bear Creek would be approximately 500 CFS.

The COTW development also proposes to implement stormwater drainage improvements along Little Bear Creek, including construction of culvert system that would initiate at an existing storm drain at the southwestern corner of the COTW site (PCR, 2010); this is the same area where flows associated with the proposed project would enter the COTW property, via the Pine Avenue culvert system described above. The COTW proposed culvert system would route through the property along the same alignment as the Little Bear Creek drainage and an existing sewer line, also generally parallel to a proposed COTW sewer alignment (PCR, 2010). Approximately midway through the COTW site, the new culvert system would discharge into the Little Bear Creek drainage and flow northeasterly through the property (PCR, 2010). Due to the location of the proposed project's discharge point at the southwestern portion of the COTW property, it is reasonably anticipated that flows associated with the proposed project would be transmitted through the COTW conveyance system described above, discharging into the proposed project's retarding basins within Little Bear Creek. The COTW proposed conveyance system may or may not be in place at the time of implementation of the proposed project; close coordination between the COTW and the County DPW is ongoing to coordinate implementation of project elements.

The existing storm drain catch basins and pipes along Apache Trail would be left in place and would continue to convey a small amount of stormwater runoff through the community of Rimforest to the existing output location at the landslide area in southern Rimforest.

A.4.2 Construction

Schedule. Construction of the proposed project may require phasing and could occur over multiple four-to-five month-long periods during summer seasons. Hours of operation during construction would be limited to daylight hours. No construction activities would occur during snow months.

Earth Disturbance. Earth-disturbing activities would occur during construction of the proposed project in order to install the proposed project features described above. Table A.4.2-1 provides estimates of the types of earth-disturbing activities required during construction of the proposed project, and the associated quantities of materials.

Table A.4.2-1. Construction – Materials Quantities

Project Feature	Activity / Material	Quantity
Pipeline	Soil excavation and trenching to install pipeline	20,000 to 30,000 cubic yards
Retarding Basins (3)	Soil excavation to provide detention volume of up to 20 acre feet	n/a*
	Rock slope protection and rip-rap	500 to 1,000 cubic yards
General	Demolition of asphalt/concrete pavement	5,000 to 6,000 linear feet
	Re-paving of asphalt/concrete pavement	5,000 to 6,000 linear feet

* Specific quantities of soil excavation that would be required to provide the needed detention volume depend upon site-specific topography and soil conditions, and will be determined during final engineering of the proposed project.

Following is a summary list of the types of earth-disturbing activities that would occur in association with the proposed project elements described in Section A.4.1 (Project Elements).

- Excavation / trenching and slope protection would be required to install the culvert system north of SR-18.
- The pipelines proposed to the north of SR-18 and from Pine Avenue to Little Bear Creek would likely be installed in eight-foot segments, the size in which the pipes are manufactured, with the trench back-filled following the placement of each eight-foot segment.
- Trenching up to depths of 22 feet may be required to install the pipeline from Pine Avenue and under SR-18 to Little Bear Creek.
- The retarding basins on the COTW property would likely be constructed prior to the culvert system(s), and would require excavation activities to achieve desired detention volume of up to 20 acre feet.

Clear and grub wastes generated during construction of the proposed project may be taken to Heaps Peak Transfer Station for disposal. Other exported waste types may also be disposed of at this transfer station or be made the property of the contractor to be used or disposed of outside of County right-of-way at their discretion. Heaps Peak Transfer Station is located at 29898 SR-18 at Heaps Peak in Running Springs, approximately five miles east of the proposed project site, along SR-18.

Equipment. The number of off-road vehicles and equipment to be used during construction of the proposed project could vary from one or two to as many as 20 or 30, depending on actual site conditions, construction schedule, and the specific construction activity. The types of equipment anticipated to be required during construction of the proposed project include the following: forklifts, water trucks, small scrapers, loaders with integrated backhoe, wheel-mounted air compressor(s), excavators, pneumatic breaker, pneumatic-tired motor grader, steel drum roller, self-propelled paving machine, and haul trucks.

Staging Areas. Specific staging area locations for vehicles, equipment, and materials during construction have not yet been identified. However, it is reasonably assumed that previously disturbed site(s) would be used for this purpose. There are several lumber yards and open lots in the proposed project area that could potentially be used for staging. In addition, the southern shoulder of SR-18 is quite wide in some areas and could also potentially be used for staging.

Transportation. It is anticipated that either State Highway 138 or Interstate 210 would be used to transport construction vehicles, equipment, and materials to and from the proposed project site, via SR-18. State Highway 138 travels in an east-west alignment from Interstate 5 south of Gorman (west of the proposed project area) to Mount Anderson Junction, where it joins SR-18 south of Crestline, west of the proposed project site. Interstate 210 travels in an east-west alignment from Interstate 5 at Sylmar (west of the project site) to Interstate 10 in Redlands (east of the project site).

Utilities. It is not anticipated that a construction management trailer would be required to support construction of the proposed project, and connection to utilities would therefore not be required either. The construction contractor selected by the County DPW to construct the proposed project would be responsible for providing generators and fuel as needed to power the equipment and vehicles required during construction.

Water. During construction of the proposed project, a water source would be required for dust control and soil compaction. It is anticipated that existing fire hydrants located within the community of Rimforest would be used to obtain the proposed project's water supply. A water truck(s) would be used to spray water on the ground surface as necessary to achieve dust control goals.

COTW. Construction of the proposed 38-acre COTW development would occur over at least a four-year period (PCR, 2010). This project would involve substantial earth disturbance, including grading, excavating, and landscape re-contouring across the COTW property. As noted, the proposed project's retarding basins would be located on this property. Based on the Final EIR for the COTW, it is understood that the retarding basins would be located on a parcel that the site plans denote as "Open Space." Construction of the proposed project would need to occur in coordination with the COTW development, and it is possible that construction of both projects would occur at the same time.

A.4.3 Operation and Maintenance

Operation and maintenance of the proposed project would include but is not limited to the following activities:

- Slope stabilization, where necessary to maintain the integrity of flood conveyance facilities;
- Removal of sediment and vegetation from the retarding basin(s) and channelized sections to maintain capacity;
- Regular inspection of facilities for wear and damage;
- Repair of facilities as needed; and
- Maintenance of vegetated landscape buffers.

No use of chemicals such as herbicides and pesticides, among others, are anticipated during operation of the proposed project. However, materials such as motor oil and lubricants would be used by inspection vehicles and equipment required for operational activities such as sediment removal and slope stabilization.

A.4.4 Project Design Features

The proposed project includes a number of design features that have been incorporated to avoid or reduce potential adverse environmental effects. These features are listed below.

- *Aesthetics.* Landscape buffers will be planted on portions of the retarding basin slopes as necessary.
- *Hydrology and Water Quality.* The county will prepare a Water Quality Management Plan (WQMP) and Stormwater Pollution Prevention Plan (SWPPP) to identify site design, pollution source control, and best management practices (BMPs) to prevent water quality degradation. The county will also perform a preliminary drainage study to analyze the addition of runoff to potential 100-year flood impacts at Lake Arrowhead.
- *Geology and Soils.* Geotechnical studies may be required to properly design the retarding basins and evaluate groundwater conditions (i.e. Whether shallow groundwater is present in excavation areas).

The measures listed above are project design features and will be implemented with the proposed project; these are not mitigation measures, or additional requirements considered necessary to avoid or minimize impacts.

A.5 Required Permits and Approvals

Construction and operation of the proposed project may require the discretionary actions and approvals listed below, per jurisdiction.

Federal

- United States Fish and Wildlife Service (USFWS)
  - Biological Opinion/Endangered Species Act/Section 7 Consultation
- United States Army Corps of Engineers (USACE)
  - Clean Water Act Section 404 Individual Permit

State

- California Department of Transportation
  - Right-of-way (ROW) Encroachment Permit
  - Transportation Permit
- California Department of Fish and Wildlife
  - Streambed Alteration Agreement / California Fish and Game Code Section 1600
  - 2081 Incidental Take Permit (if applicable)
- State Water Resources Control Board
  - Water rights transfer agreement
- Native American Heritage Commission
  - Consultation on Sacred Areas to comply with State requirements

Regional

- Santa Ana River and Lahontan Regional Water Quality Control Boards (RWQCBs)
  - National Pollutant Discharge Elimination System (NPDES) Permit (Stormwater Pollution Prevention Plan (SWPPP)
  - Water Quality Certification/Clean Water Act Section 401
  - Water rights transfer agreement

B. Environmental Determination

B.1 Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" and requiring implementation of mitigation as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Geology/Soils
☒ Greenhouse Gas Emissions	☐ Hazards/Hazardous Materials	☒ Hydrology/Water Quality
☒ Land Use/Planning	☐ Mineral Resources	☒ Noise
☐ Population/Housing	☒ Public Services	☐ Recreation
☒ Transportation/Traffic	☐ Utilities/Service Systems	☒ Mandatory Findings of Significance

B.2 Environmental Determination

On the basis of this initial evaluation:

☐ I find that the Proposed Project COULD NOT have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

☐ I find that although the Proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

☒ I find that the Proposed Project MAY have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

☐ I find that the Proposed Project may have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the Proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the Proposed Project, nothing further is required.

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Annesley Ignatius, Deputy Director
County of San Bernardino
Department of Public Works

5/21/15
Date

C. Evaluation of Environmental Impacts

C.3.1 Aesthetics

AESTHETICS **Would the project:**	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?	☐	☐	☒	☐
c. Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project have a substantial adverse effect on a scenic vista?

LESS THAN SIGNIFICANT IMPACT. The proposed project would occur along State Route 18 (SR-18), which is designated as an Eligible State Scenic Highway by the California Department of Transportation (Caltrans). The status of a proposed state scenic highway changes from eligible to officially designated when the local governing body applies to Caltrans for scenic highway approval and then adopts a Corridor Protection Program (Caltrans, 2012). Although SR-18 is not a State Scenic Highway as designated by Caltrans, SR-18 is designated as a Scenic Byway by the U.S. Forest Service, and San Bernardino County's 2007 General Plan designates SR-18 as a scenic route from San Bernardino northeast to the City of Big Bear Lake. This policy also states the County's desire to retain the scenic character of visually important roadways throughout the County (SBC, 2007).

Construction of the proposed project would temporarily have an adverse effect on the scenic vista surrounding the project site due to construction activity and vehicles. However, construction is expected to occur over an approximately four-month-long period, and operation of the proposed project would not present permanent structures that would obstruct scenic views from SR-18. Therefore, impacts from construction would be temporary and there would not be any permanent adverse effects during operation of the proposed project. As such, visual impacts associated with the proposed project would be less than significant.

b. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

LESS THAN SIGNIFICANT IMPACT. Construction of the proposed project would require earth-disturbing activities including excavation, trenching, and slope protection. Construction of the channel and pipeline would be parallel to SR-18, with the channel varying in width between four and six feet, and with all project features designed to avoid the removal of trees where possible. Some vegetation along the highway may be removed; however, the proposed channel and pipeline are located within an area of commercial and residential development, and the surrounding area is not pristine forest land. Therefore, the removal of vegetation would not substantially change the scenic views from SR-18. Construction of the retarding basins would include the removal of trees and vegetation. However, the retarding basins would not be visible from SR-18, and the removal of trees to install the retarding basins

would not alter scenic resources such as the view from the highway. Visual impacts associated with construction of the proposed project would be less than significant.

c. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

LESS THAN SIGNIFICANT IMPACT. The proposed project site is located in the community of Rimforest. Residential and commercial development is present along the proposed project site where the channel and pipeline would be constructed; therefore, the proposed project would not substantially degrade the visual quality and surroundings in this developed area. Construction of the retarding basins would require excavation, trenching, and the removal of trees, which would alter or degrade the existing visual character of the proposed project site. However, the proposed project would also include landscape buffers along the slopes of the retarding basins, which would avoid substantial degradation of visual character of the site. Therefore, with the proposed landscaping design features, this impact would be less than significant.

d. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

NO IMPACT. The main activities associated with construction of the proposed project would include excavation and trenching to install pipelines and construction of three retarding basins. Nighttime construction would not occur. Operation of the proposed project would include maintenance activities such as slope stabilization, removal of sediment from the retarding basins, and regular maintenance inspections. None of these activities would create new sources of light or glare. Therefore, there would be no impact under this criterion.

C.3.2 Agriculture and Forestry Resources

AGRICULTURE AND FORESTRY RESOURCES In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. **Would the project:**	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☒	☐
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as Shown on the Maps Prepared Pursuant to the Farmland Mapping and Monitoring Program (FMMP) of the California Resources Agency, to Non-agricultural use?

No Impact. The proposed project site is not within the FMMP survey boundary. Therefore, construction of the proposed project would not convert designated Farmland and there would be no impact under this criterion.

b. Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact. The project site is not located within the County's agricultural zoning districts, nor is it located on land under Williamson Act contracts. Therefore, there would be no impact under this criterion.

c. Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220[g]), timber-land (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104[g])?

NO IMPACT. The project site is not located on land that is zoned for forest land or timberland. Therefore, the proposed project would not conflict with existing zoning for forest land or timberland, and there would be no impact under this criterion.

d. Would the project result in the loss of forest land or conversion of forest land to non-forest use?

LESS THAN SIGNIFICANT IMPACT. The proposed project site is located within the community of Rimforest which is under the jurisdiction of the County of San Bernardino. The project site would traverse lands within the County's residential and commercial land use designations. Therefore, the proposed project would not affect land that is officially designated forest land by federal or local agencies.

Construction of the channel and pipeline would primarily occur along SR-18 in an area that is predominantly characterized by residential and commercial development. Therefore, these components of the proposed project would not convert forest land to a non-forest use. However, construction of the retarding basins would occur on up to ten acres of an undeveloped site located within an existing drainage channel that is surrounded by coniferous forest land. The removal of trees and vegetation would be required for construction; however, the retarding basins would be designed for minimal tree removal. In addition, the conversion of up to 10 acres of forest land to open space for the purposes of flood control would not be a significant loss of forest land. Therefore, conversion of forest land would be less than significant.

e. Would the project involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?

NO IMPACT. The proposed project would not convert any agricultural land to non-agricultural uses nor would it convert any forest land to non-forest use, and it is not anticipated that the proposed project would involve other changes that would result in conversions to non-agricultural or non-forest uses. In addition, as discussed under Population and Housing (Section C.3.13), the proposed project would not be growth-inducing and would, therefore, not be expected to substantially induce or exacerbate conversion of agricultural or forest land. Consequently, no conversion of Farmland to non-agricultural uses and no conversion of forest to non-forest uses would occur.

C.3.3 Air Quality

AIR QUALITY Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. **Would the project:**	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☒	☐	☐	☐
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☒	☐	☐	☐
d. Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
e. Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

b. Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

c. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

d. Would the project expose sensitive receptors to substantial pollutant concentrations?

POTENTIALLY SIGNIFICANT IMPACT. The proposed project site is located in the South Coast Air Basin (SCAB), which is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). Project construction would result in an increase in air emissions from off-road construction equipment and on-road trucks, fugitive dust, and worker trips. Project operation would also result in increases in air emissions generated by regular inspection and maintenance activities.

The proposed project would be required to comply with all applicable SCAQMD rules and regulations, but Project emissions could, nonetheless, interfere with implementation of the SCAQMD's AQMP. This issue will be analyzed further in the proposed project's EIR.

The SCAQMD has established standards for air quality priority pollutants including: ozone (O_3); carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); and particulate matter smaller than or equal to 10 microns in diameter (PM_{10}) and particulate matter smaller than or equal to 2.5 microns in diameter ($PM_{2.5}$). Construction and operation of the proposed project would contribute to an increase in air quality emissions for criteria pollutants. As such, air quality impacts from construction and operation of the project require detailed evaluation using the thresholds of significance established by the SCAQMD. Short-term emissions would result from the use of construction equipment and trips generated by construction workers and haul/material delivery trucks. Long-term emissions would result from operation and maintenance activities, including periodic slope stabilization and sediment removal

activities. Compliance with SCAQMD rules and regulations would be required during construction and operation. Mitigated construction and/or operation emissions could result in the violation of air quality standards or the exceedance of air quality thresholds of significance, which may contribute to an existing or projected air quality violation. Therefore, potential project level and cumulative air quality impacts will be further evaluated in the EIR.

Emissions generated from construction activities, especially particulate matter emissions, could potentially expose nearby sensitive receptors (such as schools, churches, hospitals, and nursing homes) to substantial pollutant concentrations. Operational activities could also expose nearby sensitive receptors to increased levels of air pollution. The comparison of project emissions against SCAQMD localized significance thresholds could identify a potential for adverse localized impacts. This issue will be analyzed further in the EIR.

e. Would the project create objectionable odors affecting a substantial number of people?

LESS THAN SIGNIFICANT IMPACT. Some objectionable odors may be temporarily created during construction-related activities, such as from diesel exhaust and paving activities. These odors would not affect a substantial number of people and would only occur in localized areas. Therefore, impacts related to objectionable odors would be less than significant.

C.3.4 Biological Resources

BIOLOGICAL RESOURCES **Would the project:**	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☒	☐	☐	☐
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☒	☐	☐	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☒	☐	☐	☐
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

POTENTIALLY SIGNIFICANT IMPACT. The proposed project could directly or indirectly impact wildlife species identified as threatened, endangered, candidate, or special status species by the California Department of Fish and Wildlife (CDFW) or U.S. Fish and Wildlife Service (USFWS). The proposed retarding basins in the northeastern portion of the project area would be located in habitat that is suitable for several special-status wildlife species. The proposed diversion of water from the Strawberry Creek Watershed is expected to be less than significant due to the negligible amount of water being diverted. In addition, the majority of flows being diverted are from storm runoff and snowmelt, both of which have short durations and are highly variable on an annual basis. Special-status plants and wildlife species with potential to occur in the project area are discussed below.

Special-Status Plants

No significant impacts to rare plants are expected. California dandelion (*Taraxacum californicum*) is the only listed threatened or endangered plant reported from the area. It is endemic to meadow habitat in the San Bernardino Mountains; it occurs at several locations in the Big Bear Valley and there is a single historic occurrence near Twin Peaks (CDFW, 2012). Habitat in the project area is not suitable for California dandelion, and no significant impacts are anticipated.

Several additional plant species with a California Rare Plant Rank (CRPR) 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere) have potential to occur in the proposed project area, including San Bernardino Mountains owl's-clover (*Castilleja lasiorhyncha*), Palmer's mariposa lily (*Calochortus palmeri* var. *palmeri*), and Southern Jewel-flower (*Streptanthus campestris*). There are occurrences in the vicinity of the project area and suitable habitat is present (CNDDB, 2012). In addition, Parish's yampah (*Perideridia parishii* ssp. *parishii*) a CRPR 2 (Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere) species is known from the vicinity and may occur in the project area. However none of these plants were observed during a site visit by qualified botanist in July 2012. Laguna Mountain's jewel-flower (*Streptanthus bernardinus*) is ranked as CRPR 4.3 (Plants of limited distribution – a watch list) and was documented in the project area during a field visit to the site in July 2012, but impacts to Rank 4 species generally do not meet CEQA criteria as significant.

Special-Status Wildlife

The proposed retarding basins could have significant impacts to special-status wildlife species. Several listed threatened or endangered species have potential to occur in the project area including southern rubber boa (*Charina bottae umbratica*) which is listed as threatened under the California Endangered Species Act (ESA), Sierra Madre yellow-legged frog (*Rana muscosa*) which is listed as endangered under the federal ESA and southwestern willow flycatcher (*Empidonax traillii extimus*) which is listed as endangered in the California and federal ESAs. There is suitable habitat for each of these species in the northeastern part of the project area.

In addition, three species recognized as Species of Special Concern by CDFW also have potential to occur in the project area: California Spotted Owl (*Strix occidentalis occidentalis*), San Bernardino flying squirrel (*Glaucomys sabrinus californicus*) and white-eared pocket mouse (*Perognathus alticolus alticolus*). Impacts to any of these species could be significant under CEQA.

The proposed project could directly or indirectly impact wildlife species identified as threatened, endangered, candidate, or special status species by the CDFWS or USFWS. Potential impacts to these species will be discussed in the EIR.

b. Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

POTENTIALLY SIGNIFICANT IMPACT. The proposed retarding basins in the northeastern part of the project area would be located along a stream channel supporting riparian vegetation. Project construction would remove or alter this habitat. The project may have an adverse effect on riparian habitat and impacts will be discussed in the EIR.

c. Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) either individually or in combination with the known or probable impacts of other activities through direct removal, filling, hydrological interruption, or other means?

POTENTIALLY SIGNIFICANT IMPACT. The project would include partial realignment of and the construction of a series of retarding basins within Little Bear Creek in the northeastern portion of the project area. The creek channel and associated habitat are potentially jurisdictional "waters of the U.S." and/or wetlands. Both permanent and temporary impacts are expected to occur to these potential State and federal jurisdictional waters. In addition, CDFW regulates impacts to State-jurisdictional streambeds ("waters") and adjacent riparian vegetation under Section 1600 et seq. of the California Fish and Game Code.

Direct effects to potentially jurisdictional waters are expected to result from channel realignment and basin construction. Indirect and operational impacts could include alterations in existing topography and hydrology regimes, increased sedimentation affecting downstream water quality, or colonization by non-native, invasive plant species. Operational impacts could occur during routine inspection and maintenance of the basins. Additionally, the installation of the basins and/or realignment of the channel may require trimming or removal of vegetation that could result in significant ground disturbance and could negatively impact wetland habitat. As a result, impacts to potentially jurisdictional waters and/or wetland habitats are likely to be significant and will be discussed further in the EIR.

d. Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of wildlife nursery sites?

POTENTIALLY SIGNIFICANT IMPACT. The proposed storm drains would be located within a developed community and would not substantially affect wildlife movement or nursery areas. Due to availability of surrounding habitat east and west of the proposed retarding basins, the basins would not substantially affect wildlife movement for many species. However, the retarding basins would be located within a designated open space/ wildlife corridor area (see below) and the proposed habitat alteration would have the potential to degrade wildlife movement habitat through the area. In addition, the basins would affect wildlife nursery sites such as nest trees for birds or small mammals; burrows or other nesting areas for ground-dwelling vertebrates; or aquatic nest sites for amphibians. In general, these impacts to wildlife breeding areas would not be substantial for common or wide-ranging species, but could be substantial for special-status wildlife (see C.3.4.a. above). Potential impacts to special-status wildlife will be discussed in the EIR.

e. Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

POTENTIALLY SIGNIFICANT IMPACT. The project could conflict with the County of San Bernardino General Plan Open Space Element. The retarding basins would be located within the Strawberry Creek open space area/wildlife corridor which is designated to preserve habitat values (County of San Bernardino, 2007). Project impacts to this open space may be significant.

The County of San Bernardino Tree Removal Ordinance regulates the removal of trees for projects not on government land and not subject to land use permitting processes. The proposed project would necessitate tree removal for construction of retarding basins, which would require a Tree or Plant Removal Permit.

Potential impacts to the County of San Bernardino General Plan Open Space Element will be discussed in the EIR.

f. Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Communities Conservation Plan, or other approved local, regional, or State habitat conservation plan?

NO IMPACT. The project would not conflict with an adopted Habitat Conservation Plan, Natural Communities Conservation Plan, or other approved local, regional, or State habitat conservation plan because the proposed project site is not located within the limits of any existing or proposed plans. No impacts would occur.

C.3.5 Cultural Resources

CULTURAL RESOURCES Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☒	☐	☐	☐
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☒	☐	☐	☐
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐
d. Disturb any human remains, including those interred outside of formal cemeteries?	☒	☐	☐	☐

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project cause a substantial adverse change in the significance of an historical resource as defined in §15064.5 [§15064.5 generally defines* historical resource *under CEQA]?

POTENTIALLY SIGNIFICANT IMPACT. Cultural resources inventories conducted within the project area resulted in the identification of one (1) built environment resource (36-007049; Rim of the World Drive/State Highway 18). This resource is located within the project Area of Potential Effects (APE), which includes areas that would be directly affected by project elements. This resource has not been formally evaluated for California Register of Historical Resources (CRHR) eligibility. The EIR will evaluate this resource and any potential impacts to this resource.

b. Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

POTENTIALLY SIGNIFICANT IMPACT. The archaeological survey of the project area has been completed. There are no significant archaeological resources within the proposed project area. However, unknown and potentially significant buried resources could be inadvertently unearthed during ground-disturbing activities associated with project construction. The EIR will evaluate this potential impact and identify measures to be implemented if any unknown and potentially significant buried resources are inadvertently uncovered during excavation activities associated with the project.

c. Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

LESS THAN SIGNIFICANT IMPACT. Significant California fossils typically consist of fossils of late Quaternary and Tertiary age and include invertebrate, vertebrate, and plant fossils. Older fossils are also found in the southern California area but are not as prevalent. The proposed project site is primarily underlain by granitic bedrock with local thin deposits of young Recent and Holocene alluvium and colluvial soils, both derived from the nearby and underlying granitic rocks, and artificial fill. The granitic bedrock consists of two units: the Cretaceous Monzogranite of City Creek, which underlies most of the proposed project site, and the Mesozoic Silverwood Lake mixed granitic rocks which are underlying the western end of Rimforest (Hilltop Geotechnical, 2010). The alluvial deposits in the proposed project area are concentrated along active washes and former drainage channels (LOR Geotechnical, 2001, Hilltop Geotechnical, 2010). Holocene colluvial soils are derived in place from the weathering of the underlying granitic bedrock and the colluvial deposits are generally found at the base of steep slopes and consist of materials weathered or transported form the underlying and surrounding granitic bedrock (Hilltop

Geotechnical, 2010). Ground disturbing activities for the trench, pipelines, and retarding basins would occur primarily within alluvial deposits, colluvial soils, and granitic bedrock (Monzogranite of City Creek).

The most useful designation for determining if paleontological resources are likely to be present in a project area is the "sensitivity" of the geologic units underlying the project. Sensitivity refers to the likelihood of finding significant fossils within a geologic unit. The colluvial and alluvial deposits and colluvial soils have low sensitivity based on their relative youthful age and/or their high-energy depositional history and are unlikely to produce important fossil remains. The granitic bedrock has zero sensitivity; zero sensitivity is assigned to crystalline rocks because they have no potential for producing fossil remains. The geologic units in the Proposed Project area have low to zero sensitivity, therefore there is a less than significant potential to damage or destroy paleontological resources.

d. Would the project disturb any human remains, including those interred outside of formal cemeteries?

POTENTIALLY SIGNIFICANT IMPACT. No human remains are known to be located within the project area. However, there is always the possibility that unmarked burials could be inadvertently unearthed during excavation activities, which could result in damage to these human remains. The EIR will evaluate this potentially significant impact and identify measures to be implemented if any remains are inadvertently uncovered during excavation activities associated with the project.

C.3.6 Geology and Soils

GEOLOGY AND SOILS **Would the project:**	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii) Strong seismic groundshaking?	☒	☐	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☒	☐	☐	☐
iv) Landslides?	☒	☐	☐	☐
b. Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
c. Be located on geologic units or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☒	☐	☐	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☒	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

Less Than Significant Impact. The project is located in a very seismically active portion of southern California; however, the Project is not located on or crossing a known Alquist-Priolo zoned fault. Two potentially active faults are located within the project vicinity, the Devils Canyon fault and the Rimforest fault. The Devils Canyon fault (also referred to as the Waterman Canyon fault) is a late Quaternary north dipping reverse fault and is located approximately 0.6 mile south of the proposed project (USGS, 2003; SCEDC, 2012). The Rimforest fault was identified by Hilltop Geotechnical Consultants, Inc. (Hilltop) in 2010 while conducting an investigation related to landslide mitigation in the community of Rimforest. The Rimforest fault as mapped by Hilltop traverses the community of Rimforest in northeast-southwest trend, passing to the south of the houses located on Apache Trail and continuing northeast across Blackfoot Trail and Highway 18. The fault zone as mapped by Hilltop consists of two nearly parallel traces of sheared rock with apparent vertical offset (Hilltop, 2010). Hilltop concluded that based on the apparent offset of soil along the fault and until further investigation is conducted along this feature it be considered a potentially active fault. Based on the landslide history of the area and the location of the

feature subparallel to the mountain front there is also potential that this linear sheared rock feature could be an old landslide plane. However, the Rimforest fault feature while mapped close to the project does not cross the alignments of proposed project features. Therefore, there is a less than significant potential of impact from surface rupture of a known fault.

ii) Strong seismic ground shaking?

POTENTIALLY SIGNIFICANT IMPACT. The project area would be subject to ground shaking associated with earthquakes on faults of the San Andreas and Transverse Ranges fault systems. The intensity of the seismic shaking, or strong ground motion, during an earthquake is dependent on the distance between the project area and the epicenter of the earthquake, the magnitude of the earthquake, and the geologic conditions underlying and surrounding the project area. Earthquakes occurring on faults closest to the project area would most likely generate the largest ground motion. The intensity of earthquake induced ground motions can be described using peak site accelerations, represented as a fraction of the acceleration of gravity (g). Data from the CGS Probabilistic Seismic Hazard Assessment (PSHA) Mapping website was used to estimate peak ground accelerations (PGA) at the proposed project site (CGS, 2012). The PSHA Maps used depict peak ground accelerations with a 10 percent probability of exceedance in 50 years; peak ground acceleration is the maximum acceleration experienced by a particle on the Earth's surface during the course of an earthquake, and the units of acceleration are most commonly measured in terms of fractions of g, the acceleration due to gravity (980 cm/sec2). The estimated peak ground acceleration at the proposed project site is 0.69g, which corresponds to "strong to very strong" ground shaking.

Components of the proposed project would likely be subject to "local strong to very strong" ground shaking during their lifetime due to earthquakes on local and regional faults. While underground components such as pipelines are generally less susceptible to damage due to strong groundshaking they could be damaged in areas where they transition to other structures, and the retarding basins and covered drainage trench may be damaged due to the ground motions. This would result in a significant impact unless mitigation is incorporated, therefore a discussion of seismic ground shaking and appropriate mitigation measures will be discussed in the EIR.

iii) Seismic-related ground failure, including liquefaction?

POTENTIALLY SIGNIFICANT IMPACT. Liquefaction is the phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced strong groundshaking. The susceptibility of a site to liquefaction is a function of the depth, density, and water content of the granular sediments and the magnitude and frequency of earthquakes in the surrounding region. Saturated, unconsolidated silts, sands, and silty sands within 50 feet of the ground surface are most susceptible to liquefaction. Liquefaction related phenomena include lateral spreading, ground oscillation, flow failures, loss of bearing strength, subsidence, and buoyancy effects.

While most of the proposed project area is underlain by granitic bedrock that is not susceptible to liquefaction, potentially liquefiable alluvial deposits exist within the community of Rimforest and where some project components are planned (Hilltop, 2010; LOR, 2001). Seismic related ground failures, including liquefaction could occur in these sediments in the event of a large earthquake if they were to occur while the sediments were saturated due to shallow perched water or seasonal high water tables. Mitigation measures would be required to reduce these impacts to less than significant and thus a discussion of seismically induced ground failures, including liquefaction, and appropriate mitigation measures will be discussed in the EIR.

iv) Landslides?

POTENTIALLY SIGNIFICANT IMPACT. The proposed project is located adjacent to an area of known landsliding and slope instability (Hilltop, 2010; LOR, 2001), and is located in an area mapped as having landslide susceptibility by San Bernardino County (2010). Ground disturbing activities for construction of the proposed project components could potentially destabilize the already susceptible slopes in the area resulting in landslides or other slope failures. Implementation of mitigation measures would be required to reduce this impact to less than significant. The potential for the project to cause and be damaged by landslides will be discussed in the EIR.

b. Would the project result in substantial soil erosion or the loss of topsoil?

POTENTIALLY SIGNIFICANT IMPACT. Ground disturbing activities for the project include trenching for the channel and pipelines along SR-18 and the pipelines along Pine Avenue, and grading and excavation for construction of the three retarding basins along Little Bear Creek. These ground disturbing activities would loosen soils and could result in soil erosion. Additionally, the introduction of additional runoff to the Little Bear Creek drainage could result in additional downstream erosion of the creek bed and banks. These potential impacts could be reduced to less than significant with the incorporation of mitigation measures. The potential for soil erosion related to construction of the proposed project and appropriate mitigation measures for erosion related impacts will be discussed in the EIR.

c. Would the project be located on geologic units or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

POTENTIALLY SIGNIFICANT IMPACT. As discussed above, the proposed project is located in an area of known landslide susceptibility and landsliding and is locally underlain by potentially liquefiable sediments. Mitigation measures would be required to reduce these impacts to less than significant. Therefore a discussion of seismically induced ground failures, including liquefaction, and landslides with appropriate mitigation measures for any impacts will be discussed in the EIR.

d. Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

LESS THAN SIGNIFICANT IMPACT. The proposed project is entirely underlain by the Morical-Wind River families complex (NRCS, 2012). The Morical-Wind River families complex is found on mountain slopes and consists of residuum weathered from the underlying granite bedrock. Linear extensibility is used to determine the shrink-swell (expansive) potential of soils by the National Resources Conservation Service. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling of the soils resulting from changes in moisture content can cause damage to buildings, roads, and other structures. Special design is commonly required. Linear extensibility of soil at the project site ranges from 0-2.9%, which indicates low expansion potential and therefore, there would be a less than significant impact from expansive soils.

e. Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

NO IMPACT. The project would not include any facilities requiring wastewater or sewage disposal and would therefore, not need septic or other wastewater disposal systems. No impact would occur.

C.3.7 Greenhouse Gas Emissions

GREENHOUSE GAS EMISSIONS **Would the project:**	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b. Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐

Note: Significance criteria established by CEQA Guidelines, Appendix G.

a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

b. Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

POTENTIALLY SIGNIFICANT IMPACT. Global climate change is an international phenomenon, and the regulatory background and scientific data are changing rapidly. In 2006, the California state legislature adopted AB 32, the California Global Warming Solutions Act of 2006. Assembly Bill (AB) 32 describes how global climate change would affect the environment in California. The impacts described in AB 32 include changing sea levels, changes in snow pack and availability of potable water, changes in storm flows and flood inundation zones, and other impacts.

Greenhouse gas (GHG) emissions would be generated from off-road equipment uses and on-road vehicle trips during construction. Operational GHG emissions would be generated by the operation and maintenance activities. Indirect GHG emissions could also occur due to the electricity needs during construction or operation. These GHG emissions could have potentially significant impacts and/or may conflict with applicable plans, policies and regulations adopted for the purpose of reducing GHG emissions. Therefore, potential impacts related to GHG emissions associated with the proposed project will be analyzed further in the EIR.

C.3.8 Hazards and Hazardous Materials

HAZARDS AND HAZARDOUS MATERIALS Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Less than significant Impact. The proposed project would not involve the routine transport, use, or disposal of hazardous materials. Potentially hazardous materials such as motor oil, gasoline, diesel fuel, and other materials necessary to operate construction vehicles and equipment would be utilized during construction of the proposed project, and would occasionally be utilized during operation of the project as related to inspection and maintenance activities. However, use of such materials for the operation of vehicles and equipment would occur under best management practices (BMPs) to avoid accidental spill(s) or leak(s), and would not introduce significant potential for hazard to the public or the environment. The proposed project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

b. Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

LESS THAN SIGNIFICANT IMPACT. As described above under criterion (a), the proposed project would not introduce significant potential for hazard to the public or the environment associated with accidental spill(s) or leak(s) of hazardous materials, including through reasonably foreseeable upset and accident conditions.

c. Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

NO IMPACT. The closest school to the proposed project site is the Rim of the World High School, located approximately one mile to the east of the community of Rimforest along State Route 18 (SR-18). Access to the project site during construction and operation would utilize SR-18, and traffic associated with the project would likely pass the Rim of the World High School. However, emissions associated with such traffic would be consistent with existing and future emissions from traffic along SR-18, and would not introduce a new impact associated with hazardous emissions in proximity to the aforementioned high school. The project would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste in proximity to any existing or proposed school.

d. Would the project be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

NO IMPACT. Government Code Section 65962.5 requires the California Department of Toxic Substances Control (DTSC) to compile and update a list of hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code (HSC), and to submit this list to the Secretary for Environmental Protection. This list, referred to as the Cortese List, currently identifies 16 sites within San Bernardino County, none of which are located on the project site or along the project's proposed access routes (DTSC, 2007).

In addition, HSC Section 25187.5(a) identifies those hazardous waste facilities where DTSC has taken or contracted for corrective action because a facility owner/operator has failed to comply with a date for taking corrective action in an order issued under HSC Section 25187, or because DTSC determined that immediate corrective action was necessary to abate an imminent or substantial endangerment (CalEPA, 2011). This is a very small and specific subgroup of facilities, which does not include any facilities on the project site or within vicinity of the proposed project (CalEPA, 2011).

The State Water Resources Control Board (SWRCB) identifies one Leaking Underground Storage Tank (LUST) Cleanup Site in the community of Rimforest on the Rimforest Lumber property, located at 26391 Pine Avenue; the cleanup status of this site is designated as complete, and the case is identified as closed (RB Case # 083602319T) (SWRCB, 2012). No solid waste disposal sites within the County of San Bernardino, including the community of Rimforest, are identified with waste constituents above hazardous waste levels outside the waste management unit (CalEPA, 2012).

Based on the above discussion, the proposed project would not be located on a hazardous materials site and would not create a significant hazard to the public or the environment. No impact would occur, and no further evaluation under this criterion is necessary.

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

NO IMPACT. There are numerous airports located within San Bernardino County. The nearest airports to the community of Rimforest are the San Bernardino International Airport, located approximately 9.25 miles (linear) to the south, and Redlands Municipal Airport, located approximately 11 miles (linear) to the south-southeast. The project is not located within an airport land use plan or within two miles of an airport, and would not result in a safety hazard for people residing or working in the project area.

f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

NO IMPACT. The project is not located within the vicinity of a private airstrip, and would not result in a safety hazard for people residing or working in the project area.

g. Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

LESS THAN SIGNIFICANT IMPACT. Construction of the proposed project may require short-term traffic lane diversions and/or closures to ensure public safety while installing project infrastructure. Such diversions/closures would be conducted in coordination with Caltrans and standard BMPs to avoid adverse traffic effects, including as related to emergency response and evacuation. The proposed project would not significantly impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

h. Would the project expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

LESS THAN SIGNIFICANT IMPACT. Construction of the proposed project would include the use of motorized vehicles and equipment in and adjacent to forest areas. Sparks or heat from vehicle and equipment engines could potentially result in the ignition of a wildland fire. However, the proposed project would be constructed in accordance with standard safety measures and would not introduce a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

C.3.9 Hydrology and Water Quality

HYDROLOGY AND WATER QUALITY **Would the project:**	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Violate any water quality standards or waste discharge requirements?	☐	☒	☐	☐
b. Substantially deplete groundwater supplies or interfere substantially with groundwater discharge such that there would be a net deficit in the aquifer volume or a lowering of the local groundwater table level (i.e., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☒	☐	☐	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off site?	☒	☐	☐	☐
d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off site?	☒	☐	☐	☐
e. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☒	☐	☐	☐
f. Otherwise substantially degrade water quality?	☒	☐	☐	☐
g. Place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other hazard delineation map?	☐	☐	☐	☒
h. Place within 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☐	☒
i. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.	☐	☐	☐	☒
j. Cause inundation by seiche, tsunami, or mudflow?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project violate any water quality standards or waste discharge requirements?

Less than Significant Impact with mitigation incorporated. A significant impact to hydrology and water quality could occur if project-related construction or operation and maintenance activities result in the violation of any water quality or waste discharge standards. Such violations could occur through the creation of erosion, sedimentation, and/or polluted runoff, through the accidental release of potentially hazardous materials required during construction or operational activities, and/or through the discharge of contaminated groundwater during dewatering activities. The proposed project would be designed and implemented to avoid such occurrences, and project-specific mitigation measures would be implemented to avoid or minimize the potential for adverse effects to occur such that a water quality standard or waste discharge requirement could be violated. In addition, the diversion of surface water flows from the Santa Ana River Watershed to the Mojave River Watershed that would occur under the proposed project would require approval of the State Water Resources Control Board (SWRCB), the Santa Ana River RWQCB, the Lahontan RWQCB, the San Bernardino Valley Municipal Water District (SBVMWD), and other private holders of water rights within the areas to be affected by the proposed

diversion of flows; implementation of the proposed project would include coordination with and approval of all applicable agencies, including as related to water rights and the diversion of surface flows. It is anticipated that the proposed project would occur in compliance with all applicable water quality standards and waste discharge requirements.

b. Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (i.e., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

POTENTIALLY SIGNIFICANT IMPACT. Groundwater supplies could potentially be depleted through the direct consumption of groundwater to meet project water supply requirements and/or through substantial interference with groundwater recharge associated with the introduction of impermeable surfaces or increased compaction of surfaces. During construction, the proposed project would require a water supply, primarily for the purposes of dust suppression and fire abatement. This water supply would be obtained from municipal fire hydrant(s) in the community of Rimforest. The proposed project is located within the service area of the Crestline-Lake Arrowhead Water Agency (CLAWA), which receives most of its supply from the California State Water Project (SWP) (CLAWA, 2010). The CLAWA does not currently deliver any groundwater resources, and there are no projected plans for CLAWA to use groundwater (CLAWA, 2010). Therefore, the project would have no effect on groundwater resources associated with water supply requirements during construction. There are no water supply requirements associated with operation and maintenance of the proposed project.

Implementation of the proposed project would include the introduction of impermeable surfaces in the form of the concrete channel and concrete pipes; however, these project features would be installed along existing roadways that are currently paved and therefore impermeable, and would not increase the area of impermeable surfaces in the area such that the rate and distribution of groundwater recharge would be affected. In addition, implementation of the proposed retarding basins within Little Bear Creek may result in localized soil compaction, but such effects would be limited to the retarding basins and would have no effect on the rate and distribution of groundwater recharge in the area.

It is understood that shallow groundwater occurs throughout the proposed project area. It is possible that shallow or perched groundwater could be unexpectedly encountered during project construction activities, particularly earth-disturbing activities such as trenching, tunneling, and excavating. If groundwater is unexpectedly encountered during construction, appropriate dewatering activities would be required to remove the perched groundwater as necessary and either return it to the subsurface or discharge to the surface, depending upon factors such as quality of the water, subsurface conditions, and applicable best management practices (BMPs). Due to the high potential for shallow or perched groundwater to be encountered during project construction, this issue will be explored in the EIR. It is anticipated that project-specific mitigation measure(s) will be developed to ensure that dewatering BMPs are applied as necessary to avoid depletion of groundwater supplies or interference with groundwater recharge. The proposed project is not anticipated to result in a net deficit in aquifer volume or a lowering of the local groundwater table level.

c. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on or off site?

POTENTIALLY SIGNIFICANT IMPACT. The proposed project would substantially alter existing drainage patterns of the project site and vicinity, towards the purpose of re-directing stormwater flows away from an existing landslide area in southern Rimforest. As described above under criterion (a), the proposed project would divert stormwater flows that currently enter Strawberry Creek in the Santa Ana River Watershed into Little Bear Creek in the Mojave River. This diversion is designed to substantially reduce existing rates of erosion and susceptibility to landslide hazards in southern Rimforest; in doing so, the project would also reduce siltation/sedimentation in the Strawberry Creek drainage associated with sediment-laden surface runoff from the landslide area.

The project's proposed stormwater conveyance facilities through the community of Rimforest are comprised of a series of concrete channels and pipes, the presence of which would not result in substantial erosion or siltation on-site. However, directing flows away from the landslide area and into Little Bear Creek could potentially increase erosion and siltation/sedimentation effects in the Little Bear Creek drainage. In order to control the velocity of increased flows in Little Bear Creek, the proposed project includes installation of a series of retarding basins near the headwaters of this drainage; the retarding basins would capture and slow the flow of surface runoff during large storm events, so that the Little Bear Creek drainage and existing downstream drainage facilities would not be damaged by increased volume and velocity of flow. The retarding basins would also allow sediment contained within surface runoff to settle out, and maintenance activities would include the occasional removal of accumulated sediment in order to maintain stormwater conveyance capacity of the basins.

The proposed project would not alter the course of any stream or river. It is anticipated that implementation of erosion control BMPs and compliance with applicable laws and regulations would avoid adverse effects associated with erosion and/or siltation. Such potential effects are considered potentially significant and will be addressed in detail in the EIR. It is anticipated that project-specific mitigation measures will be developed to ensure that appropriate BMPs are included in the project.

d. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site?

POTENTIALLY SIGNIFICANT IMPACT. As discussed above regarding the project's potential to result in increased erosion and siltation on- or off-site, the project would substantially alter existing drainage patterns on the site and surrounding area. The diversion of surface water flows from the Santa Ana River Watershed into the Mojave River Watershed would increase the volume and velocity of stormwater flows within the Little Bear Creek drainage, particularly in response to large storm events. Existing flood control facilities downstream of the proposed project's outlet point in Little Bear Creek are not substantial enough to convey increased flows under the project unless the flows are impeded by the project's proposed series of retarding basins. These basins would function to decrease the rate at which increased flows travel into the Little Bear Creek drainage, thereby reducing stresses on downstream facilities such as the existing three-foot culvert through the Blue Jay Maintenance Yard, located within the Little Bear Creek channel near the community of Blue Jay.

The proposed project would not alter the course of any stream or river. It is anticipated that implementation of BMPs would avoid adverse effects associated with the potential for the project to result in off-site flooding effects. Such potential effects are considered potentially significant and will be

addressed in detail in the EIR. It is anticipated that project-specific mitigation measures will be developed to ensure that appropriate BMPs are included in the project.

e. Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems to provide substantial additional sources of polluted runoff?

POTENTIALLY SIGNIFICANT IMPACT. As mentioned above, the existing stormwater conveyance system which transmits flows through the Blue Jay Maintenance Yard, located within the Little Bear Creek channel downstream of the proposed project's outlet point, is not capable of transmitting increased stormwater flows that would occur as a result of the project, and the proposed project would increase stormwater flows into Little Bear Creek. The retarding basins included under the proposed project would be designed to slow the velocity of flows into Little Bear Creek, and to avoid overwhelming the existing stormwater drainage system through the Blue Jay Maintenance Yard, as well as conveyance systems downstream of the maintenance yard, through the communities of Blue Jay and Lake Arrowhead. The potential for the project to create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems will be examined in the EIR for the project, and mitigation measures will be developed to address potential adverse effects.

f. Would the project otherwise substantially degrade water quality?

POTENTIALLY SIGNIFICANT IMPACT. By redirecting flows from north of SR-18 into Little Bear Creek, the proposed project would introduce the potential that surface flows affected by water quality constituents not currently in the headwaters of Little Bear Creek may be introduced to this drainage. For instance, oil and grease runoff from SR-18 may degrade the quality of surface waters diverted by the proposed project, and these waters may subsequently degrade the quality of water within Little Bear Creek. Little Bear Creek is currently routed along existing roadways through developed areas between its headwaters near the proposed project's outlet and its terminus at the Lake Arrowhead Reservoir. However, because the proposed project would direct new areas of surface runoff into Little Bear Creek, the potential for new sources of water quality degradation to be introduced will be examined in the EIR.

g. Would the project place housing within a 100-year floodplain, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

NO IMPACT. The proposed project does not include the construction of any housing, and would not place housing within a 100-year floodplain as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map. No impact would occur.

h. Would the project place within a 100-year floodplain structures that would impede or redirect flood flows?

NO IMPACT. The proposed project would not involve the construction of any structures within a 100-year floodplain that would impede or redirect flood flows. No impact would occur.

i. Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

NO IMPACT. As discussed under criterion (d), it is possible that implementation of the project could result in increased flooding; however, project design features and mitigation measures would be implemented to avoid increased flooding and associated adverse impacts, including the potential to expose people or structures to a risk of loss, injury, or death. There are no levees or dams in the vicinity of the project that could experience failure and cause flooding as a result of the project. The nearest dam to the project

site is the Lake Arrowhead Dam, located more than four miles (linear) to the northeast and downstream of Rimforest. No impact would occur due to the failure of a levee or dam.

j. Would the project cause inundation by seiche, tsunami, or mudflow?

***LESS THAN SIGNIFICANT IMPACT*.** The proposed project is located in a mountainous region that is not subject to inundation by seiche or tsunami; Lake Arrowhead, the nearest large body of water, is located approximately three miles downstream, and the Pacific Ocean is located more than sixty miles away. The proposed project would not cause inundation by seiche or tsunami. The proposed project area is subject to mudflow hazards, where mudflows are a type of mass wasting or landslide which occur when earth and surface materials are rapidly transported downhill under the force of gravity. Mudflow may be triggered by heavy rainfall that the soil is not able to sufficiently drain or absorb; as a result of this super-saturation, soil and rock materials become unstable and eventually slide away from their existing location. However, implementation of the proposed project would reduce existing potential for mudflow events in the project area by routing stormwater runoff away from areas which are currently unstable as a result of historic mudflow and landsliding issues. Although the proposed project area may be subject to future mudflow and landslide events, such hazards would not be introduced as a result of the proposed project, and the project would not cause inundation by mudflow.

C.3.10 Land Use and Planning

LAND USE PLANNING Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Physically divide an established community?	☐	☐	☐	☒
b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☒	☐	☐	☐
c. Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project physically divide an established community?

No Impact. The project site is located in the community of Rimforest. Residential and commercial development is present all along the project site. The main components of the proposed project include excavation and trenching for a 1,060-foot-long channel, a 1,616-foot-long concrete pipe, and a series of three retarding basins. The linear features of the project would primarily be aligned along SR-18, and the retarding basins would be constructed in an area of open space. Therefore, the proposed project would not physically divide any of the surrounding residential areas, and would not divide an established community.

b. Would the project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

Potentially Significant Impact. The community of Rimforest is located within the County of San Bernardino's Lake Arrowhead Community Plan. Other plans applicable to the proposed project site include the County's 2007 General Plan and the 2007 Development Code. Consistency with these and any other applicable local, regional, or State plans will be evaluated in the EIR.

c. Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?

No Impact. The proposed project is not within the boundaries of any adopted habitat conservation plan or natural community conservation plan. Therefore, the project would not conflict with any applicable habitat conservation or natural community conservations plans, and there would be no impact under this criterion.

C.3.11 Mineral Resources

MINERAL RESOURCES **Would the project:**	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?	☐	☐	☐	☒
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?

NO IMPACT. According to the U.S. Geological Survey's (USGS) Mineral Resource Data System, the closest mining activity in the vicinity of the proposed project site includes the following past producers: Heap Peak Quarry (stone), Green Lead Mine (gold), and Keystone and Lucky Jim (feldspar, mica, silica) (USGS, 2012). As these mineral sites are no longer in production, construction and operation of the proposed project would not result in the loss of availability of mineral resources.

b. Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

NO IMPACT. No mineral resources have been identified by the County's 2007 General Plan or the Lake Arrowhead Community Plan at the proposed project site or the immediate vicinity. Therefore, construction and operation of the proposed project would not prevent access to any mineral resource extraction areas specified in a local general plan, specific plan, or other land use plan. No impact would occur.

C.3.12 Noise

NOISE Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☒	☐	☐	☐
b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

POTENTIALLY SIGNIFICANT IMPACT. The County of San Bernardino 2007 General Plan (San Bernardino County, 2007a) defines noise-sensitive land uses as residences, schools, churches, and parks. The County of San Bernardino 2007 Development Code defines noise-sensitive land uses as residential uses, schools, hospitals, nursing homes, religious institutions, libraries, and similar uses (San Bernardino County, 2007b). The proposed project would be located in the immediate vicinity of residential uses within the community of Rimforest, both north of State Route 18 (SR-18) and south of the industrial/commercial uses located on the south side of SR-18. Section 8.0.1.080, Noise, of the County Code provides noise standards for stationary and mobile noise sources. Per Section 83.01.080(g), temporary construction, maintenance, repair or demolition activities are exempt between 7:00 a.m. and 7:00 p.m., except Sundays and federal holidays.

Construction of the proposed project would occur between the hours of 7:00 a.m. and 7:00 p.m, Monday through Saturday, and would therefore be exempt from the County's noise standards. Noise during operations would occur as a result of various activities, including slope stabilization, sediment removal from retarding basins, inspections, repair of facilities, and maintenance of vegetated landscape buffers. As noted above, maintenance activities occurring between 7:00 a.m. and 7:00 p.m. Monday through Saturday (except Federal holidays) would also be exempt; however, no limit on when these activities would occur has been specified. Activities occurring outside these exempted hours would have the potential to exceed the County's noise level standards. Therefore, operational noise will be analyzed further in the EIR.

b. Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

LESS THAN SIGNIFICANT IMPACT. Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration velocity is most often described in terms of peak particle velocity (PPV) for purposes of groundborne vibration analysis. Typically, ground-borne vibrations generated by man-made activities attenuate rapidly with distance from the source of the vibration. Man-made vibration issues are therefore usually confined to short distances (i.e., 500 feet or less) from the source.

Construction would not involve blasting, pile-driving, vibratory compaction, demolition, drilling, major excavation, or other similar types of vibration-generating activities in close proximity to sensitive structures; however, the use of a pneumatic breaker, large construction equipment (e.g., excavator, grader, steel drum roller, paving machine) and delivery haul trucks may produce short-term groundborne vibration and associated groundborne noise. Such vibrations may be noticeable within the existing residential structures located immediately along the project alignment. Use of large equipment in any one location, however, would be limited as project construction would progress in a linear fashion along the project alignment. Given the short duration of construction activities with the potential to produce groundborne vibration, that these activities would generally be occurring during daytime hours when people are not usually sleeping, and the absence of highly sensitive uses (e.g., concert halls, vibration-sensitive research and manufacturing, hospitals with vibration-sensitive equipment), there would not be any potential for excessive exposure of persons to or generation of groundborne vibration levels during construction. Furthermore, per Section 83.01.090, Vibration, of the County Code, temporary construction, maintenance, repair, or demolition activities occurring between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays, are exempt from the County's vibration standard (County of San Bernardino, 2007b). Therefore, construction vibration impacts would be less than significant.

Operations may require periodic maintenance activities including slope stabilization, sediment removal from retarding basins, inspections, repair of facilities, and maintenance of vegetated landscape buffers. While some of these activities may involve the use of major equipment or large vehicles (e.g., excavators for sediment removal), these activities would occur periodically, would be of limited duration, and would not occur in the vicinity of vibration-sensitive structures. Furthermore, maintenance activities occurring between 7:00 a.m. and 7:00 p.m. Monday through Saturday (except Federal holidays) are exempt from the County's vibration standard (County of San Bernardino, 2007b). Therefore, vibration impacts during operations would be less than significant.

c. Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

LESS THAN SIGNIFICANT IMPACT. On-going operation of the proposed project would involve the conveyance of water through a new storm drain system. No equipment would be utilized which would generate operational noise on a long-term basis. The project's long-term operational noise would be limited to the sounds of running water, which would vary depending on the velocity of the water flow. High velocity water flows, which would generate the greatest noise levels, would be of short duration during and immediately following a large rain event, and therefore, would not result in a substantial permanent increase in ambient noise levels in the project vicinity. Less than significant impacts would occur.

d. Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

POTENTIALLY SIGNIFICANT IMPACT. Short-term increases in ambient noise levels would occur during construction as a result of both on-site construction equipment and off-site vehicle use from the transport of construction workers, construction equipment and materials. Short-term increases in ambient noise levels would also occur during periodic maintenance activities during operations. Residential uses, which are considered to be a noise-sensitive land use, are located in the immediate vicinity of the project. Furthermore, residential uses located along SR-18 may be considered to be "noise impacted", which is defined in the County Code (Section 83.01.080(b)) as those areas within the County exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the County's noise standards (San Bernardino County, 2007b). As such, project construction and operation would have the potential to result in substantial temporary or periodic increases in ambient noise levels, resulting in a potentially significant impact. This issue will be considered further in the EIR.

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

NO IMPACT. The project is not located within an airport land use plan or within two miles of a public/public use airport.

f. For a project within the vicinity of a private air strip, would the project expose people residing or working in the project area to excessive noise levels?

NO IMPACT. The project is not located in the vicinity of a private air strip.

C.3.13 Population and Housing

POPULATION AND HOUSING Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c. Displace substantial numbers of people necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact. Construction activities associated with the proposed project would be approximately four months long and would occur Monday through Saturday from 7 a.m. to 7 p.m. Construction would be performed by the County of San Bernardino's construction crews or contractors. Therefore, construction would be short-term and temporary, and construction personnel would reside either in the County or in the vicinity of the County. As such, the proposed project would not generate a permanent increase in population levels or a decrease in available housing, and no impacts to existing or future population growth levels would occur as a result of construction of the proposed project.

During the operation period, maintenance activities include regular inspections of facilities, slope stabilization, removal of sediment from the retarding basins, and maintenance of the landscape buffers. The proposed project would not result in the creation of new jobs and there would not be a need for new housing. Therefore, operation of the proposed project would not generate a direct or indirect increase in the permanent population of the area.

b. Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

No Impact. Construction of the channel and pipeline would primarily occur along SR-18, and the retarding basins would be constructed in an area of undeveloped forest land. The project site is primarily surrounded by residential and commercial development, but no housing developments are located within the sites or corridors for the proposed project. Therefore, implementation of the proposed project would not result in the displacement of housing, nor would it necessitate the construction of replacement housing. No impacts would occur.

c. Would the project displace substantial numbers of people necessitating the construction of replacement housing elsewhere?

No Impact. As stated in Section C.3.13(b) above, there is no existing housing within the project site. Therefore, the proposed project would not result in the displacement of people, nor would it necessitate the construction of replacement housing elsewhere. No impacts would occur.

C.3.14 Public Services

PUBLIC SERVICES Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Fire protection?	☒	☐	☐	☐
b) Police protection?	☒	☐	☐	☐
c) Schools?	☐	☐	☒	☐
d) Parks?	☐	☐	☒	☐
e) Other public facilities?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

a) Fire protection?

POTENTIALLY SIGNIFICANT IMPACT. The San Bernardino County Fire Department provides fire suppression and emergency medical services to the project area. The primary fire station that would serve the project area is Lake Arrowhead Station No. 91, located at 301 South State Highway 173, Lake Arrowhead, California, approximately 3.4 miles east of the proposed project site. The majority of the proposed project site is located within a State Responsibility Area (SRA), and the California Department of Forestry and Fire Protection (CAL FIRE) implements wildfire planning and protection for the SRA. Construction activities may result in temporary increased risk of wildfire, which could impact firefighting capacity in the area. The potential impact on fire services from construction in a SRA area is therefore potentially significant and will be evaluated in the EIR.

b) Police Protection?

POTENTIALLY SIGNIFICANT IMPACT. Police protection services in the proposed project area are provided by the San Bernardino County Sheriff-Coroner Department. The Twin Peaks Police Station, located at 26010 Highway 189, Twin Peaks, California, approximately 2.5 miles northwest of the proposed project area, would be the primary substation to service the proposed project area. Although the potential is low, the project may attract vandals or other security risks, and construction activities could result in increases in traffic volumes along State Route 14 that could increase demand on law enforcement services. The potential impact on police protection is therefore potentially significant and will be evaluated in the EIR.

c) Schools?

LESS THAN SIGNIFICANT IMPACT. During project construction, a relatively small number of construction workers would be required. It is expected that most of these workers would commute to the project site from surrounding communities. Therefore substantial temporary increases in population that would

adversely affect local school populations are not expected. Operation and maintenance activities would not generate a permanent increase in population that would impact school populations. Impacts on schools would be less than significant.

d) Parks?

LESS THAN SIGNIFICANT IMPACT. Any population increase that would be experienced during the construction phases of the proposed project would be temporary and would not result in additional demand for park facilities. Operation and maintenance activities would not generate a permanent increase in population that would impact park facilities or conditions. Impacts on parks would be less than significant.

e) Other Public Facilities?

LESS THAN SIGNIFICANT IMPACT. Any population increases experienced during the construction phases would be temporary and no additional population would be required for operation and maintenance. Consequently, it is not anticipated that the proposed project would increase population in a manner that would substantially affect public facilities. The proposed project is expected to result in less than significant impacts on public services, such as post office and library services.

C.3.15 Recreation

RECREATION	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

No Impact. An increase in use of existing recreational facilities could be spurred by population growth, which increases use of existing recreational resources. Such a demand on these resources could result in the physical deterioration of the facilities. However, as discussed in the Population and Housing section, the proposed project is not expected to induce either short-term or long-term population growth, either during project construction or operation. As such, there would be no impact to recreational facilities because there would be no increased need for recreational resources.

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?

No Impact. Construction of the proposed project would include earth-disturbing activities including excavation, trenching, and slope protection. Therefore, the proposed project does not include recreational facilities, nor does it require the construction of new facilities or the expansion of existing recreational facilities. As such, no adverse physical impacts on the environment would be generated by recreational facilities resulting from the proposed project.

C.3.16 Transportation/Traffic

TRANSPORTATION AND TRAFFIC **Would the project:**	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☒	☐	☐	☐
b. Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☒	☐	☐	☐
c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☒	☐	☐	☐
e. Result in inadequate emergency access?	☒	☐	☐	☐
f. Conflict with adopted policies, plans, or programs supporting regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☒	☐	☐	☐

Significance criteria established by CEQA Guidelines, Appendix G.

a. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

POTENTIALLY SIGNIFICANT IMPACT. As discussed in Section A.4.2 (Construction), it is anticipated that State Route 138 (SR-138) would provide regional access for construction vehicles, with SR-18 providing local access to the project area. SR-138 travels in an east-west alignment from Interstate 5 south of Gorman (west of the proposed project area) to Mount Anderson Junction, where it joins SR-18 south of Crestline, west of the proposed project site. As shown on Figure 2, project-related construction traffic would access the work areas from both SR-18 (which runs in a west-east alignment through the community of Rimforest) and Pine Avenue (which runs parallel to the south of SR-18). As discussed in Section A.4.2 (Construction), construction of the project will take approximately 4 months. Construction workers traveling to the site as well as deliveries of equipment and materials would generate vehicle trips to the area. Additionally, proposed activities may require periodic and temporary closures of northern travel lanes on both SR-18 and Pine Avenue to facilitate construction. Construction related trips and temporary lane closures could decrease the existing level of service (LOS) on all affected roadway segments. Therefore, the EIR will evaluate any potential conflicts with applicable plans, ordinance, or policies pertaining to maintaining identified LOS performance standards on SR-138, SR-18, and Pine Avenue.

During operation and maintenance of the proposed project, the activities identified in Section A.4.3 (Operation and Maintenance) are expected to generate minimal daily traffic volumes and would not require any temporary disruptions to travel lanes. Due to the limited nature of operational and maintenance activities, no impacts to an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system is anticipated to occur. Therefore, no further analysis is required with respect to operational and maintenance related activities on all modes of transportation facilities.

b. Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

POTENTIALLY SIGNIFICANT IMPACT. The segments proposed for construction related vehicle traffic along both SR-18 and SR-138 are identified within the San Bernardino County, Valley Region, Congestion Management Plan (CMP) Road System (SANBAG, 2007a). For the CMP roadway system, LOS E performance standards must be met for all roadway segments (SANBAG, 2007a). While these highway segments are part of the CMP, no CMP intersections occur along the planned construction vehicle access route (SANBAG, 2007b). Therefore, The EIR will evaluate any potential impacts from construction related vehicle trips and any temporary closure of roadway lanes along these segments of the CMP roadway system with respect to the CMP LOS E performance standard.

c. Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

NO IMPACT. The nearest public airport facility to the project area is San Bernardino International Airport, located approximately 8 miles south of the proposed project site. Due to the distance of this airport and the subsurface nature of the project components (refer to Section A.4.1 (Project Elements)), the proposed project would have no impact to existing air traffic patterns or result in a change in air traffic levels that could result in a substantial safety risk. No further analysis is required.

d. Would the project substantially increase hazards because of a design feature or incompatible uses?

POTENTIALLY SIGNIFICANT IMPACT. As discussed above in checklist question C.3.16(a), the project would generate construction trips and may require temporary roadway lane closures, which could temporarily disrupt typical daily traffic volumes and conditions on SR-138, SR-18, and Pine Avenue. Construction vehicles traveling slowly on these roadways, accessing work sites, and temporary lane closures could create temporary traffic hazards. Therefore, the potential for construction-related traffic and temporary lane closures to result in safety hazards will be evaluated in the EIR.

e. Would the project result in inadequate emergency access?

POTENTIALLY SIGNIFICANT IMPACT. As discussed above in checklist question C.3.16(a), the project would generate construction trips and may require temporary roadway lane closures that could increase the daily traffic volumes or delays on SR-138, SR-18, and Pine Avenue, thereby impeding emergency access. Therefore, the potential for project-related traffic and temporary lane closures to result in inadequate emergency access will be evaluated in the EIR.

f. Conflict with adopted policies, plans, or programs supporting regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

POTENTIALLY SIGNIFICANT IMPACT. As discussed above in checklist question C.3.16(a), the project may result in temporary roadway lane closures that could disrupt bicycle and pedestrian traffic on SR-18 and Pine Avenue. The Mountain Area Regional Transit Authority operates buses on the north and south sides of SR-18. Construction traffic accessing work sites along these areas as well as temporary lane closures could pose a hazard to pedestrians and bicycles. Therefore, the EIR will discuss any potential impacts to any transit, bicycle, or pedestrian facilities as well as any conflicts with applicable San Bernardino County General Plan goals and policies pertaining to such facilities.

C.3.17 Utilities and Service Systems

UTILITIES AND SERVICE SYSTEMS Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c. Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐
g. Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

a. Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

No Impact. During construction of the proposed project, wastewater would be contained within portable toilet facilities and disposed of at an approved site. During operation, the proposed project would not generate wastewater. The proposed project would not exceed wastewater treatment requirements and no further analysis is warranted.

b. Would the project require, or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

No Impact. As described above, during construction, wastewater would be contained within portable toilet facilities and disposed of at an approved site. Water would be used during construction for dust control and would be obtained using existing fire hydrants in the community of Rimforest. Operation of the project is not expected to generate wastewater or require the use of water. All applicable local, State and federal requirements and best management practices would be incorporated into construction of the project. No new or expanded water or wastewater facilities would be required for the proposed project, and no further analysis is warranted.

c. Would the project require, or result in the construction of, new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

NO IMPACT. The proposed project is designed as an expansion and construction of new stormwater drainage facilities, the purpose of which is to reroute stormwater flows to minimize the hazards of erosion and landslides. The proposed project is designed to accommodate existing and projected stormwater flows and would not require the construction of additional new or expanded stormwater facilities. No impact would occur and no further analysis is warranted.

d. Would the project have sufficient water supplies available to serve the proposed project from existing entitlements and resources, or would new or expanded entitlements be needed?

NO IMPACT. As described above, water for dust control during construction would be obtained from fire hydrants in the community of Rimforest. As described in Section C.3.9(a), the proposed project is located within the service area of the Crestline-Lake Arrowhead Water Agency (CLAWA), which receives its water supply from the California State Water Project (SWP) (CLAWA, 2010). The specific amount of water that would be required fur dust suppression during construction of the project has not been identified; however, due to the short-term (four-month) duration of construction, and the limited use of water during construction towards the purpose of dust suppression, it is reasonably anticipated that sufficient water supply is available through municipal fire hydrants serviced by the CLAWA to meet the needs of the project. As such, sufficient water supplies are available to serve the proposed project from existing entitlements and resources, and no new or expanded water entitlements would be required. No impact would occur and no further analysis is warranted.

e. Would the project result in a determination by the wastewater treatment provider that serves or may serve the Proposed Project that it has adequate capacity to serve the Proposed Project's projected demand in addition to the provider's existing commitments?

NO IMPACT. As described above, wastewater generated during construction would be contained within portable toilet facilities and disposed of at an approved site and no wastewater would be generated during operation and maintenance. Due to the temporary and short-term nature of construction activities, the volume of wastewater generated during construction would not exceed the capacity of wastewater treatment providers serving the portable toilet disposal site. No impact would occur and no further analysis is warranted.

f. Would the project be served by a landfill with sufficient permitted capacity to accommodate the proposed project's solid waste disposal needs?

LESS THAN SIGNIFICANT IMPACT. Clear and grub wastes generated during construction of the proposed project would be taken to Heaps Peak Transfer Station operated by Athens Disposal. Other exported waste types would also be disposed of at this transfer station. Heaps Peak Transfer Station is located at 29898 SR-18 at Heaps Peak in Running Springs, approximately five miles east of the proposed project site, along SR-18. Waste would then be transferred to an appropriately permitted landfill in Redlands, Colton, or Rialto, each of which have sufficient throughput and capacity to accommodate waste generated by the proposed project. Any impacts on these landfills would be less than significant and no further analysis is warranted.

g. Would the project comply with federal, State, and local statutes and regulations related to solid waste?

LESS THAN SIGNIFICANT IMPACT. The proposed project would generate solid waste during construction of the project, thus requiring the consideration of waste reduction and recycling measures. The 1989 California Integrated Waste Management Act (AB 939) requires San Bernardino County to attain specific waste diversion goals. In addition, the California Solid Waste Reuse and Recycling Access Act of 1991, as amended, requires expanded or new development projects to incorporate storage areas for recycling bins into the proposed project design. The construction contractor will be held accountable to comply with the SBCFCD Plans and Special Provisions issued for this project as well as Caltrans Standard Specifications. Therefore, impacts would be less than significant.

C.3.18 Mandatory Findings of Significance

MANDATORY FINDING OF SIGNIFICANCE	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? (*Cumulatively considerable* means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☒	☐	☐	☐
c. Does the project have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

Significance criteria established by CEQA Guidelines, Appendix G.

a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

POTENTIALLY SIGNIFICANT IMPACT. As described in Section C.3.4 (Biological Resources), the proposed project could result in impacts to habitats that support sensitive species, riparian habitats, and wetlands. Section C.3.5 (Cultural Resources) shows that inventories conducted within the project area resulted in the identification of one (1) built environment resource (36-007049; Rim of the World Drive/State Highway 18). This resource is located within the project APE, which includes areas that would be directly affected by project elements. This resource has not been formally evaluated for CRHR eligibility. Therefore, there may be potentially significant impacts associated with the proposed project, and the EIR will evaluate this resource and any potential impacts to this resource.

b. Does the project have impacts that are individually limited, but cumulatively considerable? (Cumulatively considerable means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

POTENTIALLY SIGNIFICANT IMPACT. CEQA defines a cumulative impact as an effect that is created as a result of the combination of the proposed project together with other projects (past, present, or future) causing related impacts. Cumulative impacts of a project need to be evaluated when the project's incremental effect is cumulatively considerable and, therefore, potentially significant.

As discussed in preceding Sections C.3.1 (Aesthetics) through C.3.17 (Utilities and Service Systems), many of the potential impacts of the proposed project would occur during construction, with few lasting operational effects. Because the construction-related impacts of the proposed project would be temporary and localized, they would only have the potential to combine with similar impacts of other projects if they occur at the same time and in close proximity. Construction impacts caused by the proposed project (primarily related to air quality, biological resources, noise, and traffic) could combine with

similar effects of other projects being built in the area. Potentially significant cumulative impacts will be evaluated in the EIR.

c. Does the project have environmental effects, which would cause substantial adverse effects on human beings, either directly or indirectly?

POTENTIALLY SIGNIFICANT IMPACT. The preceding sections of this Initial Study discuss various types of impacts that could have adverse effects on human beings, including:

- Dust and air pollutants emitted during project construction activities (see Section C.3.3, Air Quality);
- Exposure to potential geological impacts that could result in ground shaking, ground failures, or landslides (see Section C.3.6, Geology and Soils);
- Generate greenhouse gas emissions (see Section C.3.7, Greenhouse Gas Emissions);
- Noise generated by project construction and operation (see Section C.3.12, Noise);
- Potentially adverse impacts to fire and police protection services (see C.3.14, Public Services); and
- Construction-related traffic (see C.3.16, Transportation and Traffic).

These are primarily temporary impacts associated with project construction activities. Each type of impact with the potential to cause substantial adverse effects on human beings has been evaluated, and this Initial Study concludes that these impacts are potentially significant. Therefore, these potentially significant impacts associated with the proposed project will be evaluated in the EIR.

D. References

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STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

Memorandum

Date: May 28, 2015

To: All Reviewing Agencies

From: Scott Morgan, Director

Re: SCH # **2015051074**

Rimforest Storm Drain Project

The State Clearinghouse distributed the above-referenced **Notice of Preparation** on **May 27, 2015** to your agency for review and comment. It has come to our attention that the document was issued a new State Clearinghouse Number in error. For all future correspondence regarding this project, please use the original State Clearinghouse Number **2015051070**. We apologize for any inconvenience this may have caused. All other project information remains the same.

cc: Nancy Sansonetti
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  Habitat Conservation Program
- [ ] **Fish & Wildlife Region 6 I/M**
  Heidi Sickler
  Inyo/Mono, Habitat Conservation Program
- [ ] **Dept. of Fish & Wildlife M**
  George Isaac
  Marine Region

Other Departments

- [ ] **Food & Agriculture**
  Sandra Schubert
  Dept. of Food and Agriculture
- [ ] **Depart. of General Services**
  Public School Construction
- [ ] **Dept. of General Services**
  Anna Garbeff
  Environmental Services Section
- [ ] **Delta Stewardship Council**
  Kevan Samsam
- [ ] **Housing & Comm. Dev.**
  CEQA Coordinator
  Housing Policy Division

Independent Commissions,Boards

- [ ] **Delta Protection Commission**
  Michael Machado
- [x] **OES (Office of Emergency Services)**
  Dennis Castrillo
- [x] **Native American Heritage Comm.**
  Debbie Treadway
- [ ] **Public Utilities Commission**
  Leo Wong
- [ ] **Santa Monica Bay Restoration**
  Guangyu Wang
- [x] **State Lands Commission**
  Jennifer Deleong
- [ ] **Tahoe Regional Planning Agency (TRPA)**
  Cherry Jacques

Cal State Transportation Agency CalSTA

- [ ] **Caltrans - Division of Aeronautics**
  Philip Crimmins
- [ ] **Caltrans – Planning HQ LD-IGR**
  Terri Pencovic
- [ ] **California Highway Patrol**
  Suzann Ikeuchi
  Office of Special Projects

Dept. of Transportation

- [ ] **Caltrans, District 1**
  Rex Jackman
- [ ] **Caltrans, District 2**
  Marcelino Gonzalez
- [ ] **Caltrans, District 3**
  Eric Federicks – South
  Susan Zanchi - North
- [ ] **Caltrans, District 4**
  Erik Alm
- [ ] **Caltrans, District 5**
  Larry Newland
- [ ] **Caltrans, District 6**
  Michael Navarro
- [ ] **Caltrans, District 7**
  Dianna Watson
- [x] **Caltrans, District 8**
  Mark Roberts
- [ ] **Caltrans, District 9**
  Gayle Rosander
- [ ] **Caltrans, District 10**
  Tom Dumas
- [ ] **Caltrans, District 11**
  Jacob Armstrong
- [ ] **Caltrans, District 12**
  Maureen El Harake

Cal EPA

Air Resources Board

- [x] All Other Projects
  Cathi Slaminski
  - [ ] Transportation Projects
    Nesamani Kalandiyur
  - [ ] Industrial/Energy Projects
    Mike Tollstrup
- [ ] **State Water Resources Control Board**
  Regional Programs Unit
  Division of Financial Assistance
- [ ] **State Water Resources Control Board**
  Jeffery Werth
  Division of Drinking Water
- [x] **State Water Resources Control Board**
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] **State Water Resouces Control Board**
  Phil Crader
  Division of Water Rights
- [ ] **Dept. of Toxic Substances Control**
  CEQA Tracking Center
- [ ] **Department of Pesticide Regulation**
  CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- [ ] **RWQCB 1**
  Cathleen Hudson
  North Coast Region (1)
- [ ] **RWQCB 2**
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] **RWQCB 3**
  Central Coast Region (3)
- [ ] **RWQCB 4**
  Teresa Rodgers
  Los Angeles Region (4)
- [ ] **RWQCB 5S**
  Central Valley Region (5)
  - [ ] **RWQCB 5F**
    Central Valley Region (5)
    Fresno Branch Office
  - [ ] **RWQCB 5R**
    Central Valley Region (5)
    Redding Branch Office
- [ ] **RWQCB 6**
  Lahontan Region (6)
  - [x] **RWQCB 6V**
    Lahontan Region (6)
    Victorville Branch Office
- [ ] **RWQCB 7**
  Colorado River Basin Region (7)
- [x] **RWQCB 8**
  Santa Ana Region (8)
- [ ] **RWQCB 9**
  San Diego Region (9)

- [ ] **Other** _____
  _____
  _____

- [ ] _____
  Conservancy

Last Updated 10/13/2014

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

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May 29, 2015

Nancy J. Sansonetti, AICP, Senior Planner
Environmental Management Division
San Bernardino County Department of Public Works
825 East Third Street, Room 123
San Bernardino, CA 92415-0835

Notice of Preparation of a CEQA Document for the
Rimforest Storm Drain Project

The South Coast Air Quality Management District (SCAQMD) staff appreciates the opportunity to comment on the above-mentioned document. The SCAQMD staff's comments are recommendations regarding the analysis of potential air quality impacts from the proposed project that should be included in the draft CEQA document. Please send the SCAQMD a copy of the CEQA document upon its completion. Note that copies of the Draft EIR that are submitted to the State Clearinghouse are not forwarded to the SCAQMD. Please forward a copy of the Draft EIR directly to SCAQMD at the address in our letterhead. **In addition, please send with the draft EIR all appendices or technical documents related to the air quality and greenhouse gas analyses and electronic versions of all air quality modeling and health risk assessment files. These include original emission calculation spreadsheets and modeling files (not Adobe PDF files). Without all files and supporting air quality documentation, the SCAQMD will be unable to complete its review of the air quality analysis in a timely manner. Any delays in providing all supporting air quality documentation will require additional time for review beyond the end of the comment period.**

Air Quality Analysis

The SCAQMD adopted its California Environmental Quality Act (CEQA) Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. The SCAQMD recommends that the Lead Agency use this Handbook as guidance when preparing its air quality analysis. Copies of the Handbook are available from the SCAQMD's Subscription Services Department by calling (909) 396-3720. More recent guidance developed since this Handbook was published is also available on SCAQMD's website here: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ceqa-air-quality-handbook-(1993). SCAQMD staff also recommends that the lead agency use the CalEEMod land use emissions software. This software has recently been updated to incorporate up-to-date state and locally approved emission factors and methodologies for estimating pollutant emissions from typical land use development. CalEEMod is the only software model maintained by the California Air Pollution Control Officers Association (CAPCOA) and replaces the now outdated URBEMIS. This model is available free of charge at: www.caleemod.com.

The Lead Agency should identify any potential adverse air quality impacts that could occur from all phases of the project and all air pollutant sources related to the project. Air quality impacts from both construction (including demolition, if any) and operations should be calculated. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and entrained dust). Air quality impacts from indirect sources, that is, sources that generate or attract vehicular trips should be included in the analysis.

The SCAQMD has also developed both regional and localized significance thresholds. The SCAQMD staff requests that the lead agency quantify criteria pollutant emissions and compare the results to the recommended regional significance thresholds found here: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2. In addition to analyzing regional air quality impacts, the SCAQMD staff recommends calculating localized air quality impacts and comparing the results to localized significance thresholds (LSTs). LST's can be used in addition to the recommended regional significance thresholds as a second indication of air quality impacts

when preparing a CEQA document. Therefore, when preparing the air quality analysis for the proposed project, it is recommended that the lead agency perform a localized analysis by either using the LSTs developed by the SCAQMD or performing dispersion modeling as necessary. Guidance for performing a localized air quality analysis can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds.

In the event that the proposed project generates or attracts vehicular trips, especially heavy-duty diesel-fueled vehicles, it is recommended that the lead agency perform a mobile source health risk assessment. Guidance for performing a mobile source health risk assessment ("*Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis*") can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mobile-source-toxics-analysis. An analysis of all toxic air contaminant impacts due to the use of equipment potentially generating such air pollutants should also be included.

In addition, guidance on siting incompatible land uses (such as placing homes near freeways) can be found in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Perspective*, which can be found at the following internet address: http://www.arb.ca.gov/ch/handbook.pdf. CARB's Land Use Handbook is a general reference guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process.

Mitigation Measures

In the event that the project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures that go beyond what is required by law be utilized during project construction and operation to minimize or eliminate these impacts. Pursuant to state CEQA Guidelines §15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed. Several resources are available to assist the Lead Agency with identifying possible mitigation measures for the project, including:

- Chapter 11 of the SCAQMD *CEQA Air Quality Handbook*
- SCAQMD's CEQA web pages at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies.
- CAPCOA's *Quantifying Greenhouse Gas Mitigation Measures* available here: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.
- SCAQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook for controlling construction-related emissions
- Other measures to reduce air quality impacts from land use projects can be found in the SCAQMD's Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning. This document can be found at the following internet address: http://www.aqmd.gov/docs/default-source/planning/air-quality-guidance/complete-guidance-document.pdf?sfvrsn=4.

Data Sources

SCAQMD rules and relevant air quality reports and data are available by calling the SCAQMD's Public Information Center at (909) 396-2039. Much of the information available through the Public Information Center is also available via the SCAQMD's webpage (http://www.aqmd.gov).

The SCAQMD staff is available to work with the Lead Agency to ensure that project emissions are accurately evaluated and mitigated where feasible. If you have any questions regarding this letter, please contact me at Jwong1@aqmd.gov or call me at (909) 396-3176.

Sincerely,

Jillian Wong

Jillian Wong, Ph.D.
Program Supervisor
Planning, Rule Development & Area Sources

SBC150526-01
Control Number

Sansonetti, Nancy

From: Daniel McCarthy <DMcCarthy@sanmanuel-nsn.gov>
Sent: Wednesday, June 10, 2015 3:18 PM
To: Sansonetti, Nancy
Subject: FW: Rimforest Storm Drain Project NOP

Follow Up Flag: Follow up
Flag Status: Flagged

From: Daniel McCarthy
Sent: Wednesday, June 10, 2015 3:04 PM
To: ,gov
Subject: Rimforest Storm Drain Project NOP

Nancy,

I am responding to the NOP for the proposed Rimforest Storm Drain Project, dated May 22, 2015. Thank you for providing the opportunity to review and respond to the NOP. The project is within the Tribe's ancestral territory. We do not have any information about significant cultural resources at the project location. If cultural resource are identified, please contact my office for further consultation. It is our recommendation that any significant cultural resources be avoided and preserved. Please add the Tribe to your list of interested parties to receive the draft EIR and related documentation. Please forward a copy of the cultural resources records search and draft cultural resources report for review and comment. The Tribe reserves the right to consult as the review process continues.

Thank you,
Daniel

Daniel McCarthy MS, RPA
Director - CRM Department
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, CA 92346
THIS MESSAGE IS INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY TO WHICH IT IS ADDRESSED AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED, CONFIDENTIAL AND EXEMPT FROM DISCLOSURE UNDER APPLICABLE LAW. If the reader of this message is not the intended recipient or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination or copying of this communication is strictly prohibited. If you have received this electronic transmission in error, please delete it from your system without copying it and notify the sender by reply e-mail so that the email address record can be corrected. Thank You

Letters

RIMFOREST LANDSLIDE AREA

I read with great interest the article in the June 4, 2015, *Mountain News* regarding the landslide area in Rimforest. Those who argue that over regulation of productivity is running rampant in California appear to have an excellent example to cite in this case.

According to the article, a landslide in 1995 destroyed a portion of a street and nine homes, and geologists feel that the likelihood of further landslides can be reduced by diverting storm water away from the slope. They are recommending the installation of storm drain facilities that will catch this water and divert it into Lake Arrowhead, which can seemingly use it.

I know that this is more complicated than it sounds, but it sure seems like a win/win scenario that improves public safety, and with reasonable diligence I do not see how the environmental impacts could not be studied in a few months.

In this case, environmental studies have been underway for 36 months, and an extension of time was just granted. A San Bernardino County spokesman "expects" that the environmental studies will be completed by November 2015. Assuming that this is true, these studies will have taken three and a half years.

It's difficult to imagine this type of delay to this type of improvement in any other state than California

Richard Scott
Lake Arrowhead

mountain News
June 11, 2015

State of California - Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Inland Deserts Region
3602 Inland Empire Blvd., Suite C-220
Ontario, CA 91764
(909) 484-0459
www.wildlife.ca.gov

EDMUND G. BROWN, Jr., Governor
CHARLTON H. BONHAM, Director

June 22, 2015

Ms. Nancy Sansonetti
Senior Planner
San Bernardino County Flood Control District
825 E. 3rd Street
San Bernardino, CA 92415

Subject: Notice of Preparation of a Draft Environmental Impact Report
Rimforest Storm Drain Project
State Clearinghouse No. 2015051070

Dear Ms. Sansonetti:

The Department of Fish and Wildlife (Department) appreciates the opportunity to comment on the Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) for the Rimforest Storm Drain Project (project) [State Clearinghouse No. 2015051070]. The Department is responding to the NOP as a Trustee Agency for fish and wildlife resources (California Fish and Game Code Sections 711.7 and 1802, and the California Environmental Quality Act [CEQA] Guidelines Section 15386), and as a Responsible Agency regarding any discretionary actions (CEQA Guidelines Section 15381), such as the issuance of a Lake or Streambed Alteration Agreement (California Fish and Game Code Sections 1600 *et seq.*) and/or a California Endangered Species Act (CESA) Permit for Incidental Take of Endangered, Threatened, and/or Candidate species (California Fish and Game Code Sections 2080 and 2080.1).

The Project is being proposed by San Bernardino County Flood Control District to address historic erosion and landsliding problems that have led to significant property loss in the southern portion of the community of Rimforest, in the San Bernardino Mountains near Lake Arrowhead. The project proposes to construct and maintain a series of drainage facilities and will include:

1. Phase 1: Phase 1 includes the construction of approximately 0.8 mile of flood control improvements comprised of approximately 0.2 mile of channel/basin, and approximately 0.6 mile of pipe and culvert appurtenances. Improvements constructed under Phase 1 will convey mountainside runoff from an area of approximately 51 acres and deliver this runoff to Little Bear Creek.

2. Phase 2: Phase 2 includes the installation of a culvert system to direct runoff from Pine Avenue, which runs parallel to the south of State Route 18 (SR-18),

and under SR-18 to join flows diverted by Phase 1 in Little Bear Creek. The Phase 2 culvert system would include street inlets and storm drains within the community of Rimforest, to facilitate the diversion of flows along Pine Avenue. Improvements constructed under Phase 2 will divert runoff from 16 acres of the interior portion of the community of Rimforest.

3. Operation and Maintenance: Operation and maintenance are proposed on an as needed basis and will include:

    a. Slope stabilization to maintain the integrity of flood conveyance facilities;

    b. Sediment removal from retarding basins to maintain detention capacity;

    c. Regular inspection for wear and damage;

    d. Repair of facilities; and,

    e. Maintenance of vegetated landscape buffers.

COMMENTS AND RECOMMENDATIONS

The Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of those species (i.e., biological resources); and administers the Natural Community Conservation Planning Program (NCCP Program). The Department offers the comments and recommendations presented below to assist San Bernardino County Flood Control District (SBCFCD; the CEQA lead agency) in adequately identifying and/or mitigating the project's significant, or potentially significant, impacts on biological resources. The comments and recommendations are also offered to enable the Department to adequately review and comment on the proposed project with respect to impacts on biological resources. The Department recommends that the forthcoming DEIR address the following:

Assessment of Biological Resources

Section 15125(c) of the CEQA Guidelines states that knowledge of the regional setting of a project is critical to the assessment of environmental impacts and that special emphasis should be placed on environmental resources that are rare or unique to the region. To enable Department staff to adequately review and comment on the project, the DEIR should include a complete assessment of the flora and fauna within and adjacent to the project footprint, with particular emphasis on identifying rare, threatened, endangered, and other sensitive species and their associated habitats. The Department recommends that the DEIR specifically include:

1. An assessment of the various habitat types located within the project footprint, and a map that identifies the location of each habitat type. The Department recommends

that floristic, alliance- and/or association based mapping and assessment be completed following *The Manual of California Vegetation*, second edition (Sawyer et al. 2009). Adjoining habitat areas should also be included in this assessment where site activities could lead to direct or indirect impacts offsite. Habitat mapping at the alliance level will help establish baseline vegetation conditions;

2. A general biological inventory of the fish, amphibian, reptile, bird, and mammal species that are present or have the potential to be present within each habitat type onsite and within adjacent areas that could be affected by the project. The Department's California Natural Diversity Database (CNDDB) in Sacramento should be contacted at (916) 322-2493 or bdb@dfg.ca.gov to obtain current information on any previously reported sensitive species and habitat, including Significant Natural Areas identified under Chapter 12 of the Fish and Game Code, in the vicinity of the proposed project. The Department recommends that CNDDB Field Survey Forms be completed and submitted to CNDDB to document survey results. Online forms can be obtained and submitted at:
http://www.dfg.ca.gov/biogeodata/cnddb/submitting_data_to_cnddb.asp

   Please note that the Department's CNDDB is not exhaustive in terms of the data it houses, nor is it an absence database. The Department recommends that it be used as a starting point in gathering information about the *potential presence* of species within the general area of the project site.

3. A complete, *recent* inventory of rare, threatened, endangered, and other sensitive species located within the project footprint and within offsite areas with the potential to be effected, including California Species of Special Concern (CSSC) and California Fully Protected Species (Fish and Game Code § 3511). Species to be addressed should include all those which meet the CEQA definition (CEQA Guidelines § 15380). The inventory should address seasonal variations in use of the project area and should not be limited to resident species. Focused species-specific surveys, completed by a qualified biologist and conducted at the appropriate time of year and time of day when the sensitive species are active or otherwise identifiable, are required. Acceptable species-specific survey procedures should be developed in consultation with the Department and the U.S. Fish and Wildlife Service, where necessary. Note that the Department generally considers biological field assessments for wildlife to be valid for a one-year period, and assessments for rare plants may be considered valid for a period of up to three years. Some aspects of the proposed project may warrant periodic updated surveys for certain sensitive taxa, particularly if the project is proposed to occur over a protracted time frame, or in phases, or if surveys are completed during periods of drought.

4. A thorough, recent, floristic-based assessment of special status plants and natural communities, following the Department's *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (see https://www.wildlife.ca.gov/Conservation/Plants);

5. Information on the regional setting that is critical to an assessment of environmental impacts, with special emphasis on resources that are rare or unique to the region (CEQA Guidelines § 15125[c]);

Analysis of Direct, Indirect, and Cumulative Impacts to Biological Resources

The DEIR should provide a thorough discussion of the direct, indirect, and cumulative impacts expected to adversely affect biological resources as a result of the project. To ensure that project impacts to biological resources are fully analyzed, the following information should be included in the DEIR:

1. A discussion of potential impacts from lighting, noise, human activity, and wildlife-human interactions created by zoning of development projects or other project activities adjacent to natural areas, exotic and/or invasive species, and drainage. The latter subject should address project-related changes on drainage patterns and water quality within, upstream, and downstream of the project site, including: volume, velocity, and frequency of existing and post-project surface flows; polluted runoff; soil erosion and/or sedimentation in streams and water bodies; and post-project fate of runoff from the project site.

2. A discussion of potential indirect project impacts on biological resources, including resources in areas adjacent to the project footprint, such as nearby public lands (e.g. National Forests, State Parks, etc.), open space, adjacent natural habitats, riparian ecosystems, wildlife corridors, and any designated and/or proposed reserve or mitigation lands (e.g., preserved lands associated with a Natural Community Conservation Plan, or other conserved lands).

   Please note that the project area supports significant biological resources and contains habitat connections, providing for wildlife movement across the broader landscape, sustaining both transitory and permanent wildlife populations. The Department encourages project design that avoids and preserves onsite features that contribute to habitat connectivity. The DEIR should include a discussion of both direct and indirect impacts to wildlife movement and connectivity, including maintenance of wildlife corridor/movement areas to adjacent undisturbed habitats.

3. An evaluation of impacts to adjacent open space lands from both the construction of the project and long-term operational and maintenance needs. Based on review of aerial photography, the project has the potential to impact San Bernardino National Forest (SBNF) lands and stream resources within the SBNF, both to the north, and south, of the project area. The Department encourages SBCFCD to contact the SBNF to determine if any portion of the project will impact forest lands, and to work collaboratively to avoid and minimize impacts.

4. A cumulative effects analysis developed as described under CEQA Guidelines §

15130. Please include all potential direct and indirect project related impacts to riparian areas, wetlands, vernal pools, alluvial fan habitats, wildlife corridors or wildlife movement areas, aquatic habitats, sensitive species and other sensitive habitats, open lands, open space, and adjacent natural habitats in the cumulative effects analysis. General and specific plans, as well as past, present, and anticipated future projects, should be analyzed relative to their impacts on similar plant communities and wildlife habitats.

Mitigation Measures for Project Impacts to Biological Resources

The DEIR should include appropriate and adequate avoidance, minimization, and/or mitigation measures for all direct, indirect, and cumulative impacts that are expected to occur as a result of the construction and long-term operation and maintenance of the project. When proposing measures to avoid, minimize, or mitigate impacts, the Department recommends consideration of the following:

1. *Fully Protected Species*: Several Fully Protected Species (Fish and Game Code § 3511) have the potential to occur within or adjacent to the project area, including, but not limited to: American peregrine falcon (*Falco peregrinus anatum*), bald eagle (*Haliaeetus leucocephalus*), and golden eagle (*Aquila chrysaetos*). Fully protected species may not be taken or possessed at any time. Project activities described in the DEIR should be designed to completely avoid any fully protected species that have the potential to be present within or adjacent to the project area. The Department also recommends that the DEIR fully analyze potential adverse impacts to fully protected species due to habitat modification, loss of foraging habitat, and/or interruption of migratory and breeding behaviors. The Department recommends that the Lead Agency include in the analysis how appropriate avoidance, minimization and mitigation measures will reduce indirect impacts to fully protected species.

2. *Sensitive Plant Communities*: The Department considers sensitive plant communities to be imperiled habitats having both local and regional significance. Plant communities, alliances, and associations with a statewide ranking of S-1, S-2, S-3, and S-4 should be considered sensitive and declining at the local and regional level. These ranks can be obtained by querying the CNDDB and are included in *The Manual of California Vegetation* (Sawyer et al. 2009). The DEIR should include measures to fully avoid and otherwise protect sensitive plant communities from project-related direct and indirect impacts.

3. *Mitigation*: The Department considers adverse project-related impacts to sensitive species and habitats to be significant to both local and regional ecosystems, and the DEIR should include mitigation measures for adverse project-related impacts to these resources. Mitigation measures should emphasize avoidance and reduction of project impacts. For unavoidable impacts, onsite habitat restoration and/or enhancement should be evaluated and discussed in detail. If onsite mitigation is not feasible or would not be biologically viable and therefore not adequately mitigate the

loss of biological functions and values, offsite mitigation through habitat creation and/or acquisition and preservation in perpetuity should be addressed.

The DEIR should include measures to perpetually protect the targeted habitat values within mitigation areas from direct and indirect adverse impacts in order to meet mitigation objectives to offset project-induced qualitative and quantitative losses of biological values. Specific issues that should be addressed include restrictions on access, proposed land dedications, long-term monitoring and management programs, control of illegal dumping, water pollution, increased human intrusion, etc.

4. *Habitat Revegetation/Restoration Plans*: Plans for restoration and revegetation should be prepared by persons with expertise in southern California ecosystems and native plant restoration techniques. Plans should identify the assumptions used to develop the proposed restoration strategy. Each plan should include, at a minimum: (a) the location of restoration sites and assessment of appropriate reference sites; (b) the plant species to be used, sources of local propagules, container sizes, and seeding rates; (c) a schematic depicting the mitigation area; (d) a local seed and cuttings and planting schedule; (e) a description of the irrigation methodology; (f) measures to control exotic vegetation on site; (g) specific success criteria; (h) a detailed monitoring program; (i) contingency measures should the success criteria not be met; and (j) identification of the party responsible for meeting the success criteria and providing for conservation of the mitigation site in perpetuity. Monitoring of restoration areas should extend across a sufficient time frame to ensure that the new habitat is established, self-sustaining, and capable of surviving drought.

   The Department recommends that local onsite propagules from the project area and nearby vicinity be collected and used for restoration purposes. Onsite seed collection should be initiated in the near future in order to accumulate sufficient propagule material for subsequent use in future years. Onsite vegetation mapping at the alliance and/or association level should be used to develop appropriate restoration goals and local plant palettes. Reference areas should be identified to help guide restoration efforts. Specific restoration plans should be developed for various project components as appropriate.

   Restoration objectives should include protecting special habitat elements or re-creating them in areas affected by the project; examples could include retention of woody material, logs, snags, rocks, and brush piles.

5. *Nesting Birds and Migratory Bird Treaty Act:* Please note that it is the project proponent's responsibility to comply with all applicable laws related to nesting birds and birds of prey. Migratory non-game native bird species are protected by international treaty under the federal Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. 703 *et seq.*). In addition, sections 3503, 3503.5, and 3513 of the Fish and Game Code (FGC) also afford protective measures as follows: Section 3503 states that it is unlawful to take, possess, or needlessly destroy the nest or

eggs of any bird, except as otherwise provided by FGC or any regulation made pursuant thereto; Section 3503.5 states that is it unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by FGC or any regulation adopted pursuant thereto; and Section 3513 states that it is unlawful to take or possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the MBTA.

The Department recommends that the DEIR include the results of avian surveys, as well as specific avoidance and minimization measures to ensure that impacts to nesting birds do not occur. Project-specific avoidance and minimization measures may include, but not be limited to: project phasing and timing, monitoring of project-related noise (where applicable), sound walls, and buffers, where appropriate. The DEIR should also include specific avoidance and minimization measures that will be implemented should a nest be located within the project site. If pre-construction surveys are proposed in the DEIR, the Department recommends that they be required no more than three (3) days prior to vegetation clearing or ground disturbance activities, as instances of nesting could be missed if surveys are conducted sooner.

6. *Translocation of Species*: The Department generally does not support the use of relocation, salvage, and/or transplantation as mitigation for impacts to rare, threatened, or endangered species as studies have shown that these efforts are experimental in nature and largely unsuccessful.

California Endangered Species Act

The Department is responsible for ensuring appropriate conservation of fish and wildlife resources including threatened, endangered, and/or candidate plant and animal species, pursuant to the California Endangered Species Act (CESA). The Department recommends that a CESA ITP be obtained if the project has the potential to result in "take" (California Fish and Game Code Section 86 defines "take" as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") of State-listed CESA species, either through construction or over the life of the project. CESA ITPs are issued to conserve, protect, enhance, and restore State-listed CESA species and their habitats. The Department encourages early consultation, as significant modification to the proposed project and mitigation measures may be necessary to obtain a CESA ITP. Revisions to the California Fish and Game Code, effective January 1998, require that the Department issue a separate CEQA document for the issuance of a CESA ITP unless the Project CEQA document addresses all Project impacts to listed species and specifies a mitigation monitoring and reporting program that will meet the requirements of a CESA permit.

Lake and Streambed Alteration Program

For any activity that will divert or obstruct the natural flow, or change the bed, channel, or bank (which may include associated riparian resources) of a river or stream or use material from a streambed, the project applicant (or "entity") is required to provide written notification to the Department pursuant to Section 1602 of the Fish and Game Code. Based on the notification and supporting information, the Department then determines if the proposed project activities may substantially adversely affect existing fish and wildlife resources and whether a Lake and Streambed Alteration (LSA) Agreement is required.

The Department's issuance of an LSA Agreement is a "project" subject to CEQA (see Pub. Resources Code 21065). To facilitate issuance of an LSA Agreement, if necessary, the DEIR should fully identify the potential impacts to the lake, stream, or riparian resources, and provide adequate avoidance, mitigation, and monitoring and reporting commitments. Early consultation with the Department is recommended, since modification of the proposed project may be required to avoid or reduce impacts to fish and wildlife resources. To obtain a Lake or Streambed Alteration notification package, please go to https://www.wildlife.ca.gov/Conservation/LSA/Forms.

Further Coordination

The Department appreciates the opportunity to comment on the NOP of a DEIR for the Rimforest Storm Drain Project (SCH No. 2015051070) and recommends that SBCFCD address the Department's comments and concerns in the forthcoming DEIR. The Department is available to meet with SBCFCD early in the planning process, and attend a site visit for this project.

If you should have any questions pertaining to the comments provided in this letter, or wish to schedule a meeting and/or site visit, please contact Joanna Gibson at (909) 987-7449 or at Joanna.gibson@wildlife.ca.gov.

Sincerely,

for Leslie MacNair
Regional Manager

Literature Cited

Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens. 2009. A manual of California Vegetation, 2nd ed. California Native Plant Society Press, Sacramento, California. http://vegetation.cnps.org/

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Lahontan Regional Water Quality Control Board

June 22, 2015

File: Environmental Doc Review
San Bernardino County

Nancy Sansonetti
San Bernardino County Flood Control District
825 E. 3rd Street
San Bernardino, CA 92415
Email: Nancy.Sansonetti@dpw.sbcounty.gov

COMMENTS ON THE NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RIMFOREST STORM DRAIN PROJECT, SAN BERNARDINO FLOOD CONTROL DISTRICT, SAN BERNARDINO COUNTY, STATE CLEARINGHOUSE NUMBER 2015051070

The Notice of Preparation of a Draft Environmental Impact Report (DEIR) for the above-referenced project (Project) was prepared by the San Bernardino County Flood Control District (County) and circulated for public comment in compliance with provisions of the California Environmental Quality Act (CEQA). As a responsible agency, the California Regional Water Quality Control Board, Lahontan Region (Water Board) is providing these comments to specify the scope and content of the environmental information germane to our statutory responsibilities pursuant to CEQA Guidelines, California Code of Regulations, title 14, section 15096. Based on our review of the proposed Project, we recommend that several issues be considered in the preparation of the DEIR, particularly: 1) established numerical and narrative water quality objectives and standards should be used when evaluating thresholds of significance for Project impacts; (2) the County should consider more eco-friendly alternatives to stabilize the banks and channel of Little Bear Creek, for example willow stakes could be used in areas where existing conditions are favorable for willow growth; and 3) all potential downstream impacts to hydrology and water quality must be evaluated as a result of Project implementation. Our comments on the Project are outlined below.

Water Board's Authority

All groundwater and surface waters are considered waters of the State. Surface waters include streams, lakes, ponds, and wetlands, and may be ephemeral, intermittent, or perennial. All waters of the State are protected under California law. State law assigns responsibility for protection of water quality in the Lahontan Region to the Lahontan Water Board. Some waters of the State are also waters of the U.S. The Federal Clean Water Act (CWA) provides additional protection for those waters of the State that are also waters of the U.S.

The *Water Quality Control Plan for the Lahontan Region* (Basin Plan) contains policies that the Water Board uses with other laws and regulations to protect the quality of waters of the State within the Lahontan Region. The Basin Plan sets forth water quality standards for surface water and groundwater of the Region, which include designated beneficial uses as well as narrative and numerical objectives which must be maintained or attained to protect those uses. The Basin Plan can be accessed via the Water Board's web site at http://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/references.shtml.

Specific Issues to be Considered in the DEIR

Based on our review of the information provided, we recommend that the following issues be considered in preparation of the DEIR.

1. The DEIR should identify the water quality standards that could potentially be violated by Project alternatives and use these standards when evaluating thresholds of significance for impacts. Water quality objectives and standards, both numerical and narrative, for **all** waters of the State within the Lahontan Region, including surface waters and groundwater, are outlined in Chapter 3 of the Basin Plan. Water quality objectives and standards are intended to protect the public health and welfare, and to maintain or enhance water quality in relation to the existing and/or potential beneficial uses of the water.

2. The Project area is located within the Upper Mojave Hydrologic Area of the Mojave Hydrologic Unit 628.00. The beneficial uses of water resources, including Little Bear Creek, are listed in Chapter 2 of the Basin Plan. We request that the DEIR identify and list the beneficial uses of the water resources within the Project area, and include an analysis of the potential impacts to water quality and hydrology with respect to those beneficial uses.

3. The Notice of Preparation describes armoring portions of Little Bear Creek and constructing in-stream "retardation" basins to reduce flow velocities and capture sediment. We recommend the County consider more eco-friendly alternatives or combinations thereof to stabilize portions of Little Bear Creek. For example, willow stakes have long been used as an effective tool to restore and stabilize creek banks. Their ability to withstand flooding, stabilize soils, and grow quickly in saturated areas makes them ideal for such uses. Little Bear Creek currently supports willow stands in various areas; therefore, the existing conditions are favorable for willow growth along the banks of the creek. We recommend the County consider stabilizing portions or reaches of the creek using willow cuttings harvested from onsite sources, and in more vulnerable areas that may be subjected to higher flow velocities and scour intensities, engineered structural elements could be utilized. As further incentive, the Water Board may consider the use of more eco- and bio-engineered bank stabilization alternatives as mitigation to offset the Projects permanent impacts to wetland and riparian areas.

4. Healthy watersheds are sustainable. Watersheds supply drinking water, provide for recreational uses, and support ecosystems. Watershed processes include

the movement of water (i.e. infiltration and surface runoff), the transport of sediment, and the delivery of organic material to surface waters. These processes create and sustain the streams, lakes, wetlands, and other receiving waters of our region, including groundwater.

Little Bear Creek is a headwater stream in the Upper Mojave watershed. The proposed Project has the potential to disrupt watershed processes and degrade the overall health of the watershed as a whole through increased peak flows, channel incision, and increased erosion and sediment transport in downstream reaches. These indirect, cumulative effects will need to be evaluated in the DEIR.

5. The portion of Little Bear Creek included in the proposed Project area is located on property owned by Church of the Woods. The hydrological analyses performed to evaluate potential Project impacts must take into consideration the full build-out condition as defined in the Final EIR prepared for the Church of the Woods development project. The DEIR should clearly distinguish between which Project components are proposed by the County and which components are planned as part of the Church of the Woods development.

6. The DEIR should include a discussion of the proposed long-term maintenance plan that will be implemented to maintain the established baseline conditions. Specific routine and non-routine activities should be identified, such as dredging/excavation and recontouring, and the thresholds that will trigger when maintenance activities are warranted.

7. It is understood that routine sediment removal is necessary to maintain the function of a basin, and the removal of accumulated sediments in the bottom of a basin would completely remove any vegetation that may had been present. However, we also recognize the benefits of vegetation for water quality by filtering sediments and constituents of concerns from water. We strongly recommend that the County include in their long term maintenance plan provisions for mowing so that vegetation can more easily reestablish post-maintenance. Recontouring and vegetation grubbing should only occur rarely on an as-needed basis.

8. Surface waters support a variety of beneficial uses including municipal and agricultural uses, groundwater and fresh water recharge, habitat, flood attenuation, and water quality enhancement. To ensure that no net loss of function and value will occur as a result of Project implementation, we request that culverts be designed to (1) pass storm flows without impoundment upstream, (2) with sufficient energy dissipation provided at the outlet to reduce flow velocities to pre-Project conditions, and (3) sufficiently sized to allow for habitat connectivity across/beneath the roadway.

9. All rock slope protection and energy dissipation rip-rap placed within stream channels should be **ungrouted** and the minimum amount necessary to provide scour protection.

10. Construction and post-construction storm water management must be considered a significant Project component, and best management practices (BMPs) that effectively treat storm water runoff should be included as part of the Project. The DEIR needs to specify those temporary sediment and erosion control BMPs that will be implemented to mitigate potential water quality impacts related to storm water. The temporary BMPs need to be implemented for the Project until such time that vegetation has been restored to pre-Project conditions. We request that vegetation clearing be kept to a minimum and, where feasible, existing vegetation be mowed so that vegetation could more readily reestablish post-construction.

11. The Water Board requires that impacts to water resources be avoided where feasible and minimized to the extent practical. Compensatory mitigation will be required for all unavoidable permanent impacts to surface water resources. Water Board staff coordinate all mitigation requirements with staff from other federal and state regulatory agencies, including the USACE and the California Department of Fish and Wildlife. In determining appropriate mitigation ratios for impacts to waters of the State, Water Board staff considers Basin Plan requirements (minimum 1.5:1 mitigation ratio for impacts to wetlands) and utilizes *12501-SPD Regulatory Program Standard Operating Procedure for Determination of Mitigation Ratios*, published December 2012 by the USACE, South Pacific Division.

12. All temporary impacts to water resource and upland areas should be restored (recontoured and revegetated) to match pre-Project conditions. A Restoration and Revegetation Monitoring Plan should be prepared that requires monitoring for some period of time (usually no less than 3 years), outlines a schedule with performance measures to be met in order for the restoration/revegetation to be deemed successful, and contains adaptive management criteria in the event performance measures are not being met.

13. Equipment staging areas, excavated soil stockpiles, and hazardous materials (i.e. oils and fuels) should be sited in upland areas outside surface waters and adjacent flood plain areas. We recommend that a comprehensive Spill Prevention and Response Plan be prepared that outlines the site-specific monitoring requirements and lists the BMPs necessary to prevent hazardous material spills or to contain and cleanup a hazardous material spill, should one occur.

14. Buffer areas should be identified and exclusion fencing used to protect water resources and to prevent unauthorized vehicles or equipment from entering or otherwise disturbing the surface waters. Equipment should use existing roadways to the extent feasible.

Permitting Requirements

A number of activities associated with the proposed Project have the potential to impact waters of the State and, therefore, may require permits issued by either the State Water

Resources Control Board (State Water Board) or Lahontan Water Board. The required permits may include the following.

15. Streambed alteration and/or discharge of fill material to a surface water may require a CWA, section 401 water quality certification for impacts to federal waters (waters of the U.S.), or dredge and fill waste discharge requirements for impacts to non-federal waters, both issued by the Lahontan Water Board.

16. Land disturbance of more than 1 acre may require a CWA, section 402(p) storm water permit, including a National Pollutant Discharge Elimination System (NPDES) General Construction Storm Water Permit, Water Quality Order (WQO) 2009-0009-DWQ, obtained from the State Water Board, or individual storm water permit obtained from the Lahontan Water Board.

17. Water diversion and/or dewatering activities may be subject to discharge and monitoring requirements under either NPDES General Permit, Limited Threat Discharges to Surface Waters, Board Order R6T-2014-0049, or General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality, WQO-2003-0003, both issued by the Lahontan Water Board.

Please be advised of the permits that may be required for the proposed Project, as outlined above. The specific Project activities that may trigger these permitting actions should be identified in the appropriate sections of the DEIR. The Project proponent should consult with Water Board staff early on should Project implementation result in activities that trigger these permitting actions. Information regarding these permits, including application forms, can be downloaded from our web site at http://www.waterboards.ca.gov/lahontan/.

Thank you for the opportunity to comment on the NOP. If you have any questions regarding this letter, please contact me at (760) 241-7376 jan.zimmerman@waterboards.ca.gov or Patrice Copeland, Senior Engineering Geologist, at (760) 241-7404 patrice.copeland@waterboards.ca.gov. Please send all future correspondence regarding this Project to the Water Board's email address at Lahontan@waterboards.ca.gov and be sure to include the State Clearinghouse No. and Project name in the subject line.

Jan M. Zimmerman, PG
Engineering Geologist

cc: State Clearinghouse (SCH 2015051070) (state.clearinghouse@opr.ca.gov)
USEPA Wetlands Regulatory Office, Region 9 (R9-WTR8-Mailbox@epa.gov)
Daniel Swenson, USACE (Daniel.P.Swenson@usace.army.mil)
Jeff Brandt, CA Dept. of Fish and Wildlife (Jeff.Brandt@wildlife.ca.gov)

Susan V. Walker

PO Box 94
966 Willow Creek Road
Lake Arrowhead, CA 92352

(909) 337-1279
svwalker@gmail.com

June 22, 2015

Project Title: Rimforest Storm Drain Project

Subject Notice of Preparation – Environmental Impact Report

Dear Annesley Ignatius, Deputy Director – Environmental & Construction:

The County proposes to construct and maintain a series of drainage facilities in Rimforest to address historic erosion and landslide problems. I write to ensure that all environmental issues are identified and adequately addressed in the EIR.

The water from the storm drain basins will eventually flow down into Aqua Fria, Blue Jay and into Lake Arrowhead. Currently the infrastructure for the stormwater runoff is not adequate. I am concerned about adding more water to this insufficient system. During heavy rains there is street flooding and many businesses have experienced flooding. The owners of "From Head to Toe" can give you the history of this flooding.

In addition, the runoff comes close to Hwy 189. Strong water flow could lead to road damage or cars ending up in a ditch filled with water.

The Church of the Woods property has a spring and water source that is an important part of the habitat for much of the wildlife. I ask that this wetland area be protected from the drainage project.

Your Notice of Preparation of May 22, 2015 gave a mailing address for comments, but no email address. I suggest in the future that NOP provide an email address for comments.

Thank you for the opportunity to comment.

Sincerely,
Susan V. Walker

To: Serra Rea Department of Public Works- Environmental Management

From : Robert Sherman (lake Arrowhead, CA)

Re: Please Include* as part of my comments on the proposed Rimforest Drainage Project
(File was too big to be transmitted electronically)

Date: 6/23/2015)

***FEIR Refute/ Response to Comments in FEIR (re CA Fish & game letter of June, 2, 2010)**
By Robert Sherman

RECEIVED
JUN 24 2015
San Bernardino County
Dept. of Public Works
Enviro Mgmt Div

Refutation of.... Response to Comments in FEIR (re CA Fish & game letter of June, 2, 2010

Key- Language of FEIR (Response to Comments)- Black

Language in FEIR referring back to and quoted from original DEIR- Dark Red

Language of either of the above, our emphasis- Various colors, italics and bold

Comments and/or refutations by Mountains Chapter of the Sierra Club- Dark Blue

2.0 Response to Comments

LETTER NO. B6

Jeff Brandt, Senior Environmental Scientist Date: 6/2/2010

DEPARTMENT OF FISH AND GAME

Inland Deserts Region

RESPONSE NO. B6-6

Regarding the recommendation that an analysis of potential impacts on the Strawberry Creek Open Space Corridor be provided along with mitigation measures to address impacts, please note that this issue was addressed in the Draft ER on pages *3.C-5* through 3.C-8, page 3.C-33, page 3.C-34, and pages 3.C-38 through 3.C-40.

(from p.3.C-38 of the DEIR)-

"C-2. Wildlife Species and Movement. The proposed project would have indirect effects on and result in the direct removal of wildlife habitat from the project site. Impacts to wildlife species and wildlife movement are considered to be Less-Than- Significant Impacts.

Adverse impacts on wildlife are generally associated with the degree of habitat loss from the standpoint of physical character, quality, diversity, and abundance of vegetation. Project implementation in the short- and long-term would result in direct removal of relatively low value wildlife habitat and the potential mortality of few common wildlife species existing on site. ***The potential loss of common wildlife does not meet any of the significance thresholds presented above; therefore, impacts on common wildlife species are considered less than significant.***"

(from p.3.C-34 of the DEIR)-

2. THRESHOLDS OF SIGNIFICANCE

In the development of significance thresholds for impacts to biological resources, CEQA provides guidance primarily in Section 15065, Mandatory Findings of Significance, and the CEQA Guidelines, Appendix G, Environmental Checklist Form. Section 15065(a) states that a project may have a significant effect where:

> The project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or wildlife community, reduce the number or restrict the range of an endangered, rare, or threatened species...

Appendix G of the CEQA Guidelines is more specific in addressing biological resources and

encompasses a broader range of resources to be considered, including: candidate, sensitive, or special status species; riparian habitat or other sensitive natural communities; federally protected wetlands; fish and wildlife movement corridors; local policies or ordinances protecting biological resources; and, adopted HCPs. This is done in the form of a checklist of questions to be answered during the Initial Study leading to the preparation of the appropriate environmental documentation for a project (i.e., Negative Declaration, Mitigated Negative Declaration, or EIR). Because these questions are derived from standards in other laws, regulations, and other commonly used thresholds, it is reasonable to use these standards as a basis for defining significance thresholds in an EIR. ***Therefore, for the purpose of this analysis, impacts to biological resources are considered potentially significant (before considering offsetting mitigation measures) if one or more of the following conditions would result from implementation of the proposed project.***

- • A substantial adverse effect, either directly or through habitat modifications, on any species listed by by Federal or State agencies as threatened or endangered. (Note- the following conditions were not on pp. cited in RESPONSE NO. B6-6, but were obviously intended to be continuing from the above italicized language.

- ***A substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate for listing, sensitive, rare, or otherwise special status plant or animal species in local or regional plans, policies, or regulations, or by the CDFG or USFWS.***

- ***Conflict with any approved or adopted local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.***

- ***A substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFG or USFWS.***

- ***A substantial adverse effect on State or Federal-protected wetlands as defined by Section 1600 of the Fish and Game Code or Section 404 of the Clean Water Act (CWA) through direct removal, filling, hydrological interruption, or other means.***

- ***Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.***

- **Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, State, or federal HCP.**

The Sierra Club takes issue with all of the contention above ("***The potential loss of common wildlife does not meet any of the significance thresholds presented above; therefore, impacts on common wildlife species are considered less than significant.***")

First, the riparian areas along Little Bear Creek are extremely significant in terms of habitat value (see pictures below), have been mischaracterized: large assemblages of Red Osier Dogwood, (*Cornus sericea*), were "missed" in surveys, never catalogued, delineated nor assessed in terms of habitat value.

Riparian areas, including stream-banks and wetlands of significance WERE cited in the June 2, 2010 letter from CA Fish & Game, and thus constitute (as above)- "• ***A substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFG*** or USFWS."

Additionally, All of these important riparian areas lie at the foot of very steep slopes, nearly all over 25% (some over 40%). Copious studies show that resources situated as such are likely to be damaged by erosion and siltation, especially when massive deforestation and changes of grades at the top of these slopes are planned. (Illustrations appear in sections below). Thus the following thresholds (as listed above) ARE abrogated:

- ***A substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFG or USFWS.***
- ***A substantial adverse effect on State or Federal-protected wetlands as defined by Section 1600 of the Fish and Game Code or Section 404 of the Clean Water Act (CWA) through direct removal, filling, hydrological interruption, or other means.***

Response No. B6-6 (from the FEIR) states:

The discussion on page 3.C-7 states that the site is within the northwest portion of, and is adjacent to, the Strawberry Creek Open Space Corridor. On page 3.C-8 it is indicated that while the site represents a portion of a potential travel route, wildlife movement in the area is expected to occur throughout the surrounding area of the project and not to be concentrated across the site itself . The Draft ER analysis goes on to state that corridors are linear in nature and generally cross landscapes that are otherwise difficult or impossible for wildlife to navigate. This is not the case on site, and wildlife movement can and likely does occur over large blocks of habitat without defined corridors. Therefore, the Draft ER concluded that the site does not constitute a wildlife corridor. Thus, wildlife movement will not be significantly effected by the project, no potentially significant impacts to the Strawberry Creek Open Space Corridor are expected, and no mitigation is warranted.

The above "assessment" is unfounded, self-serving and deceptive. How can the site NOT "constitute a wildlife corridor when it "**is within the northwest portion of, and is adjacent to, the Strawberry Creek Open Space Corridor**"? Further, specious is the assertion that "**wildlife movement in the area is expected to occur throughout the surrounding area of the project and not to be concentrated across the site itself**".

The ***California Riparian Habitat Restoration Handbook (September 2008)*** (http://riverpartners.org/reports-and-articles/Restoration_Handbook_FINAL.pdf) states: "*Statewide significance*. Riparian areas statewide support more species of wildlife than any other vegetation type (See California Wildlife Habitat Relationships document at http://www.dfg.ca.gov/biogeodata/cwhr/), primarily due to the complex structure of the vegetation and close proximity to surface water year-round. River channels and their associated riparian vegetation function as important, primary movement and migration corridors for most wildlife."

The United States Geological Service states "California's riparian areas act as wildlife corridors, provide essential reserve and open-space in many urbanizing regions of the state, and are ecologically important to watersheds. Riparian areas also occur within the floodplain and are the transition between the aquatic and terrestrial environments." (http://www.usgs.gov/newsroom/article.asp?ID=1829)

Studies done in central CA determined that "the primary features identified as facilitating animal movement in the region included waterways, riparian habitat, undeveloped flood plains, contiguous habitat, bridges, and underpasses. Riparian habitat was listed as facilitating animal movement in 65% (13/20) of the linkages." (http://longrange.sbcountyplanning.org/planareas/gaviota/documents/GavPAC%20Materials/GavPAC%20Meeting%2023/Missing%20Linkages%20Excerpt.pdf)

Given that it is well established by science that streambed/riparian habitats provide essential benefits as corridors for wildlife movement, it is astounding (and self-serving) that PCR could come to any other conclusion but that the Little Bear Creek, situated in the middle of the Church of the Woods proposed development AND within the Strawberry Creek Open Space Corridor", does not constitute a vital and threatened wildlife corridor! PCR asserts in the FEIR, that:

"Therefore, the Draft ER concluded that the site does not constitute a wildlife corridor. Thus, wildlife movement will not be significantly ***effected*** by the project, no potentially significant impacts to the Strawberry Creek Open Space Corridor are expected, and no mitigation is warranted."

One can hardly imagine a more irresponsible and fallacious "conclusion". It is based upon no analytical substantiation, and, if fact, runs counter to commonly-accepted precepts long accepted by ecological science and wildlife biology. (** should be ***affected***; PCR's usage is as faulty as their reasoning!)

County of San Bernardino Land Use Services Department SCH No. 2004031114

Church of the Woods Development Final EIR – June 2011

RESPONSE NO. **B6-8**

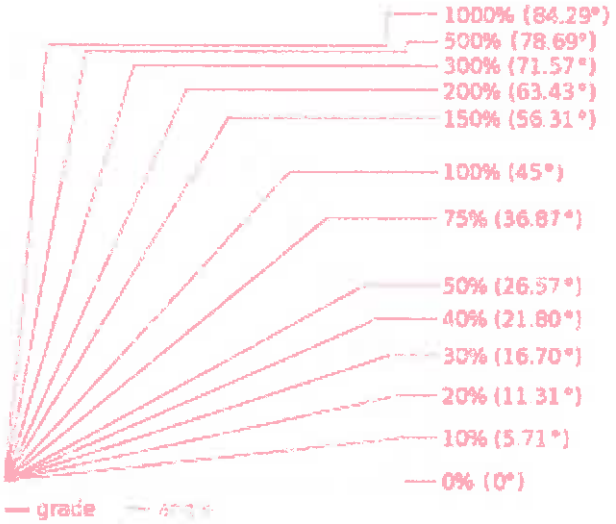
Regarding the recommendation that impacts on riparian habitat be analyzed, such analysis was provided in Section 3.C, Biological Resources of the Draft ER, including mitigation measures provided to address significant impacts. See page 3.C-2 of the Environmental Setting discussion on Plant Communities, pages 3.C-40 and 3.C-41 regarding impacts on Jurisdictional Areas, and page 3 .C-43 for mitigation measures addressing impacts to Jurisdictional Waters.

The impacts on riparian habitat cannot possibly be discerned from the DEIR because its findings are inaccurate and woefully deficient in detail. The analysis totally missed significant areas of Red-Osier Dogwood (***Cornus sericea***), classified as FACW+ (verify) that abut the stream (see Figure 1). Secondly (but no less importantly) it is impossible to assess impacts when **wetland boundaries** not located in the field nor on any plans of record. Without such surveyed plans, which also should clearly show **limits of work**, any projections of impacts are conjecture. With the extremely step slopes bordering the riparian habitats, wetlands harm is virtually certain

Figure 1

Figure 2

Slope of Land (%)	Minimum width of Buffer Strip (feet)
0	50
5	70
10	90
15	110
20	130
25	150



Source: Finley 1987 in *Establishing Vegetative Buffer Strips Along Streams to Improve Water Quality*. Pennsylvania State University. 1996.

RESPONSE NO. **B6-9**

Regarding the recommendation that a hydrological analysis be completed focusing on how the project would alter and concentrate flows from the site and potentially impact local drainages downstream to Lake Arrowhead, a Drainage Study was prepared for the project and was incorporated into the analysis presented in Section 4.F, Hydrology, Water Quality and Water Supply, of the Draft ER. In summary, ***the analysis found that since on site flows would be discharged at the same point within the natural drainage course as under existing conditions and there would be an overall decrease in storm flows discharged from the site (as a result of creating flat building pads where there are now steep slopes), neither the off site natural drainage course nor the off site watershed, would be substantially altered by development of the project. Thus, impacts regarding hydrology and drainage would be less than significant.***

How can the FEIR purport that "***the analysis found that since on site flows would be discharged at the same point within the natural drainage course as under existing conditions***", given that:

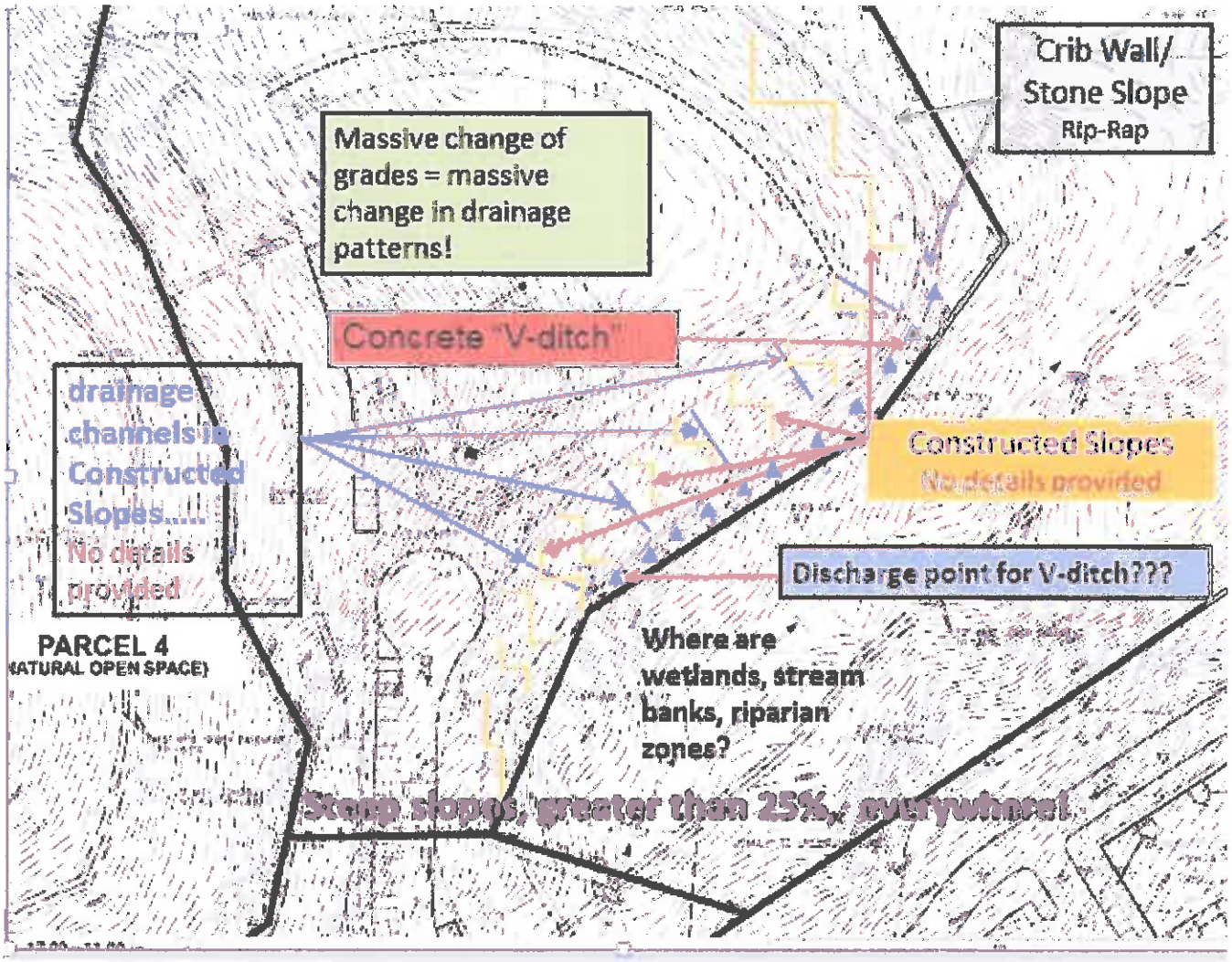
(1) There is massive (tens of acres) change in grades and (concomitant, resultant) drainage patterns.

(2) The changes, involving not only changes in grades and drainage patterns, but in removal of vegetative and duff ground cover, inevitably will result in significant changes of the direction and volume of surface run-off /sheet-flow..

(3) The construction of man-made drainage-altering structures, while massive, is neither detailed not shown adequately on plans. (Indeed, the plans are also lacking in depicting (let alone precisely locating) wetlands, riparian areas, stream-banks, etc. , most notably, in proximity to VERY steep slopes,. Temporary and permanent erosion/sedimentation control measures are lacking

(4) These man-made drainage-altering structures include constructed slopes with drainage channels within- BUT no details are provided as to construction details, materials, ground cover, etc. They also include a Crib Wall/Stone Slopes (down-gradient of the constructed slopes) with no construction details. At the base of the Crib Wall/Stone Slopes is a "concrete "V-Ditch". Again, no construction details ate provided. From the plans, it appears that this structure/drainage path "returns" into the slope (a steep one) where there would seem to have to be a discharge point. How can the FEIR then assert that "***there would be an overall decrease in storm flows discharged from the site.***" (See Figure 3, below)

Figure 3



RESPONSE NO. B6-12

Regarding the various surveys addressing biological resources that have been conducted for the site and the recommendation that all surveys and the jurisdictional delineation be updated with results included in the Final ER; site conditions, including features habitat characteristics and jurisdictional have not meaningfully changed since the surveys cited in the comment were completed. Moreover, regarding the southern rubber boa and San Bernardino flying squirrel, the Final ER incorporates pre-construction surveys for both of these species prior to the initiation of clearing and construction activities in Mitigation Measure *MM-C5(b)*. Please see Section 3.0, Corrections and Additions to the Draft ER, in this Final ER. Therefore, updated surveys at this time are not warranted.

The Sierra club can agree that "**habitat characteristics … have not meaningfully changed**"; but accepts no part of the premise that these habitat resources are (as stated in another section) are "of relatively low value wildlife habitat". Indeed, p. 2-64 of the FEIR quotes the June 2, 2010 CA Fish & Game letter as stating that that included in the FEIR should have been- "A complete assessment of the flora and fauna within and adjacent to the project site, with particular emphasis upon identifying endangered, threatened and locally unique species and sensitive and sensitive habitats."

Figure 4

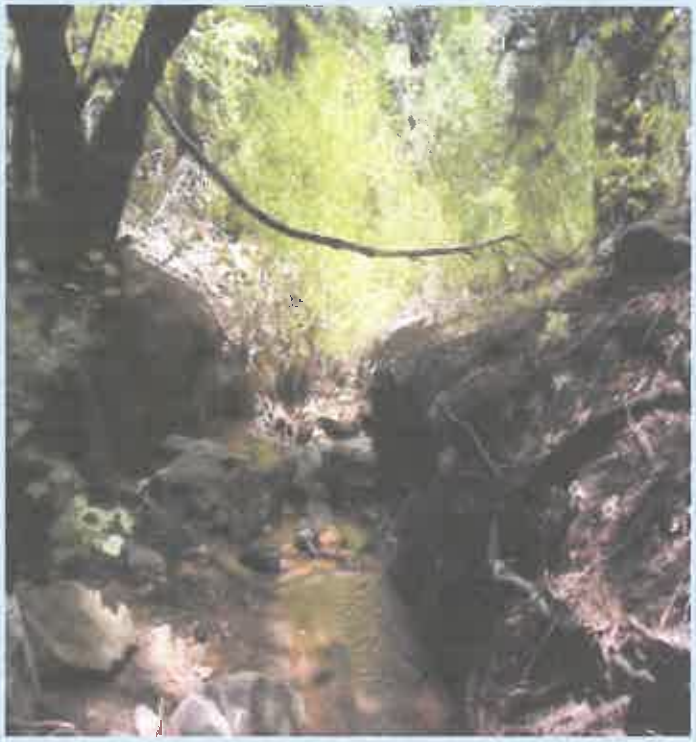
Figure 5

Stream and Riparian Area

Fish\Wildlife Habitat-

Wooded riparian corridors foster a **richly diverse habitat** for a wide variety of wildlife- aquatic, semi-aquatic and upland species (including amphibians, reptiles mammals and birds) that utilize stream bed, water, banks and slopes for **food, shelter, nesting** and other vital needs.

The diversity of "micro-habitats" is an "insurance policy" for populations and food webs!



Additionally, updated surveys are a vital necessity, given that important vegetative communities (as fore-mentioned, Red-Osier Dogwood) were not recognized nor assessed. These, and other most valuable riparian systems/features have never been definitively delineated/depicted on plans. It is impossible to address impacts unless such are shown in relation to the very steep slopes, and in relation (proximity to) ENTIRELY LACKING elements of temporary (during construction) and long-range erosion/sedimentation control.

RESPONSE NO. B6-25

Cumulative effects on biological resources were addressed in the Draft ER, see the discussion under the heading "Cumulative Impacts" in Section 3.C, Biological Resources on page 3.C-42.

Our preceding analysis shows the FEIR to be replete with errors, unfounded assertions and utterly lacking in the detail needed to justify its fallacious conclusions. It would be "laughable" if it did not portend, should the permitting process fail to protect the natural resource interests that the statutes are intended to foster, the loss of a uniquely valuable ecological resource in our mountain area.

Appendix 2

Air Pollutant Emissions Calculations

Air Quality Appendix

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Rimforest Drainage Restoration Project

Emission Calculation Assumptions:

General Assumptions

1) Work occurs 5 days a week during daylight hours.
2) Basin construction occurs in 2016, State Highway 18 Storm Drain construction occurs in 2017, and Pine Avenue Storm Drain construction occurs in 2018.

Onroad Equipment Emission Calculations Assumptions

1) CARB EMFAC2014 model emission factors for San Bernardino County region of SCAB are used to estimate on-road emissions. All passenger and crew truck vehicles are assumed to be gasoline-fueled and all delivery and heavy heavy duty trucks are assumed to be diesel-fueled.
2) Trip estimates are based on raw material import/export trips, equipment delivery, and worker trips provided by the County.
3) Trip distance assumptions: 80 miles/round trip for construction workers, 70 miles/round trip for imported rock trucks, 60 miles/round trip for other delivery vehicles and crew trucks, 50 miles/trip for fuel trucks, concrete trucks, waste trucks, and delivery trucks, and 10 miles/round trip for exported soil.

Offroad Equipment Emission Calculation Assumptions

1) CARB OFFROAD model emission factors in South Coast Air Basin (SCAB) are used to estimate ROG, NOx, SOx, and PM emissions for off-road equipment.
2) 2014 SCAQMD CEQA website emission factors are used for CO for all offroad equipment.
3) Gasoline equipment emission factors are estimated based on the rate in g/hp-hr provided in the Gasoline Equipment Emission Factor Rates table for EPA/ARB compliant four-cycle engines.

Fugitive Dust Emission Calculations Assumptions

1) Fugitive dust emissions are estimated using AP-42 fugitive dust calculations for earthmoving and road dust.
2) Unpaved travel distance assumes workers park on street (no unpaved travel) and other vehicles that access work areas average 1/10 mile unpaved to access working areas.
3) Total area to be disturbed is 12.3 acres for Basin construction, 1 acre for SH 18 Drain construction, and 0.75 acres for Pine Ave. Drain construction.

Greenhouse Gas Emission Calculations Assumptions

1) GHG emissions are estimated based on guidelines and 2015 emission factors provided by The Climate Registry.
2) For diesel-fueled equipment, fuel consumption rate is based on ARB OFFROAD values and density of 6.8 lbs/gallon are used.
3) For gasoline-fueled equipment, fuel consumption rate of 0.47 lbs/bhp-hr and density of 6.0 lbs/gallon with 50 percent average load of operation are used.

RIMFOREST DRAINAGE RESTORATION PROJECT

Construction - Schedule

BASIN CONSTRUCTION PHASE - 2016

	Phase	Start	End	Duration (work days)	No. of Employees	May	June	July	August	September
					Month	5	6	7	8	9
1	**Mobilization**	May 16	May 20	5	8					
2	**Clearing &Grubbing/Tree Removal**	May 23	June 6	10	5					
3	**Sewer Relocation**	June 7	June 27	15	8					
4	**Excavation**	June 7	July 5	20	5					
5	**Hauling**	June 28	Aug 9	30	10					
6	**Culvert Construction**	July 18	July 29	10	6					
7	**Embankment Construction**	Aug 1	Aug 26	20	6					
8	**Concrete Structures**	Aug 29	Sep 2	5	8					
9	**Rock Placement**	Sep 6	Sept 19	10	4					
10	**Paving & Miscellaneous**	Sept 20	Sept 21	2	20					

RIMFOREST DRAINAGE RESTORATION PROJECT

Construction - Equipment Assumptions

BASIN CONSTRUCTION PHASE

Assumptions:

1. Work occurs 5 days a week, between 6 am and 5 pm, excepting major holidays (average 22 days/month).
2. Trips are round trips.

Construction Schedule

	Phase	Duration (work days)	Start	End	Employees	Quantity
1	Mobilization	5	May 15	May 20	8	
2	Clearing &Grubbing/Tree Removal	10	May 20	May 30	15	10 acre
3	Sewer Relocation	15	May 30	June 15	10	2,000 L.F.
4	Excavation	20	May 30	June 20	8	60,000 cu.yd.
5	Hauling	30	June 10	July 20	10	15,000 cu.yd.
6	Culvert Construction	10	June30	July10	9	500 L.F.
7	Embankment Construction	20	July 11	July 30	9	30,000 cu.yd.
8	Concrete Structures	5	Aug 5	Aug 10	8	500 cu.yd.
9	Rock Placement	10	Aug 25	Sept 5	6	4,000 cu.yd.
10	Paving & Miscellaneous	2	Sept 1	Sept 3	20	1,250 ton

Onroad Equipment Use

		Onroad Equipment	Type	Veh. Type	Total VMT/Trip	Unpaved VMT/Trip	Trips/Day	Total Trips
1	Mobilization	Employee Vehicle	Onroad	Passenger	80	0	8	40
		Supplies Delivery	Onroad	Delivery	60	0.1	1	5
		Equipment Delivery	Onroad	HHDT	60	0.1	2	10
2	Clearing &Grubbing/Tree Removal	Employee Vehicle	Onroad	Passenger	80	0	15	150
		Supplies Delivery	Onroad	Delivery	60	0.1	1	10
		Debris Removal	Onroad	HHDT	10	0.1	1	10
3	Sewer Relocation	Employee Vehicle	Onroad	Passenger	80	0.0	10	150
		Material Delivery	Onroad	HHDT	60	0.0	1	15
4	Excavation	Employee Vehicle	Onroad	Passenger	80	0	8	160
5	Hauling	Employee Vehicle	Onroad	Passenger	80	0	10	300
		Dump Trucks	Onroad	HHDT	10	0.1	42	1,250
6	Culvert Construction	Employee Vehicle	Onroad	Passenger	80	0.0	9	90
		Delivery	Onroad	HHDT	60	0.1	1	3
7	Embankment Construction	Employee Vehicle	Onroad	Passenger	80	0	9	90
8	Concrete Structures	Employee Vehicle	Onroad	Passenger	80	0	8	40
		Haul Trucks	Onroad	HHDT	60	0.1	1	5
		Concrete Pump Truck	Onroad	HHDT	300	0.1	1	5
9	Rock Placement	Employee Vehicle	Onroad	Passenger	80	0	6	60
		Dump Trucks	Onroad	HHDT	70	0.1	35	350
10	Paving & Miscellaneous	Employee Vehicle	Onroad	Passenger	80	0	20	40
		Material Delivery	Onroad	HHDT	60	0	40	80
n/a	Daily	Crew Truck	Onroad	Delivery	60	0	1	88
		Fuel Truck	Onroad	Delivery	50	0.1	1	88

Offroad Equipment Use

		Primary Offroad Equipment	Type	HP	Quantity	Hr/day	Days
2	Clearing &Grubbing/Tree Removal	Bulldozer	Offroad	240	1	8	10
		Excavator	Offroad	300	1	8	10
		Loader	Offroad	225	1	8	10
		Chipper	Offroad	50	1	8	10
		Chainsaw	Offroad	6	3	8	10
		Water Truck	Offroad	457	1	8	10
3	Sewer Relocation	Backhoe	Offroad	107	1	8	15
		Loader	Offroad	225	1	8	15
		Water Truck	Offroad	457	1	8	15
4	Excavation	Excavator	Offroad	300	2	8	20
		Bulldozer	Offroad	240	1	8	20
		Loader	Offroad	225	2	8	20
		Water Truck	Offroad	457	1	8	20
5	Hauling	Loader	Offroad	225	1	8	30
		Excavator	Offroad	300	1	8	30
		Water Truck	Offroad	457	1	8	30
6	Culvert Construction	Excavator	Offroad	300	1	8	10
		Loader	Offroad	225	1	8	10
		Sheepsfoot/Roller/Tamper	Offroad	100	1	8	10
		Water Truck	Offroad	457	1	8	10
7	Embankment Construction	Loader	Offroad	225	2	8	19
		Bulldozer	Offroad	240	1	8	19
		Grader	Offroad	220	1	8	19
		Sheepsfoot/Roller/Tamper	Offroad	100	1	8	19
		Water Truck	Offroad	457	1	8	19
8	Concrete Structures	Backhoe	Offroad	107	1	8	1
		Generator	Offroad	5	1	4	5
9	Rock Placement	Excavator	Offroad	300	1	8	10
		Loader	Offroad	225	1	8	10
10	Paving & Miscellaneous	Paving Machine	Offroad	200	1	8	2
		Roller	Offroad	60	2	8	2
		Water Truck	Offroad	457	1	8	2
		Skip	Offroad	100	1	8	2

RIMFOREST DRAINAGE RESTORATION PROJECT

Construction - Schedule

S.H. #18 STORM DRAIN PHASE - 2017

	Phase	Start	End	Duration (work days)	No. of Employees	May	June	July	August
					Month	5	6	7	8
1	**Mobilization**	May 15	May 19	5	8				
2	**Asphalt Concrete Removal**	May 22	June 5	10	5				
3	**Pipe Installation**	May 30	July 3	25	8				
4	**Hauling (Dirt Export)**	June 12	June 23	10	5				
5	**Backfill & Compaction**	June 19	July 25	25	5				
6	**Concrete Structures**	July 26	Aug 1	5	6				
7	**Paving & Miscellaneous**	Aug 2	Aug 4	3	20				

RIMFOREST DRAINAGE RESTORATION PROJECT

Construction - Equipment Assumptions

S.H. #18 STORM DRAIN PHASE

Assumptions:

1. Work occurs 5 days a week,between 6 am and 5 pm, excepting major holidays (average 22 days/month).

2. Trips are round trips.

Construction Schedule

	Phase	Duration (work days)	Start	End	Employees	Quantity
1	Mobilization	5	May 15	May 20	8	
2	Asphalt Concrete Removal	10	May 20	May 30	6	5,000 S.Y. (2,500 Ton)
3	Pipe Installation	25	May 25	June 20	8	3,800 L.F.
4	Hauling (Dirt Export)	10	June 5	June 15	6	10,200 Ton
5	Backfill & Compaction	25	June 10	July 5	6	3,800 L.F. Pipe Trench
6	Concrete Structures	5	July 10	July15	8	120 Cu. Yd.
7	Paving & Miscellaneous	3	Aug 2	Aug 4	20	2,500 Ton

Onroad Equipment Use

		Onroad Equipment	Type	Veh. Type	Total VMT/Trip	Unpaved VMT/Trip	Trips/Day	Total Trips
1	Mobilization	Employee Vehicle	Onroad	Passenger	80	0	8	40
		Supplies Delivery	Onroad	Delivery	60	0.1	1	10
		Equipment Delivery	Onroad	HHDT	60	0.1	2	20
2	Asphalt Concrete Removal	Employee Vehicle	Onroad	Passenger	80	0	6	60
		Dump Trucks	Onroad	HHDT	60	0.1	16	160
3	Pipe Installation	Employee Vehicle	Onroad	Passenger	80	0.0	8	200
		Material Delivery	Onroad	HHDT	60	0.0	3	75
4	Hauling (Dirt Export)	Employee Vehicle	Onroad	Passenger	80	0	6	60
		Dump Trucks	Onroad	HHDT	10	0	55	550
5	Backfill & Compaction	Employee Vehicle	Onroad	Passenger	80	0	6	150
6	Concrete Structures	Employee Vehicle	Onroad	Passenger	80	0	6	30
		Concrete Mixer Trucks	Onroad	HHDT	60	0	4	12
7	Paving & Miscellaneous	Employee Vehicle	Onroad	Passenger	80	0	20	60
		Haul Trucks	Onroad	HHDT	60	0	56	168
n/a	Daily	Crew Truck	Onroad	Delivery	60	0	1	66
		Fuel Truck	Onroad	Delivery	50	0.1	1	66

Offroad Equipment Use

		Primary Offroad Equipment	Type	HP	Quantity	Hr/day	Days
2	Asphalt Concrete Removal	Backhoe w/breaker	Offroad	107	1	8	10
		Loader	Offroad	225	1	8	10
		Water Truck	Offroad	457	1	8	10
3	Pipe Installation	Excavator	Offroad	115	1	8	25
		Loader	Offroad	225	1	8	25
		Water Truck	Offroad	457	1	8	25
4	Hauling (Dirt Export)	Loader	Offroad	225	1	8	10
		Water Truck	Offroad	457	1	8	10
5	Backfill & Compaction	Loader	Offroad	225	1	8	25
		Vibratory Compactor	Offroad	100	1	8	25
		Water Truck	Offroad	457	1	8	25
6	Concrete Structures	Backhoe w/breaker	Offroad	107	1	4	5
7	Paving & Miscellaneous	Paving Machine	Offroad	200	1	8	3
		Vibratory Roller(s)	Offroad	60	2	8	3
		Skip	Offroad	100	1	8	3
		Water Truck	Offroad	457	1	8	3

RIMFOREST DRAINAGE RESTORATION PROJECT

Construction - Schedule

PINE AVE. STORM DRAIN PHASE - 2018

	Phase	Start	End	Duration (work days)	No. of Employees	May	June	July
					Month	5	6	7
1	**Mobilization**	May 14	May 18	5	8			
2	**Asphalt Concrete Removal**	May 21	May 30	7	5			
3	**Pipe Installation**	May 30	June 26	20	8			
4	**Hauling (Dirt Export)**	June 6	June 19	10	5			
5	**Backfill & Compaction**	June 12	July 10	20	5			
6	**Concrete Structures**	July 11	July17	5	6			
7	**Paving & Miscellaneous**	July 18	July 19	2	20			

RIMFOREST DRAINAGE RESTORATION PROJECT

Construction - Equipment Assumptions

PINE AVE. STORM DRAIN PHASE

Assumptions:

1. Work occurs 5 days a week,between 6 am and 5 pm, excepting major holidays (average 22 days/month).
2. Trips are round trips.

Construction Schedule

	Phase	Duration (work days)	Start	End	Employees	Quantity
1	Mobilization	5	May 15	May 20	8	
2	Asphalt Concrete Removal	7	May 23	May 30	6	5,000 S.Y. (2,500 Ton)
3	Pipe Installation	20	May 30	June 20	8	2,250 L.F.
4	Hauling (Dirt Export)	10	June 5	June 15	6	6,300 Ton
5	Backfill & Compaction	20	June 10	July 5	6	2,250 L.F. Pipe Trench
6	Concrete Structures	5	July 10	July15	8	120 Cu. Yd.
7	Paving & Miscellaneous	2	Aug 2	Aug 3	20	1,800 Ton

Onroad Equipment Use

		Onroad Equipment	Type	Veh. Type	Total VMT/Trip	Unpaved VMT/Trip	Trips/Day	Total Trips
1	Mobilization	Employee Vehicle	Onroad	Passenger	80	0	8	40
		Supplies Delivery	Onroad	Delivery	60	0.1	1	10
		Equipment Delivery	Onroad	HHDT	60	0.1	2	20
2	Asphalt Concrete Removal	Employee Vehicle	Onroad	Passenger	80	0	6	42
		Dump Trucks	Onroad	HHDT	60	0.1	16	112
3	Pipe Installation	Employee Vehicle	Onroad	Passenger	80	0.0	8	160
		Material Delivery	Onroad	HHDT	60	0.0	3	60
4	Hauling (Dirt Export)	Employee Vehicle	Onroad	Passenger	80	0	6	60
		Dump Trucks	Onroad	HHDT	10	0	35	350
5	Backfill & Compaction	Employee Vehicle	Onroad	Passenger	80	0	6	120
6	Concrete Structures	Employee Vehicle	Onroad	Passenger	80	0	6	30
		Concrete Mixer Trucks	Onroad	HHDT	60	0	4	12
7	Paving & Miscellaneous	Employee Vehicle	Onroad	Passenger	80	0	20	40
		Haul Trucks	Onroad	HHDT	60	0	56	112
n/a	Daily	Crew Truck	Onroad	Delivery	60	0	1	66
		Fuel Truck	Onroad	Delivery	50	0.1	1	66

Offroad Equipment Use

		Primary Offroad Equipment	Type	HP	Quantity	Hr/day	Days
2	Asphalt Concrete Removal	Backhoe w/breaker	Offroad	107	1	8	7
		Loader	Offroad	225	1	8	7
		Water Truck	Offroad	457	1	8	7
3	Pipe Installation	Excavator	Offroad	115	1	8	20
		Loader	Offroad	225	1	8	20
		Water Truck	Offroad	457	1	8	20
4	Hauling (Dirt Export)	Loader	Offroad	225	1	8	10
		Water Truck	Offroad	457	1	8	10
5	Backfill & Compaction	Loader	Offroad	225	1	8	20
		Vibratory Compactor	Offroad	100	1	8	20
		Water Truck	Offroad	457	1	8	20
6	Concrete Structures	Backhoe w/breaker	Offroad	107	1	4	5
7	Paving & Miscellaneous	Paving Machine	Offroad	200	1	8	2
		Vibratory Roller(s)	Offroad	60	2	8	2
		Skip	Offroad	100	1	8	2
		Water Truck	Offroad	457	1	8	2

Rimforest Drainage Restoration Project

Unmitigated Regional Emissions Summary

Basin Construction

Maximum Daily Emissions (lbs/day) - Phases 4 and 5

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad Vehicles	1.15	7.87	7.46	0.03	0.34	0.18
Offroad Equipment	5.52	19.28	85.06	0.09	3.07	2.82
Fugitive Dust	---	---	---	---	33.37	7.45
Total	6.67	27.15	92.52	0.13	36.78	10.45
SCAQMD Significance Thresholds	75	550	100	150	150	55
Exceeds Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*

Total Emissions (tons)

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad Vehicles	0.04	0.27	0.38	0.00	0.01	0.01
Offroad Equipment	0.22	0.78	2.18	0.00	0.08	0.08
Fugitive Dust	---	---	---	---	1.18	0.25
Total	0.27	1.05	2.56	0.00	1.28	0.33

SH 18 Drain Construction

Maximum Daily Emissions (lbs/day)

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad Vehicles	1.23	8.20	10.82	0.05	0.43	0.21
Offroad Equipment	4.83	17.38	67.20	0.07	2.77	2.55
Fugitive Dust	---	---	---	---	12.71	2.98
Total	6.06	25.58	78.02	0.12	15.90	5.74
SCAQMD Significance Thresholds	75	550	100	150	150	55
Exceeds Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*

Total Emissions (tons)

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad Vehicles	0.02	0.13	0.26	0.00	0.01	0.00
Offroad Equipment	0.06	0.23	0.85	0.00	0.04	0.03
Fugitive Dust	---	---	---	---	0.29	0.07
Total	0.08	0.36	1.12	0.00	0.33	0.10

Pine Avenue Drain Construction

Maximum Daily Emissions (lbs/day)

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad Vehicles	1.03	7.06	7.49	0.04	0.35	0.16
Offroad Equipment	4.29	17.13	57.89	0.08	2.35	2.16
Fugitive Dust	---	---	---	---	9.54	2.25
Total	5.32	24.19	65.38	0.11	12.24	4.58
SCAQMD Significance Thresholds	75	550	100	150	150	55
Exceeds Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*

Total Emissions (tons)

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad Vehicles	0.02	0.10	0.19	0.00	0.01	0.00
Offroad Equipment	0.04	0.18	0.59	0.00	0.02	0.02
Fugitive Dust	---	---	---	---	0.21	0.05
Total	0.06	0.28	0.78	0.00	0.24	0.07

Operations Emissions

Maximum Daily Emissions (lbs/day)

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad Vehicles	0.57	3.29	10.90	0.04	0.31	0.15
Offroad Equipment	1.21	4.85	16.64	0.03	0.61	0.56
Fugitive Dust	---	---	---	---	26.45	4.53
Total	1.78	8.14	27.54	0.06	27.37	5.25
SCAQMD Significance Thresholds	55	550	55	150	150	55
Exceeds Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*

Total Emissions (tons)

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad Vehicles	0.00	0.01	0.04	0.00	0.00	0.00
Offroad Equipment	0.01	0.03	0.09	0.00	0.00	0.00
Fugitive Dust	---	---	---	---	0.10	0.02
Total	0.01	0.04	0.12	0.00	0.11	0.02

Total GHG Emissions (Tons)

Construction Emissions	CO2	N2O	CH4	CO2e
Onroad Vehicles	295.43	0.00	0.00	296.03
Offroad Equipment	439.87	0.02	0.01	443.77
Electricity Use				0.67
Construction Total	735.30	0.03	0.01	740.48
Amortized Construction Emissions (50 Year Project Life)				14.81
Onroad Vehicles	11.24	0.00	0.00	11.26
Offroad Equipment	14.48	0.00	0.00	14.61
Operation Total	25.72	0.00	0.00	25.87
Average Annual Operation Emissions (3 Year Maintenance Frequency)				8.62
Project Total Annual Emissions				23.43
SCAQMD Significance Thresholds				10,000
Exceeds Thresholds?				*No*

Rimforest Drainage Restoration Project

Unmitigated Localized Emissions Summary

Basin Construction

Maximum Daily Localized Emissions (lbs/day) - Phases 4 and 5

	CO	NOx	PM10	PM2.5
Onroad Vehicles*	0.79	0.75	0.03	0.02
Offroad Equipment	19.28	85.06	3.07	2.82
Fugitive Dust	---	---	26.59	5.78
Total	20.07	85.80	29.70	8.63
SCAQMD Significance Thresholds**	4,142	378	65	17
Exceeds Thresholds?	*No*	*No*	*No*	*No*

** Conservatively assumes that 1/10 of the onroad tailpipe emissions occur within the construction site.*

*** Based on SRA 37 with 5 acre active construction site and 100 meters to receptor*

SH 18 Drain Construction

Maximum Daily Localized Emissions (lbs/day) - Phase 5 for PM and Phase 7 for CO and NOx

	CO	NOx	PM10	PM2.5
Onroad Vehicles*	1.28	4.50	0.01	0.00
Offroad Equipment	8.61	26.23	1.03	0.94
Fugitive Dust	---	---	1.70	0.28
Total	9.89	30.73	2.73	1.23
SCAQMD Significance Thresholds**	667	118	4	3
Exceeds Thresholds?	*No*	*No*	*No*	*No*

** Conservatively assumes that 1/10 of the onroad tailpipe emissions occur within the construction site.*

*** Based on SRA 37 with 1 acre site and 25 meters to receptor*

Pine Avenue Drain Construction

Maximum Daily Localized Emissions (lbs/day) - Phase 5 for PM and Phase 7 for CO and NOx

	CO	NOx	PM10	PM2.5
Onroad Vehicles*	1.17	4.10	0.01	0.00
Offroad Equipment	8.47	22.74	0.87	0.80
Fugitive Dust	---	---	1.11	0.18
Total	9.64	26.85	1.99	0.99
SCAQMD Significance Thresholds	667	118	4	3
Exceeds Thresholds?	*No*	*No*	*No*	*No*

** Conservatively assumes that 1/10 of the onroad tailpipe emissions occur within the construction site.*

*** Based on SRA 37 with 1 acre site and 25 meters to receptor*

Operation

Maximum Daily Localized Emissions (lbs/day) - Sediment Removal

	CO	NOx	PM10	PM2.5
Onroad Vehicles	0.33	1.09	0.03	0.02
Offroad Equipment	4.85	16.64	0.61	0.56
Fugitive Dust	---	---	14.62	1.63
Total	5.18	17.73	15.26	2.21
SCAQMD Significance Thresholds	4,142	378	16	5
Exceeds Thresholds?	*No*	*No*	*No*	*No*

** Conservatively assumes that 1/10 of the onroad tailpipe emissions occur within the construction site.*

** Based on SRA 37 with 5 acre active construction site and 100 meters to receptor*

RIMFOREST DRAINAGE RESTORATION PROJECT
Construction - On-road Equipment Emissions Calculations

Basin Construction

Assumptions:

1. CARB EMFAC 2014 model emission factors for South Coast Air Basin are used to estimate on-road emissions.
2. Assumptions on Vehicle Class and resulting emissions factors used for each vehicle type are provided below:

Onroad Emission Factors - 2016

	VOC	CO	NOx	SOx	PM10	PM2.5	Vehicle Class
Employee Vehicle	0.00059	0.00445	0.00054	0.00001	0.00011	0.00005	Passenger
Supplies Delivery	0.00047	0.00152	0.00927	0.00002	0.00061	0.00041	Delivery
Equipment Delivery	0.00054	0.00221	0.01472	0.00004	0.00035	0.00021	HHDT
Debris Removal	0.00054	0.00221	0.01472	0.00004	0.00035	0.00021	HHDT
Material Delivery	0.00054	0.00221	0.01472	0.00004	0.00035	0.00021	HHDT
Dump Trucks	0.00054	0.00221	0.01472	0.00004	0.00035	0.00021	HHDT
Delivery	0.00054	0.00221	0.01472	0.00004	0.00035	0.00021	HHDT
Haul Trucks	0.00054	0.00221	0.01472	0.00004	0.00035	0.00021	HHDT
Concrete Pump Truck	0.00054	0.00221	0.01472	0.00004	0.00035	0.00021	HHDT
Crew Truck	0.00075	0.00744	0.00073	0.00001	0.00010	0.00004	Delivery
Fuel Truck	0.00047	0.00152	0.00927	0.00002	0.00061	0.00041	Delivery

Passenger Vehicle is average of LDA, LDT1, LDT2, MDV, LHDT1, and MCY

Crew Truck is MDV gasoline vehicle, other delivery class vehicles are MHDT diesel vehicles

Daily and Total Task Emissions

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Mobilization	Employee Vehicle	640	0.38	2.85	0.34	0.01	0.07	0.03	3,200	1.90	14.26	1.71	0.03	0.35	0.15
	Supplies Delivery	60	0.03	0.09	0.56	0.00	0.04	0.02	300	0.14	0.45	2.78	0.01	0.18	0.12
	Equipment Delivery	120	0.06	0.27	1.77	0.00	0.04	0.03	600	0.32	1.33	8.83	0.02	0.21	0.13
		Totals	0.47	3.21	2.67	0.01	0.15	0.08	Totals	2.36	16.04	13.33	0.06	0.74	0.40

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Clearing &Grubbing/Tree Removal	Employee Vehicle	1,200	0.71	5.35	0.64	0.01	0.13	0.06	12,000	7.12	53.46	6.43	0.13	1.30	0.56
	Supplies Delivery	60	0.03	0.09	0.56	0.00	0.04	0.02	600	0.28	0.91	5.56	0.01	0.37	0.25
	Debris Removal	10	0.01	0.02	0.15	0.00	0.00	0.00	100	0.05	0.22	1.47	0.00	0.04	0.02
		Totals	0.75	5.46	1.35	0.01	0.17	0.08	Totals	7.45	54.59	13.46	0.15	1.70	0.83

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Sewer Relocation	Employee Vehicle	800	0.47	3.56	0.43	0.01	0.09	0.04	12,000	7.12	53.46	6.43	0.13	1.30	0.56
	Material Delivery	60	0.03	0.13	0.88	0.00	0.02	0.01	900	0.48	1.99	13.25	0.03	0.32	0.19
		Totals	0.51	3.70	1.31	0.01	0.11	0.05	Totals	7.60	55.45	19.67	0.16	1.62	0.75

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Excavation	Employee Vehicle	640	0.38	2.85	0.34	0.01	0.07	0.03	12,800	7.60	57.02	6.86	0.14	1.39	0.59
		Totals	0.38	2.85	0.34	0.01	0.07	0.03	Totals	7.60	57.02	6.86	0.14	1.39	0.59

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Hauling	Employee Vehicle	800	0.47	3.56	0.43	0.01	0.09	0.04	24,000	14.24	106.92	12.86	0.26	2.60	1.12
	Dump Trucks	420	0.23	0.93	6.18	0.02	0.15	0.09	12,500	6.71	27.66	183.97	0.47	4.43	2.67
		Totals	0.70	4.49	6.61	0.02	0.24	0.13	Totals	20.96	134.58	196.83	0.73	7.03	3.79

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Culvert Construction	Employee Vehicle	720	0.43	3.21	0.39	0.01	0.08	0.03	7,200	4.27	32.07	3.86	0.08	0.78	0.33
	Delivery	60	0.03	0.13	0.88	0.00	0.02	0.01	180	0.10	0.40	2.65	0.01	0.06	0.04
		Totals	0.46	3.34	1.27	0.01	0.10	0.05	Totals	4.37	32.47	6.51	0.08	0.84	0.37

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Embankment Construction	Employee Vehicle	720	0.43	3.21	0.39	0.01	0.08	0.03	7,200	4.27	32.07	3.86	0.08	0.78	0.33
		Totals	0.43	3.21	0.39	0.01	0.08	0.03	Totals	4.27	32.07	3.86	0.08	0.78	0.33

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Concrete Structures	Employee Vehicle	640	0.38	2.85	0.34	0.01	0.07	0.03	3,200	1.90	14.26	1.71	0.03	0.35	0.15
	Haul Trucks	60	0.03	0.13	0.88	0.00	0.02	0.01	300	0.16	0.66	4.42	0.01	0.11	0.06
	Concrete Pump Truck	300	0.16	0.66	4.42	0.01	0.11	0.06	1,500	0.81	3.32	22.08	0.06	0.53	0.32
		Totals	0.57	3.65	5.64	0.02	0.20	0.11	Totals	2.87	18.24	28.21	0.10	0.98	0.53

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Rock Placement	Employee Vehicle	480	0.28	2.14	0.26	0.01	0.05	0.02	4,800	2.85	21.38	2.57	0.05	0.52	0.22
	Dump Trucks	2,450	1.32	5.42	36.06	0.09	0.87	0.52	24,500	13.16	54.22	360.59	0.92	8.69	5.24
		Totals	1.60	7.56	36.32	0.10	0.92	0.55	Totals	16.01	75.60	363.16	0.97	9.21	5.46

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Paving & Miscellaneous	Employee Vehicle	1,600	0.95	7.13	0.86	0.02	0.17	0.07	3,200	1.90	14.26	1.71	0.03	0.35	0.15
	Material Delivery	2,400	1.29	5.31	35.32	0.09	0.85	0.51	4,800	2.58	10.62	70.65	0.18	1.70	1.03
		Totals	2.24	12.44	36.18	0.11	1.02	0.59	Totals	4.48	24.88	72.36	0.21	2.05	1.18

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Daily	Crew Truck	60	0.05	0.45	0.04	0.00	0.01	0.00	5,280	3.97	39.29	3.88	0.07	0.55	0.23
	Fuel Truck	50	0.02	0.08	0.46	0.00	0.03	0.02	4,400	2.05	6.67	40.81	0.11	2.68	1.81
		Totals	0.07	0.52	0.51	0.00	0.04	0.02	Totals	6.03	45.96	44.69	0.18	3.23	2.05

Maximum Overlap

Daily Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
1.15	7.87	7.46	0.03	0.34	0.18

Total Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
83.99	546.90	768.93	2.87	29.57	16.29

SH 18 Drain Construction

Assumptions:

1. CARB EMFAC 2014 model emission factors for South Coast Air Basin are used to estimate on-road emissions.
2. Assumptions on Vehicle Class and resulting emissions factors used for each vehicle type are provided below:

Onroad Emission Factors - 2017

	VOC	CO	NOx	SOx	PM10	PM2.5	Vehicle Class
Employee Vehicle	0.00053	0.00394	0.00047	0.00001	0.00011	0.00005	Passenger
Supplies Delivery	0.00040	0.00132	0.00819	0.00002	0.00056	0.00037	Delivery
Equipment Delivery	0.00044	0.00194	0.01317	0.00004	0.00030	0.00016	HHDT
Dump Trucks	0.00044	0.00194	0.01317	0.00004	0.00030	0.00016	HHDT
Material Delivery	0.00044	0.00194	0.01317	0.00004	0.00030	0.00016	HHDT
Concrete Mixer Trucks	0.00044	0.00194	0.01317	0.00004	0.00030	0.00016	HHDT
Haul Trucks	0.00044	0.00194	0.01317	0.00004	0.00030	0.00016	HHDT
Crew Truck	0.00073	0.00699	0.00068	0.00001	0.00010	0.00004	Delivery
Fuel Truck	0.00040	0.00132	0.00819	0.00002	0.00056	0.00037	Delivery

Passenger Vehicle is average of LDA, LDT1, LDT2, MDV, LHDT1, and MCY

Crew Truck is MDV gasoline vehicle, other delivery class vehicles are MHDT diesel vehicles

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Mobilization	Employee Vehicle	640	0.34	2.52	0.30	0.01	0.07	0.03	3,200	1.69	12.61	1.51	0.03	0.35	0.15
	Supplies Delivery	60	0.02	0.08	0.49	0.00	0.03	0.02	600	0.24	0.79	4.91	0.01	0.34	0.22
	Equipment Delivery	120	0.05	0.23	1.58	0.00	0.04	0.02	1,200	0.53	2.32	15.80	0.04	0.36	0.19
		Totals	0.42	2.83	2.37	0.01	0.14	0.07	Totals	2.46	15.73	22.23	0.09	1.04	0.56

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Asphalt Concrete Removal	Employee Vehicle	480	0.25	1.89	0.23	0.01	0.05	0.02	4,800	2.54	18.92	2.27	0.05	0.52	0.22
	Dump Trucks	960	0.42	1.86	12.64	0.04	0.29	0.16	9,600	4.20	18.58	126.42	0.35	2.88	1.55
		Totals	0.67	3.75	12.87	0.04	0.34	0.18	Totals	6.74	37.50	128.69	0.40	3.40	1.77

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Pipe Installation	Employee Vehicle	640	0.34	2.52	0.30	0.01	0.07	0.03	16,000	8.47	63.06	7.56	0.17	1.73	0.74
	Material Delivery	180	0.08	0.35	2.37	0.01	0.05	0.03	4,500	1.97	8.71	59.26	0.17	1.35	0.73
		Totals	0.42	2.87	2.67	0.01	0.12	0.06	Totals	10.44	71.77	66.82	0.33	3.08	1.47

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Hauling (Dirt Export)	Employee Vehicle	480	0.25	1.89	0.23	0.01	0.05	0.02	4,800	2.54	18.92	2.27	0.05	0.52	0.22
	Dump Trucks	550	0.24	1.06	7.24	0.02	0.16	0.09	5,500	2.41	10.64	72.43	0.20	1.65	0.89
		Totals	0.49	2.96	7.47	0.03	0.22	0.11	Totals	4.95	29.56	74.69	0.25	2.17	1.11

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Backfill & Compaction	Employee Vehicle	480	0.25	1.89	0.23	0.01	0.05	0.02	12,000	6.35	47.30	5.67	0.13	1.29	0.55
		Totals	0.25	1.89	0.23	0.01	0.05	0.02	Totals	6.35	47.30	5.67	0.13	1.29	0.55

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Concrete Structures	Employee Vehicle	480	0.25	1.89	0.23	0.01	0.05	0.02	2,400	1.27	9.46	1.13	0.03	0.26	0.11
	Concrete Mixer Trucks	240	0.11	0.46	3.16	0.01	0.07	0.04	720	0.32	1.39	9.48	0.03	0.22	0.12
		Totals	0.36	2.36	3.39	0.01	0.12	0.06	Totals	1.59	10.85	10.62	0.05	0.47	0.23

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Paving & Miscellaneous	Employee Vehicle	1,600	0.85	6.31	0.76	0.02	0.17	0.07	4,800	2.54	18.92	2.27	0.05	0.52	0.22
	Haul Trucks	3,360	1.47	6.50	44.25	0.12	1.01	0.54	10,080	4.41	19.51	132.74	0.37	3.02	1.63
		Totals	2.32	12.81	45.00	0.14	1.18	0.62	Totals	6.95	38.43	135.01	0.42	3.54	1.85

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Daily	Crew Truck	60	0.04	0.42	0.04	0.00	0.01	0.00	3,960	2.90	8.76	58.28	0.15	1.40	0.85
	Fuel Truck	50	0.02	0.07	0.41	0.00	0.03	0.02	3,300	1.32	4.35	27.01	0.08	1.85	1.21
		Totals	0.06	0.49	0.45	0.00	0.03	0.02	Totals	4.21	13.11	85.29	0.23	3.25	2.05

Maximum Overlap

Daily Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
1.23	8.20	10.82	0.05	0.43	0.21

Total Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
43.69	264.25	529.01	1.91	18.24	9.60

Pine Avenue Drain Construction - 2018

Assumptions:

1. CARB EMFAC 2014 model emission factors for South Coast Air Basin are used to estimate on-road emissions.
2. Assumptions on Vehicle Class and resulting emissions factors used for each vehicle type are provided below:

Onroad Emission Factors - 2018

	VOC	CO	NOx	SOx	PM10	PM2.5	Vehicle Class
Employee Vehicle	0.00048	0.00351	0.00042	0.00001	0.00011	0.00005	Passenger
Supplies Delivery	0.00034	0.00116	0.00730	0.00002	0.00052	0.00033	Delivery
Equipment Delivery	0.00038	0.00180	0.01202	0.00004	0.00027	0.00013	HHDT
Dump Trucks	0.00038	0.00180	0.01202	0.00004	0.00027	0.00013	HHDT
Material Delivery	0.00038	0.00180	0.01202	0.00004	0.00027	0.00013	HHDT
Concrete Mixer Trucks	0.00038	0.00180	0.01202	0.00004	0.00027	0.00013	HHDT
Haul Trucks	0.00038	0.00180	0.01202	0.00004	0.00027	0.00013	HHDT
Crew Truck	0.00071	0.00655	0.00062	0.00001	0.00010	0.00004	Delivery
Fuel Truck	0.00034	0.00116	0.00730	0.00002	0.00052	0.00033	Delivery

Passenger Vehicle is average of LDA, LDT1, LDT2, MDV, LHDT1, and MCY

Crew Truck is MDV gasoline vehicle, other delivery class vehicles are MHDT diesel vehicles

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Mobilization	Employee Vehicle	640	0.31	2.25	0.27	0.01	0.07	0.03	3,200	1.53	11.23	1.34	0.03	0.34	0.15
	Supplies Delivery	60	0.02	0.07	0.44	0.00	0.03	0.02	600	0.21	0.69	4.38	0.01	0.31	0.20
	Equipment Delivery	120	0.05	0.22	1.44	0.00	0.03	0.02	1,200	0.46	2.16	14.42	0.04	0.32	0.16
		Totals	0.37	2.53	2.15	0.01	0.13	0.06	Totals	2.19	14.09	20.13	0.09	0.98	0.50

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Asphalt Concrete Removal	Employee Vehicle	480	0.23	1.68	0.20	0.00	0.05	0.02	3,360	1.60	11.79	1.40	0.03	0.36	0.15
	Dump Trucks	960	0.37	1.73	11.53	0.03	0.26	0.13	6,720	2.56	12.11	80.74	0.24	1.81	0.89
		Totals	0.59	3.41	11.74	0.04	0.31	0.15	Totals	4.16	23.90	82.15	0.28	2.17	1.04

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Pipe Installation	Employee Vehicle	640	0.31	2.25	0.27	0.01	0.07	0.03	12,800	6.11	44.92	5.34	0.13	1.38	0.59
	Material Delivery	180	0.07	0.32	2.16	0.01	0.05	0.02	3,600	1.37	6.49	43.26	0.13	0.97	0.48
		Totals	0.37	2.57	2.43	0.01	0.12	0.05	Totals	7.48	51.41	48.60	0.26	2.35	1.06

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Hauling (Dirt Export)	Employee Vehicle	480	0.23	1.68	0.20	0.00	0.05	0.02	4,800	2.29	16.85	2.00	0.05	0.52	0.22
	Dump Trucks	350	0.13	0.63	4.21	0.01	0.09	0.05	3,500	1.33	6.31	42.05	0.13	0.94	0.46
		Totals	0.36	2.32	4.41	0.02	0.15	0.07	Totals	3.62	23.15	44.06	0.18	1.46	0.68

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Backfill & Compaction	Employee Vehicle	480	0.23	1.68	0.20	0.00	0.05	0.02	9,600	4.58	33.69	4.01	0.10	1.03	0.44
		Totals	0.23	1.68	0.20	0.00	0.05	0.02	Totals	4.58	33.69	4.01	0.10	1.03	0.44

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Concrete Structures	Employee Vehicle	480	0.23	1.68	0.20	0.00	0.05	0.02	2,400	1.15	8.42	1.00	0.02	0.26	0.11
	Concrete Mixer Trucks	240	0.09	0.43	2.88	0.01	0.06	0.03	720	0.27	1.30	8.65	0.03	0.19	0.10
		Totals	0.32	2.12	3.08	0.01	0.12	0.05	Totals	1.42	9.72	9.65	0.05	0.45	0.21

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Paving & Miscellaneous	Employee Vehicle	1,600	0.76	5.62	0.67	0.02	0.17	0.07	3,200	1.53	11.23	1.34	0.03	0.34	0.15
	Haul Trucks	3,360	1.28	6.06	40.37	0.12	0.90	0.44	6,720	2.56	12.11	80.74	0.24	1.81	0.89
		Totals	2.04	11.67	41.04	0.14	1.08	0.52	Totals	4.08	23.34	82.08	0.28	2.15	1.04

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Daily	Crew Truck	60	0.04	0.42	0.04	0.00	0.01	0.00	3,960	2.90	8.76	58.28	0.15	1.40	0.85
	Fuel Truck	50	0.02	0.07	0.41	0.00	0.03	0.02	3,300	1.32	4.35	27.01	0.08	1.85	1.21
		Totals	0.06	0.49	0.45	0.00	0.03	0.02	Totals	4.21	13.11	85.29	0.23	3.25	2.05

Maximum Overlap

Daily Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
1.03	7.06	7.49	0.04	0.35	0.16

Total Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
31.75	192.42	375.98	1.46	13.84	7.03

RIMFOREST DRAINAGE RESTORATION PROJECT

Construction - Off-road Equipment Emissions Calculations

Basin Construction

Assumptions:

1. CARB OFFROAD model emission factors in the South Coast Air Basin are used to estimate ROG, NOx, and PM emissions for off-road equipment, except for the small gasoline engine equipment. CARB OFFROAD model calculated BSCF and load factor data is used to determine SOx emissions based on 15 ppm sulfur diesel fuel.
2. 2016 SCAQMD CEQA website emission factors are used for CO for all offroad equipment.

Offroad Emission Factors - 2016 (pounds/hour)

			Off-road Emission Factor - lbs/hour *				
	Equipment Name	**HP**	**ROG**	**CO**	**NOx**	**SOx**	**PM**
13	Bulldozer	240	0.0876	0.2851	1.4185	0.0011	0.0555
14	Excavator	300	0.0593	0.2713	0.9892	0.0013	0.0325
15	Loader	225	0.0601	0.2015	0.9422	0.0009	0.0325
16	Chipper	50	0.0492	0.1632	0.2530	0.0003	0.0228
17	Chainsaw	6	0.6138	2.1016	0.0254	0.0000	0.0033
18	Water Truck	457	0.1223	0.3533	1.7096	0.0019	0.0666
19	Backhoe	107	0.0398	0.2058	0.4572	0.0004	0.0355
20	Sheepsfoot/Roller/Tamper	100	0.0453	0.2207	0.5010	0.0004	0.0372
21	Grader	220	0.0663	0.2311	1.1367	0.0010	0.0372
22	Generator	5	0.5115	1.7513	0.0212	0.0000	0.0028
23	Paving Machine	200	0.0323	0.2865	0.7376	0.0009	0.0191
24	Roller	60	0.0272	0.1324	0.3006	0.0002	0.0223
25	Skip	100	0.0372	0.1923	0.4273	0.0004	0.0332

*Emissions factors include load factor, and gasoline equipment (chainsaw) emission factors are estimated based on the rate in g/hp-hr provided in the Gasoline Equipment Emission Factor Rates table for EPA/ARB compliant four-cycle engines.

Basin Construction Tasks

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Clearing &Grubbing/Tree Removal	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Bulldozer	240	1	0.0876	0.2851	1.4185	0.0011	0.0555	8	0.70	2.28	11.35	0.01	0.44	10	7.01	22.80	113.48	0.09	4.44
Excavator	300	1	0.0593	0.2713	0.9892	0.0013	0.0325	8	0.47	2.17	7.91	0.01	0.26	10	4.74	21.70	79.14	0.10	2.60
Loader	225	1	0.0601	0.2015	0.9422	0.0009	0.0325	8	0.48	1.61	7.54	0.01	0.26	10	4.80	16.12	75.37	0.07	2.60
Chipper	50	1	0.0492	0.1632	0.2530	0.0003	0.0228	8	0.39	1.31	2.02	0.00	0.18	10	3.93	13.06	20.24	0.02	1.82
Chainsaw	6	3	0.6138	2.1016	0.0254	0.0000	0.0033	8	14.73	50.44	0.61	0.00	0.08	10	147.30	504.38	6.10	0.01	0.79
Water Truck	457	1	0.1223	0.3533	1.7096	0.0019	0.0666	8	0.98	2.83	13.68	0.02	0.53	10	9.78	28.27	136.77	0.15	5.33
									17.76	60.63	43.11	0.05	1.76		177.57	606.33	431.10	0.45	17.59

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Sewer Relocation	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Backhoe	107	1	0.0398	0.2058	0.4572	0.0004	0.0355	8	0.32	1.65	3.66	0.00	0.28	15	4.78	24.69	54.86	0.05	4.26
Loader	225	1	0.0601	0.2015	0.9422	0.0009	0.0325	8	0.48	1.61	7.54	0.01	0.26	15	7.21	24.18	113.06	0.11	3.90
Water Truck	457	1	0.1223	0.3533	1.7096	0.0019	0.0666	8	0.98	2.83	13.68	0.02	0.53	15	14.67	42.40	205.15	0.23	8.00
									1.78	6.08	24.87	0.03	1.08		26.66	91.27	373.07	0.39	16.16

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Excavation	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Excavator	300	2	0.0593	0.2713	0.9892	0.0013	0.0325	8	0.95	4.34	15.83	0.02	0.52	20	18.97	86.80	316.55	0.40	10.40
Bulldozer	240	1	0.0876	0.2851	1.4185	0.0011	0.0555	8	0.70	2.28	11.35	0.01	0.44	20	14.02	45.61	226.97	0.18	8.88
Loader	225	2	0.0601	0.2015	0.9422	0.0009	0.0325	8	0.96	3.22	15.07	0.01	0.52	20	19.22	64.48	301.50	0.29	10.41
Water Truck	457	1	0.1223	0.3533	1.7096	0.0019	0.0666	8	0.98	2.83	13.68	0.02	0.53	20	19.57	56.53	273.54	0.31	10.66
									3.59	12.67	55.93	0.06	2.02		71.77	253.43	1,118.55	1.18	40.35

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Hauling	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Loader	225	1	0.0601	0.2015	0.9422	0.0009	0.0325	8	0.48	1.61	7.54	0.01	0.26	30	14.41	48.36	226.12	0.21	7.81
Excavator	300	1	0.0593	0.2713	0.9892	0.0013	0.0325	8	0.47	2.17	7.91	0.01	0.26	30	14.22	65.10	237.41	0.30	7.80
Water Truck	457	1	0.1223	0.3533	1.7096	0.0019	0.0666	8	0.98	2.83	13.68	0.02	0.53	30	29.35	84.80	410.30	0.46	15.99
									1.93	6.61	29.13	0.03	1.05		57.99	198.26	873.84	0.98	31.60

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Culvert Construction	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Excavator	300	1	0.0593	0.2713	0.9892	0.0013	0.0325	8	0.47	2.17	7.91	0.01	0.26	10	4.74	21.70	79.14	0.10	2.60
Loader	225	1	0.0601	0.2015	0.9422	0.0009	0.0325	8	0.48	1.61	7.54	0.01	0.26	10	4.80	16.12	75.37	0.07	2.60
Sheepsfoot/Roller/Tamper	100	1	0.0453	0.2207	0.5010	0.0004	0.0372	8	0.36	1.77	4.01	0.00	0.30	10	3.63	17.66	40.08	0.03	2.98
Water Truck	457	1	0.1223	0.3533	1.7096	0.0019	0.0666	8	0.98	2.83	13.68	0.02	0.53	10	9.78	28.27	136.77	0.15	5.33
									2.30	8.37	33.14	0.04	1.35		22.95	83.74	331.36	0.36	13.51

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Embankment Construction	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Loader	225	2	0.0601	0.2015	0.9422	0.0009	0.0325	8	0.96	3.22	15.07	0.01	0.52	19	18.26	61.26	286.42	0.27	9.89
Bulldozer	240	1	0.0876	0.2851	1.4185	0.0011	0.0555	8	0.70	2.28	11.35	0.01	0.44	19	13.32	43.33	215.62	0.17	8.43
Grader	220	1	0.0663	0.2311	1.1367	0.0010	0.0372	8	0.53	1.85	9.09	0.01	0.30	19	10.07	35.12	172.77	0.15	5.65
Sheepsfoot/Roller/Tamper	100	1	0.0453	0.2207	0.5010	0.0004	0.0372	8	0.36	1.77	4.01	0.00	0.30	19	6.89	33.55	76.16	0.06	5.66
Water Truck	457	1	0.1223	0.3533	1.7096	0.0019	0.0666	8	0.98	2.83	13.68	0.02	0.53	19	18.59	53.71	259.86	0.29	10.13
									3.53	11.95	53.20	0.05	2.09		67.12	226.96	1,010.83	0.95	39.77

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Concrete Structures	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Backhoe	107	1	0.0398	0.2058	0.4572	0.0004	0.0355	8	0.32	1.65	3.66	0.00	0.28	1	0.32	1.65	3.66	0.00	0.28
Generator	5	1	0.5115	1.7513	0.0212	0.0000	0.0028	4	2.05	7.01	0.08	0.00	0.01	5	10.23	35.03	0.42	0.00	0.06
									2.36	8.65	3.74	0.00	0.30		10.55	36.67	4.08	0.00	0.34

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Rock Placement	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Excavator	300	1	0.0593	0.2713	0.9892	0.0013	0.0325	8	0.47	2.17	7.91	0.01	0.26	10	4.74	21.70	79.14	0.10	2.60
Loader	225	1	0.0601	0.2015	0.9422	0.0009	0.0325	8	0.48	1.61	7.54	0.01	0.26	10	4.80	16.12	75.37	0.07	2.60
									0.95	3.78	15.45	0.02	0.52		9.55	37.82	154.51	0.17	5.20

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Paving & Miscellaneous	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Paving Machine	200	1	0.0323	0.2865	0.7376	0.0009	0.0191	8	0.26	2.29	5.90	0.01	0.15	2	0.52	4.58	11.80	0.01	0.31
Roller	60	2	0.0272	0.1324	0.3006	0.0002	0.0223	8	0.44	2.12	4.81	0.00	0.36	2	0.87	4.24	9.62	0.01	0.72
Water Truck	457	1	0.1223	0.3533	1.7096	0.0019	0.0666	8	0.98	2.83	13.68	0.02	0.53	2	1.96	5.65	27.35	0.03	1.07
Skip	100	1	0.0372	0.1923	0.4273	0.0004	0.0332	8	0.30	1.54	3.42	0.00	0.27	2	0.60	3.08	6.84	0.01	0.53
									1.97	8.78	27.81	0.03	1.31		3.94	17.55	55.61	0.06	2.62

Maximum Overlap (Tasks 7 and 10)

Daily Emissions lbs				
ROG	CO	NOx	SOx	PM
5.52	19.28	85.06	0.09	3.07

Total Emissions lbs				
ROG	CO	NOx	SOx	PM
448.11	1,552.04	4,352.96	4.56	167.13

SH 18 Drain Construction

Assumptions:

1. CARB OFFROAD model emission factors in the South Coast Air Basin are used to estimate ROG, NOx, and PM emissions for off-road equipment. CARB OFFROAD model calculated BSCF and load factor data is used to determine SOx emissions based on 15 ppm sulfur diesel fuel.
2. 2017 SCAQMD CEQA website emission factors are used for CO for all offroad equipment.

Offroad Emission Factors - 2017 (pounds/hour)

			Off-road Emission Factor - lbs/hour *				
	Equipment Name	**HP**	**ROG**	**CO**	**NOx**	**SOx**	**PM**
114	Backhoe w/breaker	107	0.0375	0.2047	0.4315	0.0004	0.0329
115	Loader	225	0.0580	0.1975	0.8928	0.0009	0.0310
116	Water Truck	457	0.1165	0.3460	1.6019	0.0019	0.0621
117	Excavator	115	0.0368	0.3223	0.4371	0.0005	0.0315
118	Vibratory Compactor	100	0.0431	0.2192	0.4791	0.0004	0.0352
119	Paving Machine	200	0.0316	0.2761	0.6983	0.0009	0.0183
120	Vibratory Roller(s)	60	0.0259	0.1315	0.2875	0.0002	0.0211
121	Skip	100	0.0350	0.1913	0.4033	0.0004	0.0307

*Emissions factors include load factor

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Asphalt Concrete Removal	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Backhoe w/breaker	107	1	0.0375	0.2047	0.4315	0.0004	0.0329	8	0.30	1.64	3.45	0.00	0.26	10	3.00	16.38	34.52	0.04	2.63
Loader	225	1	0.0580	0.1975	0.8928	0.0009	0.0310	8	0.46	1.58	7.14	0.01	0.25	10	4.64	15.80	71.42	0.07	2.48
Water Truck	457	1	0.1165	0.3460	1.6019	0.0019	0.0621	8	0.93	2.77	12.82	0.02	0.50	10	9.32	27.68	128.16	0.15	4.97
									1.70	5.99	23.41	0.03	1.01		16.96	59.86	234.10	0.26	10.08

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Pipe Installation	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Excavator	115	1	0.0368	0.3223	0.4371	0.0005	0.0315	8	0.29	2.58	3.50	0.00	0.25	25	7.36	64.46	87.42	0.10	6.30
Loader	225	1	0.0580	0.1975	0.8928	0.0009	0.0310	8	0.46	1.58	7.14	0.01	0.25	25	11.60	39.51	178.56	0.18	6.19
Water Truck	457	1	0.1165	0.3460	1.6019	0.0019	0.0621	8	0.93	2.77	12.82	0.02	0.50	25	23.31	69.21	320.39	0.39	12.43
									1.69	6.93	23.45	0.03	1.00		42.27	173.17	586.37	0.66	24.92

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Hauling (Dirt Export)	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Loader	225	1	0.0580	0.1975	0.8928	0.0009	0.0310	8	0.46	1.58	7.14	0.01	0.25	10	4.64	15.80	71.42	0.07	2.48
Water Truck	457	1	0.1165	0.3460	1.6019	0.0019	0.0621	8	0.93	2.77	12.82	0.02	0.50	10	9.32	27.68	128.16	0.15	4.97
									1.40	4.35	19.96	0.02	0.74		13.96	43.49	199.58	0.23	7.45

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Backfill & Compaction	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Loader	225	1	0.0580	0.1975	0.8928	0.0009	0.0310	8	0.46	1.58	7.14	0.01	0.25	25	11.60	39.51	178.56	0.18	6.19
Vibratory Compactor	100	1	0.0431	0.2192	0.4791	0.0004	0.0352	8	0.35	1.75	3.83	0.00	0.28	25	8.63	43.84	95.83	0.08	7.04
Water Truck	457	1	0.1165	0.3460	1.6019	0.0019	0.0621	8	0.93	2.77	12.82	0.02	0.50	25	23.31	69.21	320.39	0.39	12.43
									1.74	6.10	23.79	0.03	1.03		43.54	152.56	594.77	0.65	25.66

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Concrete Structures	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Backhoe w/breaker	107	1	0.0375	0.2047	0.4315	0.0004	0.0329	4	0.15	0.82	1.73	0.00	0.13	5	0.75	4.09	8.63	0.01	0.66
									0.15	0.82	1.73	0.00	0.13		0.75	4.09	8.63	0.01	0.66

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Paving & Miscellaneous	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Paving Machine	200	1	0.0316	0.2761	0.6983	0.0009	0.0183	8	0.25	2.21	5.59	0.01	0.15	3	0.76	6.63	16.76	0.02	0.44
Vibratory Roller(s)	60	2	0.0259	0.1315	0.2875	0.0002	0.0211	8	0.41	2.10	4.60	0.00	0.34	3	1.24	6.31	13.80	0.01	1.01
Skip	100	1	0.0350	0.1913	0.4033	0.0004	0.0307	8	0.28	1.53	3.23	0.00	0.25	3	0.84	4.59	9.68	0.01	0.74
Water Truck	457	1	0.1165	0.3460	1.6019	0.0019	0.0621	8	0.93	2.77	12.82	0.02	0.50	3	2.80	8.31	38.45	0.05	1.49
									1.88	8.61	26.23	0.03	1.23		5.64	25.84	78.68	0.09	3.68

Maximum Overlap

Daily Emissions lbs				
ROG	CO	NOx	SOx	PM
4.83	17.38	67.20	0.07	2.77

Total Emissions lbs				
ROG	CO	NOx	SOx	PM
123.12	459.01	1,702.13	1.90	72.44

Pine Avenue Drain Construction

Assumptions:

1. CARB OFFROAD model emission factors in the South Coast Air Basin are used to estimate ROG, NOx, and PM emissions for off-road equipment. CARB OFFROAD model calculated BSCF and load factor data is used to determine SOx emissions based on 15 ppm sulfur diesel fuel.
2. 2018 SCAQMD CEQA website emission factors are used for CO for all offroad equipment.

Offroad Emission Factors - 2018

		Off-road Emission Factor - lbs/hour *				
Equipment Name	**HP**	**ROG**	**CO**	**NOx**	**SOx**	**PM**
Backhoe w/breaker	107	0.0326	0.2038	0.3824	0.0004	0.0277
Loader	225	0.0520	0.1943	0.7761	0.0009	0.0268
Water Truck	457	0.1039	0.3401	1.3674	0.0019	0.0525
Excavator	115	0.0324	0.3207	0.3902	0.0005	0.0267
Vibratory Compactor	100	0.0362	0.2178	0.4158	0.0004	0.0292
Paving Machine	200	0.0293	0.2668	0.6194	0.0009	0.0165
Vibratory Roller(s)	60	0.0217	0.1307	0.2495	0.0002	0.0175
Skip	100	0.0305	0.1904	0.3574	0.0004	0.0259

*Emissions factors include load factor

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Asphalt Concrete Removal	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Backhoe w/breaker	107	1	0.0326	0.2038	0.3824	0.0004	0.0277	8	0.26	1.63	3.06	0.00	0.22	7	1.83	11.41	21.41	0.02	1.55
Loader	225	1	0.0520	0.1943	0.7761	0.0009	0.0268	8	0.42	1.55	6.21	0.01	0.21	7	2.91	10.88	43.46	0.05	1.50
Water Truck	457	1	0.1039	0.3401	1.3674	0.0019	0.0525	8	0.83	2.72	10.94	0.02	0.42	7	5.82	19.04	76.57	0.11	2.94
									1.51	5.91	20.21	0.03	0.86		10.56	41.34	141.45	0.18	5.99

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Pipe Installation	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Excavator	115	1	0.0324	0.3207	0.3902	0.0005	0.0267	8	0.26	2.57	3.12	0.00	0.21	20	5.19	51.32	62.44	0.08	4.28
Loader	225	1	0.0520	0.1943	0.7761	0.0009	0.0268	8	0.42	1.55	6.21	0.01	0.21	20	8.32	31.09	124.18	0.14	4.29
Water Truck	457	1	0.1039	0.3401	1.3674	0.0019	0.0525	8	0.83	2.72	10.94	0.02	0.42	20	16.63	54.41	218.78	0.31	8.39
									1.51	6.84	20.27	0.03	0.85		30.14	136.82	405.40	0.53	16.96

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Hauling (Dirt Export)	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Loader	225	1	0.0520	0.1943	0.7761	0.0009	0.0268	8	0.42	1.55	6.21	0.01	0.21	10	4.16	15.55	62.09	0.07	2.15
Water Truck	457	1	0.1039	0.3401	1.3674	0.0019	0.0525	8	0.83	2.72	10.94	0.02	0.42	10	8.31	27.21	109.39	0.15	4.20
									1.25	4.28	17.15	0.02	0.63		12.48	42.75	171.48	0.23	6.34

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Backfill & Compaction	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Loader	225	1	0.0520	0.1943	0.7761	0.0009	0.0268	8	0.42	1.55	6.21	0.01	0.21	20	8.32	31.09	124.18	0.14	4.29
Vibratory Compactor	100	1	0.0362	0.2178	0.4158	0.0004	0.0292	8	0.29	1.74	3.33	0.00	0.23	20	5.79	34.85	66.52	0.07	4.68
Water Truck	457	1	0.1039	0.3401	1.3674	0.0019	0.0525	8	0.83	2.72	10.94	0.02	0.42	20	16.63	54.41	218.78	0.31	8.39
									1.54	6.02	20.47	0.03	0.87		30.74	120.35	409.48	0.52	17.37

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Concrete Structures	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Backhoe w/breaker	107	1	0.0326	0.2038	0.3824	0.0004	0.0277	4	0.13	0.82	1.53	0.00	0.11	5	0.65	4.08	7.65	0.01	0.55
									0.13	0.82	1.53	0.00	0.11		0.65	4.08	7.65	0.01	0.55

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Paving & Miscellaneous	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Paving Machine	200	1	0.0293	0.2668	0.6194	0.0009	0.0165	8	0.23	2.13	4.95	0.01	0.13	2	0.47	4.27	9.91	0.01	0.26
Vibratory Roller(s)	60	2	0.0217	0.1307	0.2495	0.0002	0.0175	8	0.35	2.09	3.99	0.00	0.28	2	0.70	4.18	7.98	0.01	0.56
Skip	100	1	0.0305	0.1904	0.3574	0.0004	0.0259	8	0.24	1.52	2.86	0.00	0.21	2	0.49	3.05	5.72	0.01	0.41
Water Truck	457	1	0.1039	0.3401	1.3674	0.0019	0.0525	8	0.83	2.72	10.94	0.02	0.42	2	1.66	5.44	21.88	0.03	0.84
									1.66	8.47	22.74	0.03	1.04		3.32	16.94	45.49	0.06	2.08

Maximum Overlap

Daily Emissions lbs				
ROG	CO	NOx	SOx	PM
4.29	17.13	57.89	0.08	2.35

Total Emissions lbs				
ROG	CO	NOx	SOx	PM
87.89	362.28	1,180.94	1.53	49.30

RIMFOREST DRAINAGE RESTORATION PROJECT

Construction - Fugitive Dust Emission Calculations

Basin Construction

Assumptions:

1. Fugitive dust emissions are estimated using AP-42.
2. Equipment usage, amount of material handling, and VMT assumptions are presented under "Schedule & Equipment"
3. Mitigation level assumes minimum mitigation required for SCAQMD Rule 403 compliance.

Emission Categories

1) Earthmoving
2) Road Dust Paved/Unpaved
3) Disturbed Area Windblown Emissions

1) Earthmoving

Emission Types
A) Dozing
B) Grading
C) Material Loading/Handling

A) Dozing (AP-42 Section 11.9 for overburden)

$E = k \times (s)^{1.5} / (M)^{1.4}$ For PM10 and $k \times 5.7 \times (s)^{1.2} / (M)^{1.3}$ for PM2.5
E = lb/hr
k = Scaling Constant (0.75 for PM10 and 0.105 for PM2.5)
s = Silt Content (assumed to be 12%)
M = Moisture Content = 15% (based on SCAQMD moist soil definition)

Emission Factor, lb/hr

PM10	PM2.5
0.70357	0.34927

Maximum Daily Dozer Use

	Hrs/day
Max Case	8

Dozer Emissions (Lbs/day)

	PM10	PM2.5
Max Case	5.63	2.79

Total Dozer Use

	Hrs
Total Dozer Use	392

Dozer Emissions (Tons)

	PM10	PM2.5
Total Dozer Use	0.14	0.07

B) Grading (AP-42 Section 11.9)

$E = k \times 0.051 \times (S)^{2.0}$ for PM10 and $k \times 0.040 \times (S)^{2.5}$ for PM2.5
E = lb/VMT
k = Scaling Constant (0.60 for PM10 and 0.031 for PM2.5)
S = Mean Vehicle Speed assumed to be 3 mph
Assumes VMT = 3 x hours in use

Emission Factor, lb/VMT

PM10	PM2.5
0.27540	0.01933

Emission Control
61%

Water dust suppresiion is assumed as a control measure.

Maximum Daily Grader VMT

	Hrs/day	VMT/day
Max Case	0	0

Grading Emissions (Lbs/day)

	PM10	PM2.5
Max Case	0.00	0.00

Total Grader VMT

	Hrs	VMT
Total Grader Use	152	456

Grading Emissions (Tons)

	PM10	PM2.5
Total Grader Use	0.02	0.00

C) Material Loading/Handling (AP-42, p. 13.2.4.3)

Assumptions:

1. This emission source covers the material handling of the stockpiled and used materials.
2. The worst case daily throughput is assumed to be 4,500 cu yds of wet soil total with two drops, or a total drop weight of 13,365 tons, total is 120,000 cu yds with two drops (356,400 tons).

$E = (k)(0.0032)[(U/5)^{1.3}]/[(M/2)^{1.4}]$
E = lb/ton
k = Particle Size Constant (0.35 for PM10 and 0.053 for PM2.5)
U = average wind speed = 25 MPH worst day, 8 MPH avg daytime (engineering assumption)
M = moisture content = 15% (SCAQMD moist)

	tons/period
Daily	13,365
Total	356,400

Emission Factors and Emissions
Emission Factors

PM10 Total	PM2.5 Total
0.00012	0.00002

PM10 Daily	PM2.5 Daily
0.00054	0.00008

Emissions (Lbs/day)

	PM10	PM2.5
Daily	7.22	1.09

Emissions (Tons/year)

	PM10	PM2.5
Total	0.04	0.01

2) Road Dust

Emission Types
A) Paved Road Dust
B) Unpaved Road Dust

A) Paved Road Dust

$E = [k \times (sL)^{0.91 \times} (W)^{1.02}]*(1-P/4N)$
E = lb/VMT
k = Constant (0.0022 for PM10 and 0.00054 for PM2.5)
sL = Silt Loading (assumed to be 0.2 g/m2 for ADT between 500 and 5,000 from Table 13.2.1-2)
W = Average weight of vehicles in tons (calculated below)
P = Days of precipitation (0 assumed for annual calculation)
N = Days in period (365 for annual calculation)

Average Vehicle Weight Calculation

Assumptions
Passenger Vehicles = 2 tons average
MDV "Delivery Vehicles = 3.5 tons
MHDT "Delivery" Vehicles = 12 ton average
Heavy-Heavy Duty Trucks = 24 tons average (loaded 35 tons, unloaded 13 tons)

Daily Case VMT	Passenger	MDV	MHDT	HHDT	Total Paved	Average Weight (Tons)
Worst Case	1,440	0	0	414	1,854	6.9

Total Case VMT	Passenger	Delivery/Work	MHDT	HHDT	Total Paved	Average Weight (Tons)
Total Project	89,600	5,280	5,286	44,851	145,016	9.2

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Worst Case	0.00365	0.00090

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	6.78	1.66

Total Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Total Project	0.00490	0.00120

Emissions (Tons)

	PM10	PM2.5
Total Project	0.36	0.09

B) Unpaved Road Dust

$E = (k)[(s/12)^{0.9}][(W/3)^{0.45}][(365-P)/365]$

k = constant = 1.5 lb/VMT for PM10 and 0.15 lb/VMT for PM2.5
s = Silt Content (assumed to be 12%, SCAQMD 1993 Handbook value for mountain roads)
W = avg. vehicle weight = calculated below
P = Days of precipitation (0 assumed for annual calculation)
No correction for number of wet days due to assumption of working in dry season

Average Vehicle Weight Calculation

Assumptions:
Passenger Vehicles = 2 tons average
Midsize "Delivery" Vehicles = 8 ton average
Heavy-Heavy Duty Trucks = 16.5 tons average (loaded 23 tons, unloaded 10 tons)

Daily Case VMT	Passenger	MDV	MHDT	HHDT	Total Unpaved	Average Weight (Tons)
Worst Case	0	0	0	6	6	24.0

Total Case VMT	Passenger	MDV	MHDT	HHDT	Total Unpaved	Average Weight (Tons)
Total Project	0	0	14	529	544	23.7

Uncontrolled Emission Factors and Emissions

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Worst Case	3.82	0.38

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	22.48	2.25

Total Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Total Project	3.80	0.38

Emissions (Tons)

	PM10	PM2.5
Total Project	1.03	0.10

Controlled Emissions (assumes 61% with watering)

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	8.77	0.88

Emissions (Tons)

	PM10	PM2.5
Total Project	0.40	0.04

Watering (61%) is assumed as a necessary Rule 403 control measure

Emission Control
61%

3) Disturbed Area Windblown Emissions

Assumptions
1. Emission Factor is 0.38 tons/disturbed acres/year of Total Suspended Particulate (AP-42 Section 11.9).
2. PM10 and PM2.5 fractions of TSP are 0.489 and 0.102 respectively per CEIDARS factors from SCAQMD CEQA Website.
3. The disturbed area totals 12.3 acres.
4. Duration of disturbance is the 88 day construction schedule.
5. Disturbed areas are controlled by water dust suppression of 61% control.
6. Restoration of disturbed acres creates no net emission increase of permanently disturbed acres

Disturbed Acres (acre-years)	Total Emissions (Tons)	
	PM10	PM2.5
3.0	0.22	0.04

Emissions (Lbs/day)	
PM10	PM2.5
4.97	1.02

* Disturbance area includes piles of earth fill.

Maximum Overlap (Tasks 4 and 5)

	PM10	PM2.5
Dozing	5.63	2.79
Grading	0.00	0.00
Material Loading/Handling	7.22	1.09
Paved Road Dust	6.78	1.66
Unpaved Road Dust	8.77	0.88
Disturbed Area Windblown Emissions	4.97	1.02
Total	33.37	7.45

Total Fugitive Emissions

	PM10	PM2.5
Dozing	0.14	0.07
Grading	0.02	0.00
Material Loading/Handling	0.04	0.01
Paved Road Dust	0.36	0.09
Unpaved Road Dust	0.40	0.04
Disturbed Area Windblown Emissions	0.22	0.04
Total	1.18	0.25

LST Maximum Overlap (Phases 4 and 5)

	PM10	PM2.5
Dozing	5.63	2.79
Grading	0.00	0.00
Scraper	0.00	0.00
Material Loading/Handling	7.22	1.09
Paved Road Dust	0.00	0.00
Unpaved Road Dust	8.77	0.88
Disturbed Area Windblown Emissions	4.97	1.02
Total	26.59	5.78

RIMFOREST DRAINAGE RESTORATION PROJECT

Construction - Fugitive Dust Emission Calculations

SH 18 Drain Construction

Assumptions:

1. Fugitive dust emissions are estimated using AP-42.
2. Equipment usage, amount of material handling, and VMT assumptions are presented under "Schedule & Equipment"
3. Mitigation level assumes minimum mitigation required for SCAQMD Rule 403 compliance.

Emission Categories

1) Earthmoving
2) Road Dust Paved/Unpaved
3) Disturbed Area Windblown Emissions

1) Earthmoving

Emission Types
A) Material Loading/Handling

A) Material Loading/Handling (AP-42, p. 13.2.4.3)

Assumptions:

1. This emission source covers the material handling of the stockpiled and used materials.
2. The worst case daily throughput is assumed to be 800 cu yds of wet soil total with two drops, or a total drop weight of 2,400 tons, total is 12,000 cu yds with two drops (36,000 tons).

$E = (k)(0.0032)[(U/5)^{1.3}]/[(M/2)^{1.4}]$
E = lb/ton
k = Particle Size Constant (0.35 for PM10 and 0.053 for PM2.5)
U = average wind speed = 25 MPH worst day, 8 MPH avg daytime (engineering assumption)
M = moisture content = 15% (SCAQMD moist)

	tons/period
Daily	2,400
Total	36,000

Emission Factors and Emissions
Emission Factors

PM10 Total	PM2.5 Total
0.00012	0.00002

PM10 Daily	PM2.5 Daily
0.00054	0.00008

Emissions (Lbs/day)

	PM10	PM2.5
Daily	1.30	0.20

Emissions (Tons/year)

	PM10	PM2.5
Total	0.00	0.00

2) Road Dust

Emission Types
A) Paved Road Dust
B) Unpaved Road Dust

A) Paved Road Dust

$E = [k \times (sL)^{0.91 \times} (W)^{1.02}]*(1-P/4N)$
E = lb/VMT
k = Constant (0.0022 for PM10 and 0.00054 for PM2.5)
sL = Silt Loading (assumed to be 0.2 g/m2 for ADT between 500 and 5,000 from Table 13.2.1-2)
W = Average weight of vehicles in tons (calculated below)
P = Days of precipitation (0 assumed for annual calculation)
N = Days in period (365 for annual calculation)

Average Vehicle Weight Calculation

Assumptions
Passenger Vehicles = 2 tons average
MDV "Delivery Vehicles = 3.5 tons
MHDT "Delivery" Vehicles = 12 ton average
Heavy-Heavy Duty Trucks = 24 tons average (loaded 35 tons, unloaded 13 tons)

Daily Case VMT	Passenger	MDV	MHDT	Heavy-Heavy Duty	Total Paved	Average Weight
Worst Case	1,600	0	0	730	2,330	8.9

Total Case VMT	Passenger	Delivery/Work	MHDT	Heavy-Heavy Duty	Total Paved	Average Weight
Total Project	48,000	3,960	3,889	31,575	87,424	10.5

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Worst Case	0.00472	0.00116

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	11.01	2.70

Total Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Total Project	0.00557	0.00137

Emissions (Tons)

	PM10	PM2.5
Total Project	0.24	0.06

B) Unpaved Road Dust

$E = (k)[(s/12)^{0.9}][(W/3)^{0.45}][(365-P)/365]$

k = constant = 1.5 lb/VMT for PM10 and 0.15 lb/VMT for PM2.5
s = Silt Content (assumed to be 12%, SCAQMD 1993 Handbook value for mountain roads)
W = avg. vehicle weight = calculated below
P = Days of precipitation (0 assumed for annual calculation)
No correction for number of wet days due to assumption of working in dry season

Average Vehicle Weight Calculation

Assumptions:
Passenger Vehicles = 2 tons average
Midsize "Delivery" Vehicles = 8 ton average
Heavy-Heavy Duty Trucks = 16.5 tons average (loaded 23 tons, unloaded 10 tons)

Daily Case VMT	Passenger	MDV	MHDT	Heavy-Heavy Duty	Total Unpaved	Average Weight
Worst Case	0	0	0	0	0	0.0

Total Case VMT	Passenger	MDV	MHDT	Heavy-Heavy Duty	Total Unpaved	Average Weight
Total Project	0	0	11	25	36	20.4

Uncontrolled Emission Factors and Emissions

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Worst Case	0.00	0.00

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	0.00	0.00

Total Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Total Project	3.56	0.36

Emissions (Tons)

	PM10	PM2.5
Total Project	0.06	0.01

Controlled Emissions (assumes 61% with watering)

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	0.00	0.00

Emissions (Tons)

	PM10	PM2.5
Total Project	0.02	0.00

Watering (61%) is assumed as a necessary Rule 403 control measure

Emission Control
61%

3) Disturbed Area Windblown Emissions

Assumptions
1. Emission Factor is 0.38 tons/disturbed acres/year of Total Suspended Particulate (AP-42 Section 11.9).
2. PM10 and PM2.5 fractions of TSP are 0.489 and 0.102 respectively per CEIDARS factors from SCAQMD CEQA Website.
3. The disturbed area totals 1 acre.
4. Duration of disturbance is the 66 day construction schedule.
5. Disturbed areas are controlled by water dust suppression of 61% control.
6. Restoration of disturbed acres creates no net emission increase of permanently disturbed acres

Disturbed Acres (acre-years)	Total Emissions (Tons)	
	PM10	PM2.5
0.2	0.01	0.00

Emissions (Lbs/day)	
PM10	PM2.5
0.40	0.08

* Disturbance area includes piles of earth fill.

Maximum Overlap (Tasks 3 through 5)

	PM10	PM2.5
Material Loading/Handling	1.30	0.20
Paved Road Dust	11.01	2.70
Unpaved Road Dust	0.00	0.00
Disturbed Area Windblown Emissions	0.40	0.08
Total	12.71	2.98

Total Fugitive Emissions

	PM10	PM2.5
Material Loading/Handling	0.00	0.00
Paved Road Dust	0.24	0.06
Unpaved Road Dust	0.02	0.00
Disturbed Area Windblown Emissions	0.01	0.00
Total	0.29	0.07

LST Maximum for Fugitive Dust (Task 3-5)

	PM10	PM2.5
Scraper	0.00	0.00
Material Loading/Handling	1.30	0.20
Paved Road Dust	0.00	0.00
Unpaved Road Dust	0.00	0.00
Disturbed Area Windblown Emissions	0.40	0.08
Total	1.70	0.28

RIMFOREST DRAINAGE RESTORATION PROJECT

Construction - Fugitive Dust Emission Calculations

Pine Avenue Drain Construction

Assumptions:

1. Fugitive dust emissions are estimated using AP-42.
2. Equipment usage, amount of material handling, and VMT assumptions are presented under "Schedule & Equipment"
3. Mitigation level assumes minimum mitigation required for SCAQMD Rule 403 compliance.

Emission Categories

1) Earthmoving
2) Road Dust Paved/Unpaved
3) Disturbed Area Windblown Emissions

1) Earthmoving

Emission Types
A) Material Loading/Handling

A) Material Loading/Handling (AP-42, p. 13.2.4.3)

Assumptions:

1. This emission source covers the material handling of the stockpiled and used materials.
2. The worst case daily throughput is assumed to be 500 cu yds of wet soil total with two drops, or a total drop weight of 1,500 tons, total is 8,000 cu yds with two drops (24,000 tons).

$E = (k)(0.0032)[(U/5)^{1.3}]/[(M/2)^{1.4}]$
E = lb/ton
k = Particle Size Constant (0.35 for PM10 and 0.053 for PM2.5)
U = average wind speed = 25 MPH worst day, 8 MPH avg daytime (engineering assumption)
M = moisture content = 15% (SCAQMD moist)

	tons/period
Daily	1,500
Total	24,000

Emission Factors and Emissions
Emission Factors

PM10 Total	PM2.5 Total
0.00012	0.00002

PM10 Daily	PM2.5 Daily
0.00054	0.00008

Emissions (Lbs/day)

	PM10	PM2.5
Daily	0.81	0.12

Emissions (Tons/year)

	PM10	PM2.5
Total	0.00	0.00

2) Road Dust

Emission Types
A) Paved Road Dust
B) Unpaved Road Dust

A) Paved Road Dust

$E = [k \times (sL)^{0.91 \times} (W)^{1.02}]*(1-P/4N)$
E = lb/VMT
k = Constant (0.0022 for PM10 and 0.00054 for PM2.5)
sL = Silt Loading (assumed to be 0.2 g/m2 for ADT between 500 and 5,000 from Table 13.2.1-2)
W = Average weight of vehicles in tons (calculated below)
P = Days of precipitation (0 assumed for annual calculation)
N = Days in period (365 for annual calculation)

Average Vehicle Weight Calculation

Assumptions
Passenger Vehicles = 2 tons average
MDV "Delivery Vehicles = 3.5 tons
MHDT "Delivery" Vehicles = 12 ton average
Heavy-Heavy Duty Trucks = 24 tons average (loaded 35 tons, unloaded 13 tons)

Daily Case VMT	Passenger	MDV	MHDT	Heavy-Heavy Duty	Total Paved	Average Weight
Worst Case	1,600	0	0	530	2,130	7.5

Total Case VMT	Passenger	Delivery/Work	MHDT	Heavy-Heavy Duty	Total Paved	Average Weight
Total Project	39,360	3,960	3,889	22,442	69,651	9.7

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Worst Case	0.00396	0.00097

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	8.43	2.07

Total Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Total Project	0.00518	0.00127

Emissions (Tons)

	PM10	PM2.5
Total Project	0.18	0.04

B) Unpaved Road Dust

$E = (k)[(s/12)^{0.9}][(W/3)^{0.45}][(365-P)/365]$

k = constant = 1.5 lb/VMT for PM10 and 0.15 lb/VMT for PM2.5
s = Silt Content (assumed to be 12%, SCAQMD 1993 Handbook value for mountain roads)
W = avg. vehicle weight = calculated below
P = Days of precipitation (0 assumed for annual calculation)
No correction for number of wet days due to assumption of working in dry season

Average Vehicle Weight Calculation

Assumptions:
Passenger Vehicles = 2 tons average
Midsize "Delivery" Vehicles = 8 ton average
Heavy-Heavy Duty Trucks = 16.5 tons average (loaded 23 tons, unloaded 10 tons)

Daily Case VMT	Passenger	MDV	MHDT	Heavy-Heavy Duty	Total Unpaved	Average Weight
Worst Case	0	0	0	0	0	0.0

Total Case VMT	Passenger	MDV	MHDT	Heavy-Heavy Duty	Total Unpaved	Average Weight
Total Project	0	0	11	18	29	19.6

Uncontrolled Emission Factors and Emissions

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Worst Case	0.00	0.00

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	0.00	0.00

Total Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Total Project	3.49	0.35

Emissions (Tons)

	PM10	PM2.5
Total Project	0.05	0.01

Controlled Emissions (assumes 61% with watering)

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	0.00	0.00

Emissions (Tons)

	PM10	PM2.5
Total Project	0.02	0.00

Watering (61%) is assumed as a necessary Rule 403 control measure

Emission Control
61%

3) Disturbed Area Windblown Emissions

Assumptions
1. Emission Factor is 0.38 tons/disturbed acres/year of Total Suspended Particulate (AP-42 Section 11.9).
2. PM10 and PM2.5 fractions of TSP are 0.489 and 0.102 respectively per CEIDARS factors from SCAQMD CEQA Website.
3. The disturbed area totals 0.75 acre.
4. Duration of disturbance is the 66 day construction schedule.
5. Disturbed areas are controlled by water dust suppression of 61% control.
6. Restoration of disturbed acres creates no net emission increase of permanently disturbed acres

Disturbed Acres (acre-years)	Total Emissions (Tons)	
	PM10	PM2.5
0.1	0.01	0.00

Emissions (Lbs/day)	
PM10	PM2.5
0.30	0.06

* Disturbance area includes piles of earth fill.

Maximum Overlap (Tasks 3 through 5)

	PM10	PM2.5
Material Loading/Handling	0.81	0.12
Paved Road Dust	8.43	2.07
Unpaved Road Dust	0.00	0.00
Disturbed Area Windblown Emissions	0.30	0.06
Total	9.54	2.25

Total Fugitive Emissions

	PM10	PM2.5
Material Loading/Handling	0.00	0.00
Paved Road Dust	0.18	0.04
Unpaved Road Dust	0.02	0.00
Disturbed Area Windblown Emissions	0.01	0.00
Total	0.21	0.05

LST Maximum for Fugitive Dust (Task 3-5)

	PM10	PM2.5
Scraper	0.00	0.00
Material Loading/Handling	0.81	0.12
Paved Road Dust	0.00	0.00
Unpaved Road Dust	0.00	0.00
Disturbed Area Windblown Emissions	0.30	0.06
Total	1.11	0.18

RIMFOREST DRAINAGE RESTORATION PROJECT
Construction GHG Emissions Calculations

Construction - Onroad Vehicles GHG Emission Calculations

Assumptions:

1. GHG emissions are estimated based on guideline and emission factors provided by The Climate Registry General Reporting Protocol (ver. 2.0 March 2013) and April 2015 updated emissions factors
2. Fuel consumption based on EMFAC 2014 comsumption rates for the vehicle classes required for this project.

TCR Table 13.1 Carbon Dioxide Emission Factors for Transport Fuels (kg CO2/gallon)

	CO2
Motor Gasoline	8.78
Diesel	10.21

TCR Table 13.5 Emission Factors for Each Fuel and Vehicle Type (g/mile)

		CH4	N2O
Passenger*	Gasoline	0.0168	0.0051
Delivery - MDV	Gasoline	0.0333	0.0134
Delivery - MHDT	Diesel	0.0051	0.0048
Heavy-Heavy Duty	Diesel	0.0051	0.0048

* 50 percent light auto and 50 percent light truck

Onroad Emission Factors - 2016 (pounds/mile)

	CH4	N2O
Passenger	0.00004	0.00001
Delivery - MDV	0.00007	0.00003
Delivery - MHDT	0.00001	0.00001
Heavy-Heavy Duty	0.00001	0.00001

Total On-road GHG Emissions

	VMT	Gallons	Total Emissions (tons)			
Vehicle Type	Total	Total	CO2	CH4	N2O	CO2e
Passenger	190,160	8,073	78.12	0.00	0.00	78.53
Delivery - MDV	13,200	968	9.37	0.00	0.00	9.44
Delivery - MHDT	13,100	19,312	217.31	0.00	0.00	217.51
Heavy-Heavy Duty	99,440			0.00	0.00	
		Totals	295.43	0.00	0.00	296.03

Construction - Offroad Equipment GHG Emission Calculations

Assumptions:

1. GHG emissions are estimated based on guideline and emission factors provided by The Climate Registry General Reporting Protocol (ver. 2.0 March 2013) and April 2015 updated emissions factors
2. For diesel-fueled equipment, fuel consumption rate is based on CARB OFFROAD model and density of 6.8 lbs/gallon are used.
3. For gasoline-fueled equipment, fuel consumption rate of 0.47 lbs/bhp-hr, density of 6.0 lbs/gallon and 50 percent load are used.

TCR Table 13.1 Carbon Dioxide Emission Factors for Transport Fuels (kg CO2/gallon)

	CO2 (kg/gallon)
Motor Gasoline	8.78
Diesel	10.21

TCR Table 13.7 Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles

Construction	CH4 (g/gallon)	N2O (g/gallon)
Gasoline	0.50	0.22
Diesel	0.58	0.26

Total Offroad GHG Emissions

	Fuel Use (gallon)	Total Emissions (tons)			
		CO2	CH4	N2O	CO2e
Gasoline	53	0.52	0.00	0.00	0.52
Diesel	39,044	439.35	0.02	0.01	443.25
Totals	39,097	439.87	0.02	0.01	443.77

Electricity Use

) Use assumption is 10 kWh per day at a construction management trailer
2) Total construction is 220 days over the 3 years of construction
3) TCR emissions factor for electricity use in the WECC is 613.3 CO2e/MWh

Electricity Use Emissions 0.67463 Tons CO2e

RIMFOREST DRAINAGE RESTORATION PROJECT

Operation Emissions Estimates

Onroad Emissions

Assumptions:

1. CARB EMFAC 2014 model emission factors for South Coast Air Basin are used to estimate on-road emissions, assuming worst-case of 2018.
2. Assumptions on Vehicle Class and resulting emissions factors used for each vehicle type are provided below:

Onroad Emission Factors - 2018

	VOC	CO	NOx	SOx	PM10	PM2.5	Vehicle Class
Employee/Pickups	0.00048	0.00351	0.00042	0.00001	0.00011	0.00005	Passenger
Dump Trucks/Equip. Delivery	0.00038	0.00180	0.01202	0.00004	0.00027	0.00013	HHDT
Fuel Truck	0.00034	0.00116	0.00730	0.00002	0.00052	0.00033	Delivery/MHDT

Passenger Vehicle is average of LDA, LDT1, LDT2, MDV, LHDT1, and MCY
Delivery class vehicles is MHDT diesel vehicle

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Inspection	Employee Vehicle	80	0.04	0.28	0.03	0.00	0.01	0.00	160	0.08	0.56	0.07	0.00	0.02	0.01

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Sediment Removal	Employee Vehicle	480	0.23	1.68	0.20	0.00	0.05	0.02	4,800	2.29	16.85	2.00	0.05	0.52	0.22
	Equip. Delivery	60	0.02	0.11	0.72	0.00	0.02	0.01	120	0.05	0.22	1.44	0.00	0.03	0.02
	Dump Truck	800	0.30	1.44	9.61	0.03	0.22	0.11	4,000	2.15	8.85	58.87	0.15	1.42	0.86
	Fuel Truck	50	0.02	0.06	0.36	0.00	0.03	0.02	500	0.27	1.11	7.36	0.02	0.18	0.11
		Totals	0.57	3.29	10.90	0.04	0.31	0.15	Totals	4.75	27.02	69.68	0.22	2.14	1.20

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Slope Maint.	Employee	160	0.08	0.56	0.07	0.00	0.02	0.01	160	0.08	0.56	0.07	0.00	0.02	0.01
	Equip. Delivery	60	0.02	0.11	0.72	0.00	0.02	0.01	120	0.05	0.22	1.44	0.00	0.03	0.02
		Totals	0.10	0.67	0.79	0.00	0.03	0.02	Totals	0.12	0.78	1.51	0.01	0.05	0.02

Off-Road Emissions

Assumptions:

1) Emissions calculated the same as done for construction using the derived fleet average CARB OFFROAD 2018 emissions factors as a worst case.
2) Equipment type, size, and duration estimates are from the County.

Offroad Emission Factors - 2018

		Off-road Emission Factor - lbs/hour *				
Equipment Name	**HP**	**ROG**	**CO**	**NOx**	**SOx**	**PM**
Excavator	300	0.0474	0.2660	0.7132	0.0013	0.0237
Water Truck	457	0.1039	0.3401	1.3674	0.0019	0.0525
Dozer	240	0.0828	0.2676	1.3108	0.0011	0.0513

*Emissions factors include load factor

			Emission Factor lbs/hour						Daily Emissions lbs					Total	Total Emissions lbs				
Sediment Removal	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Hours	ROG	CO	NOx	SOx	PM
Excavator	300	1	0.0474	0.2660	0.7132	0.0013	0.0237	8	0.38	2.13	5.71	0.01	0.19	10	3.79	21.28	57.06	0.10	1.89
Water Truck	457	1	0.1039	0.3401	1.3674	0.0019	0.0525	8	0.83	2.72	10.94	0.02	0.42	10	8.31	27.21	109.39	0.15	4.20
									1.21	4.85	16.64	0.03	0.61		12.11	48.49	166.45	0.26	6.09

			Emission Factor lbs/hour						Daily Emissions lbs						Total Emissions lbs				
Slope Maintenance	HP	Number	ROG	CO	NOx	SOx	PM	Hours/day	ROG	CO	NOx	SOx	PM	Days	ROG	CO	NOx	SOx	PM
Dozer	6	1	0.0828	0.2676	1.3108	0.0011	0.0513	6	0.50	1.61	7.86	0.01	0.31	1	0.50	1.61	7.86	0.01	0.31
									0.50	1.61	7.86	0.01	0.31		0.50	1.61	7.86	0.01	0.31

RIMFOREST DRAINAGE RESTORATION PROJECT

Operation - Fugitive Dust Emission Calculations

Assumptions:

1. Fugitive dust emissions are estimated using AP-42.
2. Equipment usage, amount of material handling, and VMT assumptions are presented under "Schedule & Equipment"
3. Mitigation level assumes minimum mitigation required for SCAQMD Rule 403 compliance.

Emission Categories

1) Earthmoving
2) Road Dust Paved/Unpaved
3) Disturbed Area Windblown Emissions

1) Earthmoving

Emission Types
A) Dozing
B) Material Loading/Handling

A) Dozing (AP-42 Section 11.9 for overburden)

$E = k \times (s)^{1.5} / (M)^{1.4}$ For PM10 and $k \times 5.7 \times (s)^{1.2} / (M)^{1.3}$ for PM2.5
E = lb/hr
k = Scaling Constant (0.75 for PM10 and 0.105 for PM2.5)
s = Silt Content (assumed to be 12%)
M = Moisture Content = 15% (based on SCAQMD moist soil definition)

Emission Factor, lb/hr

PM10	PM2.5
0.70357	0.34927

Maximum Daily Dozer Use

	Hrs/day
Max Case	0

Dozer Emissions (Lbs/day)

	PM10	PM2.5
Max Case	0.00	0.00

Total Dozer Use

	Hrs
Total Dozer Use	6

Dozer Emissions (Tons)

	PM10	PM2.5
Total Dozer Use	0.00	0.00

B) Material Loading/Handling (AP-42, p. 13.2.4.3)

Assumptions:

1. This emission source covers the material handling of the stockpiled and used materials.
2. The worst case daily throughput is assumed to be 1,000 cu yds of wet soil total with two drops, or a total drop weight of 3,000 tons, total is 10,000 cu yds with two drops (30,000 tons).

$E = (k)(0.0032)[(U/5)^{1.3}]/[(M/2)^{1.4}]$
E = lb/ton
k = Particle Size Constant (0.35 for PM10 and 0.053 for PM2.5)
U = average wind speed = 25 MPH worst day, 8 MPH avg daytime (engineering assumption)
M = moisture content = 15% (SCAQMD moist)

	tons/period
Daily	3,000
Total	30,000

Emission Factors and Emissions
Emission Factors

PM10 Total	PM2.5 Total
0.00012	0.00002

PM10 Daily	PM2.5 Daily
0.00054	0.00008

Emissions (Lbs/day)

	PM10	PM2.5
Daily	1.62	0.25

Emissions (Tons/year)

	PM10	PM2.5
Total	0.00	0.00

2) Road Dust

Emission Types
A) Paved Road Dust
B) Unpaved Road Dust

A) Paved Road Dust

$E = [k \times (sL)^{0.91 \times} (W)^{1.02}]*(1-P/4N)$
E = lb/VMT
k = Constant (0.0022 for PM10 and 0.00054 for PM2.5)
sL = Silt Loading (assumed to be 0.2 g/m2 for ADT between 500 and 5,000 from Table 13.2.1-2)
W = Average weight of vehicles in tons (calculated below)
P = Days of precipitation (0 assumed for annual calculation)
N = Days in period (365 for annual calculation)

Average Vehicle Weight Calculation

Assumptions
Passenger Vehicles = 2 tons average
MDV "Delivery Vehicles = 3.5 tons
MHDT "Delivery" Vehicles = 12 ton average
Heavy-Heavy Duty Trucks = 24 tons average (loaded 35 tons, unloaded 13 tons)

Daily Case VMT	Passenger	MDV	MHDT	Heavy-Heavy Duty	Total Paved	Average Weight
Worst Case	480	0	50	852	1,382	15.9

Total Case VMT	Passenger	MDV	MHDT	Heavy-Heavy Duty	Total Paved	Average Weight
Total Project	5,120	0	499	4,160	9,779	11.9

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Worst Case	0.00856	0.00210

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	11.83	2.90

Total Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Total Project	0.00634	0.00156

Emissions (Tons)

	PM10	PM2.5
Total Project	0.03	0.01

B) Unpaved Road Dust

$E = (k)[(s/12)^{0.9}][(W/3)^{0.45}][(365-P)/365]$

k = constant = 1.5 lb/VMT for PM10 and 0.15 lb/VMT for PM2.5
s = Silt Content (assumed to be 12%, SCAQMD 1993 Handbook value for mountain roads)
W = avg. vehicle weight = calculated below
P = Days of precipitation (0 assumed for annual calculation)
No correction for number of wet days due to assumption of working in dry season

Average Vehicle Weight Calculation

Assumptions:
Passenger Vehicles = 2 tons average
Midsize "Delivery" Vehicles = 8 ton average
Heavy-Heavy Duty Trucks = 16.5 tons average (loaded 23 tons, unloaded 10 tons)

Daily Case VMT	Passenger	MDV	MHDT	Heavy-Heavy Duty	Total Unpaved	Average Weight
Worst Case	0	0	0.1	8	8	23.9

Total Case VMT	Passenger	MDV	MHDT	Heavy-Heavy Duty	Total Unpaved	Average Weight
Total Project	0	0	1	80	81	23.9

Uncontrolled Emission Factors and Emissions

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Worst Case	3.81	0.38

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	31.27	3.13

Total Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Total Project	3.81	0.38

Emissions (Tons)

	PM10	PM2.5
Total Project	0.16	0.02

Controlled Emissions (assumes 61% with watering)

Emissions (Lbs/day)

	PM10	PM2.5
Worst Case	12.19	1.22

Emissions (Tons)

	PM10	PM2.5
Total Project	0.06	0.01

Watering (61%) is assumed as a necessary Rule 403 control measure

Emission Control
61%

3) Disturbed Area Windblown Emissions

Assumptions
1. Emission Factor is 0.38 tons/disturbed acres/year of Total Suspended Particulate (AP-42 Section 11.9).
2. PM10 and PM2.5 fractions of TSP are 0.489 and 0.102 respectively per CEIDARS factors from SCAQMD CEQA Website.
3. The disturbed area totals 2 acres.
4. Duration of disturbance is the 11 day construction schedule.
5. Disturbed areas are controlled by water dust suppression of 61% control.
6. Restoration of disturbed acres creates no net emission increase of permanently disturbed acres

Disturbed Acres (acre-years)	Total Emissions (Tons)	
	PM10	PM2.5
0.1	0.00	0.00

Emissions (Lbs/day)	
PM10	PM2.5
0.81	0.17

* Disturbance area includes piles of earth fill.

Maximum Daily - Sediment Removal, lbs

	PM10	PM2.5
Dozing	0.00	0.00
Material Loading/Handling	1.62	0.25
Paved Road Dust	11.83	2.90
Unpaved Road Dust	12.19	1.22
Disturbed Area Windblown Emissions	0.81	0.17
Total	26.45	4.53

Total Fugitive Emissions - Tons

	PM10	PM2.5
Dozing	0.00	0.00
Material Loading/Handling	0.00	0.00
Paved Road Dust	0.03	0.01
Unpaved Road Dust	0.06	0.01
Disturbed Area Windblown Emissions	0.00	0.00
Total	0.10	0.02

LST Maximum lbs/day

	PM10	PM2.5
Dozing	0.00	0.00
Scraper	0.00	0.00
Material Loading/Handling	1.62	0.25
Paved Road Dust	0.00	0.00
Unpaved Road Dust	12.19	1.22
Disturbed Area Windblown Emissions	0.81	0.17
Total	14.62	1.63

RIMFOREST DRAINAGE RESTORATION PROJECT
Operation GHG Emissions Calculations

Operation - Onroad Vehicles GHG Emission Calculations

Assumptions:

1. GHG emissions are estimated based on guideline and emission factors provided by The Climate Registry General Reporting Protocol (ver. 2.0 March 2013) and April 2015 updated emissions factors
2. Fuel consumption based on EMFAC 2014 comsumption rates for the vehicle classes required for this project.

TCR Table 13.1 Carbon Dioxide Emission Factors for Transport Fuels (kg CO2/gallon)

	CO2
Motor Gasoline	8.78
Diesel	10.21

TCR Table 13.5 Emission Factors for Each Fuel and Vehicle Type (g/mile)

		CH4	N2O
Passenger*	Gasoline	0.0168	0.0051
Delivery - MDV	Gasoline	0.0333	0.0134
Delivery - MHDT	Diesel	0.0051	0.0048
Heavy-Heavy Duty	Diesel	0.0051	0.0048

* 50 percent light auto and 50 percent light truck

Onroad Emission Factors - 2016 (pounds/mile)

	CH4	N2O
Passenger	0.00004	0.00001
Delivery - MDV	0.00007	0.00003
Delivery - MHDT	0.00001	0.00001
Heavy-Heavy Duty	0.00001	0.00001

Total On-road GHG Emissions

	VMT	Gallons	Total Emissions (tons)			
Vehicle Type	Total	Total	CO2	CH4	N2O	CO2e
Passenger	5,120	225	2.17	0.00	0.00	2.18
Delivery - MDV	0	0	0.00	0.00	0.00	0.00
Delivery - MHDT	500	806	9.06	0.00	0.00	9.07
Heavy-Heavy Duty	4,240			0.00	0.00	
		Totals	11.24	0.00	0.00	11.26

Construction - Offroad Equipment GHG Emission Calculations

Assumptions:

1. GHG emissions are estimated based on guideline and emission factors provided by The Climate Registry General Reporting Protocol (ver. 2.0 March 2013) and April 2015 updated emissions factors
2. For diesel-fueled equipment, fuel consumption rate is based on CARB OFFROAD model and density of 6.8 lbs/gallon are used.
3. For gasoline-fueled equipment, fuel consumption rate of 0.47 lbs/bhp-hr, density of 6.0 lbs/gallon and 50 percent load are used.

TCR Table 13.1 Carbon Dioxide Emission Factors for Transport Fuels (kg CO2/gallon)

	CO2 (kg/gallon)
Motor Gasoline	8.78
Diesel	10.21

TCR Table 13.7 Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles

Construction	CH4 (g/gallon)	N2O (g/gallon)
Gasoline	0.50	0.22
Diesel	0.58	0.26

Total Offroad GHG Emissions

	Fuel Use (gallon)	Total Emissions (tons)			
		CO2	CH4	N2O	CO2e
Gasoline	0	0.00	0.00	0.00	0.00
Diesel	1,287	14.48	0.00	0.00	14.61
Totals	1,287	14.48	0.00	0.00	14.61

Appendix 3

Special Status Plants and Wildlife

SPECIES OBSERVED

Scientific Name	Common Name	Voucher #
VASCULAR PLANTS		
FILICALES	FERN FAMILIES (SEVERAL INCLUDED TOGETHER)	
Pteridium aquilinum var. pubescens	Bracken fern	
CUPRESSACEAE	CYPRESS FAMILY	
Calocedrus decurrens	Incense cedar	
PINACEAE	PINE FAMILY	
Abies concolor	White fir	
Pinus coulteri	Coulter pine	
Pinus jeffreyi	Jeffrey pine	
Pinus lambertiana	Sugar pine	
Pinus ponderosa	Ponderosa pine	
ADOXACEAE	MUSKROOT FAMILY	
Sambucus nigra ssp. *cerulea*	Mexican elderberry	
APIACEAE	CELERY FAMILY	
Osmorhiza berteroi	Sweet-cicely	4,823
Sanicula graveolens	Sierra sanicle,	
APOCYNACEAE	DOGBANE FAMILY	
Asclepias sp.	Unid. broad-lv. per. Milkweed,	4,795
* *Vinca major*	Greater periwinkle	
ASTERACEAE	ASTER FAMILY	
Achillea millefolium	California yarrow	
Ambrosia acanthicarpa	Annual bur-sage	
Ambrosia artemisifolia	Low ragweed	
Artemisia douglasiana	Douglas mugwort	
Artemisia dracunculus	Tarragon	
Cirsium occidentale var. *californicum*	California thistle	
Erigeron divergens	Spreading fleabane, diffuse daisy	
Erigeron foliosus var. *foliosus*	Leafy daisy	
** *Eriophyllum lanatum* var. *obovatum*	Southern Sierra woolly sunflower	
Hieracium albiflorum	White hawkweed	4,828
* *Hypochaeris* sp.	Unid. cat's-ear	4,790

Non-native species indicated by asterisk. Special status species indicated by two asterisks.
Plant collections from the site will be deposited at the Rancho Santa Ana Botanic Garden and Justin Wood's collection numbers are listed in the right column as Voucher #. Plants were collected to document to flora of the site and to verify the identification of some of the species present. This species list includes only species observed on the site. Others may have been overlooked or unidentifiable due to season (amphibians are active during rains, reptiles during summer, some birds (and bats) migrate out of the area for summer or winter, some mammals hibernate, many plants are identifiable only in spring). Plants were identified using keys, descriptions, and illustrations in Baldwin et al. (2012). Taxonomy and nomenclature generally follow Jepson eflora (Jepson 2015). Wildlife taxonomy and nomenclature generally follow the most current literature for each taxonomic group.

* *Lactuca serriola*	Prickly lettuce	
Madia elegans	Common madia	
Malacothrix saxatilis	Quillwort	
Pseudognaphalium beneolens (Gnaphalium canescens ssp. *b.)*	Cudweed	
Solidago velutina ssp. *californica*	California goldenrod	
* *Tanacetum parthenium*	Feverfew	
* *Taraxacum officinale*	Common dandelion	
BORAGINACEAE	BORAGE FAMILY	
Cryptantha affinis	Side-grooved cryptantha	
Cryptantha simulans	Pine cryptantha	
Nemophila menziesii	Baby blue-eyes	
Phacelia davidsonii	Davidson phacelia	
Phacelia imbricata	Broad-sepaled phacelia	
BRASSICACEAE	MUSTARD FAMILY	
Barbarea orthoceras	Winter cress	
Caulanthus amplexicaulis	Clasping leaved caulanthus	
Erysimum capitatum	Western wallflower	
* *Hirschfeldia incana (Brassica geniculata)*	Shortpod mustard	
Lepidium virginicum ssp. *menziesii (L.* v. *pubescens)*	Wild peppergrass	
* *Lunaria annua*	Money plant	
* *Sisymbrium altissimum*	Tumble mustard	
** *Streptanthus bernardinus*	Laguna Mountains jewelflower	
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY	
Symphoricarpos rotundifolius var. *parishii*	Parish snowberry	
CARYOPHYLLACEAE	PINK FAMILY	
Cerastium fontanum ssp. *vulgare (C. vulgatum)*	Common mouse-ear chickweed	
Cerastium glomeratum	Sticky mouse-ear chickweed	
Silene lemmonii	Lemmon campion	
Stellaria media	Common chickweed	
CHENOPODIACEAE	GOOSEFOOT FAMILY	
* *Chenopodium album*	Common goosefoot	
CONVOLVULACEAE	MORNING-GLORY FAMILY	
Calystegia occidentalis ssp. *fulcrata (C. fulcrata)*	Morning-glory	
Convolvulus sp.	Unid. bindweed	4,791
CORNACEAE	DOGWOOD FAMILY	
Cornus nuttallii	Mountain dogwood	4,812

Cornus sericea (C. occidentalis)	American dogwood	4,808
ERICACEAE	HEATH FAMILY	
Arctostaphylos sp.	Unid. manzanita	
Pterospora andromedea	Pine drops	4,830
Pyrola picta	White veined shinleaf	4,817
Sarcodes sanguinea	Snow plant	
FABACEAE	PEA FAMILY	
Acmispon americanus (Lotus purshianus, L. unifoliatus)	"Spanish" clover	
Hosackia crassifolia var. *crassifolia (Lotus crassifolius)*	Buck lotus	
Lathyrus latifolius	Ornamental perennial sweet pea	
Lupinus latifolius	Stream lupine	
Lupinus microcarpus	Chick lupine	
Vicia americana	American vetch	
FAGACEAE	OAK FAMILY	
Quercus chrysolepis	Canyon live oak	
Quercus kelloggii	California black oak	
GROSSULARIACEAE	GOOSEBERRY FAMILY	
Ribes cereum	Wax currant	
Ribes nevadense	Mountain pink currant	
LAURACEAE	LAUREL FAMILY	
Umbellularia californica	California bay laurel	
MONTIACEAE	MONTIA FAMILY	
Claytonia exigua	Spring beauty	
Claytonia parviflora	Miner's lettuce	
Claytonia perfoliata	Miner's lettuce	
ONAGRACEAE	EVENING PRIMROSE FAMILY	
Circaea alpina ssp. *pacifica*	Enchanter's nightshade	X
Clarkia rhomboidea	Tongue clarkia	
Epilobium brachycarpum (E. paniculatum)	Summer cottonweed	X
Epilobium canum (Zauschnaria californica)	California fuchsia	X
OROBANCHACEAE	BROOMRAPE FAMILY	
Castilleja applegatei subsp. martinii	Indian paintbrush	
PHRYMACEAE	LOPSEED FAMILY	
Mimulus aurantiacus	Bush monkeyflower	
PLANTAGINACEAE	PLANTAIN FAMILY	
Collinsia childii	Child's blue-eyed Mary	
Penstemon centranthifolius	Scarlet bugler	

Penstemon rostriflorus	Bridges penstemon	4,806
Penstemon spectabilis	Royal penstemon	
POLEMONIACEAE	PHLOX FAMILY	
Allophyllum integrifolium	White false gilia	
Collomia grandiflora	Large-flowered collomia	4,824
Gilia capitata	Ball gilia	
Microsteris gracilis (Phlox gracilis)	Slender phlox	
Saltugilia splendens (Gilia splendens)	Splendid woodland-gilia	
POLYGONACEAE	BUCKWHEAT FAMILY	
Eriogonum fasciculatum	California buckwheat	
Eriogonum saxatile	Rock buckwheat	
* *Fallopia convolvulus (Polygonum convolvulus)*	Black bindweed	
* *Polygonum aviculare* ssp. *depressum (P. arenastrum)*	Common knotweed	
Rumex californicus	California dock	
RHAMNACEAE	BUCKTHORN FAMILY	
Ceanothus cordulatus	Mountain whitethorn	
Ceanothus integerrimus	Deer brush	
Frangula californica (Rhamnus californica)	California coffee berry	
ROSACEAE	ROSE FAMILY	
Drymocallis glandulosa var. glandulosa (Potentilla glandulosa)	Cinquefoil	
Fragaria vesca	Wood strawberry	4,819
Horkelia rydbergii (H. bolanderi ssp. *parryi)*	Rydberg's horkelia	4,793
Rubus parviflorus	Thimbleberry	4,820
Rubus ursinus	California blackberry	
RUBIACEAE	COFFEE FAMILY	
Galium angustifolium ssp. *angustifolium*	Narrowly leaved bedstraw	4,797
* *Galium aparine*	Goose grass, stickywilly	
SALICACEAE	WILLOW FAMILY	
Salix lasiolepis	Arroyo willow	
SAXIFRAGACEAE	SAXIFRAGE FAMILY	
Lithophragma affine	Common woodland star	
SCROPHULARIACEAE	SNAPDRAGON FAMILY	
* *Verbascum thapsus*	Woody muellin	
SOLANACEAE	NIGHTSHADE FAMILY	
Solanum xanti	Chaparral nightshade	
URTICACEAE	NETTLE FAMILY	

Urtica dioica ssp. *holosericea*	Stinging nettle	
VISCACEAE	MISTLETOE FAMILY	
Phoradendron leucarpum ssp. *macrophyllum (P. macrophyllum)*	American mistletoe (on Quercus)	
CYPERACEAE	SEDGE FAMILY	
Carex fracta	Fragile-sheathed sedge	
Carex praegracilis	Clustered field-sedge	
Carex sp.	Unid. sedge	
Carex subfusca	Rusty sedge	
IRIDACEAE	IRIS FAMILY	
Iris hartwegii ssp. *australis*	Hartweg's iris	
ORCHIDACEAE	ORCHID FAMILY	
Piperia unalascensis	Alaska piperia	4,818
POACEAE	GRASS FAMILY	
Bromus carinatus	California brome	
* *Bromus ciliatus*	Fringed brome	
* *Bromus diandrus (B. rigidus)*	Ripgut brome	
Bromus grandis	Tall brome	
Bromus hallii (Bromus orcuttianus var. *hallii)*	Hall's brome	
* *Bromus tectorum*	Cheat grass	
* *Cynosurus echinatus*	Dogtail grass	
Elymus glaucus	Blue wild-rye	
Elymus hispidus (Agropyron intermedium, Elytrigia intermedia)	Intermediate wheat grass	
Elymus sp.	Unid. wild-rye	
Festuca microstachys (Vulpia microstachys)	Annual fescue	
* *Festuca myuros (F. megalura, Vulpia myuros)*	Rattail sixweeks grass	
* *Festuca perennis (Lolium perenne)*	Awned Italian ryegrass	
* *Hordeum murinum*	Wall barley	
* *Phalaris minor*	Little-seeded canary grass	
Poa secunda	Nevada blue grass	
THEMIDACEAE	BRODIAEA FAMILY	
Bloomeria crocea	Common goldenstar	
Dichelostemma capitatum	Blue dicks, wild hyacinth	

VERTEBRATE ANIMALS

AMPHIBIA	AMPHIBIANS
PLETHODONTIDAE	LUNGLESS SALAMANDERS

Ensatina eschscholtzii ssp. *eschscholtzii*	Monterey ensatina

REPTILIA	REPTILES
IGUANIDAE	IGUANID LIZARDS
Sceloporus occidentalis	Western fence lizard
Sceloporus grasiosus	Sagebrush lizard
Uta stansburiana	Side-blotched lizard
SCINCIDAE	SKINKS
Eumeces skiltonianus	Western skink
ANGUIDAE	ALLIGATOR LIZARDS
Elgaria multicarinatus	Southern alligator lizard

AVES	BIRDS
ACCIPITRIDAE	HAWKS, EAGLES, HARRIERS
Buteo jamaicensis	Red-tailed hawk
STRIGIDAE	OWLS
** *Strix occidentalis occidentalis*	California spotted owl
COLUMBIDAE	PIGEONS AND DOVES
Columba fasciata	Band-tailed pigeon
Zenaida macroura	Mourning dove
PICIDAE	WOODPECKERS
Melanerpes formicivorus	Acorn woodpecker
Picoides albolarvatus	White-headed woodpecker
Colaptes auratus	Northern flicker
CORVIDAE	CROWS AND JAYS
Cyanocitta stellari	Stellar's jay
Corvus corax	Common raven
PARIDAE	CHICKADEES AND TITMICE
Parus gambeli	Mountain chickadee
SITTIDAE	NUTHATCHES
Sitta canadensis	Red-breasted nuthatch
Sitta carolinensis	White-breasted nuthatch
Sitta pygmaea	Pygmy nuthatch
CERTHIIDAE	CREEPERS
Certhia americana	Brown creeper
MUSCICAPIDAE	THRUSHES AND ALLIES
Sialia currucoides	Mountain bluebird
Turdus migratorius	American robin
VIREONIDAE	VIREOS

Vireo huttoni	Hutton's vireo
EMBERIZIDAE	WARBLERS & TANAGERS
Vermivora celata	Orange-crowned warbler
Dendroica coronata	Yellow-rumped warbler
Piranga ludoviciana	Western tanager
Pheucticus melanocephalus	Black-headed grosbeak
Pipilo maculatus	Spotted towhee
Junco hyemalis	Dark-eyed junco
Icterus bullockii	Bullock's oriole
FRINGILLIDAE	FINCHES
Carpodacus mexicanus	House finch

MAMMALIA	MAMMALS
SCIURIDAE	SQUIRRELS
** *Glaucomys sabrinus californicus*	San Bernardino flying squirrel
Eutamias merriami	Merriam chipmunk
Sciurus griseus	Western gray squirrel
GEOMYIDAE	POCKET GOPHERS
Thomomys bottae	Botta pocket gopher
HETEROMYIDAE	POCKET MICE
Perognathus fallax fallax	Northwest San Diego pocket mouse
Dipodomys agilis	Agile kangaroo rat
CRICETIDAE	RATS AND MICE
Peromyscus boylii	Brush mouse
Peromyscus maniculatus	Deer mouse
Neotoma lepida	Desert wood rat
MUSTELIDAE	WEASELS AND SKUNKS
Mephitis mephitis	Striped skunk

Special-status species reported from the region but excluded from this report.

Latin name	Common name	Reason for exclusion
PLANTS		
Ambrosia monogyra	Singlewhorl burrobrush	No suitable chaparral of desert scrub habitat.
Arenaria paludicola	Marsh sandwort	No suitable marsh habitat, likely extirpated from San Bernardino County.
Berberis nevinii	Nevin's barberry	Well above elev. range.
Brodiaea filifolia	Thread-leaved brodiaea	No suitable grasslands, above elev. range.
Canbya candida	White pygmy-poppy	No desert shrubland habitat.
Centromadia pungens ssp. *laevis*	Smooth tarplant	No alkali soils, above elev. range.
Chloropyrin martimum ssp. *maritimum*	Salt marsh bird's-beak	No alkali soils, above elev. range.
Chorizanthe parryi var. *parryi*	Parry's spineflower	No suitable coastal scrub or chaparral, above elev. range.
Deinandra mohavensis	Mojave tarplant	No suitable chaparral or coastal scrub, likely extirpated from the San Bernardino Mountains.
Dodecahema leptoceras	Slender-horned spineflower	No suitable coastal scrub or chaparral, above elev. range.
Dudleya abramsii ssp. *affinis*	San Bernardino Mountains dudleya	No suitable pebble plain or carbonate habitat, west of geog. range.
Eremothera boothii ssp.*boothii*	Booth's evening-primrose	No suitable sandy washes, above elev. range.
Eriastrum densifolium ssp. *sanctorum*	Santa Ana River woollystar	No suitable alluvial scrub, above elev. range.
Fimbistylis thermalis	Hot springs fimbristylis	No suitable spring habitat, above elev. range.
Imperata brevifolia	California satintail	Above elev. range.
Lycium parishii	Parish' desert-thorn	No suitable coastal or desert scrub, above elev. range.
Opuntia basilaris var. *brachyclada*	Short-joint beavertail	No suitable chaparral or desert woodland, outside of geog. range.
Pediomelum castoreum	Beaver Dam breadroot	No suitable desert scrub, above elev. range.
Ribes divaricatum var. *parishii*	Parish's gooseberry	No suitable riparian habitat, above elev. range, likely extinct.
Schoenus nigricans	Black bog-rush	No suitable hot springs or seeps, above elev. range.
Thelypteris puberula var. *sonorensis*	Sonoran maiden fern	Above elev. range.
INVERTEBRATES		
Helminthoglypta taylori	Westfork shoulderband	Outside of geog. and elev. range.
FISH		
Siphateles bicolor mohavensis	Mohave tui chub	Above elev. range, extirpated from the Mojave River and tributaries.
AMPHIBIANS		
Anaxyrus californicus	Arroyo toad	No suitable canyon habitat, above elev. range.
REPTILES		
Aspidoscelis hyperythra	Orangethroat whiptail	No suitable coastal scrub, above elev. range.
Emys marmorata	*Western pond turtle*	No suitable aquatic habitat.
BIRDS		
Polioptila californica californica	Coastal California gnatcatcher	No suitable coastal scrub, above elev. range.
Vireo bellii pusillus	Least Bell's vireo	Above elev. range
MAMMALS		
Chaetodipus fallax fallax	Northwestern San Diego pocket mouse	Above elev. range.
Dipodomys merriami parvus	San Bernardino kangaroo rat	No suitable coastal scrub, above elev. range.
Lasiurus xanthinus	Western yellow bat	Above elev. range.
Lepus californicus bennettii	San Diego black-tailed jackrabbit	No suitable coastal scrub, above elev. range.

Neotoma lepida intermedia	San Diego desert woodrat	No suitable coastal scrub, above elev. range.
Nyctinomops femorosaccus	Pocketed free-tailed bat	Above elev. range.
Perognathus longimembris brevinasus	Los Angeles pocket mouse	No suitable coastal scrub, above elev. range.

Appendix 4

Preliminary Jurisdictional Delineation Report

PRELIMINARY JURISDICTIONAL WATERS/WETLANDS DELINEATION REPORT FOR THE RIMFOREST STORM DRAIN PROJECT

Prepared for:

San Bernardino County
Department of Public Works
825 East Third Street
San Bernardino, CA 92415

Prepared by:

Aspen Environmental Group
5020 Chesebro Road, Suite 200
Agoura Hills, CA 91301

July 2015

Agreement No. 12-306

Preliminary Jurisdictional Waters/Wetlands Delineation Report

Rimforest Storm Drain Project
San Bernardino County, California

The undersigned certify that this report is a complete and accurate account of the findings and conclusions of a jurisdictional determination and delineation for the above-referenced project.

Jared Varonin
Senior Biologist/Ecologist
Certified Fisheries Professional
Aspen Environmental Group

July 2015

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1.0 Introduction and Location

This report presents the findings of an investigation of jurisdictional features conducted by Aspen Environmental Group (Aspen) for the Rimforest Storm Drain Project (Project). The Project is located north and south of State Route 18, within the community of Rimforest, in San Bernardino County, California (Figure 1). The Project area is bordered to the north, east and west by residential areas and forest lands. Land uses to the south include residential communities and commercial properties.

The assessment of jurisdictional wetlands, other "waters of the U.S.," waters of the State, and riparian habitat was conducted by Aspen Senior Biologist/Ecologist, Jared Varonin and Associate Biologist, Justin Wood, on 2 April 2015. This assessment was conducted to determine the extent of resources under the jurisdiction of the U.S. Army Corps of Engineers (USACE), the Santa Ana and Lahontan Regional Water Quality Control Boards (RWQCB), and the California Department of Fish and Wildlife (CDFW) that occur within the Project area.

1.1 Project Background and Description

Severe erosion and landsliding over the past 30 years has resulted in significant property loss, with the areas immediately south of Blackfoot Trail West and Apache Trail having been seriously impacted by more than 100 feet of bluff retreat. The rerouting of stormwater flows away from the southern area of Rimforest is necessary to minimize continued slope movement and reduce hazards to existing property in the area. The purpose and need for the proposed project is to divert stormwater flows away from Strawberry Creek and into Little Bear Creek in order to mediate ongoing erosion and landsliding hazards which pose significant risk to property and the public in southern Rimforest.

The Project would divert runoff from its current flow-path through the community of Rimforest and outlet at the landslide area in southern Rimforest, into a new flow-path comprised of channels and pipeline to the north of SR-18, with an outlet into Little Bear Creek on the Church of the Woods (COTW) property. In re-directing this runoff, the Project would result in runoff flowing into the Mojave River Watershed instead of the Santa Ana River Watershed. Based on available evidence it is believed this was the historic drainage direction, prior to construction of SR-18 and establishment of the community of Rimforest.

Downstream of the point where the Project would contribute flows to Little Bear Creek, the creek continues in a series of stormwater conveyance features through the unincorporated communities of Blue Jay and Lake Arrowhead, terminating at Lake Arrowhead Reservoir. Within the community of Blue Jay, an existing maintenance yard owned and operated by the County Department of Public Works (DPW) is located within the Little Bear Creek drainage; this maintenance yard is referred to as the Blue Jay Maintenance Yard. The maintenance yard is currently equipped with a three-foot-wide storm drain pipe to transmit flow in Little Bear Creek through the facility; however, this system is inadequate to contain the increased storm flow that would occur under the proposed project. The maintenance yard conveyance system may already be inadequate to contain existing storm flows, as asphalt within the yard appears to be damaged by water-related cracking, which occurs when water seeps to the asphalt base, causing the base to soften and form cracks which penetrate the surface, eventually leading to potholes. Therefore, in order to avoid further damage to the Blue Jay Maintenance Yard conveyance system, the Project would include a series of retarding basins on a property currently owned by the COTW, near the proposed Project's output point into Little Bear Creek. These retarding basins would slow the rate of stormwater flows in Little Bear Creek.

As mentioned, Little Bear Creek terminates at the Lake Arrowhead Reservoir. The current water supplier for Lake Arrowhead is the Lake Arrowhead Community Services District (LACSD), which presently purchases Feather River water from the San Bernardino Valley Municipal Water District, which is then transferred through Crestline Lake Arrowhead Water Agency (CLAWA). The Project would result in approximately 100 more acre-feet per year (afy) of water in Lake Arrowhead, potentially available for treatment and distribution by the LACSD. (Bonadiman, 2010).

1.2 Lead Agency Name and Address

San Bernardino County Department of Public Works
825 East Third Street
San Bernardino, CA 92415

1.3 Contact Person and Phone Number

Nancy Sansonetti, Senior Planner
San Bernardino County Department of Public Works
825 East Third Street
San Bernardino, CA 92415
Phone: (909) 387-8109
Email: Nancy.Sansonetti@dpw.sbcounty.gov

2.0 Existing Conditions

2.1 Topography and Surrounding Land Uses

The Project site is located in Township 2 North, Range 3 West, Section 30, of the Harrison Mountain 7.5" USGS topographic quadrangle, immediately north of the San Bernardino National Forest, in the unincorporated community of Rimforest. Access to the Project site is off State Route (SR)-18, Rim of the World Highway, which runs in a west-east alignment through the community of Rimforest. Pine Avenue runs parallel to the south of SR-18. Blackfoot Trail West runs in a north-south alignment through the western portion of Rimforest, between Pine Avenue and the landslide area in southern Rimforest. Apache Trail connects to Blackfoot Trail West approximately 250 feet south of Pine Avenue, and continues to the east then south, towards the landslide area in southern Rimforest.

The retarding basin(s) portion of the Project is located on private lands with other components located on San Bernardino County (County) road right of way and other unincorporated County land. Land use within the retarding basin(s) portion of the Project site is primarily open space while most of the storm drain alignment is within commercial and residential development. The staging area at the west end of the Project site is primarily open space.

Elevation of the Project site ranges from approximately 5,400 to 5,700 feet above sea level and the topography varies from relatively flat along the storm drain alignment to a steeper north-sloping canyon at the north end of the retarding basin(s). There is a spring near the southern end of the retarding basin(s) where perennial water begins flowing north through the Project site. The water eventually leaves the site and continues north in Little Bear Creek, adjacent to Daley Canyon, through the community of Blue Jay and eventually into Lake Arrowhead. Storm flows originate on SR-18 and flow into the Project site, through an incised sandy wash, past the spring, and then follow the route of the perennial flows.

2.2 Vegetation

Habitat in the Project area includes dense riparian vegetation, sandy meadow, and developed areas. The storm drain alignment component of the Project crosses residential and commercial development where little vegetation is present. Vegetation at retarding basin(s) location (s) is dominated by mixed hardwood and coniferous forests. The forest has a relatively open understory with a diverse assemblage of annuals, perennials, and shrubs; there is a dense riparian corridor dominated by dogwood trees. A small dry sandy meadow occurs just upstream of the riparian corridor and supports scattered stands of willows; this area is mapped as arroyo willow thickets. Vegetation and other cover types on the Project site are shown on Figure 2 and are described below.

White Fir–Sugar Pine Forest (*Abies concolor* – *Pinus lambertiana* Forest Alliance). The most common mapped vegetation community, white fir – sugar pine forest, is located throughout the Project site. The dominant species observed were white fir (*Abies concolor*), incense cedar (*Calocedrus decurrens*), and sugar pine (*Pinus lambertiana*). Jeffrey pine (*Pinus jeffreyi*), Coulter pine (*Pinus coulteri*), and black oak (*Quercus kelloggii*) were also present. Understory species included bracken fern (*Pteridium aquilinum* var. *pubescens*), wax currant (*Ribes cereum*), and numerous annuals and perennials. Some portions of the site better match descriptions of Jeffrey pine forest (*Pinus jeffreyi* Forest Alliance) in Sawyer et al. (2009) but were too small and interspaced within the white fir- sugar pine forest to delineate. This vegetation best matches the descriptions of upper montane mixed coniferous forest and Jeffrey pine forest in Holland (1986).

Red Osier Thickets (*Cornus sericea Shrubland* Alliance). This vegetation is found in the wettest portions of the Project site in the north-sloping canyon bottom. It is dominated by American dogwood (*Cornus sericea*); this species is also known as red osier. The American dogwoods were often greater than twenty feet in height and formed a dense continuous canopy for several hundred feet down the canyon and continuing out of the Project site to the north. Other species observed included mountain dogwood (*Cornus nuttallii*), thimbleberry (*Rubus parviflorus*) and mountain pink currant (*Ribes nevedense*). This vegetation matches the description of montane riparian forest and southern mixed riparian forest in Holland (1986), which are classified as sensitive natural communities (CDFW, 2015).

Arroyo Willow Thickets (*Salix lasiolepis* Shrubland Alliance). This vegetation is found primarily in the dry sandy meadow that lies just north of SR-18. Arroyo willow (*Salix lasiolepis*) is the dominant species, although it was observed to provide relatively sparse canopy cover. Species such as Mexican elderberry (*Sambucus nigra* ssp. *cerulea*), Douglas mugwort (*Artemisia douglasiana*), mountain pink currant, numerous sedges (*Carex* spp.), and grasses (*Elymus* spp. and *Bromus* spp.) were also present. This vegetation matches the description of both southern willow scrub southern arroyo willow riparian forest in Holland (1986).

California Black Oak Forest (*Quercus kelloggii* Forest Alliance). This vegetation community is found at the western extent of the Project site and at a few locations north of and within approximately 1,000 feet of SR-18 in the eastern portions of the Project site. This community was dominated by black oak (*Quercus kelloggii*) with other trees such as California bay (*Umbellularia californica*) and incense cedar also observed. The understory is dominated by bracken fern and numerous other perennial and annuals. This vegetation best matches the description of black oak forest in Holland (1986). Trees within and adjacent to this vegetation were thinned to reduce fuel load in 2004 (County of San Bernardino Land Use Services Department, 2010).

Developed. This unvegetated land cover type was used to identify areas that are developed and/or disturbed and generally lack natural vegetation. Within the Project site, these areas included residential

and commercial buildings, paved roads, and asphalt parking areas. In general only scattered large trees and ornamental species were observed within and around the developed areas.

2.3 Climate

The climate of the San Bernardino Mountains is characterized by warm, dry summers and cold, wet winters. Spring and fall are typically cool and wet; fog is common. Average temperatures in the area range from mid-30s in the winter to high 60s in the summer. Precipitation occurs mainly from late fall through early spring; snow is common at the higher elevations. Average annual precipitation is about 40 inches (WRCC, 2015).

2.4 Hydrology and Geomorphology

Surface watersheds in California are divided into ten hydrologic regions, as defined by the California Department of Water Resources. The proposed Project is located on the southwestern boundary of the South Lahontan Hydrologic Region (HR), a large drainage area bounded by the crests of the Sierra Nevada Mountains and the Transverse Ranges that includes the Antelope Valley and the Mojave Desert (CDF, 2004). The southwestern boundary of the South Lahontan HR is shared with the South Coast HR, which contains coastal watersheds in southern California that drain to the Pacific Ocean. Hydrologic Regions are subdivided into Hydrologic Units (HUs), and further into Hydrologic Areas (HAs) and Hydrologic Subareas (HSAs). Within the South Lahontan HR, the proposed Project is located within the Mojave HU and the Upper Mojave HA (CDF, 2004). No HSA is defined for this area. Surface water in the Upper Mojave HA eventually drains to the Mojave River. The runoff that would be diverted by the proposed Project currently flows into Strawberry Creek, which is located within the South Coast HR, the Santa Ana River HU, the Upper Santa Ana River HA, and the Bunker Hill HSA (CDF, 2004). Surface water in the Bunker Hill HSA drains to the Santa Ana River and eventually to the Pacific Ocean.

The Project is located at the interface between undeveloped land with natural drainage features and urban development with altered drainage systems, such as underground stormwater systems. There are no named drainages within the Project area, and runoff on undeveloped land typically occurs as sheet flow or ephemeral streams. Runoff on developed land either occurs as sheet flow or is intercepted by storm water drainage systems that discharge to the headwaters of Strawberry Creek. The headwaters of Strawberry Creek occupy the southern boundary of the Project area. Several named waterbodies are located outside of but near to the Project area. In addition to Strawberry Creek, the southern slopes of the San Bernardino Mountains are drained by East Twin Creek to the west of the Project area and West Fork City Creek to the east of the Project area (USGS, 2015). The northern slopes of the mountains are drained by Houston Creek and Dart Creek to the west of the Project area and Grass Valley Creek, Little Bear Creek, Burnt Mill Creek, Fleming Creek, and Orchard Creek to the east of the Project area (USGS, 2015). The headwaters of Little Bear Creek occupy the northeastern portion of the Project area. Lake Arrowhead is located approximately 1.5 miles to the northeast, and Lake Gregory is located approximately 2.25 miles to the northwest (USGS, 2015). The very small Grass Valley Lake is located approximately 2 miles due north of the proposed Project (USGS, 2015).

Runoff that would be diverted by the Project currently flows into Strawberry Creek, which is located within the South Coast HR (CDF, 2004). Based on a review of historic topographic maps, alluvial patterns, and aerial photos, it is likely that runoff in the Project area flowed towards Little Bear Creek prior to substantial human alterations of the local topography and hydrology (Bonadiman, 2010; Hilltop, 2010). These alterations, including grading and drainage improvements for Highway 18 and the community of Rimforest, likely resulted in changes to the natural runoff pattern such that storm water in the Project area now flows towards Strawberry Creek to the south rather than towards Little Bear Creek to the

northeast (Bonadiman, 2010; Hilltop, 2010). However, the historic topographic maps do not contain sufficient detail to assess historic runoff patterns with certainty. It is probable but not certain that the actions of the Project would divert runoff in the Project area towards its historic, natural outlet.

2.5 Geology

The Project is located within the western San Bernardino Mountains of the Transverse Ranges geomorphic province of southern California. Geologic structures within the Transverse Ranges have been formed by folding and displacement on normal, thrust, and reverse faults accommodating the regional compressional strain from the convergence of the North American and Pacific plates along a northwest-trending segment of San Andreas Fault. This has resulted in uplift, mountain formation, basin formation, and seismicity throughout the region. The Transverse Ranges geomorphic province is characterized by a complex series of mountain ranges and valleys with dominant east-west trends. The community of Rimforest lies at the transition between the relatively gentle to moderate slopes of the highland plateau of the San Bernardino Mountains and the steep southwestern slopes of mountain range (Hilltop, 2010).

The Project area is underlain primarily by Cretaceous granitic bedrock, the Monzogranite of City Creek, which consists of biotite monzogranite, muscovite monzogranite, pegmatite, and alaskite and commonly includes masses of older monzogranite, granodiorite, diorite, and gabbro (Morton & Miller, 2006). These units are typically deeply weathered and locally highly fractured and jointed. The granitic bedrock south of Rimforest, on the southern slope, has been mapped with numerous shear zones of crushed and broken rock, local bedrock faults, and landslides.

Colluvium is present blanketing the nearby hill slopes and generally ranges in thickness from a few inches to several feet, with local occurrences of up to 13 feet thick. The colluvium generally consists of unconsolidated silty, fine to coarse grained sand (Hilltop, 2010). Alluvial and stream deposits are present in the nearby valleys and drainages and sporadically along former drainages. The former drainage for Little Bear Creek that passes through Rimforest south of Highway 18 has local pockets of alluvium that are up to 40 feet thick (Hilltop, 2010). The alluvium/stream deposits generally consist of unconsolidated coarse-grained sand and gravel with minor fine grained sand and local cobbles and boulders (Hilltop, 2010).

2.6 Soils

Historic soil data from the Natural Resources Conservation Service (NRCS) was used to determine potential soil types, including where hydric soils have historically occurred, in the Project area (2015a). Figure 3 (Attachment 1) provides a graphical depiction of the location of historic soil types identified in the Project area.

Table 2-1 Soil Units Occurring in the Project Area

Map Unit Symbol	Map Unit Name	Description	Acres	% Total
DaG	Wapi-Pacifico families-Rock outcrop complex, 50 to 75 percent slopes	A somewhat excessively drained soil that typically occurs in the mountains from 4,000 – 7,800 feet; parent material consists of residuum weathered from granodiorite; depth to water table > 80'; not prone to flooding; loamy sand (0-7"), gravelly loamy sand (7-10"), weathered bedrock (10-15"), unweathered bedrock (15-19").	0.05	0.50

Map Unit Symbol	Map Unit Name	Description	Acres	% Total
MbE	Morical-Wind River families complex, 15 to 30 percent slopes	A well-drained soil that typically occurs in the mountains from 4,500 – 6,000 feet in elevation; parent material consists of residuum weathered from granodiorite, depth to water table > 80'; not prone to flooding; loamy (0 – 50"), weathered bedrock (50 – 54 ").	9.98	99.5
		Total	10.03	

3.0 Regulatory Background

Jurisdictional waters, wetlands, and riparian habitat are regulated by the USACE, RWQCB, and CDFW. The USACE Regulatory Program regulates activities pursuant to Section 404 of the federal Clean Water Act (CWA); the CDFW regulates activities under California Fish and Game Code Sections 1600-1607; and the RWQCB regulates activities under Section 401 of the CWA and the California Porter-Cologne Water Quality Control Act. Refer to Attachment 6 for additional details on regulatory authorities and background.

4.0 Waters/Wetlands Delineation

4.1 Delineation Methodology

This section describes the methods employed by Aspen during surveys conducted in April 2015 to determine the extent of potentially jurisdictional wetlands and/or waters that occur in the Project area. Prior to conducting the field assessment Aspen reviewed current and historic aerial photographs; detailed topographic maps (1-foot intervals); the San Bernardino National Forest Area, California, soil survey; and the local and state hydric soil list to evaluate the potential active channels and wetland features that occur in the Project area (NRCS, 2015a; 2015b). During the field assessment, vegetation, hydrology, and locations of soil pits were mapped using a Trimble Juno 3B GPS unit and identified on aerial photographs. Field maps were digitized using Geographic Information Systems (GIS) and total jurisdictional area for each jurisdiction was calculated. Based on an earlier reconnaissance site visit it was determined that the locations of sampling transects could not be determined prior to the delineation due to the dense vegetation present within the potentially jurisdictional areas. Based on the USACE Wetland Delineation Manual (1987) three transects would be required for the baseline length present in the Project area. The three sampling transects, while randomly chosen, were also dependent on safe access to the channel bottom in the Project area.

Federal Wetlands/Waters

Jurisdictional non-wetland "waters of the U.S." were delineated based on the limits of the ordinary high water mark (OHWM) as determined by changes in physical and biological features, such as bank erosion, deposited vegetation or debris, and vegetative characteristics. Jurisdictional wetlands were delineated using a routine determination according to the methods outlined in the USACE Wetland Delineation Manual (1987) and the Arid West Supplement (2008) based on three wetland parameters: dominant hydrophytic vegetation, wetland hydrology, and hydric soils. See Tables 1 – 2 in Attachment 5 (Potential Geomorphic and Vegetative Indicators of Ordinary High Water Marks for the Arid West) for a list of key physical features for determining the OHWM identified by the arid west manual. Aspen reviewed the San Bernardino Forest Area, California, Soil Survey (NRCS, 2015a) to identify historic soil types for the Project area. Data on vegetation, hydrology, and soils were collected using the methods described in Sections 4.1.1 through 4.1.3 and recorded on Wetland Determination Data Forms (Attachment 4).

CDFW Jurisdictional Waters

CDFW jurisdiction was delineated to the top of the banks of the channel and/or to the edge of the riparian canopy/riparian habitat. For portions of the Project site, the CDFW jurisdictional boundary mirrors the OHWM. In some areas, the riparian canopy/riparian habitat extends beyond the OHWM. Therefore, the total acreage of CDFW jurisdictional waters is greater than the combined acreage of federal jurisdictional waters/wetlands.

4.1.1 Wetland Vegetation

Percent cover of vegetation was visually estimated. Plant species in each stratum (tree, sapling/shrub, herb, and woody vine) were ranked according to their canopy dominance (USACE, 2008). Species that contributed to a cumulative coverage total of at least 50 percent and any species that comprised at least 20 percent of the total coverage for each stratum were recorded on the Field Data Sheets (50/20 Rule). Wetland indicator status was assigned to each dominant species using the Region 0 List of Plant Species that Occur in Wetlands (Reed, 1988), the California subregion of the National List of Vascular Plant Species that Occur in Wetlands: 1996 National Summary (USFWS, 1997), Wetland Plants of Specialized Habitats in the Arid West (USACE, 2007), and the Arid West Region of The National Wetland Plant List (USACE, 2012). If greater than 50 percent of the dominant species from all strata were Obligate, Facultative-wetland, or Facultative species, the criteria for wetland vegetation was considered to be met (refer to Table 3, Attachment 5).

4.1.2 Wetland Hydrology

The presence of wetland hydrology was evaluated by recording the extent of observed primary and secondary indicators, as listed in Tables 4 and 5 of Attachment 5 (USACE, 2008). Perennial surface water is present within a portion of the Project area; a natural seep occurs approximately 550 feet north of SR-18 just inside the temporary impact area for the retarding basin(s) portion of the Project. Evidence that portions of the Project area are routinely inundated during high flow events and/or ponded as a result of rainfall that saturated the soil (both Group A [Observation of Surface Water or Saturated Soils] indicators, see Table 5 in Attachment 5) was observed. The Arid West Supplement includes two additional indicator groups that can be utilized during dry conditions or in areas where surface water/saturated soils are not present; these are Group B (evidence of recent inundation) and Group C (evidence of recent soil saturation) (USACE, 2008). The indicators are divided into two categories (primary and secondary indicators) and presence of one primary indicator from any of the groups is considered evidence of wetland hydrology. If only secondary indicators are present, two or more must be observed to conclude presence of wetland hydrology. Indicators are intended to be one-time observations of site conditions representing evidence of wetland hydrology when hydrophytic vegetation and hydric soils are present (USACE, 2008).

4.1.3 Wetland Soils

Soil pits were first dug at a point adjacent to surface flow/centerline within the channel then extended away from the surface flow/centerline towards the banks of the channel. Soil pits were dug to a depth of 20 inches where possible (USACE, 2008). At each soil pit, the soil texture and color were recorded by comparison with standard plates within a Munsell soil color chart (2000). Any other indicators of hydric soils, such as redoximorphic features, buried organic matter, organic streaking, reduced soil conditions, gleyed or low-chroma soils were also recorded (refer to Tables 6 – 7, Attachment 5).

4.2 Results

Three types of jurisdictional features were documented within the Project area: USACE non-wetland waters, USACE jurisdictional wetlands, and CDFW State Waters (refer to Figure 4, Attachment 1). Table 4-1 and Figure 4 (Attachment 1) show locations and acreages of jurisdictional features in the Project area. Attachment 4 contains the Wetland Determination Data Forms completed during the assessment. According to the NRCS Hydric Soils List (NRCS 2015a and 2015b), there are no mapped hydric soils in the Project area.

Table 4-1 – Acreage of Jurisdictional Waters, Wetlands, and CDFW Jurisdictional Habitat in the Project Area

Jurisdiction	Impact Type		Totals
	Permanent	Temporary	
USACE/RWQCB Non-wetland Waters of the U.S.	0.05	0.12	**0.17**
USACE/RWQCB Wetlands	0.32	0.04	**0.36**
CDFW Waters	1.07	0.45	**1.52**

(a) Non-wetland Waters of the United States and Non-wetland Waters of the State overlap; as such, jurisdictional acreages are not additive.
(b) Wetlands fall under the jurisdiction of the USACE, LARWQCB, and CDFW, each with separate extents that overlap; as such, wetland acreages are not additive.

Federal Wetlands

Based on Aspen's professional opinion following an assessment of hydrology, vegetation, and soils, approximately 0.36 acres of the Project Area satisfy the criteria to be considered wetlands (USACE, 1987 and USACE, 2008). See Figure 4 (Attachment 1) for a graphical representation of this area. The majority of the vegetation observed within the established plots at each soil pit, within areas determined to be jurisdictional wetlands, included species that were FACW. A complete list of species observed within the Project area and established plots is presented below in Table 4-2. A natural seep was observed in the Project area and occurs just upstream of soil pits P-3 and P-4 (refer to Figure 4). This seep provides a perennial water source downstream of its location. In addition to surface water sediment deposits, drift deposits, and wetland drainage patterns were visible downstream of the seep location.

Table 4-2 – Wetland Indicator Status of Species Observed in the Project Area

Scientific Name	Common Name	Wetland Indicator Status (Region 0/CA Sub-region/Arid West)
VASCULAR PLANTS		
FILICALES	FERN FAMILY	
Pteridium aquilinum var. pubescens	Bracken fern	FACU
CUPRESSACEAE	CYPRESS FAMILY	
Calocedrus decurrens	Incense cedar	--

Scientific Name	Common Name	Wetland Indicator Status (Region 0/CA Sub-region/Arid West)
PINACEAE	PINE FAMILY	
Abies concolor	White fir	--
Pinus coulteri	Coulter pine	UPL
Pinus jeffreyi	Jeffrey pine	--
Pinus lambertiana	Sugar pine	--
Pinus ponderosa	Ponderosa pine	FACU
ADOXACEAE	MUSKROOT FAMILY	
Sambucus nigra ssp. *cerulea*	Mexican elderberry	FAC
APIACEAE	CELERY FAMILY	
Osmorhiza berteroi	Sweet-cicely	FACU
Sanicula graveolens	Sierra sanicle,	--
APOCYNACEAE	DOGBANE FAMILY	
Asclepias sp. [eriocarpa?]	Unid. broad-lv. per. Milkweed,	--
∞ *Vinca major*	Greater periwinkle	--
ASTERACEAE	ASTER FAMILY	
Achillea millefolium	California yarrow	FACU
Ambrosia acanthicarpa	Annual bur-sage	--
Ambrosia artemisifolia	Low ragweed	FACU
Artemisia douglasiana	Douglas mugwort	FACW
Artemisia dracunculus	Tarragon	UPL
Cirsium occidentale var. *californicum*	California thistle	UPL
Erigeron divergens	Spreading fleabane, diffuse daisy	--
Erigeron foliosus var. *foliosus*	Leafy daisy	--
** *Eriophyllum lanatum* var. *obovatum*	Southern Sierra woolly sunflower	--
Hieracium albiflorum	White hawkweed	--
∞ *Hypochaeris* sp.	Unid. cat's-ear	FACU
∞ *Lactuca serriola*	Prickly lettuce	FACU
Madia elegans	Common madia	--
Malacothrix saxatilis	Quillwort	--
Pseudognaphalium beneolens (Gnaphalium canescens ssp. beneolens)	Cudweed	FACU*
Solidago velutina ssp. californica	California goldenrod	--
∞ *Tanacetum parthenium*	Feverfew	--
∞ *Taraxacum officinale*	Common dandelion	FACU
BORAGINACEAE	BORAGE FAMILY	
Cryptantha affinis	Side-grooved cryptantha	--
Cryptantha simulans	Pine cryptantha	--

Scientific Name	Common Name	Wetland Indicator Status (Region 0/CA Sub-region/Arid West)
Nemophila menziesii	Baby blue-eyes	--
Phacelia davidsonii	Davidson phacelia	--
Phacelia imbricata	Broad-sepaled phacelia	--
BRASSICACEAE	MUSTARD FAMILY	
Barbarea orthoceras	Winter cress	FACW
Caulanthus amplexicaulis	Clasping leaved caulanthus	--
Erysimum capitatum	Western wallflower	--
∞ *Hirschfeldia incana (Brassica geniculata)*	Shortpod mustard	UPL
Lepidium virginicum ssp. menziesii (L. v. *pubescens)*	Wild peppergrass	FACU
∞ *Lunaria annua*	Money plant	--
∞ *Sisymbrium altissimum*	Tumble mustard	FACU
** *Streptanthus bernardinus*	Laguna Mountains jewelflower	--
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY	
Symphoricarpos rotundifolius var. *parishii*	Parish snowberry	--
CARYOPHYLLACEAE	PINK FAMILY	
Cerastium fontanum ssp. *vulgare (C. vulgatum)*	Common mouse-ear chickweed	--
Cerastium glomeratum	Sticky mouse-ear chickweed	UPL
Silene lemmonii	Lemmon campion	--
Stellaria media	Common chickweed	FACU
CHENOPODIACEAE	GOOSEFOOT FAMILY	
∞ *Chenopodium album*	Common goosefoot	FACU
CONVOLVULACEAE	MORNING-GLORY FAMILY	
Calystegia occidentalis subsp. *fulcrata (C. fulcrata)*	Morning-glory	--
Convolvulus sp.	Unid. bindweed	FACU
CORNACEAE	DOGWOOD FAMILY	
Cornus nuttallii	Mountain dogwood	FACU
Cornus sericea (C. occidentalis)	American dogwood	FACW
ERICACEAE	HEATH FAMILY	
Arctostaphylos sp.	Unid. manzanita	UPL
Pterospora andromedea	Pine drops	--
Pyrola picta	White veined shinleaf	--
Sarcodes sanguinea	Snow plant	--
FABACEAE	PEA FAMILY	

Scientific Name	Common Name	Wetland Indicator Status (Region 0/CA Sub-region/Arid West)
Acmispon americanus (Lotus purshianus, L. unifoliatus)	"Spanish" clover	UPL
Hosackia crassifolia var. crassifolia (Lotus crassifolius)	Buck lotus	--
Lathyrus latifolius	Ornamental perennial sweet pea	--
Lupinus latifolius	Stream lupine	FACW
Lupinus luteolus (?)	Butter lupine	--
Lupinus microcarpus	Chick lupine	--
Vicia americana	American vetch	FAC
FAGACEAE	OAK FAMILY	
Quercus chrysolepis	Canyon live oak	UPL
Quercus kelloggii	California black oak	--
GROSSULARIACEAE	GOOSEBERRY FAMILY	
Ribes cereum	Wax currant	--
Ribes nevadense	Mountain pink currant	FAC
LAURACEAE	LAUREL FAMILY	
Umbellularia californica	California bay laurel	FAC
MONTIACEAE	MONTIA FAMILY	
Claytonia exigua	Spring beauty	--
Claytonia parviflora	Miner's lettuce	FACU
Claytonia perfoliata	Miner's lettuce	FAC
ONAGRACEAE	EVENING PRIMROSE FAMILY	
Circaea alpina ssp. pacifica	Enchanter's nightshade	FAC
Clarkia rhomboidea	Tongue clarkia	--
Epilobium brachycarpum (E. paniculatum)	Summer cottonweed	--
Epilobium canum (Zauschnaria californica)	California fuchsia	--
OROBANCHACEAE	BROOMRAPE FAMILY	
Castilleja applegatei subsp. martinii	Indian paintbrush	--
PHRYMACEAE	LOPSEED FAMILY	
Mimulus aurantiacus	Bush monkeyflower	UPL
PLANTAGINACEAE	PLANTAIN FAMILY	
Collinsia childii	Child's blue-eyed Mary	--
Penstemon centranthifolius	Scarlet bugler	--
Penstemon rostriflorus	Bridges penstemon	--
Penstemon spectabilis	Royal penstemon	--
POLEMONIACEAE	PHLOX FAMILY	

Scientific Name	Common Name	Wetland Indicator Status (Region 0/CA Sub-region/Arid West)
Allophyllum integrifolium	White false gilia	--
Collomia grandiflora	Large-flowered collomia	--
Gilia capitata	Bluehead gilia, ball gilia	--
Microsteris gracilis (Phlox gracilis)	Slender phlox	FACU
Polemonium occidentale (?)	Great polemonium	--
Saltugilia splendens (Gilia splendens)	Splendid woodland-gilia	--
POLYGONACEAE	BUCKWHEAT FAMILY	
Eriogonum fasciculatum	California buckwheat	UPL
Eriogonum saxatile	Hoary wild buckwheat, rock buckwheat	--
∞ *Fallopia convolvulus (Polygonum convolvulus)*	Black bindweed	FACU
∞ *Polygonum aviculare ssp. depressum (P. arenastrum)*	Common knotweed	FACW
Rumex californicus	California dock	FACW
RHAMNACEAE	BUCKTHORN FAMILY	
Ceanothus cordulatus	Mountain whitethorn	--
Ceanothus integerrimus	Deer brush	--
Frangula californica (Rhamnus californica)	California coffee berry	--
ROSACEAE	ROSE FAMILY	
Drymocallis glandulosa var. glandulosa (Potentilla glandulosa)	Cinquefoil	FAC
Fragaria vesca	Wood strawberry, wild strawberry	UPL
Horkelia rydbergii (H. bolanderi ssp. parryi)	Rydberg's horkelia	FAC
Rubus parviflorus	Thimbleberry	FAC
Rubus ursinus	California blackberry	FAC
RUBIACEAE	COFFEE FAMILY	
Galium angustifolium ssp. angustifolium	Narrowly leaved bedstraw	--
∞ *Galium aparine*	Goose grass, stickywilly	FACU
SALICACEAE	WILLOW FAMILY	
Salix lasiolepis	Arroyo willow	FACW
SAXIFRAGACEAE	SAXIFRAGE FAMILY	
Lithophragma affine (?)	Common woodland star	--
SCROPHULARIACEAE	SNAPDRAGON FAMILY	
∞ *Verbascum thapsus*	Woody muellin, common muellin	FACU

Scientific Name	Common Name	Wetland Indicator Status (Region 0/CA Sub-region/Arid West)
SOLANACEAE	NIGHTSHADE FAMILY	
Solanum xanti	Chaparral nightshade	--
URTICACEAE	NETTLE FAMILY	
Urtica dioica ssp. *holosericea*	Stinging nettle	FAC
VISCACEAE	MISTLETOE FAMILY	
Phoradendron leucarpum ssp. macrophyllum (P. macrophyllum)	American mistletoe (on Quercus)	--
CYPERACEAE	SEDGE FAMILY	
Carex fracta	Fragile-sheathed sedge	FAC
Carex praegracilis	Clustered field-sedge	FACW
Carex sp.	Unid. sedge	--
Carex subfusca	Rusty sedge	FAC
IRIDACEAE	IRIS FAMILY	
Iris hartwegii ssp. australis	Hartweg's iris	FACU
ORCHIDACEAE	ORCHID FAMILY	
Piperia unalascensis	Alaska piperia	FACU
POACEAE	GRASS FAMILY	
Bromus carinatus	California brome	UPL
∞ *Bromus ciliatus*	Fringed brome	FAC
∞ *Bromus diandrus (B. rigidus)*	Ripgut brome	UPL
Bromus grandis	Tall brome	--
Bromus hallii (Bromus orcuttianus var. hallii)	Hall's brome	--
∞ *Bromus tectorum*	Cheat grass	UPL
∞ *Cynosurus echinatus*	Dogtail grass	--
Elymus glaucus	Blue wild-rye	FACU
Elymus hispidus (Agropyron intermedium, Elytrigia intermedia)	Intermediate wheat grass	--
Elymus sp.	Unid. wild-rye	--
Festuca microstachys (Vulpia microstachys)	Annual fescue	--
∞ *Festuca myuros (F. megalura, Vulpia myuros)*	Rattail sixweeks grass	--
∞ *Festuca perennis (Lolium perenne)*	Awned Italian ryegrass	--
∞ *Hordeum murinum*	Wall barley	FACU
∞ *Phalaris minor*	Little-seeded canary grass	FACU
Poa secunda	Nevada blue grass, nodding blue grass	FACU

Scientific Name	Common Name	Wetland Indicator Status (Region 0/CA Sub-region/Arid West)
THEMIDACEAE	BRODIAEA FAMILY	
Bloomeria crocea	Common goldenstar	--
Dichelostemma capitatum (D. pulchella)	Blue dicks, wild hyacinth	FACU
Non-native species indicated by "∞", special status species indicated by two asterisks, a single asterisk following a regional indicator identifies uncertain designations based on limited information from which to determine the indicator status. This list includes only species observed on the site. Plants were identified using keys, descriptions, and illustrations in Baldwin et al. (2012). Taxonomy and nomenclature generally follow Jepson eflora (Jepson, 2015).		

Federal Non-Wetland Waters

Approximately 0.17 acres of the Project area meet the definition of "waters of the United States" as outlined in 33 CFR Part 328 (Figure 4, Attachment 1). This assessment is based on Aspen's professional opinion following an assessment of hydrology and the limits of the OHWM as determined by changes in physical and biological features, such as bank erosion, deposited vegetation or debris, and vegetation and soils characteristics noted during the field surveys. Some of the key hydrology indicators, (See Tables 1 – 2 in Attachment 5 for additional information) that were noted during the delineation included:

- A11 – Scour holes downstream of obstructions
- B3 – Benches: low, mid, most prominent
- B12 – Litter (organic debris, small twigs, and leaves)
- B13 – Drift (organic debris, larger than twigs)
- D1 – Herbaceous marsh species
- D5 – Perennial herbs, hydromesic clonals
- F15/18 – Upland Species

CDFW Waters

Based on Aspen's professional opinion following an assessment of hydrology, presence of bed and bank, and extent of riparian vegetation, approximately 1.52 acres of the Project area meet the definition of CDFW jurisdictional waters as outlined in Sections 1600-1616 of the CDFW Code (Figure 4, Attachment 1).

5.0 Summary and Conclusions

The Project area supports CDFW jurisdictional waters, USACE/RWQCB jurisdictional wetlands, and USACE/RWQCB non-wetland waters. The portion of the unnamed drainage occurring north and adjacent to SR-18 remained dry and mostly devoid of vegetation until approximately 250 feet south of where the mapped wetlands begin. The majority of the mapped wetlands in the Project area were densely vegetated with stands of American dogwood and supported surface flow. Portions of the Project area that support hydrophytic vegetation, show evidence of wetland hydrology, and contain hydric soils were identified as jurisdictional wetlands (0.36 acres). Areas not meeting the hydrophytic vegetation and/or hydric soils criteria for wetlands but where evidence of hydrology and/or a discernible OHWM was visible were mapped as jurisdictional non-wetland "waters of the United States" (0.17 acres). Using a combination of

vegetation mapping and bed/bank delineation and field observations, 1.52 acres of CDFW jurisdictional waters were identified within the Project area.

The conclusions presented above represent Aspen's professional opinion based on their knowledge and experience with the USACE, RWQCB and CDFW, including their regulatory guidance documents and manuals. However, the USACE, RWQCB, and CDFW have final authority in determining the status and presence of jurisdictional wetlands/waters and the extent of their boundaries.

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Attachment 1 - Figures

Temporary Disturbance Area
Permanent Impact Area

0 250 500 Feet

Figure 1.

Proposed Project Site Plan

0 250 500 Feet

Cover Type

- Arroyo willow thickets
- California black oak forest
- Developed
- Red osier thickets
- White fir-sugar pine forest
- Permanent Impact Area
- Temporary Disturbance Area

Figure 2.

Vegetation

0 250 500 Feet

Permanent Impact Area

Temporary Disturbance Area

MUSYM *

DaG

MbE

* Please refer to section 2.6 for complete soil descriptions.

Figure 3.

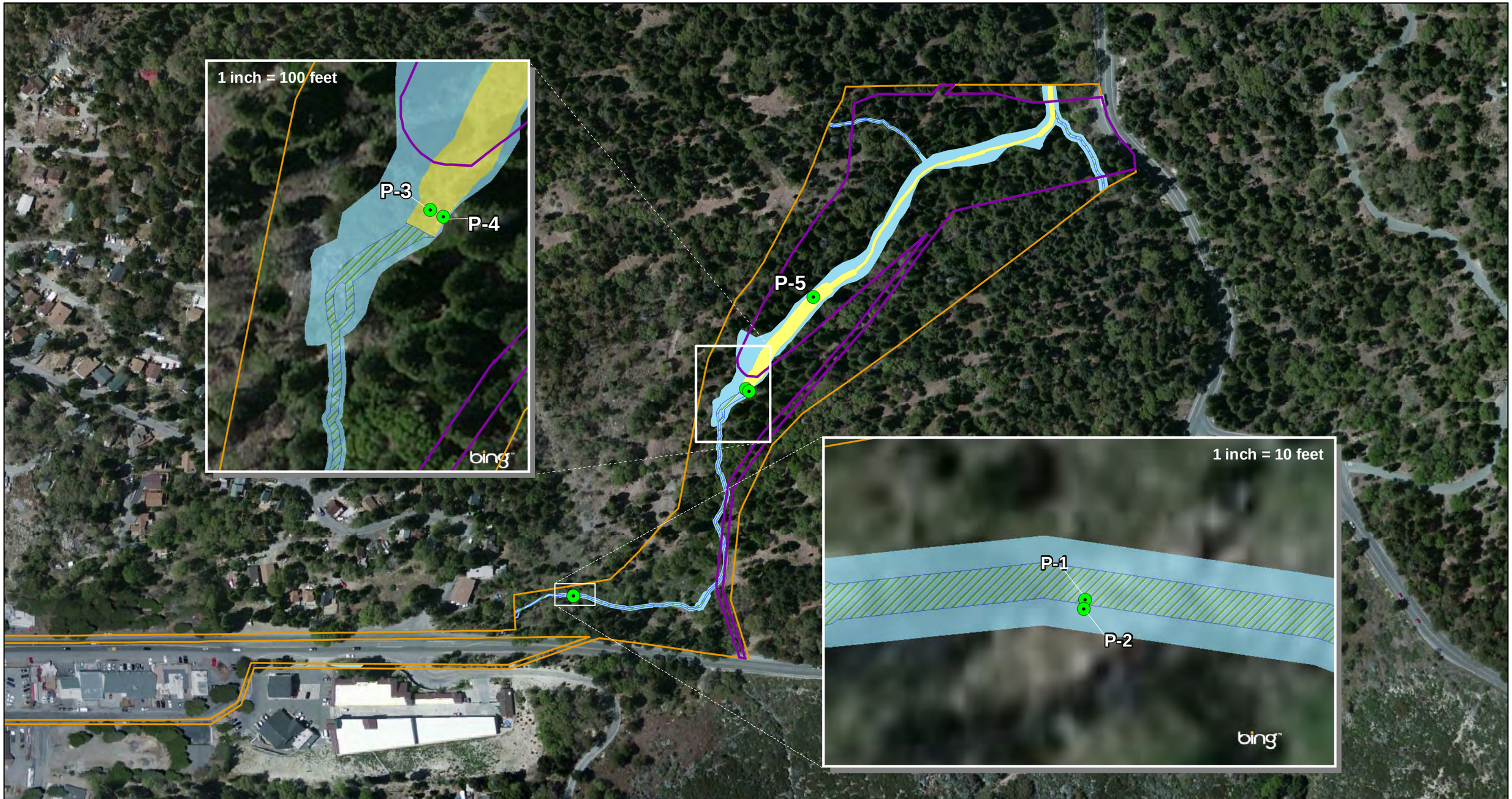
Soils

0 250 500 Feet

Federal Waters
Federal Wetlands
State Waters
Permanent Impact Area
Temporary Disturbance Area

Figure 4a.

Potentially Jurisdictional Waters and Wetlands



Soil pits

Federal Waters

Federal Wetlands

State Waters

Permanent Impact Area

Temporary Disturbance Area

0 250 500 Feet

Figure 4b.

Potentially Jurisdictional Waters and Wetlands

Attachment 2 – Representative Site Photos

Photo 1 – View looking north at a jurisdictional drainage in the western extent of the Project area adjacent to the fire station.

Photo 2 - View looking upstream, near soil pit No. P-1 and P-2, just north of State Route 18.

Photo 3 - View looking at soil pit No. P-3.

Photo 4 - View of soil pit No. P-5 (filled with water after digging only approximately five inches).

Photo 5 – View looking downstream from soil pit No. P-5.

Photo 6 - View looking upstream in the northeastern extent of the Project area.

Attachment 3 – Excerpts from Local Soil Survey Lists

Parent material: Alluvium

Properties and qualities

Slope: 2 to 10 percent
Frequency of flooding: Frequent

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w

DaG—Wapi-Pacifico families-Rock outcrop complex, 50 to 75 percent slopes

Map Unit Setting

National map unit symbol: htrp
Elevation: 4,000 to 7,800 feet
Mean annual precipitation: 20 to 35 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 120 to 175 days
Farmland classification: Not prime farmland

Map Unit Composition

Wapi family and similar soils: 35 percent
Pacifico family and similar soils: 30 percent
Rock outcrop: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wapi Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 7 inches: loamy sand
H2 - 7 to 10 inches: gravelly loamy sand
H3 - 10 to 15 inches: weathered bedrock
H4 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 10 to 15 inches to paralithic bedrock; 15 to 19 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 0.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Pacifico Family

Setting
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile
H1 - 0 to 3 inches: loamy coarse sand
H2 - 3 to 15 inches: loamy coarse sand
H3 - 15 to 19 inches: weathered bedrock

Properties and qualities
Slope: 50 to 75 percent
Depth to restrictive feature: 15 to 19 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting
Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile
H1 - 0 to 4 inches: unweathered bedrock

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e

Depth to restrictive feature: 18 to 22 inches to lithic bedrock
Natural drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

MbE—Morical-Wind River families complex, 15 to 30 percent slopes

Map Unit Setting
National map unit symbol: htsv
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 120 to 175 days
Farmland classification: Not prime farmland

Map Unit Composition
Morical family and similar soils: 50 percent
Wind river family and similar soils: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Morical Family

Setting
Landform: Mountains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granodiorite

Typical profile
H1 - 0 to 8 inches: loam
H2 - 8 to 50 inches: loam
H3 - 50 to 54 inches: weathered bedrock

Properties and qualities
Slope: 15 to 30 percent
Depth to restrictive feature: 50 to 54 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Description of Wind River Family

Setting
Landform: Mountains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile
H1 - 0 to 19 inches: sandy loam
H2 - 19 to 34 inches: sandy loam
H3 - 34 to 45 inches: sandy loam
H4 - 45 to 49 inches: weathered bedrock

Properties and qualities
Slope: 15 to 30 percent
Depth to restrictive feature: 45 to 49 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A

MbF—Morical-Wind River families complex, 30 to 50 percent slopes

Map Unit Setting
National map unit symbol: htsw
Elevation: 4,500 to 6,000 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 120 to 175 days
Farmland classification: Not prime farmland

Attachment 4 – Field Data Sheets

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Rimforest Storm Drain Project City/County: County of San Bernardino Sampling Date: 2 April 2015

Applicant/Owner: County of San Bernardino Public Works State: CA Sampling Point: P-1

Investigator(s): Jared Varonin, Justin Wood Section, Township, Range: Section 30, T 2N, R 3W

Landform (hillslope, terrace, etc.): drainage Local relief (concave, convex, none): convex Slope (%):

Subregion (LRR): C - Mediterranean California Lat: 34 13' 48.57" N Long: 117 13' 13.62" W Datum: WGS 1984

Soil Map Unit Name: Morical-Wind River families complex, 15 to 30 percent slopes NWI classification: none available

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ◉ No ◯ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ◯

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◯	No ◉	
Hydric Soil Present?	Yes ◯	No ◉	**Is the Sampled Area within a Wetland?** Yes ◯ No ◉
Wetland Hydrology Present?	Yes ◯	No ◉	

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Calocedrus decurrens*	5	No	Not Listed
2. *Quercus kelloggii*	5	No	Not Listed
3.			
4.			
Total Cover:	10 %		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Bromus diandrus*	10	No	UPL
2. *Hordeum murinum*	10	No	FACU
3. *Tanacetum parthenium*	5	No	Not Listed
4.			
5.			
6.			
7.			
8.			
Total Cover:	25 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 75 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species	10	x 4 =	40
UPL species	25	x 5 =	125
Column Totals:	35 (A)		165 (B)

Prevalence Index = B/A = 4.71

Hydrophytic Vegetation Indicators:

- ◉ Dominance Test is >50%
- ◉ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ◯ No ◉

Remarks: Sparsely vegetated, grass dominated, no evidence of wetland vegetation.

SOIL

Sampling Point: P-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-9	10 YR 4/3	100					Sandy Loam	Gleyed mottling
9-10		100	10 YR 6/6			M	Sandy Clay Loam	
11-14	10 YR 4/3	100					Sandy Loam	Gleyed mottling

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ●

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☒ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ●	Depth (inches):
Water Table Present?	Yes ○	No ●	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ●	Depth (inches):

Wetland Hydrology Present? Yes ○ No ●

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of ephemeral flow, typical sandy dry wash.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Rimforest Storm Drain Project City/County: County of San Bernardino Sampling Date: 2 April 2015

Applicant/Owner: County of San Bernardino Public Works State: CA Sampling Point: P-2

Investigator(s): Jared Varonin, Justin Wood Section, Township, Range: Section 30, T 2N, R 3W

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%):

Subregion (LRR): C - Mediterranean California Lat: 34 13' 48.56" N Long: 117 13' 13.62" W Datum: WGS 1984

Soil Map Unit Name: Morical-Wind River families complex, 15 to 30 percent slopes NWI classification: none available

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ◉ No ◯ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ◯

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◯	No ◉	
Hydric Soil Present?	Yes ◯	No ◉	**Is the Sampled Area within a Wetland?** Yes ◯ No ◉
Wetland Hydrology Present?	Yes ◯	No ◉	

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Calocedrus decurrens*	5	No	Not Listed
2. *Quercus kelloggii*	5	No	Not Listed
3.			
4.			
Total Cover:	10 %		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Bromus diandrus*	50	No	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	50 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 50 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	60	x 5 =	300
Column Totals:	60 (A)		300 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

- ◉ Dominance Test is >50%
- ◉ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ◯ No ◉

Remarks: Grass dominated terrace, approximately 4 feet above channel.

SOIL

Sampling Point: P-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-20	10 YR 3/3	100					Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ●

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ●	Depth (inches):
Water Table Present?	Yes ○	No ●	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ●	Depth (inches):

Wetland Hydrology Present? Yes ○ No ●

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrology indicators observed, grass dominated terrace.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Rimforest Storm Drain Project City/County: County of San Bernardino Sampling Date: 2 April 2015

Applicant/Owner: County of San Bernardino Public Works State: CA Sampling Point: P-3

Investigator(s): Jared Varonin, Justin Wood Section, Township, Range: Section 30, T 2N, R 3W

Landform (hillslope, terrace, etc.): channel bottom Local relief (concave, convex, none): none Slope (%):

Subregion (LRR): C - Mediterranean California Lat: 34 13' 53.56" N Long: 117 13' 8.97" W Datum: WGS 1984

Soil Map Unit Name: Morical-Wind River families complex, 15 to 30 percent slopes NWI classification: none available

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ◉ No ◯ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ◯

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ◯	
Hydric Soil Present?	Yes ◉	No ◯	**Is the Sampled Area within a Wetland?** Yes ◉ No ◯
Wetland Hydrology Present?	Yes ◉	No ◯	

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Cornus sericea*	100	Yes	FACW
2.			
3.			
4.			
Total Cover:	100%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 100% % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	100	x 2 =	200
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	100 (A)		200 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ◉ No ◯

Remarks: Adjacent to active portion of channel, think canopy of American dogwood, no herbaceous stratum.

SOIL

Sampling Point: P-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	7.5 YR 3/2	65	7.5 YR 5/6	35			Sandy Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☒ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks: Evidence of fire layer in soil profile. Low Value/Chroma soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☒ Water Marks (B1) (**Riverine**)
- ☒ Sediment Deposits (B2) (**Riverine**)
- ☒ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☒ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 10

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Surface flow present approximately 3 feet east.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Rimforest Storm Drain Project City/County: County of San Bernardino Sampling Date: 2 April 2015

Applicant/Owner: County of San Bernardino Public Works State: CA Sampling Point: P-4

Investigator(s): Jared Varonin, Justin Wood Section, Township, Range: Section 30, T 2N, R 3W

Landform (hillslope, terrace, etc.): channel bottom Local relief (concave, convex, none): none Slope (%):

Subregion (LRR): C - Mediterranean California Lat: 34 13' 53.08" N Long: 117 13' 8.87" W Datum: WGS 1984

Soil Map Unit Name: Morical-Wind River families complex, 15 to 30 percent slopes NWI classification: none available

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ◉ No ◯ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ◯

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ◯	
Hydric Soil Present?	Yes ◉	No ◯	**Is the Sampled Area within a Wetland?** Yes ◉ No ◯
Wetland Hydrology Present?	Yes ◉	No ◯	

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Cornus sericea*	100	Yes	FACW
2.			
3.			
4.			
Total Cover:	100%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 40 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	100	x 2 =	200
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	100 (A)		200 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ◉ No ◯

Remarks: Just east of P-3 near vertical bank, think canopy of American dogwood, no herbaceous stratum, leaf litter present.

SOIL

Sampling Point: P-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-14	7.5 YR 3/2	75	7.5 YR 5/6	25			Sandy Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☒ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ◯

Remarks: Evidence of fire layer in soil profile. Low Value/Chroma soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☒ Water Marks (B1) (**Riverine**)
- ☒ Sediment Deposits (B2) (**Riverine**)
- ☒ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☒ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◯	No ◉	Depth (inches):
Water Table Present?	Yes ◯	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ◯	Depth (inches): 12

Wetland Hydrology Present? Yes ◉ No ◯

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Surface flow present approximately 6 feet west.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Rimforest Storm Drain Project City/County: County of San Bernardino Sampling Date: 2 April 2015

Applicant/Owner: County of San Bernardino Public Works State: CA Sampling Point: P-5

Investigator(s): Jared Varonin, Justin Wood Section, Township, Range: Section 30, T 2N, R 3W

Landform (hillslope, terrace, etc.): channel bottom Local relief (concave, convex, none): none Slope (%):

Subregion (LRR): C - Mediterranean California Lat: 34 13' 55.15" N Long: 117 13' 7.14" W Datum: WGS 1984

Soil Map Unit Name: Morical-Wind River families complex, 15 to 30 percent slopes NWI classification: none available

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ◉ No ◯ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ◯

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ◯	
Hydric Soil Present?	Yes ◉	No ◯	**Is the Sampled Area within a Wetland?** Yes ◉ No ◯
Wetland Hydrology Present?	Yes ◉	No ◯	

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Abies concolor*	100	Yes	Not Listed
2.			
3.			
4.			
Total Cover:	100%		
Sapling/Shrub Stratum			
1. *Cornus sericea*	100	Yes	FACW
2.			
3.			
4.			
5.			
Total Cover:	100%		
Herb Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 90 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	100	x 2 =	200
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	100	x 5 =	500
Column Totals:	200 (A)		700 (B)

Prevalence Index = B/A = 3.50

Hydrophytic Vegetation Indicators:

- ◉ Dominance Test is >50%
- ◉ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ◉ No ◯

Remarks: Occurs just prior to a large reduction in channel width downstream. Small amount of leaf litter.

SOIL

Sampling Point: P-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-5	7.5 YR 4/3	100					Loamy Sand	
5-12	10 YR 3/2	100					Loamy Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5) (**LRR C**)
- [ ] 1 cm Muck (A9) (**LRR D**)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- [ ] 1 cm Muck (A9) (**LRR C**)
- [ ] 2 cm Muck (A10) (**LRR B**)
- [ ] Reduced Vertic (F18)
- [ ] Red Parent Material (TF2)
- [x] Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks: Low Chroma soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- [ ] Surface Water (A1)
- [x] High Water Table (A2)
- [ ] Saturation (A3)
- [ ] Water Marks (B1) (**Nonriverine**)
- [ ] Sediment Deposits (B2) (**Nonriverine**)
- [ ] Drift Deposits (B3) (**Nonriverine**)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Salt Crust (B11)
- [ ] Biotic Crust (B12)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Plowed Soils (C6)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Marks (B1) (**Riverine**)
- [x] Sediment Deposits (B2) (**Riverine**)
- [x] Drift Deposits (B3) (**Riverine**)
- [x] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Thin Muck Surface (C7)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Shallow Aquitard (D3)
- [x] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ◉	No ○	Depth (inches): 5
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 2

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Surface flow present just east of soil pit.

Attachment 5 – Federal Non-Wetland/Wetland Waters Indicator Information

Table 1. Potential Geomorphic Indicators of Ordinary High Water Marks for the Arid West		
(A) Below OHW	**(B) At OHW**	**(C) Above OHW**
1. In-stream dunes 2. Crested ripples 3. Flaser bedding 4. Harrow marks 5. Gravel sheets to rippled sands 6. Meander bars 7. Sand tongues 8. Muddy point bars 9. Long gravel bars 10. Cobble bars behind obstructions 11. Scour holes downstream of obstructions 12. Obstacle marks 13. Stepped-bed morphology in gravel 14. Narrow berms and levees 15. Streaming lineations 16. Desiccation/mud cracks 17. Armored mud balls 18. Knick Points	1. Valley flat 2. Active floodplain 3. Benches: low, mid, most prominent 4. Highest surface of channel bars 5. Top of point bars 6. Break in bank slope 7. Upper limit of sand-sized particles 8. Change in particle size distribution 9. Staining of rocks 10. Exposed root hairs below intact soil layer 11. Silt deposits 12. Litter (organic debris, small twigs and leaves) 13. Drift (organic debris, larger than twigs)	1. Desert pavement 2. Rock varnish 3. Clast weathering 4. Salt splitting 5. Carbonate etching 6. Depositional topography 7. Caliche rubble 8. Soil development 9. Surface color/tone 10. Drainage development 11. Surface relief 12. Surface rounding

Table 2. Potential Vegetation Indicators of Ordinary High Water Marks for the Arid West			
	(D) Below OHW	**(E) At OHW**	**(F) Above OHW**
Hydroriparian indicators	1. Herbaceous marsh species 2. Pioneer tree seedlings 3. Sparse, low vegetation 4. Annual herbs, hydromesic ruderals 5. Perennial herbs, hydromesic clonals	1. Annual herbs, hydromesic ruderals 2. Perennial herbs, hydromesic clonals 3. Pioneer tree seedlings 4. Pioneer tree saplings	1. Annual herbs, xeric ruderals 2. Perennial herbs, non-clonal 3. Perennial herbs, clonal and non-clonal co-dominant 4. Mature pioneer trees, no young trees 5. Mature pioneer trees w/upland species 6. Late-successional species
Mesoriparian Indicators	6. Pioneer tree seedlings 7. Sparse, low vegetation 8. Pioneer tree saplings 9. Xeroriparian species	5. Sparse, low vegetation annual herbs, hydromesic 6. ruderals 7. Perennial herbs, hydromesic clonals 8. Pioneer tree seedlings 9. Pioneer tree saplings 10. Xeroriparian species 11. Annual herbs, xeric ruderals	7. Xeroriparian species 8. Annual herbs, xeric ruderals 9. Perennial herbs, non-clonal 10. Perennial herbs, clonal and non-clonal codominent 11. Mature pioneer trees, no young trees 12. Mature pioneer trees, xeric understory 13. Mature pioneer trees w/upland species 14. Late-successional species 15. Upland species
Xeroriparian indicators	10. Sparse, low vegetation 11. Xeroriparian species 12. Annual herbs, xeric ruderals	12. Sparse, low vegetation 13. Xeroriparian species 14. Annual herbs, xeric ruderals	16. Annual herbs, xeric ruderals 17. Mature pioneer trees w/upland species 18. Upland species

Table 3. Summary of Wetland Indicator Status		
Category		**Probability**
Obligate Wetland	OBL	Almost always occur in wetlands (estimated probability >99%)
Facultative Wetland	FACW	Usually occur in wetlands (estimated probability of 67–99%)
Facultative	FAC	Equally likely to occur in wetlands/non-wetlands (estimated probability of 34–66%)
Facultative Upland	FACU	Usually occur in non-wetlands (estimated probability 67–99%)
Obligate Upland	UPL	Almost always occur in non-wetlands (estimated probability >99%)
Non-Indicator	NI	No indicator status has been assigned

Source: Reed, 1988; USFWS, 1997; USACE, 2012.

Table 4. Wetland Hydrology Indicators*	
Primary Indicators	**Secondary Indicators**
Watermarks	Oxidized Rhizospheres Associated with Living Roots
Water-Borne Sediment Deposits	FAC-Neutral Test
Drift Lines	Water-Stained Leaves
Drainage Patterns Within Wetlands	Local Soil Survey Data

*Table adapted from 1987 USACE Manual and Related Guidance Documents.

Table 5. Wetland Hydrology Indicators for the Arid West*		
	Primary Indicator (any one indicator is sufficient to make a determination that wetland hydrology is present)	**Secondary Indicator (two or more indicators are required to make a determination that wetland hydrology is present)**
Group A – Observation of Surface Water or Saturated Soils		
A1 – Surface Water	X	
A2 – High Water Table	X	
A3 – Saturation	X	
Group B – Evidence of Recent Inundation		
B1 – Water Marks	**X** (Non-riverine)	**X** (Riverine)
B2 – Sediment Deposits	**X** (Non-riverine)	**X** (Riverine)
B3 – Drift Deposits	**X** (Non-riverine)	**X** (Riverine)
B6 – Surface Soil Cracks	X	
B7 – Inundation Visible on Aerial Imagery	X	
B9 –Water-Stained Leaves	X	
B10 – Drainage	X	X
B11 – Salt Crust	X	
B12 – Biotic Crust	X	
B13 – Aquatic Invertebrates	X	
Group C – Evidence of Current or Recent Soil Saturation		
C1 – Hydrogen Sulfide Odor	X	
C2 – Dry-Season Water Table		X
C3 – Oxidized Rhizospheres along Living Roots	X	

Table 5. Wetland Hydrology Indicators for the Arid West*

	Primary Indicator (any one indicator is sufficient to make a determination that wetland hydrology is present)	Secondary Indicator (two or more indicators are required to make a determination that wetland hydrology is present)
C4 – Presence of Reduced Iron	X	
C6 – Recent Iron Reduction in Tilled Soils	X	
C7 – Thin Muck Surface	X	
C8 – Crayfish Burrows		X
C9 – Saturation Visible on Aerial Imagery		X
Group D – Evidence from other Site Conditions or Data		
D3 – Shallow Aquitard		X
D5 – FAC-Neutral Test		X

*Table adapted from Regional Supplement to the USACE of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0.

Table 6. Field Indicators of Hydric Soil Conditions*

1. Indicators of Historical Hydric Soil Conditions	2. Indicators of Current Hydric Soil Conditions
a. Histosols b. Histic epipedons; c. Soil colors (e.g., gleyed or low-chroma colors, soils with bright mottles (Redoximorphic features) and/or depleted soil matrix d. High organic content in surface of sandy soils e. Organic streaking in sandy soils f. Iron and manganese concretions g. Soil listed on county hydric soils list	a. Aquic or peraquic moisture regime (inundation and/or soil saturation for *7 continuous days) b. Reducing soil conditions (inundation and/or soil saturation for *7 continuous days) c. Sulfidic material (rotten egg smell)

*Table adapted from 1987 USACE Manual and Related Guidance Documents.

Table 7. Hydric Soil Indicators for the Arid West*

Hydric Soil Indicators			Hydric Soil Indicators for Problem Soils**
All Soils	Sandy Soils	Loamy and Clay Soils	
A1 – Histosol	S1 – Sandy Mucky Mineral	F1 – Loamy Mucky Mineral	A9 – 1 cm Muck
A2 – Histic Epipedon	S4 – Sandy Gleyed Matrix	F2 – Loamy Gleyed Matrix	A10 – 2 cm Muck
A3 – Black Histic	S5 – Sandy Redox	F3 – Depleted Matrix	F18 – Reduced Verti
A4 – Hydrogen Sulfide	S6 – Stripped Matrix	F6 – Redox Dark Surface	TF2 – Red Parent Material
A5 – Stratified Layers	—	F7 – Depleted Dark Surface	Other (See Section 5 of Regional Supplement, Version 2.0)
A9 – 1 cm Muck	—	F8 – Redox Depressions	—
A11 – Depleted Below Dark Surface	—	F9 – Vernal Pools	—
A12 – Thick Dark Surface	—	—	—

* Table adapted from Regional Supplement to the USACE of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0.
** Indicators of hydrophytic vegetation and wetland hydrology must be present

Attachment 6 – Regulatory Background Information

Regulatory Background Information

Section 404 of the Clean Water Act (CWA)

Section 404 of the CWA regulates the discharge of dredged material, placement of fill material, or certain types of excavation within "waters of the U.S." (resulting in more than incidental fallback of material) and authorizes the Secretary of the Army, through the Chief of Engineers, to issue permits for such actions. Permits can be issued for individual projects (individual permits) or for general categories of projects (general permits). "Waters of the U.S." are defined by the CWA as "rivers, creeks, streams, and lakes extending to their headwaters and any associated wetlands." Wetlands are defined by the CWA as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions." The USACE has adopted several revisions to their regulations in order to more clearly define "waters of the U.S." Until the beginning of 2001, "waters of the U.S." included, among other things, isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not part of a tributary system to interstate waters or to navigable "waters of the U.S."

The jurisdictional extent of USACE regulation changed with the 2001 SWANCC (Solid Waste Agency of Northern Cook County) ruling. The U.S. Supreme Court held that the USACE could not apply Section 404 of the CWA to extend their jurisdiction over an isolated quarry pit. The Court ruled that the CWA does not extend Federal regulatory jurisdiction over non-navigable, isolated, intra-state waters. However, the Court made it clear that non-navigable wetlands adjacent to navigable waters are still subject to USACE jurisdiction.

Section 401 of the CWA

Section 401 of the CWA requires that any applicant for a Federal permit for activities that involve a discharge to 'waters of the State,' shall provide the Federal permitting agency a certification from the State in which the discharge is proposed that states that the discharge will comply with the applicable provisions under the Federal Clean Water Act. Therefore, before the USACE will issue a Section 404 permit, applicants must apply for and receive a Section 401 Water Quality Certification from the RWQCB. Applications to the RWQCB must include a complete CEQA document (e.g., Initial Study/Mitigated Negative Declaration).

Section 1602 of the California Fish and Game Code

Section 1602 of the California Fish and Game Code requires any person, State or local governmental agency, or public utility which proposes a project that will substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake, or use materials from a streambed, or result in the disposal or deposition of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake, to first notify the CDFW of the proposed project. Notification is generally required for any project that will take place in or in the vicinity of a river, stream, lake, or their tributaries. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses having a surface or subsurface flow that support or have supported riparian vegetation. Based on the notification materials submitted, the CDFW will determine if the proposed project may impact fish or wildlife resources.

If the CDFW determines that a proposed project may substantially adversely affect existing fish or wildlife resources, a Lake or Streambed Alteration Agreement (SAA) will be required. A completed CEQA document must be submitted to CDFW before a SAA will be issued.

Porter-Cologne Water Quality Act

In the State of California, the State Water Resources Control Board (SWRCB) and local Regional Water Quality Control Boards (RWQCBs) have assumed the responsibility of implementing US EPA's NPDES Program and other programs under the CWA such as the Impaired Waters Program and the Antidegradation Policy. The primary quality control law in California is the Porter-Cologne Water Quality Act (Water Code Sections 13000 et seq.). Under Porter-Cologne, the SWRCB issues joint federal NPDES Storm Water permits and state Waste Discharge Requirements (WDRs) to operators of municipal separate storm sewer systems (MS4s), industrial facilities, and construction sites to obtain coverage for the storm water discharges from these operations. In addition to stormwater coverage, when a project involves work in a stream that is not subject to regulation under Section 404 of the federal CWA (see above), the project may require issuance or a waiver of WDR under the Porter Cologne Act. The application process is the same as filing for a permit under Section 401 of the CWA.

Appendix 5

Cultural Resources Survey Report

CULTURAL RESOURCES REPORT
FOR THE PROPOSED RIMFOREST STORM DRAIN PROJECT, SAN BERNARDINO COUNTY, CALIFORNIA

USGS Harrison Mtn 7.5' Quadrangle

Prepared for:
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For Submittal to:
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July 2015

Keywords: Approximately 15 acres surveyed; one resource (Rim of the World Drive [36-007049] within Project APE recommended eligible for the NRHP and CRHR; no impacts to any known cultural resources; monitoring recommended for portions of the Project

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MANAGEMENT SUMMARY

The County of San Bernardino (County) proposes to construct and maintain a series of drainage facilities to address historic erosion and landsliding in the southern portion of the community of Rimforest, San Bernardino County, California as part of a project known as the Rimforest Storm Drain Project (hereafter "Project"). A cultural resource investigation of the Project's 15.3-acre Area of Potential Effects (APE) was conducted by Applied EarthWorks, Inc. (*Æ*). In anticipation of future Project review by the U.S. Army Corps of Engineers (USACE), this cultural resource investigation was conducted in accordance with Section 106 of the National Historic Preservation Act of 1966 (NHPA, 36 CFR, 63, and 800). As well, the proposed Project is subject to compliance with the California Environmental Quality Act (CEQA), as amended.

A cultural resources literature and records search conducted at the San Bernardino Archaeological Information Center (SBAIC) indicated that 44 cultural resources are present within a one-mile radius of the Project APE. As a result of these studies, three historic-period resources have been previously recorded within or immediately adjacent to the Project alignment. These include a segment of the historical 1915–1916 alignment of Rim of the World Drive (36-007049); a segment of Daley Canyon Toll Road (36-003868); and a circa (ca.) 1940s wood-frame cabin along the south side of SR 18 in the town of Rimforest (no address, 36-012786). *Æ* also requested a search of the *Sacred Lands File* from the Native American Heritage Commission (NAHC), which indicated that no Native American cultural resources are known to exist within the immediate Project area. The NAHC requested that Native American individuals and organizations be contacted to elicit information and/or concerns regarding cultural resource issues related to the proposed Project. A letter describing the Project and asking these individuals and organizations for their input was sent via United States Postal Service (USPS) and electronic mail on July 14 and 15, 2015. A second attempt at correspondence was made on July 28, 2015. The list of contacts, letters sent, and responses received are included in Appendix A.

An intensive cultural resource pedestrian survey of the Project APE was performed by *Æ* on July 11, 2012 and July 1, 2015. No prehistoric or historical archaeological resources were identified within the Project APE. The ca.1940s wood-frame cabin (36-012786) and Daley Canyon Toll Road (36-003868) are outside of the Project APE and the Project will have no direct or indirect impacts to either of these two resources. Rim of the World Drive (36-007049) is recommended eligible for the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR). However, the proposed Project has no potential to alter, destroy, relocate, or remove any features that contribute to the integrity or significance of Rim of the World Drive. Based on these considerations, the present study concludes that the proposed Project will not cause a substantial adverse change to the integrity or significance of Rim of the World Drive, 36-007049, and will not result in an effect on this historic property. No further cultural resource management of this resource is recommended. Due to the archaeological sensitivity of the area around Little Bear Creek, all earthmoving activities within this portion of the Project APE should be monitored by a qualified archaeologist.

Field notes documenting the current investigation are on file at *Æ*'s Hemet office. A copy of this report will be placed on file at the San Bernardino County Archaeological Information Center.

1
INTRODUCTION

The County of San Bernardino (County) proposes to construct and maintain a series of drainage facilities to address historic erosion and landsliding in the southern portion of the community of Rimforest, San Bernardino County, California. This report, prepared by Applied EarthWorks, Inc. (Æ), summarizes the methods and results of a cultural resource assessment for the Rimforest Storm Drain Project (hereafter "Project") Area of Potential Effects (APE).

1.1 SCOPE AND PURPOSE OF INVESTIGATION

A cultural resource investigation was conducted by Æ on approximately 15.3 acres (ac) of the Project's APE, in the community of Rimforest, California. The Project area includes a proposed culvert system (i.e., street inlets and storm drains) along State Route18 (SR 18, Rim of the World Drive) and Pine Avenue and proposed drainage outflows along Little Bear Creek and the canyon east of Blackfoot Trail East (see discussion below and Section 1.3). The Project area is located to the north and south of SR 18 in the community of Rimforest, San Bernardino County, California (Figure 1). The Project area is situated within the west half of Section 29 and the east half of Section 30, Township 2 North, Range 3 West, San Bernardino Base Meridian, as depicted on the Harrison Mtn, CA, 7.5' USGS Quadrangle (Figure 2); elevation is approximately 5,655 feet (ft) above mean sea level (amsl).

In anticipation of future Project review by the U.S. Army Corps of Engineers (USACE), this cultural resource investigation was conducted in accordance with Section 106 of the National Historic Preservation Act of 1966 (NHPA, 36 CFR, 63, and 800). As well, the proposed Project is subject to compliance with the California Environmental Quality Act (CEQA), as amended. Æ developed the scope of work in consultation with Nancy Sansonetti of the County. Æ associate archaeologist, Joan George, served as Project Manager. Æ Archaeologist and Architectural historian Josh Smallwood, M.A., RPA, carried out the cultural resource survey and authored the report.

Severe erosion and landslides over the past 30 years within the Rimforest vicinity has resulted in significant property loss, with the areas immediately south of Blackfoot Trail West and Apache Trail having been seriously impacted by more than 100 ft of bluff retreat. The remediation approach (proposed Project) developed to address slope stability issues includes rerouting existing drainage patterns away from southern Rimforest and toward the north, into Little Bear Creek, which drains to Lake Arrowhead. The rerouting of stormwater flows away from the southern area of Rimforest, which has been most substantially affected by erosion and landslides, is necessary to minimize continued slope movement and reduce hazards to existing property in the area. The proposed Project would divert runoff from its current flow-path through the community of Rimforest and outlet at the landslide area in southern Rimforest, into a new flow-path comprising channels and pipeline to the north of SR 18 with an outlet into Little Bear Creek on the Church of the Woods (COTW) property.

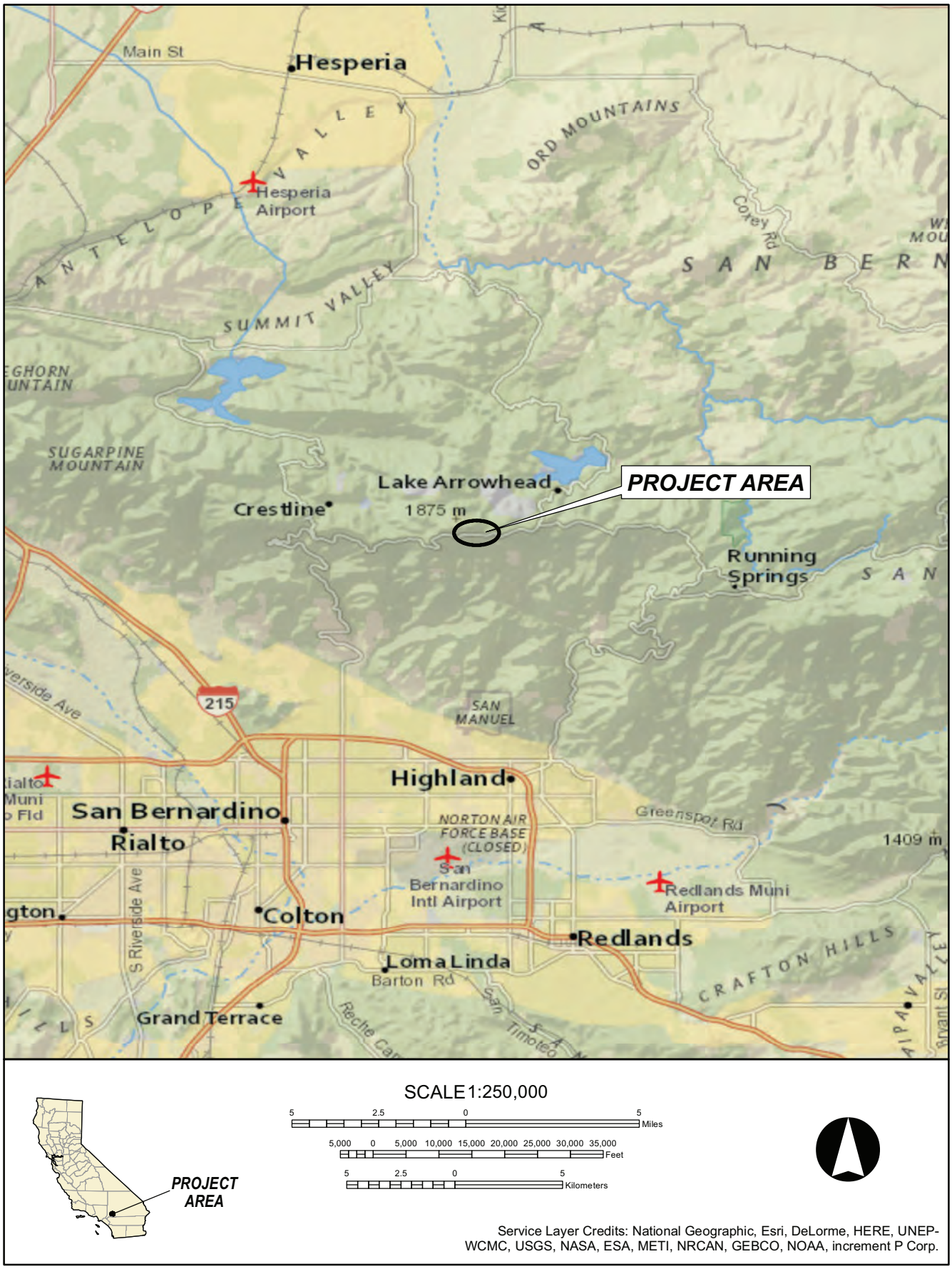

Figure 1 Project vicinity map.

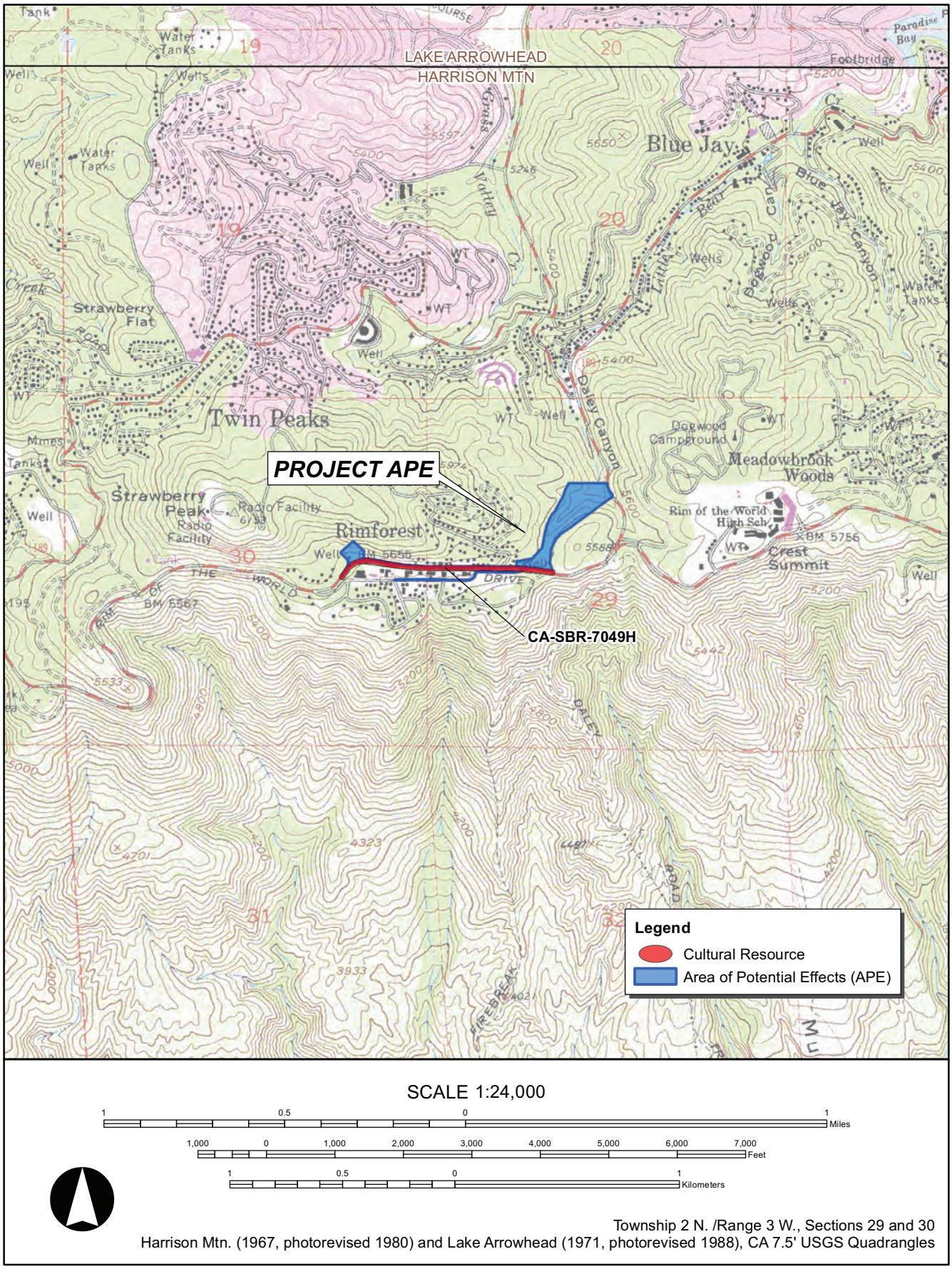

Figure 2 Project location map.

1.2 REGULATORY CONTEXT

The Project is subject to both state (i.e., CEQA) and federal (Section 106 of NHPA) regulations concerning cultural resources. The San Bernardino County Flood Control District (SBCFCD) is acting in an advisory capacity to the County, and is the lead agency for the purposes of CEQA, while the USACE is Section 106 lead agency for the Project.

1.2.1 National Historic Preservation Act (NHPA)

Because the Project requires Section 404 permitting, the Project is considered a federally licensed "undertaking" per 36 CFR § 800.2 (o) and subject to compliance with Section 106 of the NHPA of 1966, as amended. Under these guidelines, federal agencies are required to identify cultural resources that may be affected by project actions, assess the significance of these resources and their eligibility for inclusion on the *National Register of Historic Places* (NRHP) as per 16 USC 470w (5), and consult with the Advisory Council on Historic Preservation (Council) regarding project effects on significant resources. Eligibility is based on criteria defined by the Department of the Interior. Generally, districts, archaeological sites, buildings, structures, and objects that possess integrity are potentially eligible for inclusion in the NRHP under the following criteria:

A) that are associated with events that have made a significant contribution to the broad patterns of our history; or

B) that are associated with the lives of persons significant in our past; or

C) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D) that have yielded, or may be likely to yield, information important in prehistory or history (36 CFR § 60.4).

If a cultural resource is determined to be an eligible historic property under 36 CFR § 60.4, then Section 106 requires that the effects of the proposed undertaking be assessed and considered in planning the undertaking. According to 36 CFR § 800: Regulations of the Advisory Council on Historic Preservation Governing the Section 106 Review Process, the lead agency, State Historic Preservation Office (SHPO), and Council

> ….should be sensitive to the special concerns of Indian tribes in historic preservation issues, which often extend beyond Indian lands to other historic properties. …When an undertaking may affect properties of historic value to an Indian tribe on non-Indian lands, the consulting parties shall afford such tribe the opportunity to participate as interested persons. Traditional cultural leaders and other Native Americans are considered interested persons with respect to undertakings that my affect historic properties of significance to such persons (36 CFR § 800:3).

1.2.2 California Environmental Quality Act (CEQA)

The proposed Project is also subject to compliance with CEQA, as amended through 2014. Therefore, cultural resource management work conducted as part of the proposed Project shall comply with the *CEQA Statutes and Guidelines* (California 2014), which directs lead agencies to

first determine whether cultural resources are "historically significant" resources. A project with an effect that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment (California 2014). Generally, a cultural resource shall be considered "historically significant" if the resource is 45 years old or older, possesses integrity of location, design, setting, materials, workmanship, feeling, and association, and meets the requirements for listing on the *California Register of Historical Resources* (CRHR) under any one of the following criteria:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

2) Is associated with the lives of persons important in our past;

3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or,

4) Has yielded, or may be likely to yield, information important in prehistory or history (Title 14 CCR, § 15064.5).

The cited statutes and guidelines specify how cultural resources are to be managed in the context of projects, such as the proposed Rimforest Storm Drain Project. Briefly, archival and field surveys must be conducted, and identified cultural resources must be inventoried and evaluated in prescribed ways. Prehistoric and historical archaeological resources, as well as historical resources such as standing structures and other built-environment features, deemed "historically significant" must be considered in project planning and development. As well, any proposed project that may affect "historically significant" cultural resources must be submitted to the SHPO for review and comment prior to project approval by the responsible agency and prior to construction.

1.3 AREA OF POTENTIAL EFFECT

The Project APE is delineated to encompass the maximum extent of ground disturbances required by the Project design as well as areas of indirect effects. As the proposed Project entails construction of an underground pipeline and catch basins within a forested area, indirect effects, such as visual intrusion or noise, to known resources are considered less-than-significant. Thus, the APE for this Project is defined as the area of direct impacts, which encompasses approximately 15.3 ac (see Figure 2). As currently proposed, the Project would occur in two phases. Phase 1 of the Project would result in a 64 percent reduction in runoff; improvements constructed under this phase would convey mountainside runoff from an area of approximately 51 ac, and deliver this runoff to Little Bear Creek. This phase of the proposed Project includes approximately 0.8 miles (mi) of flood control improvements, comprising approximately 0.2 m of channel/basin and approximately 0.6 mi of pipe culvert and appurtenances. Phase 2 of the proposed Project would divert runoff from 16 ac of the interior portion of the community of Rimforest and result in a 30 percent reduction in runoff. This phase includes installation of a culvert system to direct runoff from Pine Avenue, which runs parallel to the south of SR 18, and under SR 18 to join flows diverted by Phase 1 in Little Bear Creek. The Phase 2 culvert system would include street inlets and storm drains within Rimforest to facilitate the diversion of flows along Pine Avenue. A culvert system would be installed through an

existing lumber yard off Pine Avenue, connecting to the main culvert system along Pine Avenue. Trenching up to depths of 22 ft may be required to install the pipeline from Pine Avenue and under SR 18 to Little Bear Creek.

1.4 REPORT ORGANIZATION

This report documents the results of a cultural resources investigation for the proposed Rimforest Storm Drain Project. Chapter 1 has introduced the scope of the work and regulatory context. Chapter 2 synthesizes the natural and cultural setting of the Project area and surrounding region. Chapter 3 presents the results of the background research, which included a cultural resources literature and records search conducted at the San Bernardino Archaeological Information Center (SBAIC) of the California Historical Resource Information System (CHRIS), housed at the San Bernardino County Museum, Redlands. Chapter 4 summarizes the *Sacred Lands File* search with the Native American Heritage Commission (NAHC) and Native American communications. Chapter 5 details the cultural resources study methods and findings. Chapter 6 provides an evaluation of the significance of the resources identified within the Project APE during this study. A Project impacts assessment is provided in Chapter 7, and management recommendations are included in Chapter 8, followed by bibliographic references, preparer's qualifications, and appendices.

2
SETTING

2.1 INTRODUCTION

This chapter describes the environmental and cultural setting of the Project area to provide a discussion and context for how historical and archaeological resources in the area were created and used. The discussion is based on a review of existing data and literature. This chapter is also useful for evaluating the significance of any cultural resources that may be found within the vicinity of the Project area. The nature and distribution of past activities in the San Bernardino Mountain, Valley, and Desert regions have been affected by such factors as topography, climate change, water availability, and access to biological resources. Therefore, prior to discussing the cultural setting, aspects of the regional environment are briefly summarized below.

2.2 ENVIRONMENTAL SETTING

2.2.1 Geography

Situated north and east of the San Bernardino Valley on the North American Plate, the San Bernardino Mountains are the easternmost in the Transverse Range. The steep northern side of the mountains is separated from the Mojave Block to the north by a fault, while the San Andreas fault separates the San Bernardino Mountains from the San Gabriel Mountains to the west and the San Bernardino Valley to the south. North of the city of San Bernardino near Waterman Canyon, the San Andreas fault divides into the Mill Creek-Mission Creek fault and the Banning fault; the former extending east across the mountains north of Mill Creek toward the Morongo Valley, while the latter runs southeast through the San Gorgonio Pass. The Precambrian igneous-metamorphic basement complex, consisting of schists, gneiss, and migmatites, daylights north of the San Andreas fault between Cajon Mountain and Mill Creek. Extensive outcrops of gneiss are also present near San Gorgonio Peak and Sugarloaf Peak. Near Big Bear Lake, these are uncomformably overlain by upper Paleozoic marine quartzite and limestone that are weakly metamorphosed. These in turn are intruded by Triassic volcanics, and Jurassic and Cretaceous plutonic rocks. During the early Cenozoic, there was erosion of the Cretaceous mountain topography. More tectonic activity extended through the Miocene, and basalts extruded in the eastern part of the range. Faulting and associated compression in the late Pliocene rejuvenated the previously eroded surface, and during the middle Pleistocene, the San Bernardino and San Gabriel mountains were uplifted along the block and thrust faults. Some flat areas in the San Bernardino Mountains are overlain by Pleistocene alluvium, and there is Wisconsin-age glacial till on north San Gorgonio Peak above 8,700 ft.

The San Bernardino Mountains is a short transverse mountain range that extends for approximately 60 mi (100 kilometers [km]) east-west on the southern edge of the Mojave Desert in southwestern San Bernardino County, north of the city of San Bernardino. The range is separated from the San Gabriel Mountains to the west by Cajon Pass, and from the San Jacinto Mountains to the south and southeast by Banning Pass. The highest peaks in the range include San Gorgonio Mountain (elevation 11,502 ft), the highest peak in southern California, and other peaks of the San Gorgonio Wilderness. The shorter Little San Bernardino Mountains extend southeast from the range along the eastern side of the Coachella Valley.

2.2.2 Climate and Vegetation

The Sierra Nevada, the Transverse Ranges, and the Peninsular Ranges (Santa Rosa and San Jacinto mountains) in California form a natural barrier between the Mojave and Colorado deserts and the west coast. Ocean breezes moving inland carry moisture, but encountering the mountain ranges, moisture-laden air is forced to rise, cooling and condensing into clouds with increasing altitude. Storm clouds habitually dump their precipitation onto the western slopes of the mountains, and are largely "spent" by the time they have passed eastwards into the deserts. This "rain shadow" effect deprives the deserts of moisture, although some winter storms do manage to deliver widespread drizzle, heavy showers, and even occasional dustings of snow to the higher elevations. During the summer, hot basins generate rising columns of air that subsequently cool and condense into towering cumulonimbus ("thunderhead") formations that often deliver intense localized afternoon showers in desert and mountain areas. Washes and canyons that are normally dry may suddenly become roaring torrents as rainwaters overwhelm dry channels and emerge onto the playas as flash floods (Miller and Hyslop 1983:68–74, 125–127; Schoenherr 1992:316–317).

In the broadest sense, three general belts of vegetation occur within the San Bernardino Mountain areas; in ascending order these include chaparral, desert scrub, and forest. Chamise chaparral typically occurs on the south and west exposures below about 6,000 ft. Small trees and shrubs that are able to exist on minimal moisture occur between 3,000 and 9,000 ft. Desert scrub is found in the watersheds which drain into the Mojave Desert, as well as the Cajon and Lytle creek drainages. Coniferous forests occur at higher altitudes of about 6,000 ft and above. Riparian woodland occurs along all permanently flowing streams in all of the vegetation zones.

Below about 7,000 ft in elevation, some of the more common species that occur within riparian woodland communities include white alder (*Alnus rhombifolia*), Fremont cottonwood (*Populus fremontii*), black cottonwood (*Populus trichocarpa*), and California sycamore (*Platanus racemosa*). Above 7,000 ft, willows (*Salix* spp.) are the most common species.

California sage scrub commonly occurs on the lowest slopes near the San Bernardino National Forest boundary. The dominant shrub in this zone is coastal sage (*Artemesia californica*), though brittle bush (*Encelia farinosa*) is common on the drier hillslopes, particularly at the base of City Creek and Santa Ana Canyon. Other shrubs common to this vegetation zone include white sage (*Salvia apiana*), wild buckwheat (*Eriogonum fasciculatum*), and black sage (*S. mellifera*).

Four major vegetation types compose the chamise chaparral zone. These include pure chamise chaparral, chamise-*Ceanothus* chaparral, chamise-manzanita chaparral, and scrub oak chaparral. The lower limits of this zone occur from almost sea level to 4,500–5,500 ft on the south-facing slopes, and 3,500–5,000 ft on the north-facing slopes. Within this vegetation zone, isolated stands of bigcone Douglas fir forest, live-oak chaparral, and live oak woodland types occur on the north-facing slopes.

Oak woodland is composed primarily of the canyon live oak species (*Quercus chrysolepsis*), and occurs most frequently on north-facing slopes higher in the chaparral zone. Bigcone Douglas fir (*Pseudotsuga macrocarpa*) occasionally appears scattered among the oaks.

Coniferous forests occur between the elevations of 6,000 and 9,000 ft. Dominant trees include Ponderosa pine (*Pinus ponderosa*), Jeffrey pine (*P. jeffreyi*), sugar pine (*P. lambertiana*), white fir

(*Abies concolor*), and incense cedar (*Calocedrus decurrens*). *P. ponderosa* and *jeffreyi* are more abundant on south-facing slopes, while *P. lambertiana* and *A. concolor* are co-dominant on north-facing slopes. Additionally, knobcone pine (*Pinus attenuata*) forest is limited to small areas of City, Plunge, and Keller creeks.

2.3 PREHISTORIC CULTURAL SETTING

A prehistoric cultural chronology generally used for the San Bernardino Mountains is based on the Mojave Desert chronology, as adapted by Warren (1984). This chronology has been divided into seven cultural complexes: Fluted Point Complex, Lake Mojave Complex, Pinto Complex, Gypsum, Saratoga Springs Complex, Late Complex, and Contact/Ethnographic Complex. Earle et al. (1997) present this chronology in calendar ages. However, for purposes of this report, the prehistoric cultural chronology will begin at the Lake Mojave Complex, and is presented in years Before Present (B.P.) in order to compare cultural periods with paleoclimatic events.

2.3.1 Lake Mojave Complex (10,000-7000 B.P.)

The Lake Mojave Complex, an expression of the so-called "Western Pluvial Lakes Tradition," is presumed to begin somewhat earlier than 9500 B.P. and lasting to perhaps 7000 B.P. in the southwestern Great Basin (Basgall and Hall 1993; Warren 1980, 1984). This cultural manifestation in the early Holocene refers to a long period of human adaptation to environmental changes brought about by the transition from the late Pleistocene to the early Holocene geologic periods. As climatic conditions became warmer and more arid, Pleistocene megafauna perished abruptly between 13,000 and 10,000 B.P. Human populations responded to these changing environmental conditions by focusing their subsistence efforts on the procurement of a wider variety of faunal and floral resources.

Most prehistoric sites of this period have been found within the southwestern Great Basin and the Mojave Desert. Although intact stratified sites dating to this period are very scarce, the limited data do suggest that the prehistoric populations of this period moved about the region in small, highly mobile groups, with a wetland-focused subsistence strategy based on hunting and foraging. The vast majority of archaeological sites dating to this period have been found around early Holocene marshes, lakes, and streams which dominated much of the landscape. These early occupants of southern California are believed to have been nomadic large-game hunters whose tool assemblage included percussion-flaked scrapers and knives; large, well-made fluted, leaf-shaped, or stemmed projectile points (e.g., Lake Mojave, Silver Lake); crescentics; heavy core/cobble tools; hammerstones; bifacial cores; and choppers and scraper planes. The absence of milling tools commonly used for seed preparation indicates that an orientation toward hunting continued throughout this phase. Nonetheless, based on ethnographic models developed for hunting-gathering groups throughout the world, populations of this phase undoubtedly exploited plant resources as well. Indeed, most Lake Mojave deposits investigated in the southwestern Great Basin have yielded some amount of milling equipment, usually large slabs with ephemeral wear and handstones, implying regular, albeit limited use of vegetal resources (Basgall and Hall 1993:19).

2.3.2 Pinto Complex (7000–4000 B.P.)

In the desert regions of southern California, the "Pinto Complex" succeeded the "Lake Mojave Complex," beginning at approximately 7000 B.P. and lasting to 4000 or 3500 B.P. Relatively recent paleo-ecological and paleo-hydrological evidence suggests maximum aridity in the desert regions

between ca. 7000 and 5000 B.P., with amelioration beginning at approximately 5500 B.P. and continuing through 4000 B.P. (Spaulding 1991, 1995). During this period, it is believed that populations diminished and dispersed due to the decrease in permanent wetland habitats; thus, the Pinto Complex reflects a settlement pattern in which the population relocated from the ancient lakeshores to seasonal water sources. As well, as an adaptive response to these changing climatic conditions, the Pinto Complex is characterized by necessary shifts in prehistoric subsistence practices and adaptations, with greater emphasis placed on the exploitation of plants and small animals than the preceding Lake Mojave Complex, as well as a continued focus on artiodactyls (Warren 1980, 1984).

The distinctive characteristics of the "Pinto Basin Complex" as defined by Campbell and Campbell (1935) are projectile points of the Pinto series, described by Amsden (1935) as weakly shouldered, indented-base projectile points that are coarse in manufacture as well as form. Other diagnostic artifact types of this period include: large and small leaf-shaped bifaces; domed and heavy-keeled scrapers; numerous core/cobble tools; large blocky metates evincing minimal wear and small, thin, extensively used milling slabs; and shaped and unshaped manos. Throughout most of the California desert region, sites containing elements of the Pinto Basin Complex (e.g., those in the Pinto Basin, Tiefort Basin, Salt Springs, and Death Valley) are small and usually limited to surface deposits suggestive of temporary and perhaps seasonal occupation by small groups of people (Warren 1984:413).

2.3.3 Gypsum Complex (4000–1500 B.P.)

Several Gypsum Complex sites have been identified in the general Project vicinity. This period is characterized by a trend toward increasingly effective moisture, which began in the late middle Holocene and culminated in a pronounced pluvial episode between ca. 3700 and 3500 B.P. At that time, a number of basins in the Mojave and Owens river drainages supported perennial lakes (Enzel et al. 1992).

In general, the projectile points of this cultural period are fairly large (dart point size), but also include more refined notched (Elko), concave base (Humboldt), and small stemmed (Gypsum) forms. In addition to diagnostic projectile points, Gypsum Complex sites include leaf-shaped points, rectangular-based knives, flake scrapers, T-shaped drills, and occasionally, large scraper planes, choppers, and hammerstones (Warren 1984:416). Manos and milling stones are common; the mortar and pestle also were introduced during this period. Other artifacts include shaft smoothers, incised slate and sandstone tablets and pendants, bone awls, *Olivella* shell beads, and *Haliotis* beads and ornaments. A wide range of perishable items dating to this period was recovered from Newberry Cave, located along the Mojave River near the southern end of the Troy Lake Basin, including atlatl hooks, dart shafts and foreshafts, sandals and S-twist cordage, and tortoise-shell bowls.

Technologically, the artifact assemblage of this period is similar to that of the preceding Pinto Complex; new tools also were added either as innovations or as "borrowed" cultural items. Included are the mortar and pestle, used for processing hard seeds (e.g., mesquite pods [*Prosopis glandulosa]*) and acorns, pine nuts, yucca, and agave, as well as the bow and arrow, as evidenced by the presence of Rose Spring projectile points late in this period. Ritual activities became important, as evidenced by split-twig figurines (likely originating from northern Arizona) and petroglyphs depicting hunting scenes. Finally, increased contact with neighboring groups likely provided the desert occupants important storable foodstuffs during less productive seasons or years, in exchange for valuable lithic

materials such as obsidian, chalcedony, and chert. The increased carrying capacity and intensification of resources suggests higher populations in the desert with a greater ability to adapt to arid conditions (Warren 1984:420). Large villages or village complexes also appear in the archaeological record during the Gypsum Complex, reflecting a transition from seasonal migration (i.e., seasonal round) to year-round sedentary occupation of the western Mojave Desert (Sutton 1988).

2.3.4 Saratoga Springs Complex (1500–800 B.P.)

Because paleo-environmental conditions were little changed from the preceding period, cultural trends in the Saratoga Springs Complex essentially saw a continuation of the Gypsum Complex subsistence adaptation throughout much of the California deserts. Unlike the preceding period, however, the Saratoga Springs Complex is marked by strong regional cultural developments, especially in the southern California desert regions, which were heavily influenced by the Hakataya (Patayan) culture of the lower Colorado River area (Warren 1984:421–422). Specifically, turquoise mining and long distance trade networks appear to have attracted both the Anasazi and Hakataya peoples into the California deserts from the east and southeast, respectively, as evidenced by the introduction of Buff and Brown Ware pottery and Cottonwood and Desert Side-notched projectile points. The initial date for the first Hakataya influence on the southern Mojave Desert remains unknown; however, it does appear that by about 1000 to 1100 B.P. the Mojave Sink was heavily influenced, if not occupied by, lower Colorado River peoples. Trade with the California coastal populations also appears to have been important in the western Mojave Desert region and helped stimulate the development of large complex villages containing deep middens and cemeteries that have been dated from 2200 to 300 B.P., as well as the trade and movement of large quantities of shell beads and steatite items from the coast.

Brown and Buff Ware pottery, first appearing on the lower Colorado River at about 1200 B.P., started to diffuse across the California deserts by about 1100 B.P. (Warren 1984:425). Associated with the diffusion of this pottery were Desert Side-notched and Cottonwood Triangular arrow points dating to about 800 to 850 B.P., suggesting a continued spread of Hakataya influences. Trade along the Mojave River also expanded resulting in middlemen between coastal and Colorado River populations. The Hakataya influence in coastal and inland southern California regions appears to have diminished during the late Protohistoric period when the extensive trade networks along the Mojave River and in Antelope Valley appear to have broken down and the large village sites were abandoned (Warren 1984:427). Evidence presented by Jones et al. (1999) points to the apparent concordance between the reduction in use of the interior desert and the Medieval Climatic Anomaly. This period, lasting from approximately 1100 to 550 B.P., was typified by increased aridity here as elsewhere in the southwest (Stine 1994; Warren 1984:427). This dry period may have led to the withdrawal of southwestern Native populations, such as the Anasazi, from marginal desert areas. Warren (1984:428) also suggests that the apparent disruption in trade networks may have been caused by the movement of Chemehuevi populations southward across the trade routes during late Protohistoric times.

2.3.5 Late Prehistoric Complex (800–300 B.P.)

The Medieval Warm extended into the Late Prehistoric Complex, ending about 550 B.P. The cultural trends and patterns of land use that characterized the Medieval Warm Interval, including that portion which extends into the earlier part of the Late Prehistoric Complex, were discussed above. At the end of the Medieval Warm, however, and lasting throughout the ensuing Contact/Ethnographic times, a period of cooler temperatures and greater precipitation ushered in the

Little Ice Age during which time ecosystem productivity greatly increased along with the availability and predictability of water (Spaulding 2001).

The Late Complex reflects an adaptive modification of the cultural developments that were established during the Saratoga Springs Complex. With the waning of the Medieval Climatic Anomaly, desert settlement is believed to have expanded. Bettinger and Baumhoff (1982) propose an expansion of Numic-speakers around 800 B.P., possibly precipitated by this climatic crisis, while Moratto (1984) has suggested an earlier beginning date for this expansion (1000–900 B.P.), perhaps associated with prolonged drought. However, it is not currently known what effect Numic expansion had on the immediate Project area as Uto-Aztecan-speakers appear to have moved into the area during an earlier period.

Socioeconomic and sociopolitical organization continued to increase in complexity during this period, and by this time the "desert village" model of settlement appears to have become generalized in at least some areas of the western Mojave Desert. This model is based on population-driven sedentism and geographical limitation of gathering and hunting territories as accompanied by ever more intensive exploitation of a larger array of less attractive and less cost-efficient food resources (Earle et al. 1997).

With the return of wetter conditions around 500 B.P., there is some evidence of population increase in southern California and archaeological evidence indicates that the Late Complex populations utilized a greater variety of subsistence resources. This included the exploitation of both small and large mammals, and in some areas, fish. The continuation of milling technologies reflect a persistence of seed collecting, and the frequency of special purpose sites increases proportionally with a growing awareness of resource availability and potential (McIntyre 1990).

2.4 ETHNOGRAPHY

Historically, the Project area is located within Serrano territory. Altschul et al. (1989) have provided a useful overview of the ethnographic land-use patterns, social organization, and early ethnohistorical interactions in Serrano territory. Pertinent aspects of this overview, along with ethnographic information obtained primarily from Strong (1929), Gifford (1918), Kroeber (1925), Bean and Smith (1978), and Bean et al. (1981) are presented below.

The Serrano, or "mountaineers" in Spanish, occupied the territory of the San Bernardino Mountains east to Mount San Gorgonio, the San Gabriel Mountains west to Mount San Antonio, and portions of the desert to the north and the fringe of the San Bernardino Valley to the south (Kroeber 1925:615–616). Numbering no more than perhaps 1,500 people, the Serrano were scattered over a rugged, expansive landscape. The Serrano were Shoshonean peoples, speakers of languages in the Takic sub-family of the larger Uto-Aztecan language family, and their ancestors are presumed to have entered southern California some 1,500 years ago from the Great Basin (Kroeber 1925:578–579). Their most intensive cultural contacts were with the Pass Cahuilla, who occupied the territory to the southeast, and the Gabrielino, who occupied the lands westward to the Pacific coast.

The term "Serrano" is properly applied to just one of four original Serrano subgroups, the others being the Alliklik, Vanyume, and Kitanemuk; all were closely linked linguistically, but were not a tribe with a recognizable political unity (Strong 1929:5–6). The Serrano subgroup occupied the

portions of the San Bernardino Mountains and Valley that encompass the Project area, and thus this term refers here to the smaller cultural unit.

Serrano clans were politically autonomous, although linked by ceremonial ties to other clans and peoples of other tribal groupings (i.e., the Cahuilla and Gabrielino). A moiety structure conditioned Serrano social life, all clans belonging to either the Coyote or Wildcat moiety, and all spring ceremonial and mourning obligations extending to at least one other clan (Strong 1929:12–13). Exchanges of shell money between clans occurred during ceremonies, and contributions of shell money were made to mourning clan leaders by members of other clans on occasions of death. These moieties were exogamous, while clan organization was both patrilineal and exogamous. Although some have suggested that the clans were totemic, Gifford (1918:218) disagrees. Gifford attributes the patrilineal clan and moiety form of organization to links with southwestern tribes (Gifford 1918:218); others would identify Serrano organization as a typically Shoshonean social structure.

Each Serrano clan had a hereditary leader, or *kika*, and an assistant who was a ceremonial leader, or *paha* (Strong 1929:17–18). These individuals were central to the ritual life of the Serrano, providing leadership during yearly ceremonial periods. In the context of discussions concerning mourning ceremonies, Strong (1929:32) indicates, "Immediately after death, much of the property of the deceased was destroyed," and Bean and Smith (1978:572) note that cremation was practiced concurrent with the destruction of most of the deceased's possessions.

Kroeber (1925:617) indicates that villages were generally located where streams emerged from the foothills. Bean et al. (1981:85–86) are considerably more precise in their descriptions of Serrano village and camp locations. Groups of lineages lived in villages at the valley margins in the winter and in smaller encampments at higher elevations in the summer. Proximity to water sources and adequate arrays of resources predictably dictated settlement location choices. Localities rich in oaks, pinyon, yucca, agave, or seasonal migratory fowl, for example, were favored for population convergence at peak "harvest" times. Streamside areas, canyon mouths by alluvial fans, and flats near springs or lakes were frequently chosen as prime locations, with avoidance of wind and floods, and adequate defensive position also of considerable concern. Bean et al. (1981:85) note also that individual homes were quite scattered across the landscape in order to ensure privacy, to the extent that some "villages" covered up to five square miles. This clearly has important implications for archaeological interpretations of occupation sites.

Serrano residences were circular, domed, willow-and-tule thatch structures. The home of the *kika* also served as a large ceremonial house, and large, semi-subterranean, earth-covered sweathouses were found immediately adjacent to streams in most villages (Bean and Smith 1978). Subsistence during winter months consisted mostly of reliance on stored foods (acorns, pinyon nuts, mesquite beans) and some fresh meats and greens. In the spring, agave, cacti, greens, and a mix of game provided the bulk of the food resources. Many fruits and seeds became available during the summer months, but perhaps the richest season was autumn, when major harvests of acorns, pinyon nuts, mesquite beans, and screwbeans occurred, and when communal rabbit hunts took place in the context of much feasting and ritual activity (Bean et al. 1981:86–87). In addition to occupation sites and food procurement sites, rock cairns ("offerings" places along trails), cupule petroglyph sites, hot springs (sacred areas), sources of lithic materials suitable for the production of stone tools and other artifacts, and trails represent important land uses by the Serrano.

Ethnographic interviews (by Harrington, Gifford, Kroeber, Strong, and more recently, Bean) indicate that several Serrano clan territories are associated with specific zones within the San Bernardino National Forest: the *Pauwiatum* clan with the Santa Ana River near Big Bear Lake, the *Wa'acham* clan with the Santa Ana River Wash and Mill Creek areas, and the *Yucaipaiem* clan with the Yucaipa area, for example (Bean et al. 1981:60–65). Specifically, several village place names, region names, and places of ritual significance are recorded, based primarily on ethnographic notes from John Peabody Harrington's ethnographic interviews in 1918. The Santa Ana River from East Highlands up to its source was known as *Hunapat patshr*, meaning "bear water." *Kaviktaviat* may describe the Bear Creek Canyon area, *An'tsipa't* may refer to narrow passages of the Santa Ana River Canyon near Bear Creek, *Kutaina't* and *Pakaviat* are the names of villages in the Seven Oaks area just upstream from Filaree Flat (this whole area is described as an important acorn harvesting zone), and *Wivaviat* is equated with archaeological site CA-SBR-2324, where grinding stones, projectile points, and other artifacts were recovered before the site was destroyed years ago (Bean et al. 1981:133–145). This latter site lies just to the northeast of Filaree Flat, and is identified as an agave harvesting and processing site (Bean et al. 1981:145). A sketch map produced by Harrington in 1918 depicts *Wivaviat* on the north side of the Santa Ana River, just east of Clark's Grave Road.

Other sites known in the Cajon Pass region include *Amuscopiabit*, *Guapiabit* (also known as Las Flores Ranch), and *Atongiabit*. Both *Amuscopiabit* and *Guapiabit* were described by Nuez in 1819, Whipple in 1856, Zalvidea in 1906, and by numerous travelers during the middle and latter parts of the nineteenth century. All three sites were recorded by Gerald Smith in 1938 and 1939 and were first subjected to subsurface investigations in the late 1930s, 1940s and 1950s (Basgall and True 1985:3.15-3.16; Smith 1963).

During the early historic era, Serrano peoples and their culture were dramatically affected by the Spanish mission system. San Gabriel Mission was established in 1771 in the Los Angeles area, and baptisms of Serrano individuals began by 1785. Much later, in 1819, a new mission *asistancia* was founded in the San Bernardino Valley at the Indian rancheria of *Guachama*. An irrigation ditch (the Mill Creek Zanja) was built with Serrano labor in 1819–1820, and agriculture became important in the valley. A more thorough review of relations between native inhabitants and early missionaries and explorers in the region is provided in the following sections.

2.5 HISTORICAL SETTING

2.5.1 Introduction

The historical background of the San Bernardino Mountains and adjacent areas is best presented by adhering to the familiar divisions of local history which have become standardized in the area literature. Beginning with the Spanish (Mission) Period in 1771, the progression moves rapidly through the poorly documented Mexican (Rancho) Period into the American Period, marked by the arrival of Mormon scouts in 1850. The Post-Mormon American Period begins with the recall and departure of the Latter Day Saints in 1857, and continues into modern times. In the following discussion, important regional historical events during these periods are summarized, followed by a more detailed discussion of the historical developments in the immediate Project vicinity.

2.5.2 European Exploration Period: 1771–1810

The earliest significant moment in the recorded history of the region was the arrival of Portola's former Lieutenant Pedro Fages who, as military governor, accompanied an expedition from San

Diego in pursuit of deserters from the Presidio. Fages kept a journal which recorded that the party traveled along the west side of the San Jacinto Mountains to what is now Riverside, continued north into the San Bernardino Valley, and then crossed into the Mojave Desert by way of the Cajon Pass (Allen 1974:24). The record of Fages' transit across the San Bernardino Valley in 1772 is the first written account of the area to have survived into modern times.

European settlement and development of the San Bernardino Valley proceeded slowly. The year 1819 is often cited as when the San Bernardino *asistencia*, or mission outpost, was established at *Guachama*; the site of the outpost is near the present location of the restored asistencia on Barton Road. The following year, the local Indians began construction of the *zanja*, or ditch, under the direction of Father Zalvidea from Mission San Gabriel. The *zanja* was completed in 1823 (Knight et al. 1962:2). During the late 1810s and early 1820s, the San Bernardino asistencia was active, functioning as the rancho headquarters.

In 1826, the first American citizen to enter California over land, trapper and mountain man Jedediah Strong Smith, reached the San Bernardino Valley. Guided by Mohaves, as was Father Garcés, Smith left the Colorado River on November 10, 1826, and arrived at the summit of Cajon Pass 15 days later. He and his men were taken in and cared for at a rancho some five miles short of San Gabriel, where they gave themselves up to the Mexican authorities. Smith's party left San Gabriel, apparently for his Salt Lake camp, on January 18, 1826 (Morgan 1953:243), with warnings from the Mexican authorities to never return to California. Despite the warnings, Smith returned to California and the San Bernardino Valley the following August 1827, again by way of the Cajon Pass. Detained for several months by the Mexican authorities and determined never to return, Smith was eventually allowed to leave on December 30, 1827.

The unsettled political condition of California during the 1820s was in part due to the turmoil in Mexico in the wake of the revolution. Most disturbing in California were the decrees issued by the Mexican authorities for the secularization of the mission system. The Indians were "liberated" by decree in 1826, followed by orders for the withdrawal of the Franciscans a few years later (Elliot 1883:27). On August 17, 1833, the Mexican Congress passed the Secularization Act which placed all mission property into the hands of civil administrators. The former Mission Indians became the most vulnerable victims in the resulting shuffle and land grab, and their numbers were rapidly decimated by disease and culture shock. Those Indians surviving on rancherias throughout the valley apparently experienced mainly a change of masters, from padre to California ranchero. This relationship of California "padron" and Indian stock tender worked as well as any system could for the aboriginal population.

In the 1830s and 1840s, the Southern Paiute and Mohaves with their well developed warrior class and knowledge of the trails and desert water holes, began their most aggressive raids on these early outposts. After their first raid in 1832, Paiutes again attacked the San Bernardino asistencia in October 1834, killing Christianized Indians and taking stored grain and altar vessels (Knight et al. 1962:2). They returned again in December 1834, burned buildings, and took Father Esteneza hostage. This last attack, coupled with the decree of secularization, dealt the final blow to the San Bernardino asistencia; it was abandoned shortly thereafter.

2.5.3 The Rancho Period: 1834–1850

Throughout the Rancho Period, the ranchers in the San Bernardino Valley were plagued by large stock losses (primarily horses) resulting from the Indian raids. By 1840, the "Hawk of the Mountains," Walkara, said to be chief of the Ute Indians, was leading well-organized raids on the valley. Walkara commanded a band of 200 men "all of whom were well armed with the best American guns and riding in Spanish saddles on the best mounts available in the western region of North America" (Waitman n.d.:5).

In 1842, in a desperate attempt to protect their stock animals, Juan Bandini, owner of the Jurupa Rancho, and the Lugo family, who had received eight leagues of the Rancho San Bernardino, and had moved into the abandoned asistencia for the purposes of settling and raising stock, decided to contract for protection with a group of New Mexicans under the leadership of Lorenzo Trujillo, a native of Taos and of Pueblo Indian descent. In exchange for good land for settlement by the New Mexican clan, the "Fighting Trujillos" agreed to establish a colony in the valley and thus protect the ranchero's property. They accepted the Lugo family's offer first, and then in 1843 the majority moved to land later known as the "Bandini Donation," consisting of one-half league on the Jurupa Rancho (Vickery 1977:31).

With these two native settlements guarding the valley, the problem of marauders entering by way of Cajon Pass began to diminish. Often with ranchero Don Benito Wilson in command, mounted parties rode up into the mountains in pursuit of Walkara and his men, which reduced the success and frequency of the raids. However, they were unable to defeat Walkara, who continued actively raiding almost up to his death in 1855 (Waitman n.d.:9).

The earliest historically known use of the Santa Ana River Canyon as a transportation route in the San Bernardino Mountains took place in 1845, when Benjamin Wilson led a party of men up the canyon in an expedition against the Indians who had been raiding livestock in the San Bernardino Valley area. The account of Wilson's travels is significant in that it served as the basis for subsequent use and exploration of the route and San Bernardino Mountain region (Arnold et al. 1987).

2.5.4 The American—Mormon Period: 1851–1857

Wilson's trip up the Santa Ana Canyon opened a new pathway to the mountains. In particular, the stories told of encountering and killing numerous bears at what is now Big Bear Lake served to attract trappers and to develop the fur trade in the San Bernardino Mountains (Drake 1949:13). Trappers undoubtedly utilized the Santa Ana Canyon route as a means of access to the Big Bear area, and their successes most certainly led to a more general circulation of knowledge regarding the region.

A far greater impact to the region was the direct result of the development of the lumber industry. The Mormon Period from 1850 to 1857 initiated "...major farming efforts and the start of timber-cutting in the mountains…From this time on, there was widespread homesteading and farming with the diversion of the mountain streams for irrigation" (Hill 1985:3–4). Although the rugged nature of the Santa Ana Canyon precluded the transportation of lumber, it is likely that the canyon was used as an exploration route into the interior region. Following the discovery of gold in the mountains around Bear Lake in 1860, lumbering would rapidly become a major industry in the Bear Valley area (Johanneck 1975:47).

During the period from 1845 to 1860, the route to Bear Valley by way of Santa Ana Canyon was traveled by hunters, trappers, lumbermen/explorers, and prospectors. From 1855 to 1860 the canyon was relatively heavily utilized by miners, setting the stage for a true gold mining boom. Santa Ana Canyon was established as the gateway to the gold fields following Billy Holcomb's gold discovery in what is now referred to as Holcomb Valley (Hatheway 1987).

The Mormon experience in California has its roots in the Mexican-American War years (1846–1848) when the Mormon Battalion was formed in Iowa and sent to California. Although too late to participate in the battle, the Mormon soldiers did observe the San Bernardino Valley during the fall harvest, and returned to Salt Lake with glowing reports of the areas potential. On March 14, 1851, a group of approximately 500 Mormons left Salt Lake with the intention of establishing a Mormon colony in the area. Camping for the summer in a sycamore grove in Cajon Pass, the Mormon families waited for the results of their leaders' negotiations to buy land to build their town. In September 1851, Mormon leaders Lyman and Rich bought the 35,000-ac Rancho de San Bernardino from Antonio Lugo for $77,500, and development of the town was immediate (Allen 1974:33). A stockade was constructed, crops were planted, and a road was built up into Waterman Canyon for lumber. In 1852, a grist mill was completed, and in the following year the first county election was held, and the post office in San Bernardino was opened (Knight et al. 1962:6). However, after several years of prosperity, in 1857, trouble between the Mormon Church and federal government became so intense that Brigham Young called the faithful to return to Salt Lake City. Roughly two-thirds obeyed, packed their belongings, and in the winter of 1857–1858, left their homes for Salt Lake City.

2.5.5 American Period: 1850–1880s

Through the 1860s, it was initially the freight wagon trains bound for Fort Mojave under military escort which functioned to restore law and order in the San Bernardino Valley. The once little town of San Bernardino became a major trade and outfitting center, catering to the increasing commercial stage and wagon traffic. However, those residing in the valley were to face three major disasters during the decade of the 1860s.

In 1862, a smallpox epidemic, which began in Los Angeles, swept the entire state taking many thousands of lives, and decimating the San Bernardino Valley's Indian population. Deaths were said to be so numerous that bodies of the victims were left in the open for days before undertakers could bury them (Waitman n.d.:56). Also in 1862, a major flood struck the valley and dramatically changed the topography. What once had been fertile bottomland below Santa Ana Canyon and Mill Creek became a wide, rock-filled wash unfit for agricultural purposes (Altschul et al. 1989:73). Following the flood in the winter of 1861–1862, a drought hit southern California; almost no rain fell until February 1864, by which time thousands of livestock had died from hunger and thirst. One estimate based on census data showed a loss of 71 percent of the total cattle in Los Angeles County (Cleland 1941:180). Considering that cattle-ranching had been the dominant occupation of the California residents of the San Bernardino Valley up to this time, the impact of the drought was catastrophic to say the least.

Desperate for water, ranchers in the San Bernardino Valley drove their cattle and sheep up through the canyons and into the high country of the San Bernardino Mountains for summer pasture. By 1864, Holcomb and Bear Valleys, as well as Coxey Meadow, Little Pine Flat, and Big Pine Flat were

full of grazing cattle, horses, and sheep. The first real cattle ranch in the San Bernardino Mountains was H.E. Parrish's Mojave Rancho along the west fork of the Mojave River in Summit Valley. Parrish drove his cattle there during the 1862 drought and patented 160 ac the following year. In late 1863, Parrish sold his Mojave Ranch to Elijah K. Dunlap for $2,500, "together with the Rocking P brand and 400 head of neat cattle" (Robinson 1989). Dunlap built a ranch house and other buildings, and patented 400 additional acres in Summit Valley. The Dunlap Ranch was a major cattle operation during the remainder of the 1860s (Robinson 1989).

Through the 1860s to 1870s, San Bernardino continued to draw settlers and tradesmen. Citrus farming, which would eventually become an extremely important economic factor in the areas history, was introduced by Anson Van Leuven in 1862 (Knight et al. 1962:10). Other dramatic changes to the San Bernardino Valley and surrounding mountain regions occurring during the 1860s through the 1880s were brought about by an intensification of silver and gold mining operations within the mountains and the deserts beyond. Lumbering came to the San Bernardino Mountains in 1883 when Oscar Newberg and Dan Rathbun erected their Summit Shingle Mill at Cedar Springs on the west fork of the Mojave River. In 1884, Charles Bennett and John Shaver bought the saw mill and moved it higher into the Mountains.

By 1890, San Bernardino County had a population of about 35,000, the vast majority of whom lived west of the Cajon Pass. The largest city in the valley was San Bernardino which, by this time, had artesian municipal water, gas and electric lighting, several banks, newspapers, churches, schools, and a developed road system. Riverside was the second largest city, but was soon to become the seat of its own county. Other population centers established by this time were Colton, Redlands, South Riverside, Rincon, Etiwanda, Grapeland, and Ontario (Allen 1974:34).

In 1883, the California Southern Railroad, later known as the Atchison Topeka & Santa Fe Railroad (AT&SF), was built over the Cajon Pass; the railroad reached the Atlantic & Pacific Railroad (later known as the Union Pacific Railroad) junction in Barstow/Dagget in 1885. Throughout the 1890s and the early 1900s the railroads were looked upon as the primary means to accomplish any and all transportation needs. Although easily able to make the ascent up Cajon and San Gorgonio Passes, a railroad was not the solution to the transportation problem faced by the San Bernardino Mountain resorts. In 1887, the San Bernardino, Arrowhead and Waterman Railroad were incorporated to build a line up Waterman Canyon; however, the track was laid only as far as Harlem Springs. The first railroad to reach the top, an electric line between Arrowhead Hot Springs and San Bernardino, was built in 1906 (Carrico et al. 1982:4-30).

Lumbering, dam building, road improvement, and sporadic mining continued in the San Bernardino Mountains through the late 1800s and early 1900s. The Big Bear District began to acquire permanent residents, and recreation became the theme of mountain land use. A number of camps were established during these years which promoted recreational use of the mountains, such as Skyland Camp, Pioneer Camp, Elder's Grove Camp, Blue Jay Camp, and others (Carrico et al. 1982:4-46). In 1893, President Benjamin Harrison created the San Bernardino Forest Reserve, which became a national forest in 1907 (Knight et al. 1962:23). Gus Knight's Big Bear Hotel opened in 1888, and attracted many tourists into the mountains until it burned down in 1900. It was replaced, however, and eventually evolved into the Pine Knot Lodge. The community of Big Bear Lake grew up around the lodge, supported by the increasing popularity of all mountain resorts (Carrico et al. 1982:4-69).

The advent of the automobile caused a dramatic increase in the mountain recreational industry, which for years had struggled with limited, and somewhat difficult, access into the rugged, steep terrain. The first automobile reached the crest of the San Bernardino Mountains in 1907. In 1910, the first truck to make the top was hauling cement for the Lake Arrowhead Dam (Knight et al. 1962:29). The early automobile routes were expensive toll roads and they were dangerous to drive. Finally in 1915, the "Rim of the World Drive" up Waterman Canyon was completed as a public highway open to motorized vehicles.

2.5.6 Rim of the World Drive and the Town of Rimforest

The history of Rim of the World Drive and the Town of Rimforest has been summarized by Hatheway (2009) as follows.

Rim of the World Drive: Dedicated on July 17 and 18, 1915, the Rim of the World Drive was touted as a 101-mi-long scenic auto route that was immediately recognized as a true wonder of engineering and beauty, where rugged canyons and mountain peaks were conquered and nature's wonder was miraculously revealed at every turn. The "Rim" route opened the mountains to a new generation of tourists, campers, and holiday seekers. By 1917, the regular holiday pilgrimages had begun in earnest, and mountain auto stages had established regular service over what was now a State highway.

Rider's California: A Guide-Book for Travelers provided the schedule for seasonal group auto tours along the Rim of the World Drive from Los Angeles, for those who could afford the tour. One of the schedules published in 1922 reads,

> The Motor Transit, Co. during the season runs a daily special from Los Angeles at 7 a.m., from San Bernardino at 10:00 a.m., reaching Pinecrest at 12 and Arrowhead Lake at 12:45 p.m. There is daily local service between Arrowhead Lake and Big Bear Lake in 3 hrs.: also between Big Bear Lake and Redlands, via Mill Creek Canyon in 5 hrs. 20 min [Collection of Roger Hatheway].

A promotional brochure issued by the San Bernardino Chamber of Commerce in 1929 describes the 101 mi on the "Rim of the World" through the San Bernardino Mountains:

> The San Bernardino Mountains are famed the world over for their natural attractions, as well as for the comfort which numerous lodges, camps, and taverns located in sheltered spots along the rocky ways, afford the traveler on foot, in the saddle, or journeying in the more convenient automobile way. The San Bernardino Mountains are penetrated by the most modern mountain highway system in the world. The Rim-of-the-World Drive has gained world-wide recognition because of the magnificent mountain scenery through which it takes the tourist. For a distance of fifty miles or more it winds along the crest of the mountains, alternating in outlook from the Mojave desert and never ending mirages on the north, to the green and fertile San Bernardino Valley on the south. It is a journey through wonderland, and is a revelation to every visitor, each turn in the road presenting some new charm, each winding trail disclosing some new beauty, smooth-surfaced lakes coming into view here and there. It is a trip of never-ending delight [Collection of the author].

Another early promotional brochure describes the Rim of the World Drive as:

> An improved highway embracing many engineering feats and affording an interesting and worth-while scenic trip, is located in the heart of the San Bernardino Mountains. The gateway to this 101-mile mountain drive is San Bernardino. Passing, through Waterman Canyon, one climbs 13 miles, up many curves and switchbacks, to Crestline, proceeding thence along the crest of the San Bernardino Range above the Valley of the Little Bear and its beautiful, placid Lake Arrowhead. The village of Lake Arrowhead is a modern community, with shops, hotels, and every convenience for all forms of outdoor sports, both summer and winter. Continuing the journey, one passes through Running Springs Park and Fish Camp, a beautiful timbered area, and up the new road to the dam at the west end of Big Bear Lake. All the resorts and public camps on the lake are accessible from this point. From many points along this 40-mile crest drive the traveler sees spread out before him checker-board orange groves, thriving cities, misty rolling hills, and in the distance the blue waters of the Pacific stretching to the far horizon.
>
> From Big Bear Lake the return journey is made by way of Mill Creek Canyon, Mentone, and Redlands, or over the City Creek Road. The former route is very beautiful and takes one through fine forests of pine and fir, down the tortuous curves of the Mill Creek grade, and out into the orange-grove lands of the Santa Ana Valley. From this road side trips may be made to Upper Santa Ana River Canyon and Upper Mill Creek" [Collection of Roger Hatheway].

By the mid-1920s, California highway planners and engineers realized that the capacity of the now famous Rim of the World Drive had exceeded all expectations. On a holiday weekend such as Memorial Day or Labor Day, it could take up to four hours to reach the crest from San Bernardino, and lines of traffic snaked up the mountain until well after midnight. As a result, a "High-Gear" road was planned that eliminated dreaded switchbacks, and ideally allowed the driver of a totally stock automobile to travel from San Bernardino to the mountain crest entirely in high gear. First planned in the mid-1920s, construction was underway by 1928, the switchbacks were eliminated by 1931, and the completed highway was officially opened on October 21, 1933. Scenic rockwork and chains were later added as part of a W.P.A. funded program to increase the safety and beauty of the drive. On February 10, 1936, the Lake Arrowhead Women's Club honored highway engineer E. Q. Sullivan for his work on the newly improved highway.

Construction of the high gear road on the Rim of the World Drive was a genuine breakthrough. By the early 1930s, mountain resorts and communities were linked to the valley by a blacktop highway, better facilitating the huge Memorial Day, Fourth of July, and Labor Day weekend traffic blowouts. Roadway improvements continued, and by the late 1960s, the present four-lane route was completed "up the hill." The segment of the Rim of the World Drive/Highway 18 from the Crestline Cut-Off to Rim Forest was completed during the years 1930–1933. Today, the historic Rim of the World Drive threads its way through the most urbanized mountains in America. Assembled from many component parts and continuously realigned and rebuilt from 1915 to the late 1960s, it is the very "backbone" of the San Bernardino Mountains connecting all towns, resorts, and recreation areas.

Town of Rimforest: The area in the vicinity of today's Rimforest community is reported to have once been known as Redwood Springs Ranch, under the ownership of Samuel A. Thompson (Garrett 1998). Little development activity took place in the area until April 1, 1921, when Thompson was granted rights to Lots 10 and 13 of Section 29, and Lots 11, 12, and 16 of Section 30, Township 2 North, Range 3 West of the San Bernardino Meridian, California, comprising nearly 47 ac (BLM 2014). Thompson, and his wife Mary, quickly subdivided their newly acquired land. Today, the central portion of the San Bernardino Mountain community of Rimforest is primarily composed of

four tracts filed between 1921 and 1946. The first two tracts were filed by S. A. Thompson and Mary E. Thompson in 1921 and 1929. Rim of the World Subdivision Number 1 was filed in 1921, and Rim of the World Subdivision No. 2: Tract No. 2414 was filed in 1929. Two tracts, Tract No. 2797 and Tract No. 2986, were subdivided in 1946 (County of San Bernardino 1921, 1929, 1946).

Historic aerial photographs from 1938 and 1953 indicate that considerable growth took place during the period of time between photographs (Historic Aerials.com 2014). In 1938, there was little development in the area, and it was confined to construction directly adjacent to Highway 18 (Rim of the World Drive). By 1953, however, additional buildings appear to have been built within the two tracts filed in 1946 (Tract No. 2797 and Tract No. 2986), expanding the limits of the town beyond the frontage of the Highway. Considerable new construction also took place in both directions along Highway 18 (Figure 3).

Figure 3 A ca. 1940s "Frasher's Fotos" postcard depicts a winter scene along Rim of the World Drive/SR 18 through the town of Rimforest (view to the west).

The post-World War II development and growth of the Rimforest community is described in a brief *History of Rim Forest*, written by Robert Prouix in 1950 (Prouix 1950). Prouix provides a first-hand account of activity in the community from ca. 1947 to 1950. The text quoted below was originally part of Prouix's class assignment for Mrs. Edith A. Fessenden's social science class at the Rim of the World Elementary School in 1950. Grammatical and spelling errors are quoted verbatim.

> The highways was originally supposed to go where Pine Avenue is now, but some political movement changed it to where it is now. About 3 years [1947] ago Rimforest was officially named and registered with the auto club then signs went up on the highway. Last year the speed

> limit signs were put up. Since Sam Thompson homesteaded Rimforest it built up a lot and many improvements have been made as the water improvement and many others. Rimforest today consists of 3 restaurants, 2 markets, 1 lumber yard, a lodge, a Post Office, a fire department, and 3 motels. One of the markets is in the same building as the Post Office, and once there was a gas station to[o], the building was built 1948, 1 ½ years ago the Post Office was put in, last year a yardage store put in with the Post Office. Carl Jensen owned the market first then he sold to Harold Fickenseher who now has it. Our postmaster is Al Missner. The other market was bought by Red Moye in 1947 then he sold it to Paul Bauman who now has it. The restaurant owners are John Turner who built his own restaurant, Jane and Peggy Edwards own the Mountain Kitchen, and Ma and Pa Horton own the Malt Shop which was built in 1947 by Mrs. Poupitch. The lumber yard is owned by Frank Holland and Chris Gustafson. The Valley Vista Lodge is owned by Mrs. Adams. The fire department is made up of volunteer fireman. The motel owners are Rex Barber, Mr. Rooney, and Mr. Tudeck [Collection of Roger Hatheway].

In Lewis Garrett's, *Place Names of the San Bernardino Mountains* (1998), published by the Big Bear Valley Historical Society, he describes the town of Rimforest as a residential and commercial community on Highway 18 near its intersection with Daley Canyon Road, where various lumber, hardware, glass and other building supply and maintenance companies serving the area are located, as well as homes. The first post office at Rimforest opened in 1949.

3
ARCHAEOLOGICAL LITERATURE AND RECORDS SEARCH

Prior to implementing the cultural resources survey of the Project area, a cultural resources literature and records search was conducted at the SBAIC, housed at the San Bernardino County Museum, Redlands, on July 11, 2012. The objective of the records search was to determine whether any prehistoric or historic-period resources had been previously recorded within or near the Project APE. The scope of the records search included the Project APE and all the land within a one-mile radius of the Project boundaries. Sources consulted during the archaeological literature and records search include: the *National Register of Historic Places* (NRHP); the *Office of Historic Preservation Archaeological Determinations of Eligibility* (ADOE); California Register of Historical Resources (California Office of Historic Preservation); California Department of Parks and Recreation: Historic Properties Directory; California Points of Historical Interest; California Historical Landmarks; California Inventory of Historic Resources. Historical maps consulted during the literature and records search include the Redlands 30' U.S. Geological Survey quadrangle dating to 1901, an Automobile Club of Southern California road map of the San Bernardino Mountains dating to 1916, and a map of the Rim of the World Drive in the San Bernardino Mountains issued by the San Bernardino Chamber of Commerce in 1929.

Records on file at the SBAIC indicate that as many as 55 project-related cultural resources studies have occurred in the vicinity of Rimforest since the 1970s. Four of these previous cultural resources surveys involved portions of the Project APE (Table 1).

Table 1
Previous Cultural Resources Studies within One-Mile of the Project Area

SBAIC Reference #	Year	Author	Title
1060788	1979	Robert E. Reynolds	Archeological Reconnaissance Report: Mud Flat Floral Conversion.
1060958	1980	Joanne M. Mack	Cultural Resources Evaluation of Camp Pinecrest, California.
1060959	1980	Gerald A. Smith	Addendum: Cultural Resources Evaluation, Pinecrest Camp Properties.
1060960	1981	Christopher E. Drover	A Spatial Evaluation of Historic and Prehistoric Resources in the North Central Portion of the Pinecrest Camp Development Near Twin Peaks, California.
1061324	1982	Michael K. Lerch	Archaeological Reconnaissance Report: Strawberry Unit Grazing Allotment (Warner Hodgdon Project).
1062467	1991	Michael K. Lerch	Cultural Resources Assessment of Tentative Tracts 15261 and 15262, Pinecrest Planned Unit Development Phase II, Twin Peaks Area, San Bernardino County, California.
1062493	1992	Roger G. Hatheway	A Determination of Eligibility/Significance Report and an Archaeological Survey for the Alpine Covenant Conference Center.
1062743	1993	Marilyn Mlazovsky	Blackfoot Trail East Road Widening.
1062906	1991	Judith Reed	Strawberry Peak Tower.

Table 1 (continued)

SBAIC Reference #	Year	Author	Title
1062907	1993	Brian D, Dillon	Archaeological Survey and Impact Assessment of the Dogwood-Bluejay Canyon Improvement Plan: A 120 Acre Parcel in the San Bernardino Mountains, San Bernardino County, California.
1063183	1975	Albert N. Hess	Blue Jay Resort, Inc. Land Exchange.
1063205	1995	Charlotte Wheland	County of San Bernardino Debris Disposal.
1063388	1998	Lee DiGregorio	Crest Park Land Exchange.
1063395	1999	Curt Duke	AT&T Wireless Services Facility C593.
1063397	1998	Patricia Grossman	Grass Valley Parcel.
1063398	1997	James Bridges	Little Bear THP.
1063399	1999	Linda Sandlein	THP#3-99-1SBR Preharvest Inspection.
1063402	1972	Gene Taliaferro	Southern California Gas 12” Pipeline Replacement from Campus Crusade via Strawberry Road to Mud Flats via Historical Daley Toll Road to Rim Forest.
1063718	2001	E. Chandler, C. Cotterman, and V. Van Hemelryck	Cultural Resources Investigation of the Proposed Royal Adventure Youth Camp near Twin Peaks, San Bernardino County, California.
1063995	2003	Josh Smallwood	Identification and Evaluation of Historic Properties: Alpine Water User’s Association New Well Site in the Unincorporated Community of Twin Peaks, San Bernardino County, California.
1064085	2004	Fred Budinger	A Historic Property Survey for the 1.5 Acre AT&T Strawberry Peak Telecommunication Site Located near Rimforest, San Bernardino County, California.
1064236	2004	Michael Mirro	Cultural Resources Survey of 40 Acres on the Church of the Woods Property for the Natural Resources Conservation Service.
1064240	2004	Michael Mirro	Cultural Resources Survey of 263 Acres on the Pinecrest Conference Center Property for the Natural Resources Conservation Service.
1064954	2004	Applied EarthWorks	Cultural Resources Survey of a 14-Mile Segment of Highway 18 near Lake Arrowhead, California.
1064961	2004	Applied EarthWorks	Cultural Resources Survey of Highway 189 between the State Route 18/189 Junction and the City of Lake Arrowhead, California (PM 0/5.6; 5.6 miles).
1064992	2005	Applied EarthWorks	Cultural Resources Survey of Approximately 23 Acres on the Lower Crest Road Project Area for the Natural Resources Conservation Service.
1064999	2004	Applied EarthWorks	Cultural Resources Survey of 37 Acres on the Lutheran Conference Center Property for the Natural Resources Conservation Service.

Table 1 (continued)

SBAIC Reference #	Year	Author	Title
1065006	2005	Applied EarthWorks	Cultural Resources Survey of Approximately 17 Acres within the Strawberry Flats Project Area for the Natural Resources Conservation Service.
1065012	2005	Applied EarthWorks	Cultural Resources Survey of Approximately 41 Acres within the Naraghi Project Area for the Natural Resources Conservation Service.
1065016	2006	Applied EarthWorks	Cultural Resources Survey of San Bernardino County Road Segments near Lake Arrowhead and Lake Gregory, California.
1065019	2006	Applied EarthWorks	Cultural Resources Survey of 137 Acres within the North Road Project Area for the Natural Resources Conservation Service.
1065021	2006	Applied EarthWorks	Update: Cultural Resources Survey of 137 Acres within the North Road Project Area for the Natural Resources Conservation Service.
1065028	2006	Katherine H. Pollock	Deteriorated Pole Replacement Project: Archaeological Survey of One Pole Location on the Rim 12kV Transmission Line, San Bernardino National Forest, San Bernardino County, California.
1065044	2005	Katherine H. Pollock and Michael K. Lerch	Deteriorated Pole Replacement Project: Archaeological Survey of Six Pole Locations on the Cushenbury 12kV, Rim 12kV, and Gold Hill 12kV Transmission Lines, San Bernardino National Forest, San Bernardino County, California.
1065048	2006	Katherine H. Pollock	Deteriorated Pole Replacement Project: Archaeological Survey of Twenty-eight Pole Locations on the Roeding 12kV, Gill 12 kV, Rim 12kV, Tetley 12 kV, Elster 12kV, Soda Springs 12kV, and Sawpit 33kV Transmission Lines, San Bernardino and Tulare Counties, California.
1065518	2006	Michael Brandman Associates	Cultural Resource Records Search Results and Site Visit for Cingular Telecommunications Facility Candidate ES-0116 (189 & Sierra Vista) Route 189 and Sierra Vista, Twin Peaks, San Bernardino County, California.
1065519	2005	Michael Brandman Associates	Cultural Resource Records Search Results and Site Visit Results for Sprint Telecommunications Facility Candidate SB54XC481F (Blue Jay), 626 Dogwood Canyon Road, Blue Jay, San Bernardino County, California.
1065528	2007	Applied EarthWorks	Cultural Resources Survey of Approximately 13.6 Acres in the Strawberry Flats Fuel Modification Project Area for the Natural Resources Conservation Service.
1065529	2006	Applied EarthWorks	Cultural Resources Survey of 512 Parcels Encompassing 252.4 Acres within the Urban Large Parcel CF 195 Project Area for the Natural Resources Conservation Service.
1065531	2006	Applied EarthWorks	Cultural Resources Survey of 401 Parcels Encompassing 175.2 Acres within the Urban Large Parcel LA 207 Project Area for the Natural Resources Conservation Service.

Table 1 (continued)

SBAIC Reference #	Year	Author	Title
1065532	2007	Applied EarthWorks	Cultural Resources Survey of 238 Parcels Encompassing 107.07 Acres within the Urban Large Parcel RF 209 Project Area for the Natural Resources Conservation Service.
1065534	2007	Applied EarthWorks	Cultural Resources Survey of Approximately 134.8 Acres in the Dogwood II Project Area for the Natural Resources Conservation Service.
1065646	2007	Applied EarthWorks	Cultural Resources Survey of Approximately 24.5 Acres in the Lakewood Project Area for the Natural Resources Conservation Service.
1065820	1994	Mark V. Thornton	A Survey and Historic Significance Evaluation of the CDF Building Inventory.
1065880	2007	Joshua Patterson	Archaeological Survey Report for Southern California Edison Company Cut Over to Relieve Load on OL 4kV Bank Project, San Bernardino County, California.
1065895	2007	Applied EarthWorks	Cultural Resources Survey of Approximately 116.5 Acres in the North Road Fuel Modification Project Area for the Natural Resources Conservation Service.
1065904	2007	Applied EarthWorks	Cultural Resources Survey of Approximately 24.0 Acres in the Calvary Chapel Project Area for the Natural Resources Conservation Service.
1065905	2007	Applied EarthWorks	Cultural Resources Monitoring of State Route 189 in the San Bernardino Mountains for the Natural Resources Conservation Service.
1065947	2008	Applied EarthWorks	Cultural Resources Survey of 107.0 Acres on the Blue Jay Fuel Modification Project Area for the Natural Resources Conservation Service.
1066455	2008	John S. Kessler	Confidential Archaeological Letter for the Calvary Chapel Forest Fire Prevention Exemption, San Bernardino County, California.
1066456	2008	John S. Kessler	Confidential Archaeological Letter for the Naraghi Forest Fire Prevention Exemption, San Bernardino County, California.
1066470	2009	Roger D. Mason and Roger G. Hatheway	Monitoring Removal of Debris for Slide Fire (title page missing, title uncertain).
1066761	2005	Jill K. Gardner, Audry Williams, Hubert Switalski, and Mark Q. Sutton	A Heritage Resources Inventory for the Hazard Tree Removal Project in the Mountain Top and Front Country Districts of the San Bernardino National Forest, on behalf of the Southern California Edison Company.
1066798	2010	Peter Feller	Confidential Archaeological Letter for the Dogwood Blue Jay CYN Assoc. Forest Fire Prevention Exemption, San Bernardino County, California.
1066799	2010	Michael Brandman Associates	Cultural Resources Records Search and Site Visit Results for T-Mobile USA Candidate IE24125-B (Strawberry Peak), 216110 Strawberry Peak, Lake Arrowhead, San Bernardino County, California.

As a result of these studies, 44 cultural resources have been documented within a one-mile radius of the Project APE (Table 2). These include 40 historic-period resources, three prehistoric resources, and one multicomponent site that consists both prehistoric and historic-period elements. The

prehistoric sites include artifacts left behind from habitation along or near reliable water sources, where dark midden soil, ground stone and chipped-stone tools, flakes, and debitage have been found. Isolate artifacts such as manos (hand-held grinding stones) have also been recorded in the area. The presence of these prehistoric sites and isolates attest to the use of the area by Native American populations for thousands of years. The historic-period resources that have been documented include road segments, refuse deposits, cabins, foundations, wells and cisterns, and other forms of built-environment that have occurred in the area since the early twentieth century when Euro-Americans first began to settle and develop the Rimforest area.

Three historic-period resources have been previously recorded within or immediately adjacent to the Project APE. These include a segment of the historical 1915–1916 alignment of Rim of the World Drive (36-007049); a segment of Daley Canyon Toll Road (36-003868); and a ca. 1940s wood-frame cabin along the south side of SR 18 in the town of Rimforest (no address, 36-012786). These resources are described further below.

Table 2
Cultural Resources Located within One-Mile of the Project APE

Primary	Trinomial	Description
36-000928	CA-SBR-928	Prehistoric habitation site containing portable metates, a mano, flakes, an arrow point, and dark soil; much of site has been removed during construction
36-003868	CA-SBR-3868H	Daley Canyon Toll Road
36-004035	CA-SBR-4035H	Pinecrest Resort
36-004034	CA-SBR-4034/H	Prehistoric campsite and historic-period refuse
36-007048	CA-SBR-7048H	Early twentieth-century refuse deposit
36-007049	CA-SBR-7049H	Segments of Rim of the World Drive
36-009896	CA-SBR-9896	Segment of the Hesperia/Lake Arrowhead Toll Road (now State Route 173)
36-010861	CA-SBR-10861H	Concrete C monument (State highway survey marker)
36-012189		Segment of State Route 18 in Hesperia
36-012761	-	Historic-period cabin foundation
36-012762	-	Historic-period cobble and mortar foundation
36-012763	-	Incinerator foundation
36-012768	-	Pacific Electric camp, built before 1923
36-012769	-	Prehistoric isolated mano
36-012777	-	Historic-period refuse
36-012786	-	Wood-frame cabin along Hwy 18 in the town of Rimforest, circa-1940s
36-013497	-	Arrowhead Alpine Club and cabins, built circa 1936
36-013498	-	Historic-period concrete foundation remains
36-013499	-	Historic-period concrete foundation remains
36-013500	-	Concrete foundation constructed in 1938
36-013501	-	Stone-and-mortar structures associated with a residence built in 1945
36-013502	-	Historic-period foundation remains and fireplace
36-013507	-	Two historic-period rectangular cisterns
36-013508	-	Possible horizontal well
36-013509	-	Historic-period circular cistern
36-018087	-	Antlers Inn, also known as Alpine Terrace Lodge
36-020172	-	AT&T Strawberry Peak Telecommunications tower and structures
36-020874	-	Agua Fria Water Vault
36-060193	-	Prehistoric isolated mano
36-023982	CA-SBR-15167H	Segment of historic-period road (Lower Crest Road)
36-023983	CA-SBR-15168H	Segment of historic-period road (Arrowhead Villa Road)

Table 2 (continued)

Primary	Trinomial	Description
36-023990	CA-SBR-15175H	U.S. Coast and Geodetic Survey marker along Hwy 18, dated 1935
36-023991	CA-SBR-15176H	Segment of unnamed historic-period road
36-024104	CA-SBR-15289H	Segments of historic-period road (Grass Valley Road)
36-024139	CA-SBR-15324H	Segment of historic-period road (Rose Lane)
36-024140	CA-SBR-15325H	Segment of historic-period road (Sierra Vista Drive)
36-024142	CA-SBR-15327H	Segment of historic-period road (North Road)
36-024143	CA-SBR-15328H	Segment of historic-period road (Bear Springs Road)
36-202297	-	Stone and cement wall
36-202298	-	Horizontal tunnel in creek bed
36-202299	-	Horizontal well
36-202300	-	Semi-circular reservoir
36-202301	-	Two artificial terraces and structural remains
P1062-14H	-	Dogwood Cabins, 80+ cabins dating to the 1920s–1960s

Daley Canyon Toll Road (36-003868) was constructed between 1921 and 1923 to connect Little Bear Valley (Lake Arrowhead) to the forks of Mojave River and has been designated California Historical Landmark 579. While the Toll Road is located adjacent to the Project, the resource is outside of the Project APE and the Project will have no direct or indirect impacts to this resource.

The Rim of the World Drive through the San Bernardino Mountains (36-007049), including the segment located in the Project APE, was mapped by the San Bernardino National Forest in 2001 as part of the recordation and evaluation of the entire 1915–1916 route from the mouth of Waterman Canyon, up and across the mountains, and then down again to the mouth of Santa Ana Canyon (McCarthy and Goodman 2001:1–42). McCarthy and Goodman indicate that the Rim of the World Drive designated in 1915 was a significant road in southern California history, as it opened the mountain areas to increased recreational use and development. However, as indicated in the record, due to the 1915–1916 road being realigned, rerouted, and resurfaced over the last several decades, the original alignment does not appear to retain sufficient integrity to be eligible for the NRHP or the CRHR. The recorders assigned an NRHP Status Code of "5," finding that the resource is ineligible, but still of local interest. Their evaluation focused specifically on the extant dirt portions of the 1915–1916 route, and does not consider the significance of the paved road in use from 1916 to the present.

According to records on file at the SBAIC, no properties currently listed on the NRHP or CRHR are located within the Project APE. Records indicate that no additional properties, beyond Daley Canyon Toll Road, have been designated California Historical Landmarks or Point of Historical Interest are located within the Project APE.

4
NATIVE AMERICAN COMMUNICATION

Æ contacted the NAHC on July 9, 2012 for a review of the *Sacred Lands File* , to determine if any known Native American cultural properties (e.g., traditional use or gathering areas, places of religious or sacred activity, etc.) are present within or adjacent to the Project APE. The NAHC responded on July 11, 2012, stating that Native American cultural resources were not identified within one-half mile of the Project APE (see Appendix A). However, the NAHC requested that Native American individuals and organizations be contacted to elicit information and/or concerns regarding cultural resource issues related to the proposed Project. A letter describing the Project and asking these individuals and organizations for their input was sent via United States Postal Service (USPS) and electronic mail on July 14 and 15, 2015. The list of contacts, letters sent, and responses received are included in Appendix A. A second attempt at correspondence was made on July 28, 2015.

Individuals/organizations contacted include: Joseph Hamilton, Chairman for the Ramona Band of Cahuilla Mission Indians; Ray Huaute, Cultural Resource Specialist for of the Morongo Band of Mission Indians; Ernest Siva, Tribal Elder of the Morongo Band of Mission Indians; Carla Rodriguez, Chairwoman for the San Manuel Band of Mission Indians; Daniel McCarthy, Cultural Resources Management with the San Manuel Band of Mission Indians; John Valenzuela, Chairperson for the San Fernando Band of Mission Indians; Nora McDowell, Cultural Resources Coordinator with the Fort Mojave Indian Tribe; Sam Dunlap, Chairperson for the Gabrielino Tongva Nation; and Goldie Walker, Serrano Nation of Indians.

As of July 31, 2015, three responses were received. The San Manuel Band of Mission Indians noted that the Project is located within the Tribe's ancestral territory; however, the Tribe does not have any specific information about significant cultural resources within the Project location. However, if Native American cultural resources are identified during Project construction, the Tribe requests to be notified for further consultation. The Morongo Band of Mission Indians stated that the Project is outside of the Tribe’s current reservation boundaries, but within an area considered to be a traditional use area. Therefore, the Tribe requested a copy of the records search and survey results to better assess the sensitivity of the area. Furthermore, the Tribe requested to be contacted if Native American cultural resources are discovered during Project construction. Mr. Ernest Siva had no comments or concerns regarding the Project. A Table summarizing communication with Native American groups and/or individuals is located in Appendix A.

5
CULTURAL RESOURCES SURVEY METHODS AND RESULTS

An initial cultural resources survey of the Project APE was conducted by Æ archaeologist/ architectural historian Josh Smallwood on July 11, 2012. Additional areas were surveyed by Smallwood and archaeologist Patrick Maloney on July 1, 2015. The survey area included both sides of Rim of the World Drive through the town of Rimforest, both sides of Pine Avenue, and areas where proposed drainage outflows would be constructed along Little Bear Creek between Rim of the World Drive and Daley Canyon Road. Each of these areas is characteristically different, and therefore, the cultural resources survey of each of these areas varied. The survey methods and results for each of these areas are discussed separately in the paragraphs below.

Due to existing roadways being heavily disturbed through previous construction, routine maintenance, upgrades, and trenching along the shoulder for utilities construction, the Project APE limits along Rim of the World Drive and Pine Avenue were surveyed at a reconnaissance level. The reconnaissance survey consisted of driving along these routes while inspecting the road surface and both shoulders for any historical road features, built-environment features, or other objects of historical interest. The ground surface along existing roads was highly visible due to the presence of bare soil and pavement. No historic-period road features or objects were encountered along Rim of the World Drive or Pine Avenue during the reconnaissance survey. Pine Avenue is an asphalt-paved two-lane road with narrow, paved shoulders. Rim of the World Drive (36-007049) is a two-lane, asphalt-paved, stripe-divided highway with paved shoulders (Figure 4). The pavement along Rim of the World Drive widens along the commercial strip in the downtown area of Rimforest to provide parking for automobiles. Photographs and postcards from the 1940s reveal that the design, appearance, and overall characteristic of this segment of Rim of the World Drive have changed very little over the last 60 or 70 years (refer to Figure 3). This segment of Rim of the World Drive was recorded during this study as an update to the previous record for 36-007049 (see Appendix B for Department of Parks and Recreation [DPR] record). An evaluation of its historical significance is provided in Chapter 5.

Figure 4 Rim of the World Drive/SR 18 through the town of Rimforest. Photograph taken on July 11, 2012; view to the east.

Among the buildings along the Rimforest commercial strip is a ca. 1940s wood-frame cabin of unknown name and address previously recorded as 36-012786. This building was revisited during this study and appears unchanged since it was first recorded. The building is vacant, with no address or name posted, and the windows and doors are boarded (Figure 5). The building is clearly outside the Project APE and will not be affected by the proposed Project.

Figure 5 A ca. 1940s wood-frame cabin in the town of Rimforest (view to the west), previously recorded as 36-012786.

The Crest Forest Fire District building at 26330 Rimforest Drive is located within the Project APE along the north side of Rim of the World Drive (Figure 6). The age of the building is unknown, but based on appearances it likely dates to the 1960s or 1970s. This area is proposed as a temporary staging area only, and the building will not be altered as a result of the Project. As such, the building was not formally recorded during this study, and it was not evaluated for historical significance.

Intensive pedestrian survey transects were employed for the remaining portions of the Project APE. Transect spacing ranged from approximately 5 to 15 m (approximately 15 to 45 ft) apart, depending on the terrain, stands of vegetation, and surface area that needed to be covered. In areas where dense, impenetrable brush and dense groundcover was present, efforts were made to follow existing human foot trails and game trails to get through to areas that had better ground visibility.

Little Bear Creek is densely vegetated by riparian weeds, shrubs, and trees, which obscured visibility to nearly 0 percent in most areas, while the gradual slopes on either side of the stream bed were covered with less vegetation (Figures 7 and 8). Granitic bedrock outcrops were inspected for any indication of prehistoric use or modification such as milling, battering, rubs, petroglyphs, or pictographs; but none were found. Leaf duff from trees covered much of the ground surface on the surrounding slopes, but subterranean soils were present in the back-dirt of gopher burrows, which were inspected for any indication of prehistoric or historic-period cultural activity. Dark organic-

Figure 6 The Crest Forest Fire District building at 26330 Rim of the World Drive, view to the north. This location is proposed as a staging area.

rich soil was observed, but no cultural resources were encountered in this area. Nonetheless, the archaeological sensitivity of this area of the Project is considered to be high due to it being located along the banks of a seasonal drainage. It is well documented that prehistoric Native American habitation sites were often located along seasonal streams, with prehistoric groups also often burying their deceased along the banks of streams. While no prehistoric cultural remains were found during the field survey, dense brush obscured the surface, and this canyon is full of alluvial soil that has developed over time burying older deposits. As such, the possibility of intact, buried archaeological deposits in this area cannot be dismissed.

Figure 7 A pedestrian trail along the south bank of Little Bear Creek.

Figure 8 Dense vegetation in Little Bear Creek.

6
RESOURCE EVALUATIONS

As discussed in Chapter 3 of this report, the entire length of Rim of the World Drive through the San Bernardino Mountains, including this segment, was mapped by the San Bernardino National Forest in 2001 (McCarthy and Goodman 2001:1–42). McCarthy and Goodman indicate that the Rim of the World Drive designated in 1915 was a significant road in southern California history, as it opened the mountain areas to increased recreational use and development. However, as indicated in the primary record, due to the 1915–1916 road being realigned, rerouted, and resurfaced over the last several decades, the original alignment does not appear to retain sufficient integrity to be eligible for the NRHP or the CRHR. It should be noted that the evaluation only considers the significance and integrity of the 1915–1916 automobile tourist route and does not consider the significance and integrity of the Rim of the World Drive that has existed since the 1920s.

Rim of the World Drive, like other early automobile roads found in southern California evolved progressively through the decades of the early twentieth century, as necessary, to accommodate the boom in growth and development of the region during the 1920s, road projects that occurred during the Great Depression, and another boom during the post-World War II era. During that time, Rim of the World Drive, as explained in Chapter 2 of this report, was transformed from an early dirt automobile road that took several hours to traverse and only driven by the few people who had the proper vehicles to make the trip, into a "high-gear road" during the 1920s and 1930s, which benefitted a broader range of the public. Rim of the World Drive, designated as State Highway 18 by the 1920s, has existed since that time as the transportation backbone of the San Bernardino Mountains, providing access to and facilitating the growth and development of the various mountain communities found along its route. Based on the historical background of the Rim of the World Drive developed during this and the 2001 National Forest study, it is apparent that the Rim of the World Drive of 1915–1916 and of the 1920s–1960s is significant for the role it played in the development and growth of the San Bernardino Mountains region, making it eligible for the NRHP under Criterion A and the CRHR under Criterion 1.

The road was improved through numerous modifications in the 1920s and early 1930s, resulting in completion of the "high-gear" road in 1933, and the alignment, design, materials, construction, and appearance have changed very little since then. While the road of today may not retain sufficient integrity to relate its 1915–1916 period of significance, it certainly retains sufficient integrity to relate its significance dating to the period of 1933–1960s. Photographs of the Rimforest community from the late 1940s indicate that this segment of Rim of the World Drive appears much the same as it did at that time, during a period of early growth and development within the town. While a complete survey of the entire length of Rim of the World Drive is beyond the scope of this study, there is sufficient data to suggest that the segment located within the Project area retains sufficient historical integrity to relate the period of significance, 1933–1960s, and is eligible for the NRHP under Criterion A and the CRHR under Criterion 1. The segment located within the Project area in the community of Rimforest does not appear to be eligible under any of the other criteria of the NRHP or CRHR, as it is not directly associated with an important historical figure (NRHP Criterion B/CRHR Criterion 2), it does not exhibit any architectural or engineering merits (NRHP Criterion C/ CRHR Criterion 3), and it does not have the data potential to yield information important to the study of our local, state, or national history (NRHP Criterion D/ CRHR Criterion 4).

7
CONCLUSION AND RECOMMENDATIONS

Section 106 of the NHPA requires federal agencies to take into account the effect of an undertaking on any historic properties prior to approval of the undertaking. Similarly, under CEQA, Lead Agencies are required to identify potential impacts on historical resources, determine if the impacts will be significant, and identify alternatives and mitigation measures that will substantially reduce or eliminate significant impacts to the environment. For the segment of Rim of the World Drive (36-007049) situated within the Rimforest Storm Drain Project APE, the existing features that contribute to the historical significance and integrity of this historic property/historical resource are the location, design, and setting of the roadway, and the materials used in its construction. No historical roadside features such as rockwork and chain or wooden guardrails, or objects such as survey markers or monuments were encountered along this segment. The proposed Project within the vicinity of Rim of the World Drive involves trenching for underground pipelines, which has no potential to alter, destroy, relocate, or remove any features that contribute to the integrity or significance of Rim of the World Drive. Based on these considerations, the present study concludes that the proposed Project will not cause a substantial adverse change to the integrity or significance of Rim of the World Drive (36-007049), and will not result in an effect on this historic property.

Regarding the Project undertaking's potential to impact subsurface archaeological remains that are unknown and yet to be documented, the soils found along existing roadways within the Project APE are moderately compact decomposed granite with no surface manifestation of any prehistoric or historic-period archaeological deposits. These portions of the Project APE were graded for road construction by at least the late-1940s, and have been maintained as transportation routes ever since. Thus, it is highly unlikely for any intact, potentially significant archaeological remains to be encountered below the ground surface along any of the existing roadways followed by the Project alignment.

However, the archaeological sensitivity of the Little Bear Creek portion of the Project APE is considered to be high due to its location along the banks of a seasonal drainage, with poor ground visibility. It is well documented that prehistoric Native American habitation sites were often located along seasonal streams, and that Native Americans often buried their deceased along the banks of streams. While no prehistoric cultural remains were found during the field survey, dense brush obscured the surface, and this canyon is full of alluvial soil that has developed over time burying older deposits. As such, the possibility of intact, buried archaeological deposits in this area cannot be overlooked, and all earthmoving activities associated with the Project should be monitored by a qualified archaeologist.

In addition, both the San Manuel Band of Mission Indians and the Morongo Band of Mission Indians requested to be notified if Native American cultural resources were identified during Project construction.

In the event that potentially significant archaeological materials are encountered during construction activities along the roadway portions of the Project APE, all work must be halted in the vicinity of the archaeological discovery until a qualified archaeologist can visit the site of discovery and assess the significance of the archaeological resource. As well, Health and Safety Code 7050.5, CEQA

15064.5(e), and Public Resources Code 5097.98 mandate the process to be followed in the unlikely event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

8
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9
PREPARER'S QUALIFICATIONS

Josh Smallwood, Architectural Historian/Historical Archaeologist. M.A. Historic Preservation, Savannah College of Art and Design, Savannah, Georgia, 2008; B.A. Anthropology, California State University, Humboldt, 1998; A.A. Archaeology, Palomar College, 1994. Has 18 years experience in California conducting historical and archaeological studies, and nine years conducting historic building surveys and evaluating historical significance. Mr. Smallwood meets the Secretary of the Interior's Professional Qualifications Standards for Architectural Historian and Historical Archaeologist. Contribution: field survey and recordation, historical research, evaluation of historical resources, and report preparation.

APPENDIX A

NATIVE AMERICAN COMMUNICATION

Sacred Lands File & Native American Contacts List Request

NATIVE AMERICAN HERITAGE COMMISSION
915 Capitol Mall, RM 364
Sacramento, CA 95814
(916) 653-4082
(916) 657-5390 – Fax
nahc@pacbell.net

Information Below is Required for a Sacred Lands File Search

Date: July 9, 2012

Project: Rimforest Storm Drain Project (AE #2410)

County: San Bernardino

USGS Quadrangle Name: Harrison Mtn.

Township 2N/Range 3W, Sections 29 & 30

Company/Firm/Agency: Applied EarthWorks, Inc.

Contact Person: Joan George

Street Address: 3292 E. Florida Ave., Suite A

City: Hemet Zip: 92544

Phone: (951) 766-2000

Fax: (951) 766-0020

Email: jgeorge@appliedearthworks.com

Project Description: The San Bernardino Flood Control District in cooperation with the County of San Bernardino proposes to construct and improve drainage flow in the Rimforest community to help with significant property loss as a result of bluff retreat from severe erosion and landsliding issues.

STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax: (916) 657-5390
Web Site www.nahc.ca.gov
ds_nahc@pacbell.net

July 11, 2012

Ms. Joan George, RPA
Applied EarthWorks, Inc.
3292 E. Florida Avenue, Suite A
Hemet, CA 92544

Sent by FAX to: 951-766-0020
No. of Pages: 5

Re: Sacred Lands File Search and Native American Contacts list for the proposed **"Rainforest Storm Drain Project (AE #2410);;"** located in San Bernardino County, California

Dear Ms. George:

The Native American Heritage Commission (NAHC) conducted a Sacred Lands File searches of the 'area of potential effect,' (APE) based on the USGS coordinates provided and **Native American cultural resources wert not identified** within one-half mile of the project area of potential effect (e.g. APE): you specified. Also, please note; the NAHC Sacred Lands Inventory is not exhaustive and does not preclude the discovery of cultural resources during any project groundbreaking activity.

California Public Resources Code §§5097.94 (a) and 5097.96 authorize the NAHC to establish a Sacred Land Inventory to record Native American sacred sites and burial sites. These records are exempt from the provisions of the California Public Records Act pursuant to. California Government Code §6254 (r). The purpose of this code is to protect such sites from vandalism, theft and destruction.

In the 1985 Appellate Court decision (170 Cal App 3rd 604), the court held that the NAHC has jurisdiction and special expertise, as a state agency, over affected Native American resources, impacted by proposed projects including archaeological, places of religious significance to Native Americans and burial sites

The California Environmental Quality Act (CEQA – CA Public Resources Code §§ 21000-21177, amendments effective 3/18/2010) requires that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR) per the CEQA Guidelines defines a significant impact on the environment as 'a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including ...objects of historic or aesthetic significance." In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE), and if so, to mitigate that effect. CA Government Code §65040.12(e) defines "environmental justice" provisions and is applicable to the environmental review processes.

Early consultation with Native American tribes in your area is the best way to avoid unanticipated discoveries once a project is underway. Local Native Americans may have knowledge of the religious and cultural significance of the historic properties of the proposed project for the area (e.g. APE). Consultation with Native American communities is also a matter of environmental justice as defined by California Government Code §65040.12(e). We urge consultation with those tribes and interested Native Americans on the list that the NAHC has provided in order to see if your proposed project might impact Native American cultural resources. Lead agencies should consider avoidance as defined in §15370 of the CEQA Guidelines when significant cultural resources as defined by the CEQA Guidelines §15064.5 (b)(c)(f) may be affected by a proposed project. If so, Section 15382 of the CEQA Guidelines defines a significant impact on the environment as "substantial," and Section 2183.2 which requires documentation, data recovery of cultural resources.

The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The aforementioned Secretary of the Interior's *Standards* include recommendations for all 'lead agencies' to consider the historic context of proposed projects and to "research" the cultural landscape that might include the 'area of potential effect.'

Partnering with local tribes and interested Native American consulting parties, on the NAHC list, should be conducted in compliance with the requirements of federal NEPA (42 U.S.C 4321-43351) and Section 106 4(f), Section 110 and (k) of the federal NHPA (16 U.S.C. 470 *et seq*), Section 4(f) of the Department of Transportation Act of 1966 (23 CFR 774); 36 CFR Part 800.3 (f) (2) & .5, the President's Council on Environmental Quality (CSQ, 42 U.S.C 4371 *et seq*. and NAGPRA (25 U.S.C. 3001-3013) as appropriate. The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The NAHC remains concerned about the limitations and methods employed for NHPA Section 106 Consultation.

Also, California Public Resources Code Section 5097.98, California Government Code §27491 and Health & Safety Code Section 7050.5 provide for provisions for accidentally discovered archeological resources during construction and mandate the processes to be followed in the event of an accidental discovery of any human remains in a project location other than a 'dedicated cemetery', another important reason to have Native American Monitors on board with the project.

To be effective, consultation on specific projects must be the result of an ongoing relationship between Native American tribes and lead agencies, project proponents and their contractors, in the opinion of the NAHC. An excellent way to reinforce the relationship between a project and local tribes is to employ Native American Monitors in all phases of proposed projects including the planning phases.

Confidentiality of "historic properties of religious and cultural significance" may also be protected under Section 304 of he NHPA or at the Secretary of the Interior discretion if not eligible for listing on the National Register of Historic Places. The Secretary may also be advised by the federal Indian Religious Freedom Act (cf. 42 U.S.C., 1996) in issuing a decision

on whether or not to disclose items of religious and/or cultural significance identified in or near the APE and possibility threatened by proposed project activity.

If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave Singleton

Attachment: Native American Contact List

Native American Contacts
San Bernardinos County
July 11, 2012

Ramona Band of Cahuilla Mission Indians
Joseph Hamilton, Chairman
P.O. Box 391670 Cahuilla
Anza , CA 92539
admin@ramonatribe.com
(951) 763-4105
(951) 763-4325 Fax

Morongo Band of Mission Indians
Michael Contreras, Cultural Heritage Prog.
12700 Pumarra Road Cahuilla
Banning , CA 92220 Serrano
(951) 201-1866 - cell
mcontreras@morongo-nsn.gov
(951) 922-0105 Fax

San Manuel Band of Mission Indians
Carla Rodriguez, Chairwoman
26569 Community Center Drive Serrano
Highland , CA 92346
(909) 864-8933
(909) 864-3724 - FAX
(909) 864-3370 Fax

San Manuel Band of Mission Indians
Ann Brierty, Policy/Cultural Resources Departmen
26569 Community Center. Drive Serrano
Highland , CA 92346
(909) 864-8933, Ext 3250
abrierty@sanmanuel-nsn.gov
(909) 862-5152 Fax

S an Fernando Band of Mission Indians
John Valenzuela, Chairperson
P.O. Box 221838 Fernandeño
Newhall , CA 91322 Tataviam
tsen2u@hotmail.com Serrano
Vanyume
(661) 753-9833 Office Kitanemuk
(760) 885-0955 Cell
(760) 949-1604 Fax

Fort Mojave Indian Tribe
Nora McDowell, Cultural Resources Coordinator
500 Merriman Ave Mojave
Needles , CA 92363
NoraMcDowall@fortmojave.
(760) 629-4591
(760) 629-5767 Fax

Gabrielino Tongva Nation
Sam Dunlap, Chairperson
P.O. Box 86908 Gabrielino Tongva
Los Angeles , CA 90086
samdunlap@earthlink.net

(909) 262-9351 - cell

Serrano Nation of Indians
Goldie Walker
P.O. Box 343 Serrano
Patton , CA 92369

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Rainforest Storm Drain Project (AE #2410); located in the Harrison Mt. Quadrangle area to construct and improve drainage, in cooperation with the San Bernardino Flood control District, San Bernardino County, California.

Native American Contacts
San Bernardinos County
July 11, 2012

Ernest H. Siva
Morongo Band of Mission Indians Tribal Elder
9570 Mias Canyon Road Serrano
Banning , CA 92220 Cahuilla
siva@dishmail.net
(951) 849-4676

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed Rainforest Storm Drain Project (AE #2410); located in the Harrison Mt. Quadrangle area to construct and improve drainage, in cooperation with the San Bernardino Flood control District, San Bernardino County, California.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

July 14, 2015

Sam Dunlap
Chairperson
Gabrielino Tongva Nation
P.O. Box 86908
Los Angeles, CA 90086

Re: Cultural Resource Investigation for the Rimforest Storm Drain Project, San Bernardino County, California; F02377

Dear Mr. Dunlap:

Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study of the San Bernardino County Flood Control District (District) Rimforest Storm Drain Project (Project). The District proposes to construct and maintain a series of flood control facilities located in the community of Rimforest, San Bernardino County, California. As indicated on the attached map, the Project is located on the Harrison, CA 7.5' USGS map within Section 29 and 30, Township 2 North, Range 3 West, San Bernardino Baseline and Meridian (SBBM).

A cultural resources literature and records search conducted at the Archaeological Information Center indicates that as many as 55 cultural resource studies have been conducted within a one-mile radius of the Project area; two of these studies involved the Project area specifically. The records search also indicated that 44 cultural resources have been identified within a one-mile radius of the Project area; one built environment resource (Rim of the World Drive) has been documented within the Project boundaries. Æ performed an intensive-level archaeological survey of the Project area on July 1, 2015. During the pedestrian survey, parallel transects spaced 10 meters apart were walked back-and-forth across the property. Close attention was paid to soils, vegetation, and natural and human-modified landforms. Naturally occurring rocks were inspected for any indication of prehistoric or historic human modification. ***No prehistoric or historic-age cultural resources were identified during the survey***.

As part of the cultural resource assessment of the Project area, Æ requested a search of the Native American Heritage Commission's (NAHC's) Sacred Lands File. The NAHC responded indicating that no Native American cultural resources were identified within a half-mile of the Project area. Should you know of cultural resources (e.g., burial sites, religious activity sites, or gathering sites) that may exist within or near the Project area shown on the enclosed map, please contact me at (951) 766-2000 or via letter expressing your concerns. You may also e-mail me at jgeorge@appliedearthworks.com. If I do not hear from you within in the next two weeks, I will contact you with a follow-up phone call or email.

Your comments are very important to us, and to the successful completion of this Project. I look forward to hearing from you in the near future. Thank you, in advance, for taking the time to review this request.

Respectfully yours,

Joan George
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

July 14, 2015

John Gomez
Environmental Coordinator
Ramona Band of Mission Indians
P.O. Box 391670
Anza, CA 92539

Re: Cultural Resource Investigation for the Rimforest Storm Drain Project, San Bernardino County, California

Dear Mr. Gomez:

Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study of the San Bernardino County Flood Control District (District) Rimforest Storm Drain Project (Project). The District proposes to construct and maintain a series of flood control facilities located in the community of Rimforest, San Bernardino County, California. As indicated on the attached map, the Project is located on the Harrison, CA 7.5' USGS map within Section 29 and 30, Township 2 North, Range 3 West, San Bernardino Baseline and Meridian (SBBM).

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Joan George
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Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

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July 14, 2015

Raymond Huaute
Cultural Resource Specialist
Morongo Band of Mission Indians
12700 Pumarra Road
Banning, CA 92220

Re: Cultural Resource Investigation for the Rimforest Storm Drain Project, San Bernardino County, California

Dear Mr. Huaute:

Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study of the San Bernardino County Flood Control District (District) Rimforest Storm Drain Project (Project). The District proposes to construct and maintain a series of flood control facilities located in the community of Rimforest, San Bernardino County, California. As indicated on the attached map, the Project is located on the Harrison, CA 7.5' USGS map within Section 29 and 30, Township 2 North, Range 3 West, San Bernardino Baseline and Meridian (SBBM).

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Joan George
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

July 14, 2015

Daniel McCarthy
Cultural Resource Management
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, CA 92346

Re: Cultural Resource Investigation for the Rimforest Storm Drain Project, San Bernardino County, California

Dear Mr. McCarthy:

Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study of the San Bernardino County Flood Control District (District) Rimforest Storm Drain Project (Project). The District proposes to construct and maintain a series of flood control facilities located in the community of Rimforest, San Bernardino County, California. As indicated on the attached map, the Project is located on the Harrison, CA 7.5' USGS map within Section 29 and 30, Township 2 North, Range 3 West, San Bernardino Baseline and Meridian (SBBM).

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Respectfully yours,

Joan George
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

July 14, 2015

Nora McDowell
Cultural Resources Coordinator
Fort Mojave Indian Tribe
500 Merriman Avenue
Needles, CA 92363

Re: Cultural Resource Investigation for the Rimforest Storm Drain Project, San Bernardino County, California

Dear Ms. McDowell:

Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study of the San Bernardino County Flood Control District (District) Rimforest Storm Drain Project (Project). The District proposes to construct and maintain a series of flood control facilities located in the community of Rimforest, San Bernardino County, California. As indicated on the attached map, the Project is located on the Harrison, CA 7.5' USGS map within Section 29 and 30, Township 2 North, Range 3 West, San Bernardino Baseline and Meridian (SBBM).

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Respectfully yours,

Joan George
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

July 14, 2015

Carla Rodriguez
Chairwoman
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, CA 92346

Re: Cultural Resource Investigation for the Rimforest Storm Drain Project, San Bernardino County, California

Dear Ms. Rodriguez:

Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study of the San Bernardino County Flood Control District (District) Rimforest Storm Drain Project (Project). The District proposes to construct and maintain a series of flood control facilities located in the community of Rimforest, San Bernardino County, California. As indicated on the attached map, the Project is located on the Harrison, CA 7.5' USGS map within Section 29 and 30, Township 2 North, Range 3 West, San Bernardino Baseline and Meridian (SBBM).

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Your comments are very important to us, and to the successful completion of this Project. I look forward to hearing from you in the near future. Thank you, in advance, for taking the time to review this request.

Respectfully yours,

Joan George
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

July 14, 2015

Ernest H. Siva
Tribal Elder
Morongo Band of Mission Indians
9570 Mias Canyon Road
Banning, CA 92220

Re: Cultural Resource Investigation for the Rimforest Storm Drain Project, San Bernardino County, California

Dear Mr. Siva:

Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study of the San Bernardino County Flood Control District (District) Rimforest Storm Drain Project (Project). The District proposes to construct and maintain a series of flood control facilities located in the community of Rimforest, San Bernardino County, California. As indicated on the attached map, the Project is located on the Harrison, CA 7.5' USGS map within Section 29 and 30, Township 2 North, Range 3 West, San Bernardino Baseline and Meridian (SBBM).

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Joan George
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

3550 E. Florida Ave., Suite H
Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

July 14, 2015

John Valenzuela
Chairperson
San Fernando Band of Mission Indians
P.O. Box 221838
Newhall, CA 91322

Re: Cultural Resource Investigation for the Rimforest Storm Drain Project, San Bernardino County, California

Dear Mr. Valenzuela:

Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study of the San Bernardino County Flood Control District (District) Rimforest Storm Drain Project (Project). The District proposes to construct and maintain a series of flood control facilities located in the community of Rimforest, San Bernardino County, California. As indicated on the attached map, the Project is located on the Harrison, CA 7.5' USGS map within Section 29 and 30, Township 2 North, Range 3 West, San Bernardino Baseline and Meridian (SBBM).

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Respectfully yours,

Joan George
Associate Archaeologist
Applied EarthWorks, Inc.

Applied EARTHWORKS Inc.

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Hemet, CA 92544-4937
O: (951) 766-2000 | F: (951) 766-0020

July 14, 2015

Goldie Walker
Serrano Nation of Indians
P.O. Box 343
Patton, CA 92369

Re: Cultural Resource Investigation for the Rimforest Storm Drain Project, San Bernardino County, California

Dear Ms. Walker:

Applied EarthWorks, Inc. (Æ) is conducting a cultural resource study of the San Bernardino County Flood Control District (District) Rimforest Storm Drain Project (Project). The District proposes to construct and maintain a series of flood control facilities located in the community of Rimforest, San Bernardino County, California. As indicated on the attached map, the Project is located on the Harrison, CA 7.5' USGS map within Section 29 and 30, Township 2 North, Range 3 West, San Bernardino Baseline and Meridian (SBBM).

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Respectfully yours,

Joan George
Associate Archaeologist
Applied EarthWorks, Inc.

From:	Daniel McCarthy
To:	Joan George
Subject:	RE: Cultural Resource Study for the Rimforest Storm Drain Project in Rimforest
Date:	Thursday, July 16, 2015 1:45:32 PM

Hi Joan,

Thank you for the opportunity to review and provide information for your scoping effort. The project is located within the Tribe's ancestral territory, however, we do not have any specific information about significant cultural resources at the project location. Our only comment is that if Native American cultural resources are identified during the course of construction, that the lead agency contact our office for consultation.

Leslie Mouriquand MS, RPA
for

Daniel McCarthy MS, RPA
Director - CRM Department
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, CA 92346

From: Joan George [jgeorge@appliedearthworks.com]
Sent: Tuesday, July 14, 2015 12:07 PM
To: Daniel McCarthy
Subject: Cultural Resource Study for the Rimforest Storm Drain Project in Rimforest

Good Afternoon,

Attached please find a scoping letter and map for the Rimforest Storm Drain Project in Rimforest, San Bernardino County.

Thank you,
Joan

Joan George | Applied EarthWorks, Inc.
Associate Archaeologist

3550 E. Florida Ave., Ste. H
Hemet, CA 92544-4937
951.766.2000 x-24 office
http://www.appliedearthworks.com

THIS MESSAGE IS INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY TO WHICH IT IS ADDRESSED AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED, CONFIDENTIAL AND EXEMPT FROM DISCLOSURE UNDER APPLICABLE LAW. If the reader of this message is not the intended recipient or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination or copying of this communication is strictly prohibited. If you have received this electronic transmission in error, please delete it from your system without copying it and notify the sender by reply e-mail so that the email address record can be corrected. Thank You

From: Ray Huaute
To: Joan George
Cc: Denisa Torres
Subject: RE: Cultural Resource Study for the Rimforest Storm Drain Project in Rimforest
Date: Monday, July 20, 2015 3:11:49 PM
Attachments: SBC_RimforestStormDrainProject.pdf

Dear Joan,
Please find our comments/concerns at this time for this project in the attachment. Once we receive the requested documents we will be better able to comment on this project. Should you have any further questions or concerns feel free to contact me.

Raymond Huaute
Cultural Resource Specialist
Morongo Band of Mission Indians
12700 Pumarra Road
Banning, CA 92220
Phone: (951) 755-5025
Fax: (951) 572-6004
Email: rhuaute@morongo-nsn.gov

From: Joan George [mailto:jgeorge@appliedearthworks.com]
Sent: Tuesday, July 14, 2015 12:07 PM
To: Ray Huaute
Subject: Cultural Resource Study for the Rimforest Storm Drain Project in Rimforest

Good Afternoon,

Attached please find a scoping letter and map for the Rimforest Storm Drain Project in Rimforest, San Bernardino County.

Thank you,
Joan

Joan George | Applied EarthWorks, Inc.
Associate Archaeologist

3550 E. Florida Ave., Ste. H
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951.766.2000 x-24 office
http://www.appliedearthworks.com

MORONGO CULTURAL HERITAGE PROGRAM
12700 PUMARRA RD BANNING, CA 92220
OFFICE 951-755-5025 FAX 951-572-6004

Date: July 20, 2015

Re: Cultural Resource Investigation for the Rimforest Storm Drain Project, San Bernardino County, California

Joan George
Applied Earthworks

Thank you for contacting the Morongo Band of Mission Indians regarding the above referenced project(s). The tribe greatly appreciates the opportunity to comment on the project. After reviewing our records and consulting with our tribal elders and cultural experts, we would like to respectfully offer the following comments and/or recommendations:

___ The project is outside of the Tribe's current reservation boundaries and is not within an area considered to be a traditional use area or one in which the Tribe has cultural ties (i.e. Cahuilla or Serrano Territory). We recommend contacting the appropriate tribes who have cultural affiliation to the project area. We have no further comments at this time.

___ The project is outside of the Tribe's current reservation boundaries but within in an area considered to be a traditional use area or one in which the Tribe has cultural ties (i.e. Cahuilla or Serrano Territory). At this time, we are not aware of any cultural resources on the property; however, that is not to say there is nothing present. At this time, we ask that you impose specific conditions regarding all cultural and/or archaeological resources and buried cultural materials on any development plans or entitlement applications (see Standard Development Conditions attachment).

_X_ The project is outside of the Tribe's current reservation boundaries but within in an area considered to be a traditional use area or one in which the Tribe has cultural ties (i.e. Cahuilla or Serrano Territory). At this time we ask that you impose specific conditions regarding all cultural and/or archaeological resources and buried cultural materials on any development plans or entitlement applications (see Standard Development Conditions attachment). Furthermore, we would like to formally request the following:

- _X_ A thorough records search be conducted by contacting one of the CHRIS (California Historical Resources Information System) Archaeological Information Centers and have a copy of the search results be provided to the tribe.

- _X_ A comprehensive cultural survey be conducted of the proposed project property and any APE's (Areas of Potential Effect) within the property. We would also like to request that a tribal monitor be present during the cultural survey and that a copy of the results be provided to the tribe as soon as it can be made available.

___ Morongo would like to request that our tribal monitors be present during any test excavations or subsequent ground disturbing activities during the construction phase of the project.

___ The project is located with the current boundaries of the Morongo Band of Mission Indians Reservation. Please contact the Morongo Band of Mission Indians planning department for further details.

Once again, the Morongo Band of Mission Indians appreciates the opportunity to comment on this project. Please be aware that receipt of this letter does not constitute "meaningful" tribal consultation nor does it conclude the consultation process. This letter is merely intended to initiate consultation between the tribe and lead agency, which may be followed up with additional emails, phone calls or face-to-face consultation if deemed necessary. If you should have any further questions with regard to this matter, please do not hesitate to contact me at your convenience.

Very truly yours,

Raymond Huaute
Cultural Resource Specialist
Morongo Band of Mission Indians
Email: rhuaute@morongo-nsn.gov
Phone: (951) 755-5025

MORONGO BAND OF MISSION INDIANS

A SOVEREIGN NATION

Standard Development Conditions

The Morongo Band of Mission Indians asks that you impose specific conditions regarding cultural and/or archaeological resources and buried cultural materials on any development plans or entitlement applications as follows:

1. If human remains are encountered during grading and other construction excavation, work in the immediate vicinity shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code §7050.5.

2. In the event that Native American cultural resources are discovered during project development/construction, all work in the immediate vicinity of the find shall cease and a qualified archaeologist meeting Secretary of Interior standards shall be hired to assess the find. Work on the overall project may continue during this assessment period.

    a. If significant Native American cultural resources are discovered, for which a Treatment Plan must be prepared, the developer or his archaeologist shall contact the Morongo Band of Mission Indians.

    b. If requested by the Tribe[1], the developer or the project archaeologist shall, in good faith, consult on the discovery and its disposition (e.g. avoidance, preservation, return of artifacts to tribe, etc.).

[1] The Morongo Band of Mission Indians realizes that there may be additional tribes claiming cultural affiliation to the area; however, Morongo can only speak for itself. The Tribe has no objection if the archaeologist wishes to consult with other tribes and if the city wishes to revise the condition to recognize other tribes.

LIST OF NATIVE AMERICAN CONTACTS AND RECORD OF RESPONSES

Name	Date & Time of Calls	Responses
Ray Huaute Cultural Resource Specialist Morongo Band of Mission Indians	July 14, 2015 July 20, 2015 July 28, 2015	Scoping letter sent via email to RHuaute@morongo-nsn.gov. Mr. Huaute sent a response letter via email stating that the Project is outside of the Tribe's current reservation boundaries, but within an area considered to be a traditional use area. Therefore, the Tribe requested a copy of the records search and survey results to better assess the sensitivity of the area. Furthermore, the Tribe requested to be contacted if Native American cultural resources are discovered during Project construction. A copy of the cultural report was sent to Mr. Huaute.
Carla Rodriguez Chairwoman San Manuel Band of Mission Indians	July 15, 2015 July 16, 2015	Scoping letter sent via USPS to Ms. Rodriguez. Received email response from Ms. Leslie Mouriquand, cultural representative for the San Manuel CRM Department. The Tribe notes that the Project is located within the Tribe's ancestral territory; however, the Tribe does not have any specific information about significant cultural resources within the Project location. However, if Native American cultural resources are identified during Project construction, the Tribe requests to be notified for further consultation.
Daniel McCarthy Cultural Resources Management San Manuel Band of Mission Indians	July 14, 2015 July 16, 2015	Scoping letter sent via email to dmccarthy@sanmanuel-nsn.gov. Received email response from Ms. Leslie Mouriquand, cultural representative for the San Manuel CRM Department. The Tribe notes that the Project is located within the Tribe's ancestral territory; however, the Tribe does not have any specific information about significant cultural resources within the Project location. However, if Native American cultural resources are identified during Project construction, the Tribe requests to be notified for further consultation.

Name	Date & Time of Calls	Responses
Joseph Hamilton Chairman Ramona Band of Cahuilla Mission Indians	July 14, 2015 July 28, 2015	Scoping letter sent via email to jgomez@ramona-nsn.gov. E-mailed follow-up effort for correspondence. As of July 31, 2015, no response received.
John Valenzuela Chairperson San Fernando Band of Mission Indians	July 14, 2015 July 28, 2015	Scoping letter sent via email to tsen2u@hotmail.com. E-mailed follow-up effort for correspondence. As of July 31, 2015, no response received.
Ernest Siva Tribal Elder Morongo Band of Mission Indians	July 15, 2015 July 28, 2015	Scoping letter sent via USPS to Mr. Siva. Called Mr. Siva who stated that he had no comments or concerns about the Project.
Nora McDowell Cultural Resources Coordinator Fort Mojave Indian Tribe	July 14, 2015 July 28, 2015	Scoping letter sent via email to noramcdowell@fortmojave.com. E-mailed follow-up effort for correspondence. As of July 31, 2015, no response received.
Sam Dunlap Chairperson Gabrielino Tongva Nation	July 14, 2015 July 28, 2015	Scoping letter sent via email to sdunlap@earthlink.net. E-mailed follow-up effort for correspondence. As of July 31, 2015, no response received.
Goldie Walker Serrano Nation of Indians	July 15, 2015 July 28, 2015	Scoping letter sent via USPS to Ms. Walker. Because no phone number was provided by the NAHC, I was unable to follow-up with Ms. Walker regarding the Project.

APPENDIX B

DPR RECORD,
36-007049, RIM OF THE WORLD DRIVE (UPDATE)

State of California — The Resources Agency DEPARTMENT OF PARKS AND RECREATION **PRIMARY RECORD**	**Primary #** 36-007049 (update) **HRI #** **Trinomial** CA-SBR-7049H **NRHP Status Code** 3S
Other Listings **Review Code** **Reviewer** **Date**	

Resource Name or #: (Assigned by recorder) Æ-2410-1H; Rim of the World Drive

P1. Other Identifier:

P2. Location: a. County San Bernardino, CA ☐ **Not for Publication** ☒ **Unrestricted**

b. USGS 7.5′ Quad Harrison Mtn, CA **Date** 1973

T 2 **N**; **R** 3 **W**; portions **of Sec** 29 and 30; **S.B.B.M.**

c. Address: None **City** Rimforest **Zip** 92378

d. Zone 11 478,963 **mE/** 3,787,695 **mN** West end of segment

479,790 **mE/** 3,787,649 **mN** East end of segment

e. Other Locational Data (e.g., parcel #, legal description, directions to resource, additional UTMs, etc., when appropriate): This stretch of Rim of the World Drive (State Route 18) traverses through the town of Rimforest in the San Bernardino Mountains.

P3a. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries): This 2,724-ft (0.52-mile) -long segment of the historical Rim of the World Drive appears much the way it did in the late 1940s according to historical maps and photographs of the area. It is a short segment of State Highway 18 that has evolved as Rim of the World Drive since 1915. Only this short segment was documented during this study. Rim of the World Drive (36-007049) is a two-lane, asphalt-paved, stripe-divided highway with paved shoulders (see Figure 1). The pavement along Rim of the World Drive widens along the commercial strip in the downtown area of Rimforest to provide parking for automobiles. Photographs and postcards from the 1940s reveal that the design, appearance, and overall characteristics of this segment of Rim of the World Drive have changed very little over the last 60 or 70 years (see Figure 2). This segment of Rim of the World Drive was recorded during this study as an update to the previous record for 36-007049. The Rim of the World Drive through the San Bernardino Mountains, including the segment located in the Project area, was mapped by the San Bernardino National Forest in 2001 as part of the recordation and evaluation of the entire 1915–1916 route from the mouth of Waterman Canyon, up and across the mountains, and then down again to the mouth of Santa Ana Canyon (McCarthy and Goodman 2001:1–42).

P3b. Resource Attributes (List all attributes and codes): HP 37: Highway/trail

P4. Resources Present: ☐ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other:

P5. Photograph or Drawing: (Photograph required for buildings, structures, and objects.) See photograph on attached Continuation Sheet.

P6. Date Constructed/Age and Source: ☐ Prehistoric ☒ Historic ☐ Both

P7. Owner and Address: County of San Bernardino

P8. Recorded by (Name, affiliation, address): Josh Smallwood, Applied EarthWorks, Inc., 3550 E. Florida Ave., Suite H, Hemet, CA 92544.

P9. Date Recorded: July 11, 2012

P10. Type of Survey: ☒ Intensive ☐ Reconnaissance ☐ Other

Describe: Maximum 15-m pedestrian transects.

P11. Report Citation (Provide full citation or enter "none"): Smallwood, Josh (2012): *Cultural Resources Report for the Proposed Rimforest Storm Drain Project, San Bernardino County, California*. Prepared for County of San Bernardino, Department of Public Works, by Applied EarthWorks, Inc. (Æ).

Attachments: ☐ None ☒ Location Map ☐ Site Map ☒ Continuation Sheet ☒ Building, Structure, and Object Record ☐ Archaeological Site Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record Other:

B1. Historic Name: Rim of the World Drive **B2.** Common Name: Same
B3. Original Use: Automobile route through the San Bernardino Mountains
B4. Present Use: Same
B5. **Architectural Style:** Asphalt-paved two-lane striped highway with dirt shoulders
B6. **Construction History:** (Construction date, alterations, and date of alterations) The following brief history of Rim of the World Drive was provided by Roger Hatheway, author of the *Images of America* book titled, "Rim of the World Drive" (2007). Dedicated on July 17 and 18, 1915, the Rim of the World Drive was touted as a 101-mile-long scenic auto route that was immediately recognized as a true wonder of engineering and beauty, where rugged canyons and mountain peaks were conquered and natures' wonder was miraculously revealed at every turn. The "Rim" route opened the mountains to a new generation of tourists, campers, and holiday seekers. By 1917, the regular holiday pilgrimages had begun in earnest, and mountain auto stages had established regular service over what was now a State highway.

Rider's California: A Guide-Book for Travelers provided the schedule for seasonal group auto tours along the Rim of the World Drive from Los Angeles, for those who could afford the tour. One of the schedules published in 1922 reads,

> The Motor Transit, Co. during the season runs a daily special from Los Angeles at 7 a.m., from San Bernardino at 10:00 a.m., reaching Pinecrest at 12 and Arrowhead Lake at 12:45 p.m. There is daily local service between Arrowhead Lake and Big Bear Lake in 3 hrs.: also between Big Bear Lake and Redlands, via Mill Creek Canyon in 5 hrs. 20 min. (Collection of Roger Hatheway)

A promotional brochure issued by the San Bernardino Chamber of Commerce in 1929 describes the 101 miles on the "Rim of the World" through the San Bernardino Mountains:

> The San Bernardino Mountains are famed the world over for their natural attractions, as well as for the comfort which numerous lodges, camps, and taverns located in sheltered spots along the rocky ways, afford the traveler on foot, in the saddle, or journeying in the more convenient automobile way. The San Bernardino Mountains are penetrated by the most modern mountain highway system in the world. The Rim-of-the-World Drive has gained world-wide recognition because of the magnificent mountain scenery through which it takes the tourist. For a distance of fifty miles or more it winds along the crest of the mountains, alternating in outlook from the Mojave desert and never ending mirages on the north, to the green and fertile San Bernardino Valley on the south. It is a journey through wonderland, and is a revelation to every visitor, each turn in the road presenting some new charm, each winding trail disclosing some new beauty, smooth-surfaced lakes coming into view here and there. It is a trip of never-ending delight. (Collection of Josh Smallwood)

Another early promotional brochure describes the Rim of the World Drive as:

> An improved highway embracing many engineering feats and affording an interesting and worth-while scenic trip, is located in the heart of the San Bernardino Mountains. The gateway to this 101-mile mountain drive is San Bernardino. Passing, through Waterman Canyon, one climbs 13 miles, up many curves and switchbacks, to Crestline, proceeding thence along the crest of the San Bernardino Range above the Valley of the Little Bear and its beautiful, placid Lake Arrowhead. The village of Lake Arrowhead is a modern community, with shops, hotels, and every convenience for all forms of outdoor sports, both summer and winter. Continuing the journey, one passes through Running Springs Park and Fish Camp, a beautiful timbered area, and up the new road to the dam at the west end of Big Bear Lake. All the resorts and public camps on the lake are accessible from this point. From many points along this 40-mile crest drive the traveler sees spread out before him checker-board orange groves, thriving cities, misty rolling hills, and in the distance the blue waters of the Pacific stretching to the far horizon.
>
> From Big Bear Lake the return journey is made by way of Mill Creek Canyon, Mentone, and Redlands, or over the City Creek Road. The former route is very beautiful and takes one through fine forests of pine and fir, down the tortuous curves of the Mill Creek grade, and out into the orange-grove lands of the Santa Ana Valley. From this road side trips may be made to Upper Santa Ana River Canyon and Upper Mill Creek." (Collection of Roger Hatheway)

B6. Construction History: (Continued) By the mid-1920s, California highway planners and engineers realized that the capacity of the now famous Rim of the World Drive had exceeded all expectations. On a holiday weekend such as Memorial Day or Labor Day, it could take up to four hours to reach the crest from San Bernardino, and lines of traffic snaked up the mountain until well after midnight. As a result, a "High-Gear" road was planned that eliminated dreaded switchbacks, and ideally allowed the driver of a totally stock automobile to travel from San Bernardino to the mountain crest entirely in high gear. First planned in the mid-1920s, construction was underway by 1928, the switchbacks were eliminated by 1931, and the completed highway was officially opened on October 21, 1933. Scenic rockwork and chains were later added as part of a W.P.A. funded program to increase the safety and beauty of the drive. On February 10, 1936, the Lake Arrowhead Women's Club honored highway engineer E. Q. Sullivan for his work on the newly improved highway.

Construction of the high gear road on the Rim of the World Drive was a genuine breakthrough. By the early 1930s, mountain resorts and communities were linked to the valley by a blacktop highway, better facilitating the huge Memorial Day, Fourth of July, and Labor Day weekend traffic blowouts. Roadway improvements continued, and by the late 1960s, the present four lane route was completed "up the hill." The segment of the Rim of the World Drive/Highway 18 from the Crestline Cut-Off to Rim Forest was completed during the years 1930–1933. Today the historic Rim of the World Drive threads its way through the most urbanized mountains in America. Assembled from many component parts and continuously realigned and rebuilt from 1915 to the late-1960s, it is the very "backbone" of the San Bernardino Mountains connecting all towns, resorts, and recreation areas.

B7. Moved? ☒ No ___ Yes ___ Unknown **Date:** ___ **Original Location:** ___

B8. Related Features: No historical roadside features such as rockwork and chain or wooden guardrails, or objects such as survey markers or monuments were encountered along this segment.

B9a. Architect: Highway engineer E. Q. Sullivan **b.** Builder: San Bernardino County

B10. Significance: Theme Early twentieth century mountain roads
Area San Bernardino Mountains **Period of Significance** 1933-1960s
Property Type Road **Applicable Criteria** CRHR Criterion A

(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.) The entire length of Rim of the World Drive through the San Bernardino Mountains, including this segment, was mapped by the San Bernardino National Forest in 2001 as part of the recordation and evaluation of the entire 1915–1916 route from the mouth of Waterman Canyon, up and across the mountains, and then down again to the mouth of Santa Ana Canyon (McCarthy and Goodman 2001:1–42). McCarthy and Goodman indicate that the Rim of the World Drive designated in 1915 was a significant road in southern California history, as it opened the mountain areas to increased recreational use and development. However, as indicated in the record, due to the 1915–1916 road being realigned, rerouted, and resurfaced over the last several decades, the original alignment does not appear to retain sufficient integrity to be eligible for the NRHP or the CRHR. The recorders assigned a NRHP Status Code of "5," finding that the resource is ineligible, but still of local interest. Their evaluation focused specifically on the extant dirt portions of the 1915–1916 route, and it does not consider the significance and integrity of the Rim of the World Drive that has existed since the 1920s.

Rim of the World Drive, like other early automobile roads found in southern California evolved progressively through the decades of the early twentieth century, as necessary, to accommodate the boom in growth and development of the region during the 1920s, road projects that occurred during the Great Depression, and another boom during the post-WWII era. During that time, Rim of the World Drive, as explained in Chapter 2 of this report, was transformed from an early dirt automobile road that took several hours to traverse and was only afforded by the few people who had the proper vehicles to make the trip, into a "high-gear road" during the 1920s and 1930s, which excelled its benefits and use to a broader range of the public. Rim of the World Drive, designated as State Highway 18 by the 1920s, has existed since that time as the backbone of the San Bernardino Mountains, providing access to and facilitating the growth and development of the various mountain communities found along its route. Based on the historical background of the Rim of the World Drive developed during this and the 2002 National Forest study, it is apparent that the Rim of the World Drive of 1915–1916 and of the 1920s–1960s is significant for the role it played in the development and growth of the San Bernardino Mountains region, making it eligible for the CRHR under Criterion 1.

B10. Significance: (Continued)

The road was improved through numerous modifications in the 1920s and early 1930s, resulting in completion of the "high-gear" road in 1933, and the alignment, design, materials, construction, and appearance have changed very little since then. While the road of today may not retain sufficient integrity to relate its 1915–1916 period of significance, it certainly retains sufficient integrity to relate its significance dating to the period of 1933–1960s. Photographs of the Rimforest community from the late 1940s indicate that this segment of Rim of the World Drive appears much the same as it did at that time; during a period of early growth and development within the town. While a complete survey of the entire length of Rim of the World Drive is beyond the scope of this study, there is sufficient data to suggest that the segment located within the Project area retains sufficient historical integrity to relate the period of significance, 1933-1960s, and is eligible for the CRHR under Criterion 1. The segment located within the Project area in the community of Rimforest does not appear to be eligible under any of the other criteria of the CRHR, as it is not directly associated with an important historical figure (Criterion 2), it does not exhibit any architectural or engineering merits (Criterion 3), and it does not have the data potential to yield information important to the study of our local, state, or national history (Criterion 4).

B11. Additional Resource Attributes: (List attributes and codes)

B12. References:

B13. Remarks: **Project Impacts Assessment:** For the segment of Rim of the World Drive (36-007049) situated within the Rimforest Storm Drain Project boundaries, the existing features that contribute to the historical significance and integrity of this "historical resource" under CEQA are the location, design, and setting of the roadway, and the materials used in its construction. No historical roadside features such as rockwork and chain or wooden guardrails, or objects such as survey markers or monuments were encountered along this segment. The proposed Project within the vicinity of Rim of the World Drive involves trenching for underground pipelines, which has no potential to alter, destroy, relocate, or remove any features that contribute to the integrity or significance of Rim of the World Drive. Based on these considerations, the present study concludes that the proposed Project *will not cause a substantial adverse change* to the integrity or significance of Rim of the World Drive, 36-007049.

B14. Evaluator: Josh Smallwood
Date of Evaluation: October 2012

(Sketch Map with north arrow required.)

See attached Continuation Sheet

(This space reserved for official comments.)

Figure 1. Rim of the World Drive/SR 18 through the town of Rimforest. Photograph taken on July 11, 2012; view to the east.

Figure 2 A circa-1940s "Frasher's Fotos" postcard depicts a winter scene along Rim of the World Drive/SR 18 through the town of Rimforest (view to the west).

Figure 3 An aerial view of the segment of Rim of the World Drive recorded during this study.

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

LOCATION MAP

Primary # 36-007049 (Update)
HRI#
Trinomial CA-SBR-7049H

Page 7 **of** 7 ***Resource Name or #:** Æ-2410-1H ***Scale:** 1:24,000

***Map Name:** Harrison Mtn. (1967, photorevised 1980), CA, USGS 7.5' quadrangle ***Date:** 2012

SCALE 1:24,000

1 0.5 0 1 Miles

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

1 0.5 0 1 Kilometers

TRUE NORTH