

Initial Study/Mitigated Negative Declaration

San Bernardino County Flood Control District

Elder Creek Channel Improvement Project

Highland, California

Lead Agency



San Bernardino County Flood Control
District

825 E. Third Street
San Bernardino, CA 92415

Technical assistance provided by:



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

September 2019

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SECTION 1 – INTRODUCTION

The San Bernardino County Flood Control District (District) proposes to construct and maintain flood control improvements along approximately 2,100 linear feet of the Elder Creek system within the City of Highland, San Bernardino County (Figure 1). The project limits are from Old Greenspot Road, to approximately 700 feet downstream of Abbey Way. The Elder Creek Channel Improvement Project (proposed Project) would increase the capacity of the Elder Creek system to handle a 100-year (Q100) storm event and allow for proper conveyance of flows into Plunge Creek. Currently, the Elder Creek system is undersized, and the downstream portion of the Creek is at a lower elevation than Plunge Creek downstream, resulting in stormwater and urban runoff backing up at the confluence with Plunge Creek. The portion of the Elder Creek system to be improved currently consists of reinforced concrete box (RCB), which transitions into an open channel, which then confluences with Plunge Creek downstream. The open channel contains both concrete and earthen segments. Proposed improvements include removing existing channel infrastructure and installing a deeper and slightly wider concrete rectangular channel between Old Greenspot Road and Abbey Way, constructing a concrete bypass rectangular channel and enlarging the existing earthen channel (low-flow channel) between Abbey Way and Plunge Creek. Above the earthen channel, a small sedimentation basin is proposed to prevent excess sediment from entering the earthen channel. Grouted rip-rap would be placed at the confluence of the low-flow earthen channel, by-pass channel, and Church Street Channel to control erosion and reduce flow velocity. Other improvements include regrading and improving the existing side channel (East Highland Storm Drain), replacing two existing box culverts at the road crossings of Merris Street and Abbey Way, constructing a berm to protect the earthen channel, and revegetating the existing stockpile area southeast of the low-flow channel. The proposed Project also includes a one-time maintenance of Church Street Channel. See Section 3 for details of the proposed Project.

1.1 Background

The total watershed area for Elder Creek (also known as Elder Gulch) is approximately 1,425 acres. Elder Creek discharges its flow into Plunge Creek. The length of the improved Elder Creek system from Elder Basin to the confluence with Plunge Creek is approximately 2 miles long. Elder Basin's primary function is debris retention. Flows from Elder Basin outlet into Highland Basin about 1.5 miles upstream of the project area and are intercepted by a 66-inch diameter pipe culvert beneath Highland Avenue. Flows are then conveyed south via open channel to the inlet of a 72-inch diameter underground pipe culvert system located approximately 500 feet south of Highland Avenue, which then transitions approximately 1.2 miles downstream, into a 10-foot wide by 7-feet high RCB located just south of Old Greenspot Road. Approximately 600 feet downstream of Greenspot Road, the RCB connects to the Elder Creek open channel (Elder Creek Channel), which merges into Plunge Creek approximately 1,900 feet downstream. There are numerous lateral conduits connected to this system, which convey storm water runoff from the East Highland areas and the surrounding developments north of Greenspot Road.

Elder Creek is supported by natural surface hydrology and nuisance flows (i.e., urban runoff from developed areas to the north) that provide surface flow outside of storm season. Within the project area, channel grades in Elder Creek are relatively flat. Plunge Creek has a relatively flat topography in the area and this contributes to sediment deposition. As a result, Plunge Creek is higher in elevation than Elder Creek, so flows are not always conveyed properly downstream. Poor conveyance has resulted in pooling of nuisance flows and saturated soils, leading to wetland conditions upstream of the confluence of Elder and Plunge Creeks. These wetland conditions are historically atypical for this area with low rainfall and sandy substrate. Hydric soils are present within the channel center, and include hydrophytes such as Watercress (*Nasturtium officinale*), Waterspeedwell (*Veronica anagallis-aquatica*), Seep monkey flower

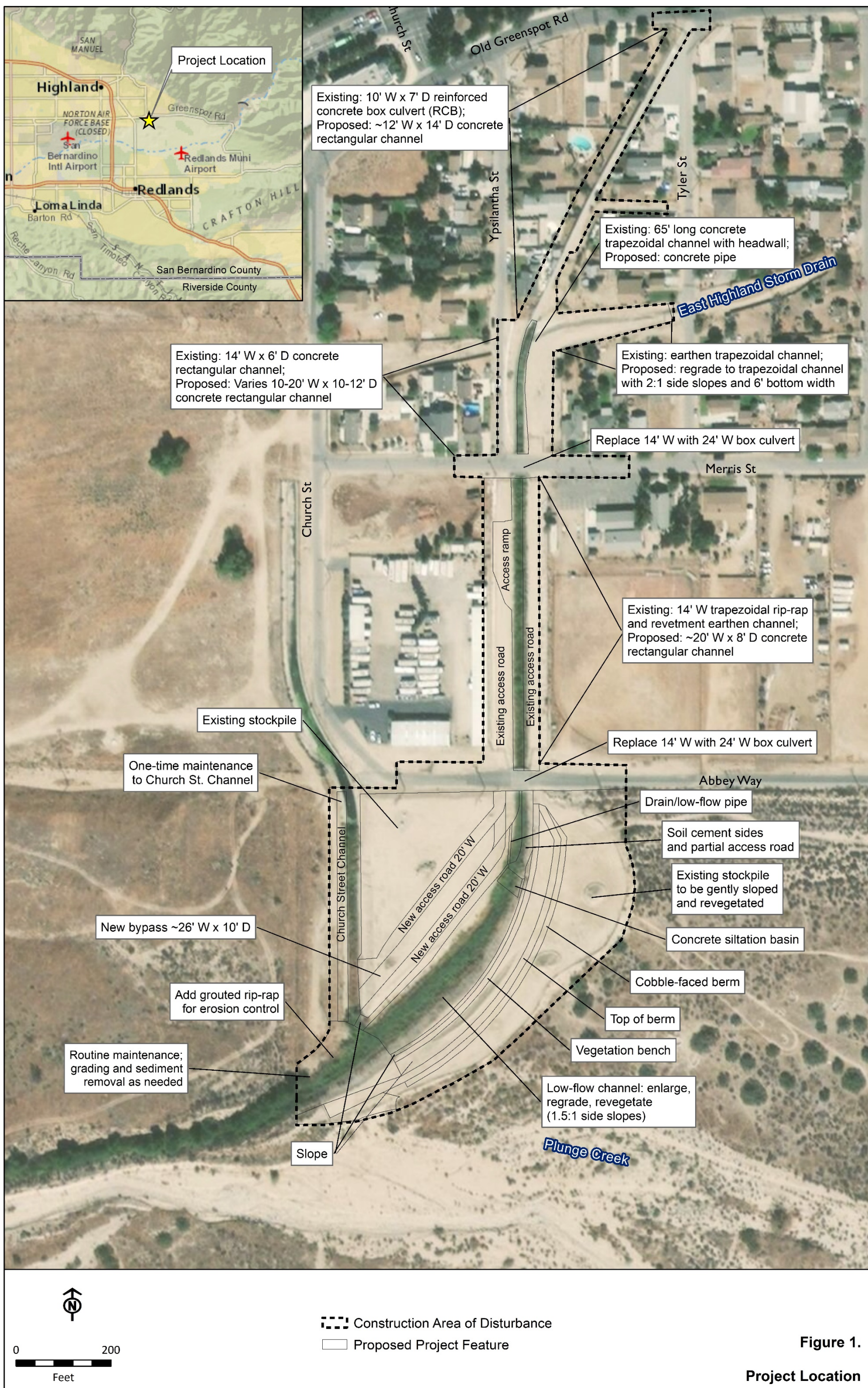
(*Mimulus guttatus*), Yellow sweetclover (*Melilotus indicus*), Cattail (*Typha latifolia*), and further downstream, black willow (*Salix goodingii*) and Fremont cottonwood (*Populus fremontii*). Maintenance records show that vegetation gets scoured out by debris flows or removed by District equipment during emergency work about once every 2.5 to 3 years.

Plunge Creek is a natural drainage system with compound braided low-flow channels that meander through a broader active flood plain. The streambed within Plunge Creek is characterized by a sandy substrate with a regular distribution of cobble and small boulders through the study area. Plunge Creek is typically absent of most vegetation within the active floodplain except for narrow bands of southern willow scrub. Outside the active floodplain, the low terrace transitions to Riversidean Alluvial Fan Sage Scrub (RAFSS). These areas support predominantly upland plant species including scalebroom (*Lepidospartum squamatum*), California buckwheat (*Eriogonum fasciculatum*), yucca (*Hesperoyucca whipplei*), yerba santa (*Eriodictyon trichoyx*), deerweed (*Lotus scoparius*), white sage (*Salvia apiana*), and California sagebrush (*Artemisia californica*).

Due to the relatively flat terrain surrounding Plunge Creek, the occurrence of a 100-year flood would result in a wide floodplain. The Federal Emergency Management Agency (FEMA) performed studies and developed Flood Insurance Rate Maps (FIRM, dated August 28, 2008), which state that this area, roughly 0.35 miles North of Plunge Creek, will be inundated regardless of any improvements done to the lateral connections along Plunge Creek. In December 2010, the watershed experienced substantial rainfall. A 300-year storm event in a 1-hour interval and a 400-year storm event in a 3-hour interval were documented. With the substantial rainfall unable to adequately flow through Elder Creek due to above mentioned issues, and foothill sloughing from the Old Fire, debris flow/mud floods damaged 51 homes. Subsequent litigation stemming from incurred flood damages resulted in a settlement to property owners of over \$9 million. Additional storms in 2014, though less than a 100-year storm event, also resulted in emergency work in Elder and Plunge Creeks to address imminent threats to life and property.

1.2 Purpose and Need

The project's ultimate purpose is the protection of life and property. Improvements to the Elder Creek system are necessary to convey a 100-year storm event through Elder Creek downstream of Old Greenspot Road and mitigate potential flooding in the area. Currently, the residential neighborhood south of Old Greenspot Road is subject to flooding because the system lacks 100-year storm capacity in this area. In addition, channel grades at the outlet of Elder Creek are relatively flat, and the downstream end of Elder Creek is at a higher elevation than Plunge Creek downstream. This results in storm water and urban runoff back up. This condition can result in flow conveyance issues as well as vector control problems (e.g., spread of infectious diseases from mosquitos).



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SECTION 2 – REGULATORY FRAMEWORK

The San Bernardino County Flood Control District has identified that the Elder Creek Channel Improvement Project meets the California Environmental Quality Act (CEQA) Guidelines Section 15378 definition of a Project. CEQA Guidelines Section 15378 defines a Project as the following:

"Project" means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment.

In accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Sections 21000-21177), this Initial Study has been prepared to determine potentially significant impacts upon the environment resulting from the construction, operation and maintenance of the Elder Creek Channel Improvement Project (hereinafter referred to as the "Project" or "proposed Project"). In accordance with Section 15063 of the State *CEQA Guidelines*, this Initial Study is a preliminary analysis prepared by the San Bernardino County Flood Control District (District) as Lead Agency to inform the Lead Agency decision makers, other affected agencies, and the public of potential environmental impacts associated with the implementation of the proposed Project.

Initial Study Organization

This Initial Study is organized as follows:

Introduction: Provides the regulatory context for the review along a brief summary of the CEQA process.

Project Information: Provides fundamental Project information, such as the Project description, Project location and figures.

Lead Agency Determination: Identifies environmental factors potentially affected by the Project and identifies the Lead Agency's determination based on the initial evaluation.

Mitigated Negative Declaration: Prepared when a determination can be made that no significant environmental effects will occur because revisions to the Project have been made or mitigation measures will be implemented which will reduce all potentially significant impacts to less than significant levels.

Evaluating Environmental Impacts: Provides the parameters the District uses when determining level of impact.

CEQA Checklist: Provides an environmental checklist and accompanying analysis for responding to checklist questions.

References: Include a list of references and various resources utilized in preparing the analysis.

SECTION 3 – DETAILED PROJECT DESCRIPTION

The proposed upgrades to the Elder Creek system are located in the City of Highland, San Bernardino County (see Figure 1). The proposed Project extends from Old Greenspot Road (upstream, northern limit) approximately 2,100 feet to just southwest of the confluence of Elder Creek and Church Street Channel, approximately 700 feet downstream of Abbey Road (downstream, southern limit). Elder Creek is located north of Plunge Creek and east of City Creek.

The project site is located in a mostly undeveloped portion of the City of Highland. Two paved roads, Merris Street and Abbey Way, cross the northern portion of the project site. A small residential community known as “The Village” is located within the project site and south of Old Greenspot Road. Within the project area, there are two substantially improved flood control facilities: (1) Elder Creek and (2) Church Street Channel. The proposed Project ends above the confluence with Plunge Creek. The project area is very disturbed, with little to no vegetation in the upland areas. Both native and non-native wetland vegetation is currently scoured out by storms every 2.5 to 3 years on average.

Open space to the east and west of the project area downstream of Abbey Way has newly established conservation and U.S. Department of the Interior Bureau of Land Management (BLM) land uses under the Upper Santa Ana River Habitat Conservation Plan (Wash Plan HCP). The Wash Plan HCP is 20-year master plan covering multiple government jurisdictions, water districts, businesses, and other private property owners and approved by State and federal oversight agencies. The Upper Santa River Wash Plan and Land Exchange Act was adopted in March, 2019. Within the Wash Plan HCP, the proposed project area has been set aside as a flood control “Covered Activity”.

The proposed Project would improve Elder Creek Channel by removing and replacing the existing, approximately 10-feet wide by 7-feet deep, concrete box culvert (RCB) between Old Greenspot Road and just north of Merris Street with a concrete rectangular channel, approximately 12-feet wide by 14-feet deep. Downstream of this section of RCB and just upstream north of Merris Street, the existing 14-feet wide by 6-feet deep concrete rectangular channel would transition into a larger, approximately 20-feet wide by 8-feet deep concrete rectangular channel. Between Merris Street and Abbey Way, the existing 14-feet wide trapezoidal rip-rap and revetment-improved earthen channel would be removed and replaced with an approximately 20-feet wide by 8-feet deep concrete rectangular channel. It should be noted that the above referenced depths are not fixed at the different reaches and will vary as required to meet upstream and downstream grades. Existing access roads along both sides of the channel would remain in this location. Additionally, two existing 14-feet wide box culverts at the road crossings of Merris Street and Abbey Way would be replaced with approximately 24-feet wide box culverts. Approximately 18-inch diameter sewer sleeves would be placed directly beneath the culverts for approximately 24 feet to allow sewer connections for adjacent residents in the future.

East Highland Storm Drain, which is a small side channel that drains into Elder Creek Channel, is located approximately 610 feet south of Old Greenspot Road. The East Highland Storm Drain is earthen and would remain earthen with implementation of the proposed Project, but would be regraded to a trapezoidal channel configuration with 2:1 side slope and a bottom width of approximately 6 feet. The earthen trapezoidal channel would include placement of an erosion control mat on the bottom and side slopes. At the confluence of East Highland Storm Drain and Elder Creek Channel, there is an existing 65-feet long section of concrete trapezoidal channel that would be removed and replaced with an approximately 48-inch concrete pipe and apron to convey the runoff from the earthen channel into Elder Creek Channel.

Downstream of Abbey Way, the earthen channel would be maintained as a low-flow, vegetated channel, and a concrete by-pass rectangular channel, approximately 26-feet wide by 10-feet high, would be constructed adjacent to the earthen channel. Low flows from the by-pass channel would discharge into a small concrete sedimentation basin, approximately 45 feet by 40 feet, via a low-flow pipe/box drain. The sedimentation basin would allow for centralized capture of sediment and removal, and flows would continue through the basin and into the earthen channel downstream. The earthen channel would experience the day-to-day low flows while the by-pass channel would only experience flows during storm events. Two access roads, about 20 feet wide, would be located on either side of the by-pass channel. Adjacent and parallel to the east bank of the low-flow channel, a berm would be constructed to protect the earthen low-flow channel. At the confluence of the low-flow channel, the concrete by-pass channel, and Church Street Channel, approximately 120 linear feet of $\frac{1}{4}$ ton, 3.5-feet thick, grouted rip-rap would be placed to control erosion and reduce flow velocities at this location. Grading would occur for approximately 100 feet downstream of the grouted rip-rap in order to meet downstream grades.

The southeastern portion of project area sits on an existing “shelf” that is unvegetated. As part of the proposed Project, this area would be regraded so it gently slopes more to the west, better reflecting the natural terrain.

As part of the proposed Project, a one-time maintenance of Church Street Channel, which is owned by the City of Highland, would occur as well as routine-maintenance of Elder Creek within the Project limits. Maintenance activities would occur within the limits of construction depicted on Figure 1 and would include cleaning out of vegetation and deposited sediment to ensure flow conveyance.

Construction

Construction of the proposed Project is anticipated to occur starting towards the end of June 2020 and continue into March 2021 (about 8.5 months), although this schedule could extend due to unforeseen circumstances or other work requirements. Consistent with the City of Highland General Plan Noise Element, construction would occur between 7:00 a.m. and 6:00 p.m. weekdays; however, hours may need to be modified. One modification may be to start a half hour after sunrise and stop a half hour before sunset in certain areas should sensitive species be present. Construction on Saturdays shall be at the discretion of the County Flood Control District Engineer. Equipment types anticipated to be used during construction include: wheeled loader, skip loader (with hammer attachment), excavator, grader, sheep-foot roller/compactor, steel vibratory and non-vibratory rollers, rubber tire roller, paving machine, concrete truck, concrete pump truck, generator, water truck, and dump truck. No impact pile driving equipment would be utilized; however, shoring or sheet piles may be required in areas north of Merris Street where there is limited space to perform sloped excavation. To access the constricted northern area, it is anticipated the contractor may have to drive on top of the existing RCB. Strategies for demolition and construction of the improvements will be determined by the contractor during the bidding process for the proposed Project.

Construction equipment staging and temporary stockpile locations would occur in disturbed locations within the project footprint, as identified in Figure 1, including: (1) along the east bank of Elder Creek Channel north of Merris Street; (2) the disturbed upland area between Church Street Channel and the west bank of Elder Creek Channel, immediately south of Abbey Way; and (3) the disturbed upland area immediately east of Elder Creek Channel south of Abbey Way extending towards the confluence with Plunge Creek.

Exported materials would be transported off-site within a 10-mile radius. The District would utilize the closest neighborhood fire hydrant(s) for water to support the proposed Project, such as for dust suppression.

Operations

The Elder Creek system will require routine maintenance within the proposed Project footprint over the length of the permit. There are two access routes into the Elder Creek Channel within the project area: one below Merris Street adjacent to the channel on the west side, and one downstream of Abbey Way, between the bypass channel and the low-flow earthen channel.

Maintenance is anticipated to be minimal within the concrete sections of the channel and culverts. It is estimated that maintenance would be 1-2 times a year or every few years depending on storms, and consist primarily of debris, trash, and graffiti removal, and fence and appurtenant structure repairs. Maintenance of the low-flow earthen channel is expected to be minimal and occur approximately twice a year, and would include invasive species removal, vegetation management that includes removing large tree species, thinning as required to ensure a healthy ecology and to allow vector control staff to address vector control concerns when they arise, and application of rodenticide as needed. Sediment removal would occur a few times a year within the sedimentation basin.

Vector management activities would occur in accordance with the Memorandum of Understanding (MOU) between the District and the County Environmental Health Department for the implementation of vector management activities.

Following construction, the low-flow earthen channel downstream of Abbey Way would be revegetated using appropriate riparian and wetland plant palettes as determined by a qualified biologist. Maintenance at the downstream area, where grouted rip-rap and grading are proposed, would occur approximately twice a year and include debris, trash, sediment removal, and vegetation management as required to convey flows.

Maintenance within the East Highland Storm Drain would consist of vegetation management, primarily invasive species removal, rodenticide application if needed, and slope and channel bottom repairs and sediment removal as needed, up to twice a year.

A one-time maintenance of Church Channel to remove sediment and vegetation build up is proposed as part of the proposed Project. This is to ensure that the system functions properly in the first few years following its construction, and to reduce maintenance requirements downstream post-construction.

SECTION 4 – ENVIRONMENTAL CHECKLIST FORM

1. **Project Title:** Elder Creek Channel Improvement Project

2. **Lead Agency Name:** San Bernardino County Flood Control District

Address: 825 East Third Street
San Bernardino, California 92415-0835

3. **Contact Person:** Michele Derry, Senior Planner
mderry@dpw.sbcounty.gov
(909) 387-8114

4. **Project Location:** Elder Creek Channel within the City of Highland, San Bernardino County, extending from Old Greenspot Road (upstream, northern limit) to just southwest of the confluence of Elder Creek and Church Street Channel, approximately 700 feet downstream of Abbey Road (downstream, southern limit). Elder Creek is north of Plunge Creek and east of City Creek.

Topographic Quad (USGS 7.5"): Redlands, California

Topographic Quad: Township 1S, Range 3W, Sections 2, 10, 11

Coordinates:
Latitude/Longitude: 34.10765°N / -117.1726°W
Site Access: Old Greenspot Rd., Ypsilantha St., Merris St., Abbey Way

5. **Project Sponsor:** Department of Public Works, Environmental Management Division

Name and Address: Michele Derry, Project Manager
825 East Third Street
San Bernardino, California 92415-0835

6. **General Plan/Zoning Designation:** South of Old Greenspot Road to Merris Street is designated Low Density Residential with zoning specific to the East Highland Village District, south of Merris Street to north of Abbey Way is designated Planned Development specific to the East Highlands Ranch, and south of Abbey Way is designated Open Space.

7. Project Description Summary:

The Elder Creek Channel Improvement Project (proposed Project) involves the replacement of the existing channel/road culverts with larger capacity channel/culverts; construction of a new concrete by-pass channel, small sedimentation basin, and regrading, enlarging, and revegetating the earthen channel below Abbey Way and maintaining it as a low flow channel; grading/culvert pipe improvements to East Highland Storm Drain that drains into Elder Creek; grouted rock placement at the downstream end where Elder Creek by-pass channel, earthen low flow channel, and Church Street channel converge; a one-time maintenance of Church Street Channel; and routine maintenance of the existing District-owned system within the project limits. Additionally, the southeastern stockpile area (shelf) would be regraded to gently slope west and be revegetated. Details of the proposed Project are further discussed in Section 3.

8. Environmental/Existing Site Conditions:

Elder Creek is supported by natural surface hydrology and nuisance flows (i.e., urban runoff from developed areas to the north) that provide surface flow outside of storm season. Within the project area, channel grades in Elder Creek are relatively flat. Plunge Creek has a relatively flat topography in the area and this contributes to sediment deposition. As a result, Plunge Creek is higher in elevation than Elder Creek, so flows are not conveyed properly downstream. Poor conveyance has resulted in pooling of nuisance flows and saturated soils, leading to wetland conditions upstream of the confluence of Elder and Plunge Creeks. Open space to the east and west of the project area downstream of Abbey Way has newly established conservation and U.S. Department of the Interior Bureau of Land Management (BLM) land uses under the Upper Santa Ana Habitat Conservation Plan (Wash Plan HCP). The Project area itself has been identified as a “Covered Activity (flood control)” within the Wash Plan HCP. Critical habitat for the San Bernardino kangaroo rat is present in the project area, south of Abbey Way. No other critical habitat is present within one mile of the project site.

9. Surrounding land uses and setting:

The site is generally located within an area characterized as residential at the north end and undeveloped, open space to the south. Two paved roads, Merris Street and Abbey Way, cross the northern portion of the project site. The site is bordered on the north by Old Greenspot Road within the “The Village” residential community, on the south by Plunge Creek, on the west by Tyler Street, and on the east by Ypsilantha Street and Church Street Channel.

10. Other public agencies whose approval is required:Federal:

- United States Army Corps of Engineers – Clean Water Act Section 404, Individual
- United States Fish and Wildlife Service – Endangered Species Act, Section 7

State Agencies:

- California Department of Fish and Wildlife – Streambed Alteration Agreement/California Fish and Game Code Section 1600; California Endangered Species Act, potential for Incidental Take Authorization (Section 2081) or Consistency Determination with federal authorization (Section 2080.1) (if applicable)
- Santa Ana Regional Water Quality Control Board, Region 8 – Clean Water Act Section 401, Water Quality Certification; Clean Water Act Section 402, National Pollutant Discharge Elimination System (NPDES) Construction General Permit

Financing Approval or Participation Agreements:

- The Project is funded by a FEMA Hazard Mitigation Grant for \$3 million, with the balance of funding provided by the District.

11. Have California Native American tribes traditionally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation?

Note: Conducting consultation early in the CEQA process allows tribal governments, lead agencies, and project proponents to discuss the level of environmental review, identify and address potential adverse impacts to tribal cultural resources, and reduce potential for delay and conflict in the environmental review process. (See Public Resources Code section 21080.3.2.) Information may also be available from the California Native American Heritage Commission's Sacred Lands File per Public Resources Code section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. Please also note that the Public Resources Code section 21082.3(c) contains provisions specific to confidentiality.

The District has completed consultation with California Native American tribes per Public Resources Code section 21080.3.1 and Assembly Bill (AB) 52. Notification letters were provided to San Manuel, Gabrieleño Band of Mission Indians – Kizh Nation, Soboba Band of Luiseño Indians, and Morongo Band of Mission Indians in August 2015. A response was received from the Soboba Band of Luiseño Indians. The District met with a representative of the Soboba Band of Luiseño Indians to discuss the project in September 2015. Consultation was completed on October 2015. No further consultation is required, and no mitigation measures were recommended.

12. Lead Agency Discretionary Actions:

Adopt Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact requiring mitigation to be reduced to a level that is less than significant as indicated in the checklist on the following pages.

<input type="checkbox"/>	Aesthetics	<input type="checkbox"/>	Agricultural / Forest Resources	<input type="checkbox"/>	Air Quality
<input checked="" type="checkbox"/>	Biological Resources	<input checked="" type="checkbox"/>	Cultural Resources	<input type="checkbox"/>	Energy
<input checked="" type="checkbox"/>	Geology / Soils	<input type="checkbox"/>	Greenhouse Gas Emissions	<input checked="" type="checkbox"/>	Hazards / Hazardous Materials
<input checked="" type="checkbox"/>	Hydrology / Water Quality	<input type="checkbox"/>	Land Use / Planning	<input type="checkbox"/>	Mineral Resources
<input checked="" type="checkbox"/>	Noise	<input type="checkbox"/>	Population / Housing	<input type="checkbox"/>	Public Services
<input type="checkbox"/>	Recreation	<input checked="" type="checkbox"/>	Transportation	<input type="checkbox"/>	Tribal Cultural Resources
<input type="checkbox"/>	Utilities / Service Systems	<input checked="" type="checkbox"/>	Wildfire	<input checked="" type="checkbox"/>	Mandatory Findings of Significance

LEAD AGENCY DETERMINATION

On the basis of this initial evaluation, the following finding is made:

	The proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
X	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.
	The proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
	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.
	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 or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature [Darren J. Meeka, P.E., Chief]

Date

09/19/19

1. AESTHETICS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?				X
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?			X	
c) Substantially degrade an existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage points.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?			X	
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				X

(Check ☐ if project is located within a view-shed of any Scenic Route listed in the General Plan):

Environmental Setting

The proposed upgrades to the Elder Creek system are located in the City of Highland, San Bernardino County. The proposed Project extends through a small residential community known as “The Village,” located south of Old Greenspot Road. The project site and adjacent residential land uses are zoned “East Highland Village Residential” by the City of Highland (City of Highland, 2019). The existing flood channel is visible from these adjacent residences and adjacent streets (refer to Figure 1). Open space to the east and west of the project area downstream of Abbey Way has newly established conservation and U.S. Department of the Interior Bureau of Land Management (BLM) land uses under the Upper Santa Ana Habitat Conservation Plan (Wash Plan HCP). The Wash Plan HCP is 20-year master plan covering multiple government jurisdictions, water districts, businesses, and other private property owners and approved by State and federal oversight agencies. Within the Wash Plan HCP, the project area has been set aside for flood control purposes. The nearest designated scenic highway to the project site is a portion of State Route (SR) 38 located over 15-miles away (Caltrans, 2019). The nearest eligible scenic highway to the project site is SR-18 located approximately 5-miles north (Caltrans, 2019).

Impact Analysis

a) *Have a substantial adverse effect on a scenic vista?*

No Impact. The San Bernardino County General Plan states that a feature or vista can be considered scenic if it provides a vista of undisturbed natural areas, includes a unique or unusual feature that comprises an important or dominant portion of the viewshed, or offers a distant vista that provides relief from less attractive views of nearby features (such as views of mountain back drops from urban areas)

(San Bernardino County General Plan [San Bernardino County, Open Space Element, Policy OS 5.1]). From the project site, there are views of the San Bernardino Mountains to the north/northeast and views of open space to the south/southwest. Because the proposed Project would replace the concrete box culvert (RCB) between Old Greenspot Road and just north of Merris Street with a lower-profile concrete rectangular channel, while other improvements are to below-grade flood channel structures, it would not obstruct any viewsheds of adjacent open space or mountains. Therefore, the project would have no impacts to scenic vistas.

- b) *Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?*

Less Than Significant. Based on the distances to the nearest designated and eligible scenic highways, the project site would not be visible from those locations. The project site does not contain, nor would it impact, rock outcroppings or historic buildings. Construction and maintenance of the channel includes vegetation management, which may require the removal of large tree species or tree thinning to ensure a healthy ecology and to allow vector control staff to address vector control concerns when they arise. The removal or trimming of trees would only occur when necessary and immediately adjacent to the existing flood channel. These changes are not expected to result in significant new visual contrast compared to existing views of the flood channel from adjacent residences and streets. Therefore, visual impacts associated with the proposed Project would be less than significant.

- c) *Substantially degrade an existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage points.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?*

Less Than Significant. Construction of the proposed Project would temporarily have an adverse effect on the scenic quality of the project site due to construction activity and vehicles. However, these impacts would be temporary, only occurring during the approximately 8.5-month construction phase. Therefore, impacts from construction would be temporary and there would not be any permanent adverse effects.

Once completed, the proposed upgrades to the Elder Creek system would slightly expand and deepen the existing facilities. Implementation of the proposed Project would improve Elder Creek Channel by removing and replacing the existing, approximately 10-foot wide by 7-foot deep, RCB between Old Greenspot Road and just north of Merris Street with a concrete rectangular channel, approximately 12-foot wide by 14-foot deep. The concrete channel would be deepened as required to meet upstream grades. Existing access roads along both sides of the channel would remain in this location. The Highland Storm Drain is earthen and would remain earthen with implementation of the proposed Project, but would include placement of an erosion control mat on the bottom and side slopes. Downstream of Abbey Way, the proposed Project consists of constructing a concrete by-pass rectangular channel, approximately 26-foot wide by 10-foot deep and keeping the existing earthen channel. The southeastern portion of project area sits on an existing “shelf” that is unvegetated. As part of the proposed Project, this area would be regraded so it gently slopes more to the west, better reflecting the natural terrain.

Residential development and streets along the proposed Project corridor have views of the affected segment of the Elder Creek system. While the proposed improvements would result in a larger and deeper channel, these changes are not expected to result in significant new visual contrast compared to existing views of the flood channel from adjacent residences and streets. Because the improvements would occur to an existing flood channel with similar surface material and visual appearance, the improvements would avoid substantial degradation of visual character of the site. Additionally,

maintenance would consist of debris, trash, and graffiti removal, vegetation management, and fence/structure repairs. This would reduce visual degradation of the channel and immediately surrounding area. Therefore, visual impacts associated with the proposed Project would be less than significant.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

No Impact. Construction would occur between 7:00 a.m. and 6:00 p.m. weekdays; however hours may need to be modified. One modification may be to start a half hour after sunrise and stop a half hour before sunset in certain areas should sensitive species be present in the project area. Construction on Saturdays shall be at the discretion of the County Flood Control District Engineer. In the event nighttime construction would occur, lighting would be temporary and directed only on the work area. Such lighting is not considered a source of substantial light that could affect nighttime views in the area. The proposed Project would not introduce permanent lighting sources and would not include metallic or other surfaces that could introduce a new permanent source of glare. Operation of the proposed Project would include regular inspections and maintenance activities. None of these activities would occur during the nighttime. Therefore, there would be no impacts from lighting or glare sources.

Mitigation Measures

None Required.

Aesthetics Impact Conclusions

No potentially significant adverse impacts are identified or anticipated, and no mitigation measures are required.

2. AGRICULTURE AND FORESTRY RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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 Dept. 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:				X
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?				X
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?				X
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))?				X
d) Result in the loss of forest land or conversion of forest land to non-forest use?				X
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?				X

(Check ☐ if project is located in the Important Farmlands Overlay):

Environmental Setting

The California Department of Conservation (DOC) manages the Farmland Mapping and Monitoring Program (FMMP), which incorporates soil rating data and current land use information to classify categories of Important Farmland. Important Farmland is defined as Prime Farmland, Unique Farmland, and Farmland of Statewide Importance. The FMMP also identifies Farmland of Local Importance, as determined by the county, as well as Grazing Land. In addition to the FMMP, the DOC regulates the Land Conservation Act that enables local governments (counties and cities) to enter into contracts (e.g. Williamson Act contracts) with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use.

According to the DOC's Important Farmland maps, the project area south of Old Greenspot Road and north of Abbey Way is designated as Urban and Build-Up Land, while the project area south of Abbey Way is designated as Grazing Land (DOC, 2017). None of the lands within the project site or the surrounding area are currently under a Williamson Act contract (DOC, 2016).

Regarding local land use designations, the project site is zoned as Low Density Residential within the East Highland Village District (City of Highland, 2006). None of the lands within the project area are zoned for Agriculture.

Impact Analysis

- 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?*

No Impact. According to the DOC, the proposed Project would be located on designated Grazing Land south of Abbey Way, and on Urban and Built-Up Land north of Abbey Way. None of the proposed flood control improvements would occur on designated Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. Therefore, the proposed Project would not convert Farmland to a non-agricultural use and no impact would occur.

- b) *Conflict with existing zoning for agricultural use or a Williamson Act contract?*

No Impact. The proposed Project would not be located on land that is under a Williamson Act contract. Furthermore, the project site is zoned by the City of Highland as Low Density Residential. None of the proposed activities would conflict with existing zoning for agriculture or with a Williamson Act contract. No impact would occur.

- 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))?*

No Impact. The project site is not located on land that is zoned for forest land or timberland. There would be no impact.

- d) *Result in the loss of forest land or conversion of forest land to non-forest use?*

No Impact. The project site is not located on or adjacent to forest land, and none of the proposed flood control improvements would result in the loss or conversion of forest land. There would be no impact.

- 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?*

No Impact. The proposed Project would generally occur within an existing flood control system. There are no agricultural uses, designated Farmland, or forest land within or adjacent to the project site. None of the proposed improvements would involve changes to the environment that could result in conversions to non-agricultural or non-forest uses. There would be no impact.

Mitigation Measures

None Required.

Agriculture and Forestry Services Impact Conclusions

No potentially significant impacts are anticipated for agriculture and forestry resources, and no mitigation measures are required.

3. AIR QUALITY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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:				
a) Conflict with or obstruct implementation of the applicable air quality plan?			X	
b) 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?			X	
c) Expose sensitive receptors to substantial pollutant concentrations?			X	
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?			X	

(Discuss conformity with the South Coast Air Quality Management Plan, if applicable):

Environmental Setting

The project site is in the City of Highland in southwestern San Bernardino County within the South Coast Air Basin (SCAB) and under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The project area is located within the SCAQMD designated Source Receptor Area (SRA) 34 (Central San Bernardino County) and the closest ambient air monitoring locations are in San Bernardino, Redlands, and Fontana. The project area has a climate that is characterized by hot, dry summers and cool winters with a moderate amount of seasonal precipitation that occurs primarily during the winter months. The average summer (June to September) high and low temperatures in the Highland area range from 96°F to 58°F. Average winter (December to March) high and low temperatures range from 71°F to 41°F. The average annual precipitation is approximately 16.5 inches with over 75 percent of the precipitation occurring between December and March (The Weather Channel, 2019). This inland area is less moderated by the Pacific Ocean, being warmer in the summer and cooler in the winter, than coastal areas of the SCAB. Additionally, air pollutant concentrations are typically higher in this inland area of the SCAB, in comparison with more coastal areas, due to the surrounding mountains blocking downwind pollutant transport from onshore winds and trapping pollutants in this part of the air basin.

Regulatory Setting

Air quality is regulated at the federal (United States Environmental Protection Agency [USEPA]), State (California Air Resources Board [ARB]), and local level (SCAQMD). The SCAQMD is primarily responsible for planning, implementing, and enforcing federal and State ambient air quality standards within the SCAB. The USEPA, ARB, and the local air districts classify an area as attainment, unclassified, or nonattainment of the ambient air quality standards depending on whether the monitored ambient air quality data shows compliance, insufficient data available, or non-compliance with these standards; the National and California Ambient Air Quality Standards (NAAQS and CAAQS). The SCAB is currently designated as nonattainment for the State and federal ozone and fine particulate matter (PM_{2.5})

standards, and the State respirable particulate matter (PM₁₀) standard. The SCAB is designated as attainment, attainment/maintenance, or unclassified for all other State and federal standards (USEPA, 2019; ARB, 2019).

As part of its planning responsibilities, SCAQMD prepares Air Quality Management Plans (AQMPs) and Attainment Plans as necessary based on the attainment status of the air basins within its jurisdiction. The SCAQMD is also responsible for permitting and controlling stationary source criteria and air toxic pollutants as delegated by the USEPA. The proposed Project, as a construction project with no stationary sources, is not directly subject to many regulations, but the ARB and SCAQMD rules that would apply are:

ARB Statewide Portable Equipment Registration Program (PERP) Regulation (ARB, 2011)

This regulation applies to any portable stationary equipment, such as generators, that may be used during construction. The PERP establishes a uniform program to regulate portable engines and portable engine-driven equipment units. Once registered in the PERP, engines and equipment units may operate throughout California without the need to obtain individual permits from local air districts, so long as the equipment is located at a single location for no more than 12 months.

SCAQMD Rules and Regulations (SCAQMD, 2019)

Regulation 2 – Permits. This regulation would apply to any portable stationary equipment not registered under the PERP program that might be used during construction. These stationary and portable equipment would need to obtain permits to construct and operate.

Rule 401 – Visible Emissions. This rule prohibits discharge of air contaminants or other materials that are as dark or darker in shade as designated No. 1 on the Ringelmann Chart, or at an equivalent opacity, for a period or periods greater than three minutes in one hour.

Rule 402 – Nuisance. This rule prohibits discharge of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public; or that endanger the comfort, repose, health, or safety of any such persons or the public; or that cause, or have a natural tendency to cause, injury or damage to business or property.

Rule 403 – Fugitive Dust. The purpose of this rule is to control the amount of particulate matter (PM) entrained in the atmosphere from man-made sources of fugitive dust. The rule prohibits emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area to be visible beyond the emission source's property line. During construction, fugitive dust control measures identified in the rule would be required to minimize fugitive dust emissions from proposed earth moving, temporary storage pile(s), and unpaved vehicle travel activities. These measures would include watering as necessary to maintain sufficient soil moisture content, vehicle/equipment speed limits when on unpaved areas, bulk material haul truck freeboard or cover dust controls, and sediment track-out controls.

County of San Bernardino Countywide Plan.

In addition, the County of San Bernardino has eight air quality policies in the Natural Resources Element of the General Plan (County of San Bernardino, 2019). None of these policies would require any direct action for completion of the proposed Project, beyond compliance with existing air quality regulations, but two of these policies do relate to proposed Project emissions sources:

Policy NR-1.6: Fugitive dust emissions. We coordinate with air quality management districts on requirements for dust control plans, revegetation, and soil compaction to prevent fugitive dust emissions.

Policy NR-1.8: Construction and operations. We invest in County facilities and fleet vehicles to improve energy efficiency and reduce emissions. We encourage County contractors and other builders and developers to use low-emission construction vehicles and equipment to improve air quality and reduce emissions.

Impact Analysis

a) Conflict with or obstruct implementation of the applicable air quality plan?

Less Than Significant. The SCAQMD and Southern California Association of Governments (SCAG) have developed AQMPs to meet the requirements of the Federal Clean Air Act. AQMPs were developed in 2003, 2007, 2012, and 2016 to address various federal non-attainment and attainment/maintenance planning requirements. These plans are incorporated into the State Implementation Plan by ARB and are then reviewed and approved or disapproved by USEPA. USEPA is currently reviewing the 2016 AQMP.

There are no applicable emissions reduction measures in these plans, that are not already part of approved regulations, that apply to the proposed Project. The proposed Project does not include major stationary emissions sources, so very few SCAQMD regulations would apply, and the proposed Project would comply with those applicable SCAQMD rules and regulations. Additionally, the proposed Project would not cause new growth during construction or operation. Therefore, the proposed Project would not conflict with or obstruct the applicable air quality plans.

b) 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?

Less Than Significant. Pollutant emission calculations related to the proposed construction activities include the emissions from on-road vehicles and off-road equipment utilized during construction; and include the fugitive dust emissions resulting from earthmoving activities, wind erosion, and vehicle travel. During operations Project-direct emissions would come from the vehicles accessing the project site area for inspection and vehicles and equipment used during periodic maintenance events.

The District provided information used to estimate the proposed construction and operation activities. Air pollutant emissions from the proposed Project construction and operation were estimated using ARB on-road vehicle and off-road equipment emissions factor models (EMFAC2014 and OFFROAD), and USEPA AP-42 fugitive dust calculation methods. The specific assumptions regarding the construction task equipment needs, and vehicle trips are provided in Appendix A. The emissions results, which are unmitigated emissions for the purposes of CEQA, only include applicable SCAQMD Rule 403 fugitive dust control requirements. No other mitigation measures such as off-road equipment or on-road vehicle tailpipe emissions mitigation are assumed.

Project Construction

Table 3-1 compares the maximum daily unmitigated construction emissions of the proposed Project with the SCAQMD regional emissions significance thresholds. As shown, the maximum daily construction emissions have been determined to be well below all SCAQMD regional significance thresholds. Therefore, proposed Project construction regional emissions impacts are less than significant.

Table 3-1. Maximum Daily Unmitigated Construction Emissions						
	VOC	CO	NO _x	SO _x	PM10	PM2.5
On-Road Vehicle Emissions	0.42	4.20	5.49	0.04	0.06	0.05
Off-Road Equipment Emissions	2.11	16.17	20.01	0.02	0.54	0.50
Fugitive Dust Emissions	--	--	--	--	13.21	1.85
Total Maximum Daily Emissions (lbs/day)	2.53	20.37	25.50	0.06	13.81	2.40
SCAQMD Regional Significance Thresholds (lbs/day)	75	550	100	150	150	55
<i>Exceeds Thresholds?</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
Source: Appendix A; SCAQMD, 2015						
Note: Maximum daily VOC, NO _x , and SO _x emissions occur during an optional sheet piling construction phase with other overlapping tasks, maximum CO emissions occur during the paving period with other overlapping tasks, and the maximum daily PM10 and PM2.5 emissions occur during the maximum traffic emissions period that also include grading fugitive dust emissions.						

Project Operation

Proposed Project operation maximum daily emissions would be lower than construction emissions due to substantially less on-road vehicles, including less heavy truck travel. These emissions would also go down overtime as on-road vehicle and off-road equipment emissions decline due to the ongoing regulatory measures controlling emissions from these sources. Therefore, the operation regional emissions would be well below the SCAQMD operation regional daily emissions significance thresholds.¹

c) Expose sensitive receptors to substantial pollutant concentrations?

Less Than Significant. There are three specific impact issues that have been analyzed with respect to the proposed Project's potential to expose sensitive receptors to substantial pollutant concentrations, as follows:

- Localized short-term criteria pollutant concentration impacts
- Health-risk impacts from toxic air contaminant (TAC) emissions
- Risk for causing incidence of Valley Fever infection

Localized Pollutant Concentration Impacts

SCAQMD Localized Significance Thresholds (LSTs) are used to determine if a project could exceed ambient air quality thresholds for nearby sensitive receptors. The LSTs were established by SCAQMD for each SRA within their jurisdiction and represent on-site emission levels that could cause ambient air quality standard exceedances or substantial contributions to existing exceedances at given distances from the site to nearby receptor locations for four pollutants (CO, NO₂, PM10, and PM2.5). There are separate construction and operations thresholds for PM10 and PM2.5. The Project site is in SRA 34

¹ The SCAQMD operation daily emission regional thresholds are the same as the construction thresholds, except for NO_x and VOC which are reduced to 55 pounds per day.

(Central San Bernardino Valley), and the nearest sensitive receptors are residences located within 25 meters along sections of the proposed Project's linear footprint, both for construction and for maintenance operations. There are no nearby schools, hospitals, or other sensitive receptors other than residences.

Project Construction

Table 3-2 compares the maximum daily unmitigated on-site construction emissions of the proposed Project with the SCAQMD most conservative applicable LSTs. The LSTs were determined using the SCAQMD look up table (SCAQMD, 2009) for SRA 34 with the assumptions of the nearest receptors being located 25 meters from construction areas, where the active construction area at the time of the peak daily on-site emissions is assumed to be one acre in size. Appendix A includes detailed assumptions for the construction phases, including equipment and fugitive dust emissions assumptions that were used to generate the maximum daily localized (on-site) emissions.

Table 3-2. Maximum Localized Daily Unmitigated Construction Emissions				
	CO	NO _x	PM10	PM2.5
Off-Road Equipment Emissions	6.86	12.28	0.52	0.47
Fugitive Dust Emissions	--	--	Neg.	Neg.
Maximum On-site Unmitigated Construction Emissions (lbs/day)	6.86	12.28	0.52	0.47
SCAQMD Localized Significance Thresholds (lbs/day)	667	118	4	3
<i>Exceeds Thresholds?</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
Source: Appendix A; SCAQMD, 2009				
Note: Maximum daily localized emissions occurring with 25 meters of sensitive receptors occurs during the sheet pile option task, which has no on-site on-road emissions (no water truck or concrete pump truck), and negligible (Neg.) fugitive dust emissions.				

The maximum unmitigated daily on-site localized proposed Project construction emissions were determined to be below all SCAQMD LSTs for the worst-case conditions where construction activities are located adjacent to residences. There is no potential for the proposed Project to exceed the SCAQMD CO and NO_x threshold, which are actually higher than the regional thresholds (see the worst-case daily emissions presented in Table 3-1, above); however, PM10 and PM2.5 emissions, specifically the fugitive dust emissions, are much higher in areas with unpaved road travel and motor grading activities south of Abbey Way. However, this construction work zone is at least 150 meters from the nearest sensitive receptor and this construction work area is around 5 acres in size. To ensure that the work area with maximum daily PM10 and PM2.5 emissions would not exceed the SCAQMD LSTs, those emissions are compared to the appropriate LSTs for that work area, which would be the SCAQMD LST thresholds for a 5-acre construction site with a receptor distance of 150 meters (85 lbs/day for PM10 and 26 lbs/day for PM2.5). Comparing all of the PM10 and PM2.5 maximum daily emissions shown in Table 3-1, which represents maximum daily on-site and off-site emissions during a maximum task overlap south of Abbey Way (13.81 lbs/day PM10 and 2.40 lbs/day PM2.5), it can be seen that these emissions are also well below the appropriate SCAQMD LSTs.

Project Operation

The proposed Project's maximum daily onsite emissions would be substantially lower than the maximum daily construction emissions, and the higher emissions maintenance events would occur south of Abbey, which is more than 150 meters from the nearest sensitive receptor location. The operation LSTs for a one-acre work area at this receptor distance would be: CO – 3,748 lbs/day; NOx – 272 lbs/day; PM10 – 13 lbs/day; and PM2.5 – 4.5 lbs/2. Therefore, after consideration of the occasional operations and maintenance events that are expected to occur, in comparison to the maximum daily construction on-site construction LST emissions presented above in Table 3-2 and discussed further below the table, the emissions from operation have been determined to be below the applicable SCAQMD LSTs.

The SCAQMD LSTs were developed to identify substantial emissions that could cause near-field ambient air pollutant concentrations that could cause or contribute to a violation of a short-term ambient air quality standards. The ambient air quality standards are set at levels meant to be health protective, and per the findings above the proposed Project would not have emission of a magnitude that would directly cause substantial increases in ambient pollutant levels surrounding the project area. Additionally, the proposed Project would not have the potential to substantially affect secondary pollutant formation³ that could cause substantial health effects. Therefore, the proposed Project's criteria pollutant emissions would not be of a magnitude to cause substantial adverse health effects.

Toxic Air Contaminants (TAC) Health Risk Analysis

Emissions of air toxics include emissions from the short-term construction period for the proposed Project and long-term from operation. From a health risk perspective, the construction emissions impacts are primarily associated with the emissions of diesel particulate matter (DPM) from the diesel-fueled construction equipment operating at the project site during construction. There are transportation emissions during construction and operation, but those emissions are spread over a large area and are not substantial at the project site. Additionally, the operations emissions would be minimal in comparison to the construction emissions, would go down over time as average vehicle and off-road equipment emissions decrease, would be primarily located south of Abbey Way where the nearest residential receptors are at a greater distance from than the distance to the construction emissions sources, and the proposed Project's lifetime annual average emissions are expected to be below current conditions, resulting in no increase in health risk from existing conditions.

The on-site DPM emissions during construction would occur over a relatively short period (approximately 8.5 months) in relation to life-time exposure periods; however, DPM has a high cancer potency. Given the fact that there are adjacent residential receptors, a health risk assessment of the proposed Project's construction emissions was completed. Health risk assessments can be completed using more conservative screening level methods to more sophisticated refined modeling methods that include air dispersion modeling techniques. An initial screening-level approach from SCAQMD risk assessment guidance was completed by determining a conservative worst-case concentration based on the annual on-site DPM emissions (0.03 tons per the emissions estimate in Appendix A) multiplied by the SCAQMD

² SCAQMD LST Table C-1 for SRA 34 (SCAQMD, 2009), for one-acre construction area with emissions thresholds for 100 and 200 meters linearly interpolated to derive thresholds for a receptor distance of 150 meters.

³ Secondary pollutants are not those emitted at the site, but rather are created by complex reactions over time, like ozone, and secondary PM10 and PM2.5.

published Chi/Q (X/Q) appropriate dispersion factor.⁴ The maximum concentration value using this screening technique is $0.03 \text{ tons/year} \times 6.69 = 0.20 \text{ } \mu\text{g}/\text{m}^3$. Using this concentration of DPM in the OEHH/ARB Risk Assessment Standalone Tool (RAST) model⁵ these worst-case screening level risks are calculated to be 36×10^{-6} for cancer and a chronic health index of 0.04 (diesel emissions do not have acute health risk reference exposure levels, so acute impacts are not provided in RAST for diesel emissions). SCAQMD has published TACs health risk significance thresholds of 10 in a million (10×10^{-6}) for increased cancer risk and scores of more than 1.0 for chronic and acute hazard indices (SCAQMD, 2015). Therefore, for this very simple screening-level approach the cancer risk is determined to be almost four times lower than the significance threshold. Thus, the screening level chronic risk is below the significance level.

The initial simplified screening level approach summarized above assumed that all of the proposed Project's DPM emission were emitted within 25 meters of the maximum exposed residential receptor. However, the proposed Project's emissions would be emitted along a linear area that is over 500 meters long. A more refined screening level approach was completed that estimates the emissions at different distance intervals from the maximum exposed residential location (assumed to be the nearest residence on Merris Street). This method includes the same multiplication of the emissions by the SCAQMD published Chi/Q (X/Q) for each of the distance intervals to determine a concentration for the emissions at that interval. These interval-based concentrations were then summed to provide a maximum concentration to use for risk determination. Using this approach, the maximum concentration was determined to be $0.043 \text{ } \mu\text{g}/\text{m}^3$ (see Appendix A). The cancer risk determined for this concentration is 7.6×10^{-6} , which is below the significance criteria of 10×10^{-6} . The determined risk values using these screening-level risk analysis approaches are below the TAC health risk significance thresholds.

Valley Fever Risk Analysis

Coccidioidomycosis, often referred to as San Joaquin Valley Fever or Valley Fever, is one of the most studied and oldest known fungal infections. Valley Fever most commonly affects people who live in hot dry areas with alkaline soil and varies with the season. This disease is caused by inhalation of arthroconidia (spores) of the fungus *Coccidioides immitis* (CI). The disease is most often symptomatic and diagnosed in adults age 60 and older. However, African Americans, Filipinos, women in the third trimester of pregnancy, and persons whose immunity is compromised are most likely to develop the most severe form of the disease (CDC, 2018). In addition to humans, a total of 70 different species are known to be susceptible to Valley Fever infections, including dogs, cats, and horses; with dogs being the most susceptible (LACPH, 2007).

The project site is in an area designated as "suspected endemic" for Valley Fever by the Center for Disease Control (CDC, 2018). The annual incidence rates reported from 2001 through 2017, by the State Department of Public Health, indicate that San Bernardino County has relatively low rates (ranging from 1.1 to 3.9 cases per 100,000 population) of reported Valley Fever infections, with reported case rates being well below the State average for each year reported (CDPH, 2019).

⁴ For diesel engines (average total rating between 300 and 400 break horsepower [bhp] and used less than 12 hours per day) that have a downwind distance of 25 meters in the project area's closest guideline meteorological station (Redlands). This value in Table 10.3 A in the SCAQMD guidance manual appendix is 6.69 (units of $[\mu\text{g}/\text{m}^3]/[\text{ton}/\text{year}]$) (SCAQMD, 2017).

⁵ For the worst-case risks, using the worst-case one-year exposure period for this yearly average concentration, the risks are calculated starting in the third trimester.

Substantial exposure to the CI spores could cause construction workers and area residents to contract the disease. The primary way to avoid Valley Fever, which is not transmittable person to person, is to limit exposure to the CI spores. The greatest likelihood of the presence of spores in the project area would be in the work areas that are currently not covered by concrete or asphalt in the southern part of the Elder Creek channel work area. The southern part of the Elder Creek channel work area is located further from the area's residential receptors than the northern developed parts of the channel, which would limit the residential receptor exposure potential. Additionally, as noted above, the County does not have a high incidence rate for Valley Fever infection, so a substantial presence of CI spores at the project site, while unknown, is certainly questionable. Therefore, exposure of CI spores to the area's residential population resulting from the proposed Project is expected to be minimal. Also, the required fugitive dust controls (SCAQMD Rule 403 compliance) would provide substantial control of the fugitive dust emissions during construction. Impacts during operations (i.e., periodic maintenance events) would also need to comply with SCAQMD Rule 403 dust control requirements. Given the low likelihood of substantial residential exposure, and with the implementation of the SCAQMD Rule 403 fugitive dust control measures, it is concluded that the potential risk from Valley Fever infection due to the proposed Project is less than significant.

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Less Than Significant. Potentially objectionable odors would temporarily be created during the Project's construction activities, primarily from paving operations on Merris Street and Abbey Way. However, these asphalt odors would occur for a limited amount of time (approximately one day), are not overly offensive, and asphalt odors are regularly experienced in suburban settings. Other minor odor sources during construction and operation include tailpipe emissions from off-road equipment and on-road vehicles used during construction. These minor odor sources would not be expected to pose a significant concern.

The proposed Project would not cause a large amount of airborne dust, given compliance with SCAQMD Rule 403 fugitive dust control requirements, or other emissions that could cause a nuisance or otherwise adversely affect a substantial number of people surrounding the project site.

Mitigation Measures

None Required.

Air Quality Impact Conclusions

No significant adverse impacts are identified or anticipated, and no mitigation measures are required.

4. BIOLOGICAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
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?		X		
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?			X	
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		X		
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?		X		
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			X	
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?				X

☒ Check if project is located in the Biological Resources Overlay or Contains habitat for any species listed in the California Natural Diversity Database

Environmental Setting

A Biological Resources Technical Report (BRTR) was prepared by Aspen Environmental Group (Aspen) for the project and is included as an appendix to this document (Appendix B). The report includes a literature review and a search of the California Natural Diversity Database (CNDDB) for the Harrison Mountain, Keller Peak, Redlands, San Bernardino North, San Bernardino South, and Yucaipa States Geological Survey (USGS) 7.5-minute topographic quad. In addition, the report describes field surveys conducted by Justin M. Wood (of Aspen Environmental Group [Aspen]) in 2019. The purpose of the 2019 survey was to map vegetation, survey for special-status plants and animals, and assess habitat suitability for all other special-status species. Transects were walked throughout the project site parallel and into the adjacent habitat. In addition to the Aspen survey, focused coastal California gnatcatcher surveys and San Bernardino kangaroo rat trapping was also conducted in late 2018 and early 2019.

A Jurisdictional Delineation (JD) was prepared by Aspen for the proposed Project and is included as an appendix to this document (Appendix C). The field surveys for the JD were conducted by Mr. Wood during

site visits on September 27, 2018 and October 29, 2018 to determine the type and extent of jurisdictional waters present.

Impact Analysis

- 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?*

Less Than Significant with Mitigation Incorporated. The proposed Project has a very low potential to impact Santa Ana River woollystar, which are growing nearby. There is potential to result in the removal or “take” of the endangered species, San Bernardino kangaroo rat. No additional listed species were found; however, several special-status species that were found or have a potential to be present are described below.

Listed Plant and Wildlife Species

San Bernardino kangaroo rat is listed as endangered under the federal Endangered Species Act (ESA). It is recognized as a state species of special concern by the California Department of Fish and Wildlife (CDFW). The southern 550 feet of the project site lies within Unit 1 of the designated critical habitat for San Bernardino kangaroo rat (USFWS, 2008). During 2017 the project site was trapped for San Bernardino kangaroo rat and none were captured (Romich, 2018). During 2019, the site was once again trapped but across a larger area surrounding the project site. A single San Bernardino kangaroo rat was captured approximately 90 feet west of the project site. The natural habitat surrounding the project site is occupied by San Bernardino kangaroo rat. It is assumed that San Bernardino kangaroo rat may occasionally forage within the project site, but they are not likely to burrow there or occupy it during daylight hours.

Santa Ana River woollystar is listed as endangered under the California Endangered Species Act (CESA) and federal ESA. A total of 110 individual plants were mapped in the habitat surrounding the project site. No Santa Ana River woollystar are present within the project site and none are expected to be directly impacted by project activities.

Mitigation Measure BIO-1 would require the County or lead federal agency to consult with the USFWS to obtain a Biological Opinion (BO) to account for the potential take of San Bernardino kangaroo rat and to obtain a take permit from the California Department of Fish and Wildlife. Mitigation Measure BIO-2 also requires the County to develop and implement a small mammal exclusion plan to ensure that no San Bernardino kangaroo rats or other small mammals would be killed by proposed Project activities. In addition, Mitigation Measure BIO-7 would ensure that proposed Project activities do not extend beyond the approved Project limits and Mitigation Measure BIO-10 would prohibit any night work at the project site, both of which would further reduce the potential impacts on San Bernardino kangaroo rat and other special-status species.

Temporary impacts to natural upland habitat within the project site would be less than significant with the creation and subsequent long-term conservation of upland habitat as proposed in the project description. Lastly, Mitigation Measures BIO-3, BIO-4, BIO-8, and BIO-9 would avoid potential take of Santa Ana River woollystar by (1) assigning a project biologist to the Project to monitor work; (2) requiring a pre-construction clearance survey of the project site; (3) requiring on-site monitoring of proposed Project activities; and (4) requiring worker training to ensure workers know the resources and measures that must be implemented as part of the proposed Project.

Coastal California gnatcatcher (*Poliophtila californica californica*) and slender-horned spineflower were not observed during the focused surveys. However, there is a low potential that slender-horned spineflower

could be present in the natural lands immediately adjacent to the project site. Given the historic lack of occupation of gnatcatcher within the project area and following protocol level surveys, there is a very low potential that coastal California gnatcatcher could be present in or near the project site. Mitigation Measures BIO-3, BIO-4, and BIO-5 would require (1) a project biologist to be assigned to the Project, (2) pre-construction surveys to be completed, and (3) biological monitoring to ensure these species are not present and would not be impacted the proposed Project.

Other Special-status Plants.

Several other special-status plants have potential to be present but were not observed. These include Parry's spineflower (*Chorizanthe parryi* var. *parryi*), Plummer's mariposa-lily (*Calochortus plummerae*), and Robinson's pepperweed (*Lepidium virginicum* var. *robinsonii*). There are occurrences of all of these species in the vicinity of the project site and suitable habitat is present. Any impacts to additional special-status species that could become present on the project site prior to the start of the Project would be reduced by Mitigation Measures BIO-4 and BIO-8, which (1) require a pre-construction clearance survey of the project site, (2) require on-site monitoring of Project activities, and (3) require avoidance of special-status species to the greatest extent practicable.

Other Special-status Wildlife

Two additional special-status wildlife species were observed within or adjacent to the project site including northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*) and San Diego desert woodrat (*Neotoma lepida intermedia*). Several additional special-status wildlife species have at least a moderate potential to be present and include southern California legless lizard (*Anniella stebbinsi*), California glossy snake (*Arizona elegans occidentalis*), coast horned lizard (*Phrynosoma blainvillii*), coastal whiptail (*Aspidoscelis tigris stejnegeri*), burrowing owl (*Athene cunicularia*), Cooper's hawk (*Accipiter cooperii*), white-tailed kite (*Elanoides forficatus*), California horned lark (*Eremophila alpestris actia*), loggerhead shrike (*Lanius ludovicianus*), and San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). These species and several others are described in more detail in the BRTR (Appendix B). Any impacts to additional special-status species would be reduced with implementation of Mitigation Measures BIO-4, BIO-7, and BIO-8 which (1) require a pre-construction clearance survey of the project site, (2) require on-site monitoring of Project activities, and (3) require avoidance of special-status species to the greatest extent practicable. Potential impacts to special-status small mammals would also be further reduced with the implementation of Mitigation Measure BIO-2, which requires the County to develop and implement a small mammal exclusion plan.

Nesting birds. The federal Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Sections 3503, 3503.5, and 3513 prohibit take of migratory birds, including eggs or active nests, except as permitted by regulation (e.g., licensed hunting). Mitigation Measures BIO-4, BIO-7, and BIO-8 would avoid potential take or other adverse impacts to nesting birds, including burrowing owl by (1) avoiding nesting season if possible; (2) requiring a pre-construction clearance survey of the project site during bird nesting season; (3) identifying buffer areas around any bird nest within or near the project site; (4) requiring on-site monitoring of Project activities; and (5) requiring burrowing owl surveys, avoidance, and relocation, if needed.

With implementation of Mitigation Measures BIO-1 through BIO-10, all impacts to candidate, sensitive, or special status species would be reduced to a less-than-significant level.

- 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?*

Less Than Significant.

No significant impacts to riparian habitat are expected to occur. The proposed Project is expected to permanently impact 0.004 acres of arroyo willow thicket, which is not considered to be a sensitive natural community, but which closely resembles southern willow scrub, a sensitive natural community. In addition, a loss of 0.004 acres is less than significant given the abundance of this vegetation just to the west of the project site and the proposed habitat creation within the project site. Furthermore, the Project proposes to create similar vegetation within the project site following the completion of construction further reducing any potential significance.

No significant impacts to other sensitive natural communities is expected to occur. The proposed project is expected to permanently impact approximately 0.008 acres and temporarily impact approximately 0.18 acres of California buckwheat scrub. California buckwheat scrub is not considered a sensitive natural community; however, it is similar in form and function to Riversidean alluvial fan sage scrub, which is a sensitive natural community. The 0.19 acres of impacted vegetation will be offset by grading and hydroseeding of native vegetation within a former stockpile area following construction.

- c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less Than Significant with Mitigation Incorporated. Federally jurisdictional wetlands, federal non-wetland waters of the United States, and CDFW jurisdictional waters of the state are present on the project site. Approximately 0.08 acres of federally jurisdictional wetlands, 0.41 acres of federal non-wetland waters of the United States, and 1.13 acres of CDFW jurisdictional waters of the state are expected to be temporarily impacted by proposed Project construction. Approximately 0.15 acres of federally jurisdictional wetlands, 0.19 acres of federal non-wetland waters of the United States, and 0.86 acres of CDFW jurisdictional waters of the state are expected to be permanently impacted by the proposed Project.

Alteration to federal wetlands and non-wetland waters of the U.S would necessitate authorization from the United States Army Corps of Engineers in Section 404 of the Clean Water Act. Alteration would also require authorization from the California Regional Water Quality Control Board (RWQCB) in Section 401 of the Clean Water Act. The CDFW jurisdictional waters on the project site are regulated under section 1600 of the California Fish and Game Code and alteration to these features would necessitate authorization from the CDFW.

The proposed Project, as designed, includes the creation of wetland habitat within the project site to offset the permanent impact to federal wetlands. Mitigation Measure BIO-11 requires the County of San Bernardino, Department of Public Works to prepare and implement a habitat restoration plan, or comparable plan, for the creation of wetland, riparian, and upland habitat within the project site. With implementation of this measure, impacts to jurisdictional wetlands and streambeds would be less than significant. In addition, Mitigation measure BIO-12 requires the County of San Bernardino, Department of Public Works to obtain all required permits from the US Army Corps of Engineers, RWQCB, and CDFW for impacts to jurisdictional waters of the state and non-wetland waters of the U.S.

- 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?*

Less Than Significant with Mitigation Incorporated. Wildlife may use the project site on occasion to move around the wash habitat or between upstream developed areas and downstream open space. The proposed Project would not erect permanent or long-term barriers to wildlife movement, although there would be some short-term interruption of potential movement during proposed Project activities. These

short-term impacts would be less than significant because of the short duration of the impact and the abundance of similar habitat throughout the vicinity of the project site. Potential impacts to wildlife movement would be further reduced with the implementation of Mitigation Measure BIO-10, which requires the County to only work during daytime hours.

Project activities would be located primarily on an existing stockpile and unpaved roads along existing flood control channels and would not be expected to substantially affect wildlife movement or nursery areas. Mitigation Measure BIO-7 would ensure that proposed Project activities are limited to the approved Project boundary which ensures additional biological resources are not impacted. There is a potential for nesting birds to be present on the project site and to be impacted by proposed Project activities. Mitigation Measure BIO-5 would require pre-construction nesting bird surveys within the project site and require avoidance of nests until they are allowed to fledge. Nesting bird buffers would be established, as needed, to further avoid impacts to any nesting birds should they be present during proposed Project activities.

Wildlife nursery sites such as shrubs for birds, bare ground for ground-nesting birds, and burrows or other nesting areas for ground-dwelling vertebrates are present, but significant impacts from proposed Project activities are not expected. Impacts to wildlife breeding areas would not be substantial for common or wide-ranging species, but could be substantial for special-status wildlife (see question (a) above). Due to availability of similar habitat surrounding the project area, any loss of habitat would be considered negligible and less than significant.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Less Than Significant. The proposed Project is located within the Santa Ana River open space area and designated Wildlife Corridor identified in the County of San Bernardino General Plan Open Space Element (County of San Bernardino, 2007). It was designated as open space and as a wildlife corridor to preserve habitat values and maintain dispersion area. The Open Space Element states that this open space should be maintained to prevent damage to important dispersion areas and habitat. However, the proposed Project involves constructing improvements within an existing flood control facility actively maintained by the District for the protection of residents; the proposed Project is not expected to result in long-term changes to the habitat in the open space areas (see question (d) above). In addition, the proposed project is a covered activity within the Upper Santa Ana Watershed Habitat Conservation Plan, a master plan for conservation and development within the upper Santa Ana Watershed.

The project site is immediately adjacent to the Bureau of Land Management designated Santa Ana River Area of Environmental Concern (ACEC). The Santa Ana River ACEC was established to protect habitat for the federally listed Santa Ana River woollystar and slender-horned spineflower. The proposed Project is not expected to impact the Santa Ana River ACEC to the west of the project site, as impacts would be limited to the project site, which is outside of the ACEC. As such, impacts would be less than significant.

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?

No Impact. The proposed Project would not conflict with an adopted Habitat Conservation Plan (HCP); Natural Communities Conservation Plan; or other approved local, regional, or state habitat conservation plan because the project site is not located within the limits of any existing plans. Two HCPs are currently being developed for the Santa Ana River Wash in the vicinity of the project site. The Wash Plan HCP is being prepared by the San Bernardino Valley Water Conservation District. The proposed project is included in the Wash Plan HCP as a covered activity. The Wash Plan has been approved by Congress and is currently in the process of publishing a record of decision for the Wash Plan approval in the Federal Register. The District will coordinate with the regulatory agencies and the San Bernardino Valley Water

Conservation District to determine how the species take provisions contained in the Wash Plan HCP can be applied towards the proposed Project.

Mitigation Measures

- BIO-1 Consult and Obtain Permits for San Bernardino Kangaroo Rat.** The County of San Bernardino, Department of Public Works (County) or lead agency shall consult with the US Fish and Wildlife Service (USFWS) to obtain take for San Bernardino kangaroo rat that have a potential to be present during the Project. The County or lead agency shall also obtain an Incidental Take Permit from California Department of Fish and Wildlife (CDFW) for impacts to San Bernardino kangaroo rat.
- BIO-2 Small Mammal Exclusion Plan.** The County of San Bernardino, Department of Public Works shall prepare and implement a small mammal exclusion plan. The plan will include the following details (1) type of physical barrier that will be installed around the perimeter of the project site to exclude small mammals, (2) small mammal trapping by a permitted San Bernardino kangaroo rat biologist during appropriate weather conditions to capture the target species, (3) relocation of small mammals to adjacent intact suitable habitat, and (4) periodic monitoring of the physical barrier to ensure that small mammal re-entry to the project site is not possible.
- BIO-3 Assign Project Biologist.** The County of San Bernardino, Department of Public Works (County) shall assign a qualified biologist to conduct pre-construction surveys (MM BIO-4), implement nesting bird avoidance (MM BIO-5), conduct burrowing owl surveys (MM BIO-6), ensure that work is limited to the approved disturbance area (MM BIO-7), monitor initial ground disturbance and vegetation clearing (MM BIO-8), and conduct worker trainings (MM BIO-9). A "qualified biologist" is defined as a person with appropriate education, training, and experience to conduct the required surveys, monitor Project activities, provide worker education programs, and supervise or perform other monitoring-related actions. The Project Biologist shall be authorized by the County to temporarily halt Project activities if needed to prevent take of listed species or harm to any other special-status species.
- BIO-4 Pre-construction Clearance Survey.** Prior to the start of any ground disturbance or vegetation clearing, the Project Biologist shall survey the work area to determine if Santa Ana River woollystar are present. During the survey the Project Biologist should also search for small mammal burrows, nesting birds, or any other special-status species within the work area. Any special-status species or sensitive resources shall be flagged and avoided, as feasible.
- BIO-5 Nesting Bird Avoidance Measures.** Vegetation removal and initial ground disturbance shall be completed outside the breeding season (i.e., no removal of potential nesting habitat from February 15 through August 15), or after a pre-construction nesting bird survey has been completed. The qualified biologist shall confirm that no birds are nesting in or adjacent to areas to be disturbed. If native birds are nesting on the site, then construction will be postponed until nesting is completed or the Project Biologist shall designate appropriate avoidance buffers around nests to protect nesting birds. No Project related disturbance will be allowed within these buffers.
- BIO-6 Burrowing Owl Avoidance Measures.** The Project Biologist shall survey the project site in advance of vegetation and soil clearing to determine burrowing owl presence or

absence. If burrowing owls are present on the site outside of the nesting season (September 1 to January 31), then the California Department of Fish and Wildlife (CDFW) shall be consulted and the Project Biologist may be authorized to exclude them from the site using passive exclusion methods described in the most recent CDFW staff report on burrowing owl mitigation (CDFG, 2012). If burrowing owls are present on the site during nesting season (February 1 through August 31), then construction shall either be postponed until nesting is completed, or no disturbance will be allowed within an appropriate buffer area to be established by the Project Biologist in accordance with the CDFW staff report on burrowing owl mitigation (CDFG, 2012).

BIO-7 Limit Disturbance Area. Prior to the initiation of any ground-disturbing activity, the Project Biologist shall work with County of San Bernardino, Department of Public Works staff and contractors to clearly demarcate the approved work area with fencing, flagging, lathe and rope, or other devices. The demarcated area shall be limited to the mapped project disturbance area shown in Figure 1 of the Initial Study/Mitigated Negative Declaration. No construction-related activity shall be permitted outside the marked area.

BIO-8 Biological Monitoring. The Project Biologist or another qualified biological resources monitor shall be present on the work site during all initial ground disturbance or vegetation clearing to document compliance with the avoidance and minimization measures and any additional mitigation, and to provide guidance in avoiding or minimizing impacts to biological resources. Once initial ground disturbance and clearing is completed the biological monitor shall return on at least a weekly basis to ensure special-status species are being avoided and to inspect all the special-status species and evaluate the buffer distance.

BIO-9 Worker Training. The assigned Project Biologist will conduct training to ensure that all workers on the Project site (including contractors) are aware of all applicable Conservation Measures for biological resources. Specifically, workers will be required to (1) limit all activities to approved work areas; (2) report any Santa Ana River woollystar, small mammals, burrowing owl, or other special-status species, or bird nest observation in the work areas and access routes to the supervisor or Project Biologist; (3) avoid contact with any wildlife that may approach a work area and be aware of potential venomous reptile bites from carelessness or unnecessary harassment; (4) pick up and properly dispose of any food, trash or construction refuse; and (5) report any spilled materials (oil, fuel, solvent, engine coolant, raw concrete, or other material potentially hazardous to wildlife), to the supervisor or on-site Project Biologist. During the training, the instructor will briefly discuss special-status species that may occur in the work areas, their habitats, and requirements to avoid or minimize impacts. In addition, all workers will be informed of civil and criminal penalties for violations of the federal Endangered Species Act, California Endangered Species Act, and the Migratory Bird Treaty Act.

BIO-10 Limit Work Hours. No work will be allowed to take place at night near biologically sensitive habitat areas.

BIO-11 Wetland and Streambed Creation. The County of San Bernardino, Department of Public Works will develop and implement a Habitat Restoration Plan to create wetland, riparian, and upland vegetation within the project site. The plan will provide details on the timing of the restoration, maintenance and monitoring plan, plant palette, and other details. The wetlands will be designed and constructed to maintain hydrology, hydric soils, and hydrophytic vegetation.

BIO-12 Obtain Required Permits. The County of San Bernardino, Department of Public Works will obtain all required permits from the US Army Corps of Engineers, Regional Water Quality Control Board, and California Department of Fish and Wildlife for impacts to jurisdictional waters of the state and non-wetland waters of the U.S.

Biological Resources Impact Conclusions

With the implementation of Mitigation Measures BIO-1 through BIO-12, any impacts to biological resources will be less than significant. It will also ensure the project complies with all applicable federal, State, and local regulations.

5. CULTURAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?				X
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?		X		
c) Disturb any human remains, including those interred outside of formal cemeteries?		X		

(Check if project is located in the Cultural ☐ overlays or cite results of cultural resource review)

Regulatory Setting

There are laws, ordinances, regulations, and standards on federal, State, and local levels which seek to protect and manage cultural resources. Due to the location of the proposed Project on both federal and private lands within California, federal, State, and local laws and regulations were followed. The primary Federal regulation governing significant cultural resources is the National Historic Preservation Act (NHPA). California regulations include the California Environmental Quality Act (CEQA) and Public Resources Code (PRC) Section 5097. Local regulations include the City of San Bernardino General Plan.

Federal Regulations

National Historic Preservation Act of 1966 as Amended (NHPA) sets forth the responsibilities that federal agencies must meet in regard to cultural resources. Based on Section 106 and its implementing regulations in 36 CFR Part 800, federal agencies must conduct the necessary studies and consultations to identify cultural resources that may be affected by an undertaking, evaluate cultural resources that may be affected to determine if they are eligible for the National Register of Historic Places (NRHP) (that is, whether identified resources constitute historic properties), and assess whether such historic properties would be adversely affected. Historic properties are resources that are listed on or eligible for listing on the NRHP (36 CFR 800.16[i][1]). A property may be listed in the NRHP if it meets criteria provided in the NRHP regulations (36 CFR 60.4). Typically, such properties must also be 50 years or older (36 CFR 60.4[d]).

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, or association and:

- (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 artistic value, 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.

Section 106 defines an adverse effect as an effect that alters, directly or indirectly, the qualities that make a resource eligible for listing in the NRHP (36 CFR 800.5[a][1]). Consideration must be given to the property's location, design, setting, materials, workmanship, feeling, and association, to the extent that these qualities contribute to the integrity and significance of the resource. Adverse effects may be direct and reasonably foreseeable or may be more remote in time or distance (36 CFR 8010.5[a][1]).

State Regulations

California Environmental Quality Act (California Public Resources Code Section 21000 et seq.) (1970) established that historical and archaeological resources are afforded consideration and protection by the California Environmental Quality Act (CEQA) (14 CCR Section 21083.2, 14 CCR Section 15064). CEQA Guidelines define significant cultural resources under two regulatory designations: historical resources and unique archaeological resources.

A historical resource is a "resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR [California Register of Historical Resources]"; as "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code"; or "any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record" (14 CCR Section 15064.5[a][3]).

Historical resources automatically listed in the CRHR include California cultural resources listed in or formally determined eligible for the NRHR and California Historical Landmarks list from No. 770 onward (PRC 5024.1[d]). Locally listed resources are entitled to a presumption of significance unless a preponderance of evidence in the record indicates otherwise.

Under CEQA, a resource is generally considered historically significant if it meets the criteria for listing in the CRHR. A resource must meet at least one of the following criteria in order to be considered historically significant (PRC 5024.1; 14 CCR Section 15064.5[a][3]):

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage. Title 14, CCR Section 4852(b)(1) adds, "is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States."
2. Is associated with the lives of persons important in our past. Title 14, CCR Section 4852(b)(2) adds, "is associated with the lives of persons important to local, California, or national history."
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. Title 14, CCR 4852(b)(3) allows a resource to be CRHR eligible if it represents the work of a master.
4. Has yielded, or may be likely to yield, information important in prehistory or history. Title 14, CCR 4852(b)(4) specifies that importance in prehistory or history can be defined at the scale of "the local area, California, or the nation."

Historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (14 CCR 4852[c]).

An archaeological artifact, object, or site can meet CEQA's definition of a unique archaeological resource even if it does not qualify as a historical resource (PRC 21083.2[g]; 14 CCR 15064.5[c][3]). An archaeological artifact, object, or site is considered a unique archaeological resource if "it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria (PRC 21083.2[g]):

- Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information.
- Has a special and particular quality such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Public Resources Code 5097.98. This section discusses the procedures that need to be followed upon the discovery of Native American human remains. The NAHC, upon notification of the discovery of human remains is required to contact the County Coroner pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code and shall immediately notify most likely descendants of the deceased Native American.

Health and Safety Code 7050.5. This code establishes that any person who knowingly mutilates, disinters, wantonly disturbs, or willfully removes any human remains in or from any location without authority of law is guilty of a misdemeanor. It further defines procedures for the discovery and treatment of Native American human remains.

Local Regulations

County of San Bernardino 2007 General Plan, Chapter V, Conservation Element, Section C, Countywide Goals and Policies of the Conservation Element, Goal CO 3. This establishes the primary goal of preserving and promoting the historic and prehistoric cultural heritage of the county. Several policies and programs are outlined for implementing this goal and are summarized here: (1) identify and protect important archaeological and historic cultural resources in areas of the county that have been determined to be sensitive for cultural resources; (2) identify and protect important archaeological and historic cultural resources when there will be disturbance of all previously undisturbed areas; (3) design programs to preserve the information and heritage value of cultural and historical resources; (4) comply with SB 18 by consulting with tribes identified by the NAHC on all General Plan and specific plan actions; and (5) ensure that important cultural resources are avoided or that impacts are minimized to protect Native American beliefs and traditions.

Environmental Setting

The proposed Project is located in the northern extent of the Santa Ana Wash. Both Elder Creek and Plunge Creek, and the several nearby tributaries that drain the San Bernardino Mountains into the Santa Ana Wash, enter the Santa Ana Wash at the Project area and become indistinguishable from it at their confluences. Native peoples inhabiting the region found abundant resources in the diverse plant and animal foods available along the Santa Ana River, wherever it had been meandering at various times in prehistory, with a generally constant perennial water supply.

American settlement began soon after statehood with the first white settlers of East Highland being John Henry Cram and Henry Rabel in 1856 and 1857, respectively. Cram and Rabel, and many to follow,

found the East Highland area, and its rich soils with excellent shallow water table, highly suited to orchard crops that could self-sustain without regular watering (Beattie 1994).

Cultural Setting

Prehistory

San Bernardino County has been inhabited throughout the Holocene (10,000 calendar years before present [BP]) by Native Americans, today represented by the Serrano Tribes. The prehistoric period of the Project area was characterized by seasonal movement based on the availability of resources. The high aridity during the Early Archaic Period (9500-7000 BP) likely limited the number of inland sites in southern California. Lifeways at this time consisted of hunting large and small game and migratory birds, as well as some fishing. A broad variety of plant resources were collected, but considerable changes were made through time in terms of the types of plant foods collected and how they were processed. The most well-known example is the shift from earlier grinding slabs used for processing small seeds and even small mammals, to deep mortars used for pounding of larger seeds, especially acorns. Mortars too, have been shown to have been used for processing small mammals for consumption. Early Holocene occupation was quite sparse and highly mobile until the mid to late Holocene when permanent settlements become more common, especially near productive food and water resources (Moratto 1984).

Periods of climatic heating and cooling shifted habitation patterns during prehistory due to the effect climate had on the availability of resources. Most recently a persistent drought began by 1060 BP, and conditions became significantly warmer and drier (Jones et al. 1999, Kennet and Kennet 2000). The availability of water and other resources within this desert region shrank until the next cooling period, in which the ecosystem productivity increased (Spaulding 2001). The Serrano arrived in the valley around 1000 BCE (Pritzker 2000). During the Protohistoric period (400-150 BP) sedentism increased as lifeways included hunting of game, fishing, exploitation of acorns and other gathering, as well as some agricultural practices.

Ethnography

The Project area lies within the traditional lands of the Serrano peoples, who identify their traditional territory as the mountain ranges between the San Gabriel Mountains in Los Angeles County and the San Bernardino Mountains east through Joshua Tree National Park. Their territory extended to the foothills of these mountains on the southern side and to the Mojave River on the northern side. These lands include large pine forests, high valleys, and the vast desert area of the western Mojave (Kroeber 1925). The term Serrano dates to the Spanish settlement of California, and it simply translates to mountaineers. The Serrano people, however, lived near water sources throughout their territory which contained hundreds of streams and springs. The Serrano had maintained this settlement pattern well into the 19th century and until a reservation was established for them (Pritzker 2000).

Serrano social organization consisted of exogamous clans within either the Coyote or Wildcat moieties. Gifford (1918:179-180) notes 14 Serrano clans that inhabited the traditional territory. Of these Cataldo (2005) places *Apuimabit* along City Creek near the Project site.

The creation of the San Manuel Reservation in 1891 came after a series of escalating conflicts between Native Americans and the white settlers of the region. Settlers from San Bernardino formed a militia and launched a 32-day campaign. As a result of this campaign, the Yuhaaviatam clan of Serrano Indians fled, and in 1891 the Act for Relief for Mission Indians allowed for the establishment of the San Manuel Band of Mission Indians. The reservation, originally 657 acres just north of San Bernardino, is a miniscule

portion of the Serrano ancestral territory. The reservation is located roughly 3.5 miles northwest of the Project area in the low foothills of the San Bernardino Mountains. The Serrano Tribe today is involved in maintaining cultural continuity and Serrano traditions through language, art, song, dance and the old technologies, such as their notoriously intricate basket making.

History

Pedro Fages may have been the first non-Native contact with the Serrano of San Bernardino Valley in 1772, but records are unclear. The early Spanish explorations were part of Spain's efforts to colonize Alta California by establishing Catholic missions with associated garrisons of soldiers and small groups of civilians. The San Bernardino Mountains, and areas of the Mojave to the north, escaped the settlement of the Spanish System. The Serrano may have had early contact with Spanish settlers, but they were relatively isolated for the next four decades. Beginning in the early 1820s, the Serrano and Gabrieleño Natives living on the southern slopes of the mountains and in San Bernardino Valley, however, were exposed to the effects of Mexico's independence from Spain. This event was to end the Mission system with lands returned the Native peoples per Mexican law. But that did not happen. What did happen was the grant of Rancho San Bernardino by Governor Juan Bautista Alvarado to Antonio Maria Lugo. During the creation of this Rancho, Serrano groups were forced to abandon their settlements (Pritzker 2000, 142). This settlement transition, though more focused in the San Bernardino Valley, affected all Serrano clans. Those directly affected moved to live with relatives or other clans from Fort Tejon down into Cahuilla territory.

The American Period

Shortly after California became an American state in 1850, 500 hundred Mormons arrived in 1851 and purchased 35,000 acres of the San Bernardino Rancho, and due to rumors of raids by Native Americans they built the Fort San Bernardino. San Bernardino County was created in 1853, and the City of San Bernardino was incorporated in 1854. The Mormons supported much of their efforts with intensive logging of the San Bernardino Mountains and agriculture.

Beattie (1994) identifies John Henry Cram and sons settling at Fifth and Orange streets in 1856, ¼ mile west of Project site. Further west, Henry Rabel settled along Baseline west of Victoria and roughly 3.5 miles west-northwest of the Project site. He developed the artesian springs and thermal wells there, and by the late 1880s the place had become a popular resort.

When the Mormons left in 1859 after being called back to Salt Lake City by Brigham Young, the city structure suffered and San Bernardino disincorporated. In 1860, however, the discovery of gold in nearby Holcomb Valley brought people through San Bernardino who were headed up to the mountains. The gold craze produced several boom towns that were short-lived.

The establishment of the Santa Fe Railway in 1886 provided a transcontinental link and the population of San Bernardino Valley exploded. In May of that year, the city reincorporated. Combined with the increase in population due to the Gold Rush, conflict between American settlers and Native Americans escalated. Settlers in the San Bernardino Valley formed a militia with the intent to eliminate Native Americans from the region. If they didn't kill the Serrano, the militia drove them from their ancestral land. The creation of the San Manuel Reservation in 1891 provided a small refuge for Native Americans as the rest of their lands were claimed.

Local History

The Project area's first homestead claim was made on May 20, 1862 to Benjamin Van Leuven (BLM GLO 1891). The 40-acre claim was later patented on August 19, 1891 by President Harrison for the benefit of his heirs, as Benjamin had died in 1868.

Benjamin Van Leuven was a member of the Mormon migration to San Bernardino in 1851 with his wife and seven children. Van Leuven's Brother Frederick, a Mormon elder, met Lewis Cram, Henry Cram's son, in 1857. The two would build one of the first irrigation projects to benefit East Highland (Quayle 2009).

The planting of fruit and nut trees had been conducted successfully since the Franciscan Mission system was first established. Trees were more successful due to the high-water tables and the trees' deep root systems. Vegetables and grain crops, however, required regular and predictable irrigation. The Cram/Van Leuven Ditch was completed in 1858. The original Cram/Van Leuven Water Ditch was incorporated into the North Fork Water Co. The Cram/Van Leuven Ditch appears on an 1898 USGS quad as "the Old North Fork Ditch" and appears to have coursed through or just above the northern limits of the Project area.

Water was provided to East Highland by the North Fork Water Ditch, The Highland Ditch Co., and Bear Valley Lake for storing of irrigation water. As a result, citrus groves were planted everywhere.

In 1857 the first sweet seedling oranges were planted by Anson Van Leuven, Benjamin Van Leuven's son, in old San Bernardino. The trees were from San Gabriel.

The first County Road was built in 1860 and appears to have followed the alignment of today's Greenspot Road. Originally called the old County Road, it became Third Street which was eventually changed to Fifth Street. Fifth Street changes to Greenspot Road east of the 210 Freeway and is the northern border of the Project area.

In 1881, Church Street was built to carry traffic from Redlands across the Santa Ana River wash to Cramville and settlements north of the Santa Ana River. In 1882, AT&SF Railroad finished laying track from Los Angeles to San Bernardino Valley. The depot at Cramville was renamed East Highlands.

The residential area encompassing the Project site has been known locally as "The Village" since at least the 1930s. Aerial photographs from 1933 (UCSB-MIL 2019) show a dense residential area with well over 100 structures and mature trees for landscaping. This parcel, originally homesteaded by Benjamin Van Leuven in 1862 (BLM GLO 1891), remained in the family and does not appear to have been developed until the early 20th century. This community was likely populated with the large work force needed for the booming citrus industry.

Records Searches

Three previous cultural resource studies of the Project area conducted records searches. Hatheway (2009) identified two historic resources near the Project area, CA-RIV-6848H (the Cram-Van Leuven ditch system) and CA-RIV-6073H (a historic residence). Neither resource is within the Project site. Due to modifications to the Area of Potential Effect (APE) in 2011, Hatheway (2011) prepared an amended report with no change in findings. The original records search in 2009 was used. A second records search was conducted for the Project by Yorck (2018). Yorck identified 18 previously recorded cultural resources within one-mile of the Project but does not include the two historic resources mentioned above that are identified by Hatheway (2009). The most recent study of the Project was conducted by Tetra Tech (Farrell 2018). The latter report was prepared for the Federal Emergency management Agency (FEMA) and was

not available for review, but they identified two historical resources as near the Project. One of the two resources is CA-RIV-6073 previously identified by Hatheway (2009) as an historic residence. The FEMA study also identified site -6073 as near the Project but identified the latter site as “a historic trash dump and refuse scatter”. One additional site mentioned in the Farrell report (2018) is P-36-006849.

Surveys

Hatheway (2009) surveyed the Elder Creek Channel below Merris Street to a point 700 feet beyond its confluence with Plunge Creek, an area of approximately nine acres. Modification of the Project in 2011 required survey of an additional seven acres around the confluence and further downstream. Both surveys by Hatheway were conducted under ideal field conditions with excellent surface visibility. A standard 15-meter transect interval was employed. Much of the areas surveyed by Hatheway were most recently surveyed by Farrell (2018) and included most of the balance of the Project area north of Merris Street with a few small extensions. These additional small areas were inspected by Macko (2019).

Historical Map and Imagery Review

Historic maps and aerial imagery were consulted to identify whether any features associated with the early historic development of the Project site, including the Cramville siding for the AT&SF Railroad, could be located and identified in the Project area. Sources consulted include the 1898 USGS 15” quad for Redlands, CA. A georeferenced copy of this map was overlain with a 1933 aerial image of the Project site and the Project’s GIS files showing areas of disturbance. The Project area is associated with the location of early structures built at the Cramville siding and the Cram/Van Leuven Ditch.

Impact Analysis

a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

No Impact. No known Historical Resources have been recorded within the Project site. The existing Elder Creek Channel follows the alignment of an earlier ditch that dates to the early 20th century. Modifications to the earlier Elder Creek ditch have removed all context of the original ditch. Therefore, no impacts to historical resources would result from construction of the Elder Creek Improvement Project.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Less Than Significant with Mitigation Incorporated. The Project site is in an area settled and utilized for hunting and food gathering by the Gabrieliño and Serrano for millennia. While there are no known archaeological resources within the Project site, the possibility of encountering buried cultural resources is high. Mitigation Measure CUL-1 is recommended, which would require monitoring by an archaeologist during excavation activities in native soils, to reduce impacts to a less-than-significant level.

c) Disturb any human remains, including those interred outside of formal cemeteries?

Less Than Significant with Mitigation Incorporated. No human remains are known or recorded in the Project area. However, in the event that human remains are uncovered during excavation, Mitigation Measure CUL-2 is recommended, which provides a clear process for handling human remains upon discovery. This impact would be reduced to a less-than-significant level.

Mitigation Measures

CUL-1 Cultural Monitoring. All initial grading and all excavation activities shall be monitored by a Project archaeologist retained by the District or its contractor. The Project archaeologist shall be present full-time during the excavation of native soils (undisturbed non-fill alluvial deposits) that have the potential to contain cultural deposits. The monitor shall document all monitoring activity. The Project archaeologist shall be qualified for historic resource evaluation, as defined in CEQA and by Office of Historic Preservation (OHP). The qualified archaeologist shall be listed, or be eligible for listing, in the Register of Professional Archaeologist (RPA).

In the event of a discovery, or when requested by the Project archaeologist, the construction contractor shall divert, direct, or temporarily halt ground disturbing activities in the area of the discovery in order to evaluate potentially significant archaeological resources.

It shall be the responsibility of the Project archaeologist to:

1. Determine the scope and significance of the find, and
2. Determine the appropriate documentation, preservation, conservation, and/or relocation of the find; and determine when grading/excavation activities may resume in the area of the find.

If the find is determined to be a “unique archaeological resource”, then the District or its contractor, in conjunction with the recommendation of the Project archaeologist, shall comply with California Public Resources Code Section 21083.2, subdivisions (b) through (f). If at any time the Project area, or a portion of the Project area, is determined to be a historical resource as defined in California Code of Regulations Chapter 3, Article 1, Section 15064.5, subdivision (a), the Project archaeologist shall prepare and issue a mitigation plan in conformance with Section 15126.4, subdivision (b). If the Project archaeologist determines that continuation of the Project or Project-related activities will result in an adverse impact on a discovered historical resource which cannot be mitigated, all further activities resulting in the impact shall immediately cease, and the District’s Project Manager shall be contacted for further evaluation and direction. The District or its contractor shall comply with the recommendations of the Project archaeologist with respect to the documentation, preservation, conservation, and/or relocation of finds.

Monitoring activities may cease when initial grading and all excavation activities have concluded; or by written consent of the Project archaeologist agreeing that no further monitoring is necessary. At the conclusion of monitoring activities, and only if archaeological materials were encountered, the Project archaeologist shall prepare and submit a report of the findings to the District and the South-Central Coastal Information Center.

CUL-2 Treatment of Human Remains. If human remains are encountered during excavation activities, all work shall halt in the vicinity of the remains and the County Coroner shall be notified (California Public Resources Code, Section 5097.98). The Coroner will determine whether the remains are of forensic interest. If the Coroner, with the aid of a qualified Archaeologist, determines that the remains are prehistoric, s/he will contact the Native American Heritage Commission (NAHC). The NAHC will be responsible for designating the most likely descendant (MLD), who will be responsible for the ultimate disposition of the remains, as required by Section 7050.5 of the California Health and Safety Code. The

MLD shall make his/her recommendation within 48 hours of being granted access to the site. If feasible, the MLD's recommendation shall be followed and may include scientific removal and non-destructive analysis of the human remains and any items associated with Native American burials (California Health and Safety Code, Section 7050.5). If the landowner rejects the MLD's recommendations, the landowner shall rebury the remains with appropriate dignity on the property in a location that will not be subject to further subsurface disturbance (California Public Resources Code, Section 5097.98).

Cultural Resources Impact Conclusions

No significant impacts to cultural resources are identified. Due to the possibility of buried cultural resources; however, implementation of Mitigation Measures CUL-1 and CUL-2 are required to reduce potential impacts to inadvertent cultural resource finds, should they be present, to a less-than-significant level.

6. ENERGY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?			X	
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?			X	

Environmental Setting

The California Natural Resources Agency adopted certain amendments to the State CEQA Guidelines effective in 2019, to change how CEQA Lead Agencies consider the environmental impacts of energy use. The State CEQA Guidelines, §15126.2(b) requires analysis of a project's energy use, in order to assure that energy implications are considered in project decisions. CEQA requires a discussion of the potential environmental effects of energy resources used by projects, with particular emphasis on avoiding or reducing the "wasteful, inefficient, and unnecessary consumption of energy" (see Public Resources Code section 21100(b)(3)). The analyses contained in this section complies with this regulatory requirement.

All construction- and operation-related activities would involve use of energy-consuming equipment and processes. This analysis presents a qualitative discussion of the proposed Project's energy use. As set forth in the State CEQA Guidelines, Appendix F: Energy Conservation, the goal of conserving energy implies the wise and efficient use of energy including:

- Decreasing overall per capita energy consumption;
- Decreasing reliance on fossil fuels such as coal, natural gas and oil; and
- Increasing reliance on renewable energy sources.

Lead agency actions that are consistent with these goals would not be likely to cause an energy-related impact. The energy impact analysis emphasizes avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy resources, and whether the proposed Project would result in a potentially significant environmental impact due to inefficient, wasteful, and unnecessary consumption of energy.

The proposed Project would directly consume motor fuels from on-road vehicles (passenger vehicles, delivery vehicles, and heavy haul trucks) and off-road equipment during construction and operation. These fuels would primarily be diesel and gasoline, but natural gas may also be used. Motor vehicle fuels, primarily gasoline and diesel fuel, would come from public and private refueling stations (a.k.a. "gas stations") located throughout the project area, or in the case of the construction period off-road equipment these fuels would be delivered directly to the site for equipment refueling. Additionally, some of the energy used by on-road vehicles and commuting vehicles during construction and operation could be in the form of electrical energy. However, the proposed Project would not otherwise use electricity during construction or operation. Electricity for vehicle use during proposed Project operations would come from

the Southern California Edison (SCE) transmission system, which serves 15 million people in central, coastal, and southern California, excluding the City of Los Angeles and certain other cities (CAISO, 2018).

Regulatory Setting

Energy efficiency is regulated at the federal, State, and local levels. For California, many of the federal energy efficiency standards are repeated in the California regulations. The State of California's Code of Regulations has several building standards (Title 24) and appliance efficiency regulations (Title 20); however, none of these regulations apply to infrastructure projects such as the proposed Project which does not include the construction of habitable structures or have permanent on-site energy consuming operating equipment, such as pumps.

There are no standards that would directly apply to the proposed Project related to the sources that would consume energy, on-road vehicles and off-road vehicles. There are federal and State standards related to fuel efficiency that apply to various types of on-road vehicles that would indirectly apply to the proposed Project and personal commuting vehicles used during construction. While there are emissions reduction regulations related to off-road equipment, there are no regulations specifically related to fuel or energy consumption efficiency. However, there are construction waste recycling policies and regulations that are related to the State's Climate Change Scoping Plan and the County's Renewable Energy and Conservation Element into the General Plan (County of San Bernardino, 2017). Compliance and conformance with these waste recycling regulations and policies is discussed under Greenhouse Gas Emissions (Section 8).

Impact Analysis

a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?

Less Than Significant. The proposed Project would consume energy in the form of on- and off-road vehicle fuel during construction and operation. The proposed Project is designed to be efficiently constructed and future operation activities would be completed as efficiently as possible. Indirectly, the proposed Project is designed to improve the Elder Creek system's ability to convey 100-year storm flow, which would reduce future flood-related damage and demolition/reconstruction needs (see Section 1.2, Purpose and Need) and would reduce future energy consumption that would be required without implementation of the proposed Project. Therefore, the proposed Project would not include the wasteful, inefficient, or unnecessary consumption of energy resources during construction or operation.

b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Less Than Significant. The proposed Project does not include renewable energy infrastructure, restrict renewable energy projects, or restrict the use of renewable energy. The proposed Project does not include energy consumption sources during construction or operation that are directly subject to State or local energy efficiency plans. Indirectly, on-road vehicles used during construction and operation would have to meet the ongoing federal and State fuel efficiency requirements. Therefore, the proposed Project would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency.

Mitigation Measures

None Required.

Energy Impact Conclusions

Less than significant impacts are identified or anticipated and no mitigation measures are required.

7. GEOLOGY AND SOILS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury 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.				X
ii. Strong seismic ground shaking?			X	
iii. Seismic-related ground failure, including liquefaction?			X	
iv. Landslides?			X	
b) Result in substantial soil erosion or the loss of topsoil?			X	
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction or collapse?			X	
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?			X	
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?				X
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?		X		

(Check if project is located in the Geologic Hazards ☐ or Paleontologic Resources ☐ Overlay District):

Environmental Setting

The project site is located within the Transverse Ranges geomorphic province of California which is characterized by generally east-west trending mountain ranges and valleys. The project area is located near the northeastern end of the San Bernardino Valley, north of the Santa Ana River. The project area

is on flat to very gently sloping alluvial fans, river terraces, and river wash and flood plains of the Santa Ana River, Mill Creek, and associated tributaries such as Plunge Creek.

Geologic materials underlying the project site consist primarily of very young wash deposits and young alluvial valley deposits. The very young wash deposits are unconsolidated to very slightly consolidated sand and gravel with cobble-boulder gravel and gravelly sand, and the young alluvial valley deposits are slightly to moderately consolidated and dissected silt, sand, and gravel with some bouldery and cobbly sandy units (USGS, 2003). The young valley deposits have slight to moderate soil development. Soil develops from weathering of the underlying geologic material and chemical and mechanical breakdown of deposited materials such as biologic material and windblown sediments; the extent of development depends of climate, topography, biologic factors, and time (the older the geologic unit the more time a soil has had to develop).

Three soil unit are mapped underlying the proposed Project components, Soboba gravelly loam, Soboba stony loamy sand, and psamments/fluvents. The Soboba soils are formed in alluvium on alluvial fans and plains and the psamments/fluvents soil is generally formed in sandy alluvium in active drainageways. These soils all have low shrink-swell (expansive) potential and limited to no organic topsoil (NRCS, 2019).

The Elder Creek Channel is located in a seismically active area of Southern California, and in close proximity to two significant active fault zones. The San Andreas fault zone is located approximately 1.2 miles northeast of the project site, has an estimated maximum earthquake magnitude of M 8.0, and a 53 percent probability of having a M>6.7 earthquake in the next 30 years (starting in 2014) (2014 WGCEP, 2015). The San Jacinto fault zone is located approximately 6 miles southwest of the project site, has an estimated maximum earthquake magnitude of M 7.8, and a 9 percent probability of a M>6.7 earthquake in the next 30 years (starting 2014) (2014 WGCEP, 2015).

The intensity of earthquake-induced ground motions can be described using peak site accelerations (PGAs), represented as a fraction of the acceleration of gravity (g) (980 cm/sec²). Peak ground acceleration is the maximum acceleration experienced by a particle on the Earth's surface during the course of an earthquake. The project site will be subject to PGAs of approximately 1.1 g with a 2 percent in 50 years probability of exceedance (a return interval of 2,475 years for a maximum considered earthquake), which corresponds to strong to severe groundshaking in the event of an earthquake on one of the nearby faults (CGS, 2019).

Impact Analysis

- 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.*

No Impact. Although the project site is located in a very seismically active area of Southern California, no known active or Alquist-Priolo zoned faults cross or are in the immediate vicinity of the project site. The closest known active faults are the San Bernardino Mountains section of the San Andreas fault zone, and the San Bernardino section of the San Jacinto fault zone, located approximately 1.2 miles northeast and 6 miles southwest of the project site, respectively.

ii. Strong seismic ground shaking?

Less Than Significant. The project site is located in a seismically active area that may experience one or more earthquakes in its lifetime. The project site may undergo strong to severe ground shaking in the event of a large earthquake on one of the local or regional faults. However, proposed Project structures would be constructed per the City of Highland Municipal Code Title 15 – Buildings and Construction which adopts the 2016 California Building Code. Construction of the Elder Creek channel structures and improvements would also be subject to Title 24 of the California Code of Regulations, which requires appropriate seismic design. As the proposed Project does not include any habitable structures and would be designed and constructed in compliance with State and local design guidelines, there would be a less-than-significant impact related to adverse effects from strong seismic ground shaking.

iii. Seismic related ground failure, including liquefaction?

Less Than Significant. Liquefaction is the phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced strong ground shaking. 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. The project site is underlain by loose unconsolidated sandy alluvial sediments. Groundwater in the project area is generally greater than 100 feet below ground surface, although levels may vary seasonally and in wet years (DWR, 2019). The project site is located in a mapped high liquefaction susceptibility area in the City of Highland General Plan - Safety Element (City of Highland, 2006). Although the project site is in an area that may be subject to liquefaction, the project structures would be constructed per the City of Highland Municipal Code Title 15 – Buildings and Construction, which adopts the 2016 California Building Code. Construction of the Elder Creek channel structures and improvements will also be subject to Title 24 of the California Code of Regulations, which requires appropriate seismic design. As the proposed Project does not include any habitable structures and would be designed and constructed in compliance with State and local design guidelines, there would be a less-than-significant impact related to adverse effects from liquefaction or liquefaction related phenomena.

iv. Landslides?

Less Than Significant. The proposed Project is located in a relatively flat to gently sloping area and would not be subject to landslides. Additionally, the project site is not included in a mapped landslide susceptibility area in the City of Highland General Plan - Safety Element (City of Highland, 2006). Therefore, it is unlikely that the project site would be subject to earthquake induced landslides resulting in a less-than-significant impact.

b) Result in substantial soil erosion or the loss of topsoil?

Less Than Significant. The soils underlying the project area have limited to no topsoil, however, construction related ground disturbance consisting of grading, excavation, and construction of access roads could increase the potential for erosion. The movement of equipment and materials during construction could destabilize the soil surface and increase erosion potential from water and wind. However, as the proposed Project would disturb a surface area greater than one acre it would be required to obtain, under Clean Water Act regulations, a National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity. Compliance

with the NPDES would require that the District submit a project-specific Storm Water Pollution Prevention Plan (SWPPP). The SWPPP would require development and implementation of best management practices (BMPs) to identify and control erosion, which would reduce the potential for construction to trigger erosion. Operation and maintenance activities would primarily be related to trash and graffiti removal, vegetation management, and limited sediment removal and would not trigger soil erosion. Therefore, there is a less-than-significant impact related to soil erosion or destruction of top soil.

- c) *Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction or collapse?*

Less Than Significant. As noted above, the project site is located on flat to gently sloping terrain and would not be subject to landslides. Although the project site may be subject to liquefaction or liquefaction related phenomena such as lateral spreading, the project would be designed per City of Highland Municipal Code and California Building Code Title 24 which require appropriate seismic design. Therefore, impacts would be less-than significant.

- 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?*

Less Than Significant. The soils underlying the project area, Soboba soils and psamments/fluvents, are sandy soils formed in alluvium and active washes and have low shrink-swell (expansive) potential (NRCS, 2019). Therefore, there is a less-than-significant impact from the potential for damage from expansive soils.

- 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?*

No Impact. The proposed Project does not include installation of septic tanks or alternative wastewater disposal systems. No impact would occur.

- f) *Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?*

Less Than Significant with Mitigation Incorporated. The highest resolution geologic mapping available is at a scale of 1:24,000 (Morton, 1978). It indicates that all the sediments underlying the proposed Project are of Holocene age. Most are mapped as Qya2 (younger unconsolidated grayish pebbly to boulder alluvium) and the southernmost part is mapped as Qya (younger unconsolidated grayish sandy to boulder alluvium). The paleontological records search (MacLeod, 2019) indicates that the surficial sediments are too young to produce significant paleontological resources, but that deeper excavations might encounter sediments old enough to produce such resources. Excavations associated with the proposed Project are expected to reach a maximum depth of 16 feet below ground surface. Mitigation Measures PAL-1 through PAL-4 are recommended to reduce any potentially significant impacts to paleontological resources to a less-than-significant level and meet San Bernardino County requirements (Development Code §82.20.030).

Mitigation Measures

- PAL-1 Retention of a Qualified Paleontologist and the Preparation of a Paleontological Resources Mitigation and Monitoring Plan (PRMMP).** A Qualified Paleontologist shall be retained before the initiation of construction activities to develop a PRMMP

for the project. The function of the PRMMP will be to explain Project geology, paleontological sensitivity, and procedures that will comply with State statutes and County of San Bernardino's requirements so that potential impacts to significant paleontological resources are minimized or eliminated. The Qualified Paleontologist will draw on geotechnical reports, grading and excavation plans, and the construction schedule in order to formulate the proper monitoring methods, places, and times. The Qualified Paleontologist shall participate in a preconstruction meeting with the San Bernardino County Flood Control District's staff and project contractors so that an understanding of construction mitigation measures is ensured and so that clear communication procedures are formulated. Full-time paleontological monitoring is recommended when Project earth-moving activities reach a depth of nine (9) feet below original ground level. This minimum depth will be stipulated in the PRMMP.

The County of San Bernardino defines a qualified paleontologist as:

- Education: An advanced degree (Masters or higher) in geology, paleontology, biology or related disciplines (exclusive of archaeology).
- Professional Experience: At least five years professional experience with paleontological (not including cultural) resources, including the collection, identification and curation of the resources.

PAL-2 Worker Environmental Appreciation Training. Prior to commencement of or participation in Project earth-moving activities, all construction personnel shall participate in training that shall provide examples of possible paleontological resources that could be encountered on the project. Construction personnel shall be trained on the procedures that shall be followed if a potential paleontological resource is encountered. The training shall include an explanation of applicable federal, State, and local laws. The training shall include instruction on the procedure to follow if construction personnel encounter a possible paleontological resource when a monitor is not present. The training shall emphasize the responsibility to notifying the construction supervisor when possible fossils are encountered when a monitor is not present. Construction work shall immediately cease within a 20-foot radius of the discovery. The paleontological monitor or the Qualified Paleontologist shall be summoned so that the find can be assessed, and appropriate steps taken if it proves to be significant.

PAL-3 Paleontological Monitoring in Excavations Below Nine Feet. Earth-moving activities shall be monitored by the paleontological monitor or the Qualified Paleontologist any time excavations reach a level of nine (9) feet or greater below original ground surface. The paleontological monitor and the Qualified Paleontologist shall have proper tools and supplies to quickly salvage fossils when they are encountered and to minimize construction delays. If excavations below nine (9) feet encounter sediments that are appropriate for preserving fossils of small invertebrates and/or vertebrates, samples of the sediment shall be tested for the presence of significant paleontological resources. If the horizon is in danger of being back-filled or otherwise rendered inaccessible before the sediment sample is tested, approximately 3 cubic yards of the horizon in question shall be stockpiled onsite in a safe place so that it can further tested or processed later. In the event of a possible fossil discovery, the paleontological monitor and the Qualified Paleontologist shall have authority to temporarily halt or divert equipment to allow for inspection or salvage. If test samples indicate the presence of fossils in the sample, the stockpile shall be wet-screened in

a location agreeable to the construction supervisor and the Qualified Paleontologist. The resulting concentrate shall be sorted with the aid of a binocular dissecting microscope. Pertinent data, including precise location and precise depth of a specimen shall be recorded in a field notebook. Site stratigraphy shall be recorded in photographs and sketches.

PAL-4 Fossil Preparation, Identification, Curation, and Reporting. Any identifiable and significant fossils recovered during monitoring and/or sediment sample processing shall be cleaned, stabilized, repaired, identified to the lowest taxonomic level possible, reported, and curated in a qualified repository. Each fossil shall be labeled with a locality number, the collector's name, date collected, taxon, and element. All appropriate fossil locality information shall be provided to the San Bernardino County Museum. All fossil specimens shall be curated at the San Bernardino County Museum if it is equipped to receive and curate specimens at that time. If not, the specimens shall be curated in a qualified paleontological repository as defined by the Society of Vertebrate Paleontology (2010).

If significant paleontological resources are recovered, the Qualified Paleontologist shall prepare a final summary report. It shall include discussion of the monitoring and recovery methods employed, stratigraphic context of any and all specimens recovered, significance of specimens recovered, and an itemized list of fossil(s) recovered. A copy of the report shall be provided to the San Bernardino County Flood Control District and a copy shall accompany the collection to its institution where it is curated.

Geology and Soils Impact Conclusions

No significant adverse geology impacts are identified or anticipated; however, implementation of Mitigation Measures PAL-1 through PAL-4 are required to reduce paleontologic impacts to a less-than-significant level.

8. GREENHOUSE GAS EMISSIONS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			X	
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			X	

Background

While climate change has been a concern since at least 1998, as evidenced by the establishment of the United Nations and World Meteorological Organization's Intergovernmental Panel on Climate Change (IPCC), efforts devoted to greenhouse gas (GHG) emissions reduction, and climate change research and policy have increased dramatically in recent years.

Global climate change (GCC) is expressed as changes in the average weather of the Earth, as measured by change in wind patterns, storms, precipitation, and temperature. Much scientific research has indicated that the human-related emissions of GHGs above natural levels are likely a significant contributor to GCC.

GHGs are gases that trap heat in the atmosphere and are emitted by natural processes and human activities. Examples of GHGs that are produced both by natural processes and by industry include carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The accumulation of GHGs in the atmosphere regulates the Earth's temperature. GHGs have varying amounts of global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. By convention, CO₂ is assigned a GWP of 1. In comparison, CH₄ per the IPCC's Fourth Assessment Report has a GWP of 25, which means that it has a global warming effect 25 times greater than CO₂ on an equal-mass basis. To account for their GWP, GHG emissions are often reported as CO₂e (CO₂ equivalent). The CO₂e for a source is calculated by multiplying each GHG emission by its GWP, and then adding the results together to produce a single, combined emission rate representing all GHGs.

Because the direct environmental effect of GHG emissions is the increase in global temperatures, which in turn has numerous indirect effects on the environment and humans, the area of influence for GHG impacts associated with the proposed Project would be global. However, those cumulative global impacts would be manifested as impacts on resources and ecosystems in California.

California's Fourth Climate Change Assessment describes how GCC would affect the environment in California. The impacts described in the assessment reports, including the Statewide Summary Report (Bedsworth et al., 2018) and the Los Angeles Summary Report (Hall et al., 2018), include changing sea levels, changes in snow pack and availability of potable water, changes in storm flows and flood inundation zones, health and other impacts from extreme temperature events, increases in wildfires, and other impacts.

Regulatory Setting

All levels of government have some responsibility for the protection of air quality, and each level (federal, State, and regional/local) has specific responsibilities relating to air quality regulation. Regulation of GHGs is a relatively new component of air quality. Several legislative actions have been adopted to regulate GHGs on a federal, State, and local level. There are currently no federal regulations that would apply directly to the proposed Project, and most State and local GHG emissions reduction regulations, policies, and goals apply to new structure construction, appliance efficiency, electricity generation and use efficiency, etc. that do not apply to the proposed Project. However, there are a few State and local GHG emissions reduction regulations, goals, and policies that would apply directly or indirectly to the construction and operation of the proposed Project, as discussed below.

California Governor's Office of Planning and Research, Guidelines on GHG (SB 97)

In late December 2009, the California Natural Resources Agency adopted certain amendments to the State CEQA Guidelines for reviewing the environmental impacts of GHG emissions to implement the California Legislature's directive in PRC Section 21083.05 (enacted as part of SB 97 (Chapter 185, Statutes, 2007)). These amendments became effective in March 2010. As part of the administrative rulemaking process, the Natural Resources Agency developed a Final Statement of Reasons explaining the legal and factual bases, intent, and purpose of the CEQA Guidelines amendments. The Final Statement of Reasons guides the scope of GHG analyses for CEQA documents and addresses the subject of life-cycle analysis.

Life-cycle analysis (i.e., assessing economy-wide GHG emissions from the processes in manufacturing and transporting all raw materials used in developing a given project and infrastructure) depends on emission factors or econometric factors that are not well established for all processes. The basis of State CEQA Guidelines set forth by the California Natural Resources Agency indicate that a full life-cycle analysis would be beyond the scope of a given CEQA document because of a lack of consensus guidance on life-cycle analysis methodologies.

California Governor's Executive Orders on GHG Emissions

The California Governor's Executive Order S-3-05 (June 2005) declared California's particular vulnerability to climate change and sets a target of an 80 percent reduction of California GHG emissions from 1990 levels by 2050 and a target to achieve 1990 levels by 2020. In response to Executive Order S-3-05 and increasing societal concern about the effects of climate change, the California Legislature enacted California Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32). In passing the bill, the California Legislature found that:

Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems [HSC Section 38501, Division 25.5, Part 1].

In September 2018, Executive Order B-55-18 established a new statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter. The California Air Resources Board (ARB) was directed to develop the framework for

implementing the goal of carbon neutrality. Executive Order B 30 15 (April 2015) established a California GHG reduction target of 40 percent below 1990 levels by 2030. One purpose of this interim target is to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050. This executive order also specifically addresses the need for climate adaptation and directs state agencies to update the California Climate Adaptation Strategy to identify how climate change will affect California infrastructure and industry and what actions the state can take to reduce the risks posed by climate change. Senate Bill 32 (SB 32) of 2016 codified the GHG emissions target to 40 percent below the 1990 level by 2030.

AB 32 Climate Change Scoping Plan and Scoping Plan Updates

With AB 32, the 2020 GHG emissions reduction goal became law and requires California to maintain and continue reductions beyond 2020. AB 32 also directed the ARB to develop regulations and market mechanisms to reduce GHG and prepare a scoping plan to identify how best to reach the 2020 limit. AB 32 requires ARB to update the Scoping Plan at least every five years. Accordingly, the 2017 Scoping Plan Update, approved on December 14, 2017, provides the strategy for achieving California's 2030 target in SB 32 (ARB, 2017).

The initial AB 32 Climate Change Scoping Plan (ARB, 2008) identified the strategies for achieving the maximum technologically feasible and cost-effective GHG reductions by 2020, and to maintain and continue reductions beyond 2020. The first statewide AB 32 Scoping Plan was adopted by ARB in December 2008, and the ARB approved the First Update to the Scoping Plan in May 2014 (ARB, 2014). The proposed Project itself conforms with the renewable energy objectives of the Scoping Plan, and at least one regulation that has come from enacting the climate change strategies in the Scoping Plan, the Low Carbon Fuel Standard, would indirectly cause a small reduction in the GHG emissions from proposed Project construction and operation.

County of San Bernardino Greenhouse Gas Emissions Reduction Plan (GGERP)

The County of San Bernardino adopted a Greenhouse Gas Emissions Reduction Plan (County of San Bernardino, 2011) that includes a number of GHG emissions reduction strategies; however, only a few would apply to the proposed Project. Objective GHG SW 1.3 includes GHG emissions reduction strategies related to waste recycling and recycled materials use, including the following that could apply:

- Reduction Strategy 2 - Construction and Demolition Debris Diversion. This reduction strategy provides a goal for diverting at least 50 percent of construction and building materials and demolition debris to recycling programs.
- Reduction Strategy 3 – County Waste Diversion Program. Part i of this reduction strategy requires the use of salvaged and recycled-content materials and other materials that have low production energy costs for building materials, hard surfaces, and non-plant landscaping; requires sourcing of construction materials locally, as feasible; and encourages the use of cement substitutes and recycled building materials for new construction.

Parts of these construction GHG emissions reduction strategies could apply to the proposed Project; however, the use of cement substitutes would not be technically feasible.

Impact Analysis

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

Less Than Significant. The proposed Project would generate GHG emissions through ongoing maintenance activities. These activities, while short-term per event (four weeks or less), would be ongoing as needed in perpetuity. The maintenance activities would cause GHG emissions directly from the off-road heavy-duty equipment and the on-road motor vehicles needed to mobilize crew, equipment, and materials. The proposed Project would also create a small amount of indirect GHG emissions from water use and from the reduction in vegetative CO₂ uptake, but there is no incremental electricity use associated with the proposed Project. These indirect GHG emissions are negligible and were not calculated for the proposed Project.

The South Coast Air Quality Management District (SCAQMD) has established a GHG significance threshold of 10,000 metric tons of carbon dioxide equivalent (MTCO₂e) emissions per year (SCAQMD, 2015) for industrial facilities, which would not apply to this flood control infrastructure project. SCAQMD's GHG working group also suggested that threshold of 3,000 MTCO₂e per year could be applied to non-industrial projects (SCAQMD, 2008). The County also has adopted a project review standard of 3,000 MTCO₂e per year, where projects with emissions below this level being "considered to be consistent with the County's GHG Emissions Reduction Plan and determined to have a less than significant individual and cumulative impact for GHG emissions" (County of San Bernardino, 2011). Therefore, a significance threshold of 3,000 MTCO₂e per year has been used to determine the Project's GHG emissions significance.

The GHG emissions estimate calculations for the proposed Project's direct construction emissions are provided in Appendix A and summarized as CO₂e emissions in Table 8-1.

Table 8-1. Greenhouse Gas Emissions	
Construction	GHG Emissions (MTCO ₂ e)
On-road Vehicles	229
Off-road Equipment	93
Water Use Indirect Emissions	7
Total Construction Emissions	329
GHG Emissions Significance Threshold	3,000
Exceeds Thresholds?	No

Source: Appendix A

The annual maintenance emissions would be a small fraction of the estimated construction emissions shown above in Table 8-1, so the proposed Project's annual construction and operation emissions would be well below the significance criteria of 3,000 MTCO₂e per year. The indirect CO₂ emissions from the long-term land use change (removal of existing natural areas that currently uptake CO₂) in the southern part of the Elder Creek Channel, from water use during maintenance events, and from potential electricity use during construction were not estimated due to limited availability of information on these indirect emissions sources. However, the potential indirect emissions reductions of the proposed Project, the response and repair of future flood damage that would occur without implementation of the proposed Project, also have not been estimated and those potential indirect emissions reductions would be much greater than the proposed Project's indirect emissions during construction and operation.

The proposed Project's estimated direct annual GHG emissions, shown above in Table 8-1, are well below the GHG emissions significance threshold. Therefore, the proposed Project's GHG emissions do not require additional analysis or mitigation and would result in a less-than-significant GHG emissions impacts.

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

Less Than Significant. The GHG emissions for the proposed Project, as described above, are expected to be minimal and would not be subject to federal and State mandatory reporting regulations. The proposed Project's GHG emissions would not trigger regulatory action under the federal 40 CFR Part 52 and the State Cap-and-Trade regulations, nor is the proposed Project subject to other State regulations that directly or indirectly reduce GHG emissions such as Title 20 appliance efficiency standards or Title 24 building construction standards.

Table 8-2 identifies current potentially applicable State Climate Change Scoping Plan and County Greenhouse Gas Emissions Reduction Plan GHG emission reduction strategies and identifies the Project conformance with these potentially applicable strategies.

Table 8-2. State and Local GHG Emissions Reduction Strategy Conformance	
State Strategy	Project Design/Mitigation to Comply with Strategy
Vehicle Climate Change Standards	These are ARB enforced standards; vehicles that access the project site that are required to comply with the standards would comply with these strategies.
Limit Idling Time for Commercial Vehicles	Project vehicles would be required to comply with ARB idling restriction regulations.
Construction and Demolition Waste Reduction	Construction and routine maintenance wastes, specifically any asphalt and concrete wastes, would be recycled to the extent feasible.
Increase Water Use Efficiency	The Project would only use water as necessary to comply with regulations for dust control.
Local Strategy	
GGERP Objective GHG SW 1.3, Strategy 2	Construction and routine maintenance wastes, specifically any asphalt and concrete wastes, would be recycled to meet the 50 percent landfill diversion target.
GGERP County Review Standard	Table 8-1 indicates that the annual GHG emissions are below the San Bernardino GHG Emissions Reduction Plan review standard threshold of 3,000 MT CO ₂ e per year. Therefore, additional Project emissions analysis and mitigation is not triggered.

Source: ARB 2017, County of San Bernardino, 2011.

In summary, the proposed Project would conform to State and local GHG emissions/climate change regulations, policies, and strategies; therefore, GHG impacts would be less than significant.

Mitigation Measures

None Required.

Greenhouse Gas Emissions Impact Conclusions

No significant adverse impacts are identified or anticipated, and no mitigation measures are required.

9. HAZARDS AND HAZARDOUS MATERIALS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X	
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?			X	
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?			X	
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?				X
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?				X
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?		X		
g) Expose people or structures, either directly or indirectly, to a significant risk loss, injury or death involving wildland fires?			X	

Environmental Setting

Hazardous materials are generally substances that by their nature and reactivity have the capacity to cause harm or health hazards during normal exposure, an accidental release, or other mishap. Hazardous materials are characterized as being toxic, corrosive, flammable, reactive, an irritant, or strong sensitizers. The term “hazardous substances” encompasses chemicals regulated by both the United States Department of Transportation’s (DOT) “hazardous materials” regulations and the U.S. Environmental Protection Agency’s (USEPA) “hazardous waste” regulations, including emergency response. Hazardous wastes require special handling and disposal because of their potential to impact public health and the environment. A designation of “acutely” or “extremely” hazardous refers to specific listed chemicals and quantities.

Hazardous substances are defined by State and federal regulations to protect public health and the environment. Hazardous materials have certain chemical, physical, or infectious properties that cause them to be considered hazardous. Hazardous substances are defined in CERCLA Section 101(14), and also in the California Code of Regulations (CCR), Title 22, Chapter 11, Article 2, Section 66261, which provides the following definition:

A hazardous material is a substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed.

Impact Analysis

- a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Less Than Significant. The proposed Project would not involve the routine transport, use, or disposal of hazardous materials in any substantial quantities. 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 standard construction 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. During maintenance, the use of any herbicides for vegetation management and rodenticide (as needed) would all occur consistent with manufacturers recommendations, applicable regulations, and San Bernardino County standard practices. Therefore, construction and maintenance activities would not 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?*

Less Than Significant. As described above under criterion (a), the proposed Project would not introduce significant potential for hazard to the public or the environment associated with reasonably foreseeable upset and accident conditions.

- c) *Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?*

Less Than Significant. The closest school to the project site is Arroyo Verde Elementary School, located approximately 0.16-mile north on Church Street (center of the Project work area to the center of the school). Construction and maintenance of the project would utilize hazardous materials in limited quantities, as described above under criterion (a). Access to the project site during construction and operation would likely utilize SR-210 and Greenspot Road, with traffic associated with the project not directly passing Arroyo Verde Elementary School, but would travel within 0.25-mile of this school and Highland Grove Elementary School, which is located 0.12-mile west/northwest of the project site on Orange Street. As described above under criterion (a), the proposed Project would not introduce significant potential for hazard to the public or the environment associated with the transport or use of hazardous materials that could adversely impact these adjacent schools. Additionally, the proposed Project would not emit hazardous emissions that could affect these existing schools.

- 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?*

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, and to submit this list to the Secretary for Environmental Protection. This list, referred to as the Cortese List, currently identifies no sites within the City of Highland, meaning no hazardous materials sites are located on the project site or along the localized proposed access routes (DTSC, 2019). Therefore, 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 by disrupting an identified hazardous material site.

- 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 or excessive noise for people residing or working in the project area?*

No Impact. The nearest airport to the project site is Redlands Municipal Airport, with the closest runway located approximately 1.65 miles southeast of the project site. The San Bernardino International Airport is also located approximately 2.7 miles to the west/southwest of the project site. The proposed Project would only require a small temporary workforce during construction and maintenance, which would not be subject to any safety hazards from operation of these airports. As a below-grade flood channel, the proposed Project features would not result in an aviation safety hazard for people residing or working in the project area.

- f) *Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?*

Less Than Significant with Mitigation Incorporated. Roadways affected by the proposed Project are not known to be part of an adopted or designated emergency evacuation route or plan. However, the proposed Project could potentially result in a significant impact relative to emergency access and evacuation due to periodic and temporary closures of travel lanes on Ypsilantha Street, Old Greenspot Road, Merris Street, and Abbey Way. These impacts would be less than significant with implementation of Mitigation Measures TR-1 (Construction Area Management Plan), TR-2 (Notification to Property Owners and Tenants), and TR-3 (Coordinate with Emergency Service Providers) (see Section 17, Transportation). With implementation of these mitigation measures, the proposed Project's impacts on emergency access and evacuation would be less than significant. Operation and maintenance of the proposed Project is expected to generate minimal daily traffic volumes and would rarely require any temporary disruptions to travel lanes. Due to the limited nature of operational and maintenance activities, no impacts to emergency access and evacuation is anticipated to occur. The proposed Project would not significantly impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

- g) *Expose people or structure, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?*

Less Than Significant. The project site is not located within or adjacent to forest areas. Construction of the proposed Project would include the use of motorized vehicles and equipment adjacent to open lands, including nearby Plunge Creek. Because the proposed Project includes upgrades to an existing flood channel within a previously disturbed easement, sparks or heat from vehicle and equipment engines are not expected to create a significant potential for fire ignition that could spread outside the immediate work area. Additionally, Project work and staging areas would be clear of flammable vegetation and all construction and maintenance work would be conducted in accordance with standard safety measures to reduce the potential for fire ignition. The proposed Project would not introduce a significant risk of loss, injury, or death involving wildland fires.

Mitigation Measures

- MM TR-1 Construction Traffic Management Plan.** (see full text under Section 17, Transportation)
- MM TR-2 Notification to Property Owners and Tenants.** (see full text under Section 17, Transportation)
- MM TR-3 Coordinate with Emergency Service Providers.** (see full text under Section 17, Transportation)

Hazards and Hazardous Materials Impact Conclusions

Less than significant impacts would occur with implementation of Mitigation Measures TR-1 through TR-3.

10. HYDROLOGY AND WATER QUALITY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?		X		
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?				X
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would?				
I. Result in substantial erosion or siltation on – or off-site;		X		
II. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on – or off-site;				X
III. Create or contribute runoff water which would exceed the capacity of the existing or planned stormwater drainage systems or provide substantial additional resources of polluted runoff; or				X
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?				X

Environmental Setting

Much of the hydrologic setting for the proposed Project is provided in Section 3, Detailed Project Description. To summarize, Elder Creek at the location of the proposed Project has a drainage area of 1,425 acres and drains into Plunge Creek within the City of Highland. Major existing features are shown in Figure 1. The existing Elder Creek channel is entirely constructed for drainage conveyance and consists of a reinforced concrete box culvert between Old Greenspot Road and the confluence with the East Highland Storm Drain, and a trapezoidal rip-rap and revetment earthen channel from that point to the confluence with Plunge Creek. The Church Street Channel, also constructed for drainage conveyance, flows into the Elder Creek channel just upstream of the confluence with Plunge Creek.

Elder Creek conveys surface flow generated by urban runoff outside of the storm season. Channel grades in Elder Creek at the project area are relatively flat, with downstream Plunge Creek elevations higher than Elder Creek, resulting in pooling of nuisance flows leading to wetland conditions and vector control problems upstream of the confluence of Elder and Plunge Creeks. The existing Elder Creek channel is undersized for flood control, and cannot convey a 100-year storm event, resulting in the potential for flooding downstream of Old Greenspot Road.

The project site is within the jurisdiction of the Santa Ana Regional Water Quality Control Board (RWQCB). Beneficial uses of Elder Creek waters include municipal and domestic supply, groundwater recharge, water contact and non-contact recreation, cold freshwater habitat, and wildlife habitat. All are considered intermittent beneficial uses (RWQCB, 1994). None of the waters within the project area are listed as impaired by the State Water Resources Control Board (SWRCB, 2019).

Groundwater beneath the project site is in the Upper Santa Ana Valley Groundwater Basin Bunker Hill Subbasin. This basin has a total area of 120 square miles with approximately 5,890,300 acre-feet groundwater in storage with stable groundwater levels at the area of the proposed Project. The streams flowing southward from the San Bernardino Mountains, which would include Elder Creek, are considered lesser sources of recharge to the basin (DWR, 2004).

Impact Analysis

a) *Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?*

Less Than Significant with Mitigation Incorporated. During proposed Project construction and routine maintenance activities there could be a potential for spills of oil, grease, trash, or other water contaminants associated with the use of vehicles, equipment, and construction materials. Existing flows within Elder Creek and tributaries could be disturbed with resultant degradation of water quality from bed sediments. Vector management would include mosquito control, which could involve the use of pesticides. Rodenticide is also proposed to be used. Both could affect water quality.

The proposed Project is located within the jurisdiction of the Santa Ana RWQCB and is subject to the management direction of the Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin region. The proposed Project would be compliant with the District's Municipal Stormwater (MS4) Permit Order No. R8-2010-0036 (National Pollutant Discharge Elimination System No. CAS618036) and Aquatic Pesticide Application Plan (APAP) Permit Order No. 2013-0002-DWQ, amended by 2016-0073-EXEC (General Permit No. CAG990005) issued by the Santa Ana RWQCB. The MS4 permit is intended to ensure non-degradation of waters of the State and U.S. The permit requirements ensure compliance with the RWQCB Basin Plan, which establishes water quality standards for the ground and surface waters of the region, includes procedures to protect the beneficial uses of specific waterbodies, and describes the levels of quality which must be met and maintained to protect those uses.

Vector management activities would occur in accordance with MOU between the District and the County Department of Environmental Health Department as described in Section 3, Detailed Project Description. The application of chemical vegetation and vector controls would be conducted in conformance with label recommendations and Department of Environmental Health Department standards.

Any flows that may be in the channels during construction would be collected using a cofferdam and piped through the construction area in a flexible pipe. If a storm is expected, the site would be protected and construction halted during flood flows.

Elder Creek and tributaries qualify as jurisdictional waters of the State under Section 1600 of the State Fish and Game Code. Prior to initiation of the proposed Project, correspondence with CDFW would be required to obtain a Streambed Alteration Agreement. Elder Creek and tributaries are also jurisdictional under Section 404 of the Federal Clean Water Act (CWA). Therefore, a CWA Section 404 permit would be required. A 404 Permit would ensure minimization of, and mitigation of, impacts to Waters of the U.S. A water quality certification from the RWQCB would be required under Section 401 of the CWA.

The total area of disturbance associated with the proposed Project would be more than one acre. Therefore, a Stormwater Pollution Prevention Plan (SWPPP) will be required in order to comply with the California Construction General Permit for stormwater. Mitigation Measure HYD-1 is proposed to ensure certain minimal requirements are included in the SWPPP to avoid and reduce water quality impacts.

Mitigation Measure HYD-1, along with required permit restrictions, including MS4, the SWPPP, RWQCB Basin Plan requirements, Section 1600 of the State Fish and Game Code, Sections 401 and 404 of the CWA, and restrictions and procedures imposed by EMD, would ensure that the potential for surface water and ground water contamination from the proposed construction and maintenance activities be less than significant.

b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Less Than Significant. The proposed Project does not involve the pumping of local groundwater resources and would not introduce substantial new impervious areas such that recharge rates or patterns would be affected. Approximately $\frac{1}{4}$ acre of existing pervious channel bed would be replaced by concrete. Given the size of the overall groundwater basin and the lesser importance of the mountain streams such as Elder Creek to groundwater recharge, this small area is expected to have negligible effect on recharge. Any water needed for implementation of the proposed Project would be obtained from a local water purveyor. No significant impact to groundwater resources would occur.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would?

- I. Result in substantial erosion or siltation on – or off-site;*
- II. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off-site;*
- III. Create or contribute runoff water which would exceed the capacity of the existing or planned stormwater drainage systems or provide substantial additional resources of polluted runoff.*

Less Than Significant with Mitigation Incorporated.

- I.** Some temporary increase in erosion potential could occur during construction, but would be addressed by compliance with existing regulations and Mitigation Measure HYD-1 as described above for Impact (a). No increase in erosion potential is expected during operations. The proposed Project consists of permanent bank stabilization and erosion-control measures intended to reduce erosion. The overall drainage pattern would not be altered.
- II.** The purpose of the proposed Project is flood control. Flooding would be reduced by implementing the proposed Project. Drainage patterns would not be substantially altered. Therefore, a substantial increase in the rate or amount of surface runoff would not occur.
- III.** The purpose of the proposed Project is flood control. Flooding would be reduced by implementing the proposed Project. Drainage patterns would not be substantially altered. The proposed Project has no potential to increase runoff.

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

Less Than Significant. The project site is in a flood zone, which is the reason the proposed Project is being considered. The proposed Project would reduce floodplain limits without introducing new sources of pollutants. Not being alongside the ocean or a lake, the proposed Project would not be subject to tsunami or seiche. This impact is less than significant.

Mitigation Measures

HYD-1 Stormwater Pollution Prevention Plan (SWPPP). Prior to construction, the District or its contractor shall prepare a Storm Water Pollution Prevention Plan (SWPPP) that includes all State Water Resources Control Board requirements as well as the following Best Management Practices (BMPs) to ensure that disturbed soils do not impact water quality downstream. The SWPPP shall include, but not be limited to, the following BMPs.

BMP 1 Avoid Channel Work during the Rainy Season to the Greatest Extent Practicable. To the greatest extent practicable, construction and routine maintenance activities in earthen channels and in channels with soft bottoms and bank protection shall be avoided during the rainy season. In the Santa Ana watershed (Valley Areas), the rainy season is typically from October through April. If work must occur within the channel, water diversion structures shall be in place to protect water quality downstream.

BMP 2 Clear Water Diversion. Should water be encountered during construction and maintenance, clear water diversion structures such as diversion ditches, berms, dikes, cofferdams, slope drains, rock, gravel bags, filter fabric or turbidity curtains, drainage and interceptor swales, pipes, or flumes shall be employed as needed to protect water quality downstream.

BMP 3 Avoid Spills and Leaks. The District or its contractor shall ensure that equipment operating in and near the facility is in good working condition and free of leaks. No equipment maintenance and/or refueling shall occur within District facilities. Equipment used during construction and routine maintenance activities shall be parked outside of channels and/or washes on the road tops and/or adjacent roadway. All operations staff working with heavy equipment shall have been trained in the use of the equipment and in spill containment and response for any unforeseeable accidents that may occur. A spill kit shall always be kept on-site while construction or maintenance crews are working at the site. Special care shall be taken to prevent liquid paint from entering aquatic resources while painting associated with graffiti removal is conducted. Any spills that occur shall be reported to California State Warning Center (Cal OES) at (800) 852-7550. Additionally, a copy of the Cal OES California Hazardous Materials Spill/Release Notification Guidance shall be kept on-site while all maintenance activities take place. If necessary, operations staff shall follow up with the appropriate agencies as outlined in the Cal OES guidelines, which can be located on the Cal OES website at www.calema.ca.gov.

BMP 4 Avoid Road Base Discharge. The District or its contractor shall not discharge road base, fill, sediment, concrete, and/or asphalt beyond the previously established roadbed when maintaining existing driveways and dirt access roads within the construction and maintenance activity area.

BMP 5 Concrete Washout Protocols. The District or its contractor shall implement the appropriate waste management practices during on-site construction operations. Waste management practices shall be applied to the stockpiling of concrete, curing, and finishing of concrete as well as concrete washout operations. Waste management practices shall be adequate to ensure that all fluids associated with the curing, finishing, and washout of concrete shall not be discharged into any area with the potential to enter an aquatic resource. Further, all concrete waste shall be stockpiled separately from sediment and protected with erosion control measures to ensure that concrete dust and/or debris is not discharged into an aquatic resource. The District or its contractor shall determine the appropriate waste management practices based on considerations of flow velocities, site conditions, availability of stockpile locations, availability of erosion control materials, construction costs, and other requirements that may be outlined within the District's MS4 permits.

BMP 6 Location of Temporary Stockpiles and Staging Areas. Stockpile locations and staging areas shall be located within the disturbed/graded areas outside of the facility bottom and at the tops of the levees/banks to the greatest feasible extent. Silt fences, berms, or other methods of erosion control may be used if stockpiles are to remain in designated areas for longer than 10 days. Additionally, heavy equipment may be staged on the access roads within the maintenance activity area, but shall be confined to those locations where potential pollutants cannot enter an aquatic resource.

BMP 7 Location of Permanent Stockpiles. Any permanent or long-term stockpiles onsite shall be located outside of areas identified as Waters of the State and Waters of the U.S. Any material not placed onsite shall be removed by the District or its contractor and placed at the nearest Operations yard.

BMP 8 Application of Pesticides, Herbicides, and Fertilizers. The District Aquatic Pesticides permit outlines a schedule of monitoring requirements, BMPs, and conditions designed to promote the reduction of pollutants in stormwater discharges. The permit (Order Number 2013-0002-DWQ) requires the District to manage pesticides and herbicide applications under specific criteria.

General Requirements. Apply pesticides and herbicides in accordance with California Department of Pesticide Regulation requirements: (1) Read and follow manufacturers' label requirements before each application; (2) Check sprinkler system for overflows into the streets and storm drain; (3) As much as possible, utilize safer alternatives such as insecticidal soaps and horticultural oils.

Herbicide Applicator Training Requirement. The San Bernardino County Department of Agriculture/Weights and Measures (Ag) is contracted by the District to spray various flood control facilities throughout the County for vegetation control. Many times, the Ag spray rigs are not able to spray

close to fence lines and in tight areas. Spotty re-growth also occurs and is required to be re-sprayed.

The District consulted with Ag to develop a plan for weed abatement that is an extension of Ag's current weed abatement program; using the same herbicide (Monsanto Roundup Pro Concentrate or similar glyphosate product). The application process has been approved by Ag and is determined not to require a California State Qualified Applicator License (QAL) or Certificate (CAC) per 3CCR section 6504. The District application of herbicide shall be under the constant monitoring of Ag, who will be dispensing the herbicide and conducting random monitoring inspections in the field. District staff shall complete daily records of herbicide use by amount and location. These logs shall be turned in to Ag monthly, to ensure no overuse of herbicides occurs.

At least annually, Ag shall provide training to District staff consisting of:

1. Classroom instruction on the laws and regulations governing the application of herbicides in the State of California.
2. Review of the functions of the Department of Agriculture/Weights and Measures Pest Management Division Written Employee Training Program for Pesticide Applicators, Herbicide Applications; including:
 - a. Safety Procedures;
 - b. MSDS for Monsanto Roundup Pro Concentrate (or similar glyphosate product), signs, symptoms & effects of exposure;
 - c. Pesticide Safety Series N1, N2, N4, N5, N7, N8;
 - d. Review of the Dept of Ag Pesticide Monitoring Inspection form;
 - e. Instruction on completing and submission of the required daily use log;
 - f. Practical demonstration of identification and proper use of items required for safe transport, mixing, pouring, application, clean up, storage, disposal of wastes, and emergency procedures associated with the Roundup Pro Concentrate (or similar glyphosate product) herbicide application procedure;
 - g. The required personal protective equipment and hygiene practices.
3. Employee will perform a proficiency demonstration of knowledge of the above training items.
4. Employee will successfully complete a verbal/written post test on the above training. Herbicides shall be applied by the District on a limited basis. Licensing standards and procedures are established by DPR and are described in: 1998 California Code of Regulations,

Title 3 (Food and Agriculture); and 1997 California Food and Agriculture Code (Divisions 6, 7, and 13).

- BMP 9 Invasive Plant Removal Protocols.** Invasive plant species shall be removed in a manner that prevents propagation of those species in the same location and/or in other locations throughout the facility and/or County. Where maintenance activities are required, Operations staff shall spray and/or mow invasive plant species before seeds ripen. All cut/removed invasive vegetation shall be taken to an approved refuse facility as a load designated for destruction. Operations staff shall prevent cut stems and/or seed material from being transported downstream and/or being left behind to allow the seed to propagate. In the case of giant reed (*Arundo donax*) removal, the District shall minimize ground disturbance and use foliar glyphosate treatment on smaller infestations. Stems shall be removed only when the plants are determined to be dead and unable to re-sprout and/or propagate.
- BMP 10 Remove Debris.** Remove litter and debris from facility as necessary.
- BMP 11 Wind Erosion.** Prevent dust and wind erosion by applying water or other dust palliatives as necessary to reduce or alleviate dust nuisance generated by construction activities.

Hydrology and Water Quality Impact Conclusions

With implementation of Mitigation Measure HYD-1 all impacts are less than significant.

11. LAND USE AND PLANNING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Physically divide an established community?				X
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?				X

Environmental Setting

The project site is located in the East Highland Village community of the City of Highland (City of Highland, 2006a). The East Highland Village community consists primarily of single-family residences. Between Merris Street and Abbey Way, a recreational vehicle (RV) storage site is located adjacent to the project area's western boundary and a church (i.e., St. John Bosco Mission) is located adjacent to the eastern boundary (Google Earth, 2018). South of Abbey Way, the proposed Project would be located across undeveloped land that is managed by the District (BLM, USFWS, & SBVWCD, 2018).

The project area south of Old Greenspot Road and north of Merris Street is designated as Low Density Residential with zoning specific to the East Highland Village District. South of Merris Street and north of Abbey Way, the project area is designated as Planned Development specific to the East Highlands Ranch. South of Abbey Way, the project area is designated as Open Space (City of Highland, 2006a).

The City of Highland has developed the following goals and policies specific to preserving and enhancing flood control systems within the surrounding watershed (City of Highland, 2006b):

Conservation and Open Space Element

Goal 5.4: Continue to preserve and enhance the water quality and natural habitat of its waterways.

- **Policy 1:** In coordination with the East Valley Water District and the County of San Bernardino, continue to maintain and improve the hydrology and natural quality of the watersheds of Bledsoe Creek, Plunge Creek, Elder Gulch City Creek, Sand Creek, Warm Creek, Old City Creek Overflow Channel, Bald Ridge Creek, Santa Ana Canyon and the Santa Ana River.
- **Policy 3:** Cooperate with other agencies and participate in multijurisdictional efforts to improve watershed management practices.
- **Policy 4:** Reevaluate the effect of engineering practices and specifications relative to storm channel design to avoid their appearance as "concrete ditches."

Impact Analysis

a) *Physically divide an established community?*

No Impact. A community may be divided if a project were to introduce a new physical barrier through that community (e.g., a highway or railroad). The proposed Project would involve improvements to the existing Elder Creek flood control system, and all Project-related activities would occur within disturbed areas adjacent to the Elder Creek Channel as illustrated in Figure 1. The proposed Project would not introduce any new infrastructure that could create a barrier across an existing community. No impact would occur.

- b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?*

No Impact. All activities associated with the proposed Project would occur within the existing Elder Creek Channel and within flood control areas adjacent to the channel. The proposed Project would not result in any change to established land uses surrounding the project area (e.g., residences, RV storage, church). The proposed Project would be consistent with the City's planning designations of Residential and Open Space, and there would be no conflict with the existing zoning specific to an East Highland Village District.

As a flood control improvement project, the proposed activities would be consistent with the City's goals and policies for its watersheds. Regarding Policy 4 (see text under Section 11, Environmental Setting), the proposed Project would be consistent with the City's preference to avoid the creation of "concrete ditches" to the degree feasible as both the East Highland Storm Drain and the existing channel downstream of Abbey Way would remain earthen. Although an earthen segment of the Elder Creek Channel between Merris Street and Abbey Way would be replaced with a concrete channel, this design is necessary in order to improve flows through the channel. No impact would occur.

Mitigation Measures

None Required.

Land Use and Planning Impact Conclusions

No potentially significant impacts to land use and planning are anticipated, and no mitigation measures are required.

12. MINERAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
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?			X	
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?			X	

Environmental Setting

Mineral resources are broadly divided in California into fuel and non-fuel. Fuel resources consist of oil and gas resources and non-fuel include metals, industrial minerals, and construction aggregate. Mineral resources are varied in San Bernardino County with many active mines; materials actively being mined include rare earth minerals, clay, gold, silver, talc, borates, sand and gravel, and decorative rock (San Bernardino County, 2019). The USGS Mineral Data Resources System identifies several past and present sand and gravel (aggregate) producers in the vicinity of the project site (USGS, 2019). There are several active Cemex and Robertson's sand and gravel quarries in the Santa Ana River wash. The closest site is an active Cemex quarry, which is located about 0.4 miles south of the project site (Google Earth, 2019).

The State Geologist, under the Surface Mining and Reclamation Act, has mapped and classified areas of non-fuel mineral resources in California into four categories based on: available geologic information, likelihood of mineral resources being present, and whether they have areas of known mineral resources. The project area is within a mapped MRZ-2 zone that includes underlain geologic units with demonstrated mineral or sand and gravel resources (CGS, 1984).

Impact Analysis

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?*

Less Than Significant. Although the project site is located within a mapped MRZ-2 zone in an area of known aggregate resources, the proposed Project would only include construction and improvements within the existing Elder Creek Channel disturbed footprint, with some limited expansion of the channel width, and annual maintenance activities within the channel's concrete sections, bi-annual maintenance activities within the channel's earthen sections, and a one-time maintenance of the Church Street Channel. The proposed Project would not infringe upon existing quarrying activities in the area. Therefore, no loss in availability of known mineral resources due to proposed Project activities would occur and there would be a less than significant impact.

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?*

Less Than Significant. The project area is within a mapped MRZ-2 zone with known aggregate resources. The City of Highland General Plan includes the following policies related to availability of mineral resources: identify any significant mineral resources within the City and, as feasible, protect them from encroachment by residential or other incompatible development, for future use, and permit non-

mining uses within the designated Open Space District only if a finding is made that no significant impacts on future regional mineral resources will result from project approval (City of Highland, 2006). However, as noted above, the proposed Project would only include construction and improvements within the existing Elder Creek Channel disturbed footprint, with some limited expansion of the channel width, and associated maintenance activities. Thus, the proposed Project would not result in the loss of availability of a locally important mineral resource recovery site. There would be a less-than-significant impact.

Mitigation Measures

None Required.

Mineral Resources Impact Conclusions

No significant adverse impacts to mineral resources are identified or anticipated, and no mitigation measures are required.

13. NOISE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?		X		
b) Generation of excessive groundborne vibration of groundborne noise levels?		X		
c) For a project located within the vicinity of a private airstrip or 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?			X	

Environmental Setting

A Noise Impact Analysis Report (Noise Report) was completed by Urban Crossroads (2019) and is included as Appendix D to this Initial Study. The following discussion and impact analysis are based on this report and it is incorporated by reference herein.

Fundamentals of Noise. Noise occurs when sound becomes unwanted, a nuisance, or harmful to psychological or physical health. Noise is measured on a logarithmic scale of sound pressure level known as “decibel” (dB). The human ear, however, can distinguish a certain frequency of sound that is measured by “A-weighted decibels” (dBA), which ignores very low and very high frequencies of the audible spectrum.

Equivalent continuous sound level (L_{eq}) is the collective noise from all sources that create a level of ambient noise at a given location. It is considered the “average” noise level in a given environment. It is defined by the average dBA and takes into account fluctuations of noise measurements. Similarly, the maximum (loudest) sound level measured over a time period is defined as L_{max} and the minimum (quietest) sound level is defined as L_{min} .

Fundamentals of Vibration. According to the Federal Transit Administration *Transit Noise and Vibration Impact Assessment Manual* (FTA, 2018), vibration is the periodic oscillation of a medium or object. Ground-borne vibrations may be described by amplitude and frequency. Peak particle velocity (PPV) is the maximum instantaneous peak of a vibration signal. PPV is most frequently used to describe vibration impacts to buildings, but not always suitable for evaluating human response. On the other hand, decibel notation (VdB) is commonly used to measure the root mean square (RMS) of vibrations that are detected by the human body. For the purpose of the proposed Project’s noise analysis, PPV is used to describe vibration estimates. Vibrations are analyzed in terms of impacts to physical structures and sensitive receptors (also referred to as “human annoyance”).

Regulatory Setting

City of Highland General Plan Noise Element. The City's Noise Element provides goals and strategies to ensure a quiet noise environment for residents, employees, and visitors. The Noise Element contains the following goals:

- 7.1 *Protect sensitive land uses and the citizens of Highland from annoying and excessive noise through diligent planning and regulation.*
- 7.2 *Encourage the reduction of noise from transportation-related noise sources such as automobile and truck traffic.*
- 7.3 *Protect residents from the effects of "spill over" or nuisance noise.*

Goal 7.3, Action 1, in the Noise Element indicates that construction, as a condition of approval, shall be limited to daytime hours between 7:00 a.m. to 6:00 p.m. on weekdays.

City of Highland Municipal Code. The City of Highland Municipal Code Chapter 8.50, Noise Control, Section 8.50.060, Exemptions, provides a list of activities and noise sources exempt from the City's noise standards, including (City of Highland, 2019):

- K. *Construction, operation, maintenance and repair of equipment, apparatus or facilities of the park and recreation department, public work projects or essential public services and facilities, including trash collection and those of public utilities subject to the regulatory jurisdiction of the Public Utilities Commission.*
- L. *Construction, repair or excavation work performed pursuant to a valid written agreement with the city or any of its political subdivisions, which agreement provides for noise mitigation measures.*

County of San Bernardino General Plan Noise Element. Policy N 1.6 states that hourly noise-level performance standards for stationary and other locally regulated sources, such as industrial, recreational, and construction activities as well as mechanical and electrical equipment will be enforced through an ordinance that is consistent with the Noise Element of the General Plan and includes development standards in the Development Code.

County of San Bernardino Development Code. Section 83.01.080, Noise, of the County Development Code provides noise standards for stationary and mobile noise sources. According to 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.

Section 93.01.090 (a), Vibration, establishes a vibration standard of 0.2 in/sec PPV. Vibrations may not exceed this level at or beyond the lot line.

Existing Noise Level Measurements. Six 24-hour average noise level measurements (L1 to L6) were recorded at various receiver locations on Friday, June 22, 2018 (Refer to Appendix D – Table 5-1 and Exhibit 5-A). The measurements represent the daytime measurements (7:00 a.m. to 10:00 p.m.) based on daytime construction activities.

■ **Receiver Locations.** There were 13 sensitive receiver locations along Elder Creek between Greenspot Road and Abbey Way that were identified and selected for noise analysis due to their proximity to noise-sensitive receptors. Refer to Exhibit 7-A, Receiver Locations, in Appendix D.

Impact Analysis

- a) *Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?*

Less Than Significant with Mitigation Incorporated. The proposed project will not generate substantial permanent increases in ambient noise levels, but may generate substantial temporary and intermittent increases in ambient noise levels. With mitigation incorporated however, temporary noise impacts are reduced to less than significant levels. The following analysis is based on the Noise Report completed by Urban Crossroads (2019), which is included as Appendix D to this Initial Study.

Project Construction

Typical construction equipment noise impacts were analyzed, in addition to a focused assessment of pile-driving equipment. Typical construction equipment includes, but is not limited to, maintenance trucks, water trucks, excavators, pavers, rollers, loaders, excavators, and dump trucks. Additionally, pile driving equipment is analyzed because it may be used for this project to drive piles, including sheet piles, into the ground to shore up walls during channel construction. While public works projects, such as the proposed Project, are considered exempt from the noise standards of the City of Highland Municipal Code, neither the General Plan nor Municipal Code establish numeric construction source noise level thresholds at potentially affected receivers for analysis under CEQA. To evaluate whether the proposed Project would generate potentially significant temporary noise levels at sensitive receiver locations, a construction-related noise level threshold is adopted from the *Criteria for Recommended Standard: Occupational Noise Exposure* prepared by the National Institute for Occupational Safety and Health (NIOSH). NIOSH identifies a noise level threshold of 85 dBA.

Typical Construction Activity Noise Levels. Typical construction noise levels are anticipated to range from 75 to 92 dBA L_{eq} (see Appendix D – Table 7-7). These levels exceed the 85 dBA L_{eq} threshold at 6 of the 13 receiver locations (R1, R3, R5, R6, R8, and R9), which are all located north of East Highland Storm Drain (see Appendix D – Exhibit 7-A). Therefore, unmitigated construction noise levels from typical construction activities could result in potentially significant impacts at these receiver locations if they are occupied residences at the time of proposed Project construction. To reduce impacts, Mitigation Measures NOISE-1 through NOISE-4 are recommended. These include standard measures, such as equipping construction equipment with properly operating mufflers, staging equipment away from noise sensitive receivers, using delivery routes that minimize passing by sensitive receivers, and notifying residences regarding construction. Additionally, Mitigation Measure NOISE-5 requires minimum 10-foot high temporary noise barriers when activities are within 25 feet of nearby, occupied receiver locations, which would reduce noise levels to below the 85 dA L_{eq} threshold (see Appendix D – Table 7-9). If noise barriers are not feasible, relocation or hours restrictions would be implemented per Mitigation Measure NOISE-5. Therefore, noise impacts due to typical Project construction activities would be reduced to a less-than-significant level with mitigation incorporated.

Pile Driving Construction Noise Levels. Impact pile driving equipment noise levels are anticipated to range from 76 to 108 dBA L_{eq} (see Appendix D – Table 7-10). These levels exceed the 85 dBA L_{eq} construction noise level threshold at 10 of the 13 receiver locations (R1 to R10), which are all located north of East Highland Storm Drain (see Appendix D – Exhibit 7-A). Non-impact pile driving equipment noise levels range from 59 to 91 dBA L_{eq} (see Appendix D – Table 7-11). This also exceeds the 85 dBA L_{eq} construction noise level threshold at 4 of the 13 receiver locations (R1, R3, R5, and R8). Therefore,

both the unmitigated impact and non-impact pile driving equipment noise levels would result in potentially significant noise impacts (see Appendix D – Table 7-12).

Mitigation Measures NOISE-1 through NOISE-4 are recommended to reduce impacts to occupied sensitive receiver locations. These include standard measures, such as equipping construction equipment with properly operating mufflers, staging equipment away from noise sensitive receivers, using delivery routes that minimize passing by sensitive receivers, and notifying residences regarding construction. Additionally, Mitigation Measure NOISE-5 requires minimum 10-foot high temporary noise barriers when activities are within 25 feet of nearby, occupied receiver locations, which would reduce noise levels to below the 85 dA L_{eq} threshold (see Appendix D – Table 7-13). If noise barriers are not feasible, relocation or restricting hours would be implemented per Mitigation Measure NOISE-5. Furthermore, with Mitigation Measure NOISE-6, non-impact pile driving equipment (e.g., drilling or other non-impact methods) would be required to reduce noise levels at adjacent receiver locations. Therefore, the noise impact due to pile driving (e.g., drilling or non-impact alternatives) activities would be reduced to a less-than-significant level with mitigation incorporated.

Routine Maintenance

The Elder Creek system will require routine maintenance. Maintenance between Greenspot Road and Abbey Way will be limited and will include access road maintenance, fence repair, trash and graffiti removal and occasional debris removal within the concrete channel and small earthen channel using a small loader. The majority of maintenance work will occur south of Abbey Way and include removal of debris, trash, and graffiti, repairing fences and appurtenant structures, invasive species removal and vegetation management within the low-flow earthen channel, and sediment removal within the sedimentation basin. These activities would occur intermittently and infrequently (1-2 times a year and some every few years). These activities would occur primarily south of Abbey Way, away from existing residences. As shown in Appendix D – Table 7-7, at residences south of Merris Street (R13) construction noise levels would not exceed the 85 dBA threshold. As such, it can be extrapolated that further south of Abbey Way, which is farther away from homes/residences, and with less equipment involved, maintenance activities would not exceed the noise threshold. Operational noise impacts would therefore be less than significant.

b) Generation of excessive groundborne vibration or groundborne noise levels?

Less Than Significant with Mitigation Incorporated. Construction of the proposed Project may potentially generate excessive groundborne vibration and groundborne noise levels. However, with mitigation incorporated, impacts are reduced to less than significant levels. The following vibration impact analysis is based on the Noise Report completed by Urban Crossroads (2019), which is included as Appendix D to this Initial Study. Vibration Analysis is subdivided into impacts to physical structures and impacts to sensitive receptors (known as “human annoyance”). Human annoyance refers to the human physical and psychological response to noise levels.

Typical construction and pile driving equipment activities were analyzed. As noted above, the City of Highland General Plan and Municipal Code do not identify specific vibration level standards. Therefore, vibration thresholds are adopted from the California Department of Transportation (CalTrans) Transportation and Construction Vibration Guidance Manual (CalTrans, 2013) to assess potential building damage impacts associated with vibration. The CalTrans threshold determines potential vibration impacts resulting in building damage for older residential structures of 0.3 in/sec PPV. Additionally, the County of San Bernardino Development Code, Section 83.01.090 (a), establishes vibration standards of

0.2 in/sec PPV. The County threshold is used to evaluate potential impacts related to human annoyance at nearby sensitive receiver locations.

As identified earlier in this Section, Mitigation Measure NOISE-6 requires that non-impact pile driving equipment be used to reduce noise levels to less than significant. Therefore, the following sections focus on impacts from typical construction and non-impact pile driving or alternative equipment.

Typical Construction/ Non-Impact Pile Driving Vibration: Impacts to Physical Structures

Vibration levels generated by heavy construction and non-impact pile driving equipment are expected to range from 0.018 to 0.352 in/sec PPV within 73 feet of the project site (see Appendix D – Table 7-15). Further analysis shows that at sensitive receiver locations R3 and R8, vibration levels may exceed the Caltrans residential building damage threshold of 0.3 in/sec PPV. This may result in potentially significant impacts to structures. Potential Impacts will be reduced to less than significant levels through the implementation of NOISE-7, which includes ground-borne vibration monitoring of residential structures represented by receiver locations R1, and R3 to R8 (between Old Greenspot Road and Merris Street) to ensure that vibration noise thresholds are not exceeded. Though Caltrans identifies a residential building damage threshold of 0.3 in/sec PPV, the County of San Bernardino may require that vibration levels do not exceed a more conservative threshold (e.g., lower) at their discretion. NOISE-7 also includes pre and post-construction surveys of the nearby residential structures to document the condition of the residences.

Typical Construction/ Non-Impact Pile Driving Vibration: Impacts To Sensitive Receptors

The County has established a threshold to evaluate potential impacts to human annoyance at nearby sensitive receiver locations. “Human annoyance” is a term used to describe the human response to environmental noise. Human responses to noise at high vibration levels can include interference with sleep and tasks that demand concentration and coordination.

Vibration levels at the site of the closest sensitive receiver are unlikely to be sustained during the entire construction period and levels are dependent in part on the type of construction equipment used onsite and its proximity to sensitive receptors. Construction at the project site would be restricted to daytime hours consistent with federal, state and local requirements.

Vibration levels from typical construction activities, including non-impact pile driving or alternative methods, are anticipated to exceed the human annoyance threshold of 0.2 in/sec PPV at receiver locations R1, R3, and R8, resulting in a potentially significant impact to four residences: R1 (residential home south of Old Greenspot Road), R3 (two residential homes approximately 46 feet southeast of Project site on Tyler Street), and R8 (residential home on Ypsilantha Street located approximately 10 feet west of Project site).

With mitigation measure NOISE-7, the project will be monitored to determine vibration levels at locations north of Merris Street as identified in Appendix D. Should vibration levels exceed the County of San Bernardino 0.2 in/sec PPV threshold, Mitigation Measure NOISE-8 would require relocation of residents, and/or hours restrictions to whenever the impacted receiver(s) are unoccupied, and shall be provided for the duration of activities within 25 feet of the affected receiver location(s). With mitigation, vibration impacts would be less than significant. The District may elect to implement mitigation measure NOISE-8 in advance of vibration monitoring.

Routine Maintenance

The Elder Creek system will require routine maintenance. Maintenance between Greenspot Road and Abbey Way will be limited and include access road maintenance, fence repair, trash and graffiti removal and occasional debris removal within the concrete channel and small earthen side channel using a small loader. The majority of maintenance work will occur south of Abbey Way and include removal of debris, trash, and graffiti, repairing fences and appurtenant structures, invasive species removal and vegetation management within the low-flow earthen channel, and sediment removal within the sedimentation basin. These activities would occur intermittently and infrequently (1-2 times a year and some every few years). Activities would occur primarily south of Abbey Way, away from existing residences. As shown in the Noise Report (Appendix D – Table 7-15), at residences south of Merris Street (R13) construction vibration levels would not exceed the 0.2 in/sec PPV human annoyance threshold or the 0.3 in/sec PPV building damage threshold. As such, it can be extrapolated that further south of Abbey Way, which is farther away from homes/residences, and with less equipment involved, maintenance activities would not exceed the vibration thresholds. Operational vibration impacts would therefore be less than significant.

- c) For a project located within the vicinity of a private airstrip or 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?*

Less Than Significant. The nearest airport to the project site is Redlands Municipal Airport, with the closest runway located approximately 1.65 miles southeast of the project site. The San Bernardino International Airport is located approximately 2.7 miles to the west/southwest of the project site. The project site is not within the vicinity of a private airstrip. The proposed Project is located just outside of the sphere of influence and beyond the area of aircraft noise concern associated with Redlands Municipal Airport (City of Redlands, 2003). As such, the proposed Project would not expose people residing or working in the project area to excessive noise levels from airport operations. Impacts are less than significant.

Mitigation Measures

- NOISE-1 Proper Mufflers.** During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise-sensitive receivers nearest the Project site.
- NOISE-2 Siting Staging Areas.** The District or its construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site during all Project construction (i.e., south of Abbey Way).
- NOISE-3 Delivery Routes.** The District or its contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.
- NOISE-4 Notification of Construction.** Residences and other noise-sensitive land uses within 100 feet of Project construction shall be notified of the construction in writing. The notification shall describe the activities anticipated, provide dates and hours of activity, and provide contact information with a description of a noise and/or vibration

complaint and response procedure. The notification shall also advise residents to remain indoors with windows closed when construction activity is occurring outside of their homes to avoid elevated exterior noise and/or vibration levels.

NOISE-5 Noise Barriers or Relocation. The following measures shall be implemented to reduce impacts at sensitive receiver locations (if occupied):

- Install the following temporary construction noise barriers at the minimum heights specified for each receiver location when Project construction activities are within 25 feet of occupied noise-sensitive residential homes:
 - Minimum 10-foot high temporary noise barriers for occupied residential homes represented by receiver locations R1, and R3 to R9. The County may elect to provide additional noise barrier coverage;
 - The temporary noise control barriers shall be located at the edge of Project construction activities and must have a solid face from top to bottom. The noise control barrier must meet the minimum height and be constructed as follows:
 - The temporary noise barrier shall provide a minimum transmission loss of 20 dBA (Federal Highway Administration, Noise Barrier Design Handbook). The noise barrier shall be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts. Example photos are provided in Appendix 7.3;
 - The noise barrier must be maintained, and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired;
 - The noise control barrier and associated elements shall be completely removed, and the site appropriately restored upon the conclusion of the construction activity.
- Relocation and/or Hours Restrictions
 - If the above is not feasible then relocation of residents, and/or hours restrictions to day(s)/time(s) when the impacted receiver(s) are unoccupied, shall be provided for the duration of activities within 25 feet of the affected receiver location(s).

NOISE-6 Use of Non-Impact Pile Driving Equipment. The use of impact pile driving equipment shall be prohibited. Instead, alternative pile driving methods and equipment (e.g., drilling or non-impact alternative) shall be used.

NOISE-7 Protection of Sensitive Structures and Receptors

- Pre- and post-construction surveys of the nearby residential structure(s), documenting the condition of the interior and exterior of the structures, shall be provided for residential structures represented by receiver locations R1, and R3 to R8, adjacent to the channel between Old Greenspot Road and Merris Street (refer to Appendix D, Exhibit 7-A).
- Ground-borne vibration monitoring of nearby residential structures, represented by receiver locations R1, and R3 to R8 adjacent to the channel between Old Greenspot Road and Merris Street, shall be required for the duration of Project construction between Old Greenspot Road and Merris Street. The monitoring shall be based on the Caltrans residential building damage threshold of 0.3 in/sec PPV

and 0.2 in/sec PPV County threshold for human annoyance. Though Caltrans identifies a residential building damage threshold of 0.3 in/sec PPV, the County of San Bernardino may require that vibration levels do not exceed a more conservative threshold (e.g., lower) at their discretion.

NOISE-8 Limit Vibration Annoyance. If monitored vibration levels exceed the County of San Bernardino 0.2 in/sec PPV annoyance threshold, then relocation of residents, and/or hours restrictions to day(s)/time(s) when the impacted receiver(s) are unoccupied, shall be provided for the duration of activities within 25 feet of the affected receiver location(s). The District may elect to implement this mitigation measure in advance of NOISE-7.

Noise Impact Conclusions

With implementation of Mitigation Measures NOISE-1 to NOISE-8 all impacts are less than significant.

14. POPULATION AND HOUSING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Induce substantial unplanned 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)?				X
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?				X

Environmental Setting

The proposed upgrades to the Elder Creek system are located in the City of Highland, San Bernardino County. The flood channel travels through a portion of a small residential community known as "The Village," located south of Old Greenspot Road. The project area also contains institutional and commercial businesses within the immediate area, primarily north of Old Greenspot Road.

Impact Analysis

- a) *Induce substantial unplanned 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. The ultimate purpose of the proposed Project is the protection of life and existing property. Improvements to the Elder Creek system are necessary to convey a 100-year storm event through Elder Creek downstream of Old Greenspot Road and mitigate potential flooding in the area. Currently, the residential neighborhood south of Old Greenspot Road is subject to flooding because the system lacks capacity in this area. The immediate area to be protected has already been developed with residential properties. Implementation of the proposed Project would not directly result in the construction of new homes, businesses, or infrastructure that could induce unplanned population growth to the City of Highland.

- b) *Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?*

No Impact. The proposed Project involves upgrades to an existing flood channel that travels through a one block portion of an existing residential community. The proposed improvements to the Elder Creek system would occur within the existing easement of the channel and would not require the permanent removal or displacement of housing or persons that would warrant replacement housing be constructed elsewhere.

Mitigation Measures

None Required.

Population and Housing Impact Conclusions

No significant adverse impacts to population growth (existing or projected) or numbers of housing are identified or anticipated, and no mitigation measures are required.

15. PUBLIC SERVICES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) 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:				
i. Fire protection?			X	
ii. Police protection?			X	
iii. Schools?				X
iv. Recreation/Parks?				X
v. Other public facilities?				X

Environmental Setting

The following describes key public services serving the project site and surrounding area:

- The City of Highland Fire Department provides fire suppression and emergency medical services to the project area. The nearest fire station to the project site is Station 542, located at 29507 Base Line Street, approximately 1.2 miles northeast of the project site.
- The Highland Police Department provides police protection to the project area. The Department's primary station is located at 26985 Base Line Street, approximately 2.1 miles northwest of the project site.
- The Redlands Unified School District and the San Bernardino Unified School District provide public school services to the City of Highland and project area. Several private and parochial schools and many licensed preschools also serve the immediate area.
- Public parks near the project site include Aurantia Park on Greenspot Road approximately 0.60-mile east and Highland Community Park on Central Avenue approximately 1.5 miles west of the project site.

Impact Analysis

a) *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: Fire protection, Police protection, Schools, Recreation/Parks, Other public facilities?*

i) Fire protection?

Less Than Significant. Construction and routine maintenance of the proposed Project is not expected to significantly increase the risk of fire. Furthermore, because much of the adjacent lands are developed, there is little risk of spread of wildfire. To the south/southwest where open

space exists, this land is primarily desert land with low-lying vegetation posing a low risk of wildfire spread. Vegetation management associated with maintenance activities under the proposed Project would ensure the site is maintained in a manner to reduce the risk of fire occurring within the site. Furthermore, proposed Project activities would include debris and trash removal, maintenance of chain link fencing and gates, and repairs of facilities. These activities are considered to reduce the potential for fires and fire service calls to the site through trespass.

Emergency response via the fire department could be required at the project site in the event of an accident during construction or maintenance. However, the likelihood of an accident requiring such a response is unknown and is not expected to be significant, as construction and maintenance activities associated with the proposed Project would be short-term and temporary. Furthermore, the proposed Project would not induce an increase in population that may require fire protection. Therefore, the proposed Project would have a less-than-significant impact with respect to disrupting existing fire service levels and would not require new or expanded fire facilities.

ii) Police Protection?

Less Than Significant. The presence of workers and equipment associated with construction and maintenance activities may attract vandals or other security risks that would increase demand on law enforcement services. However, the likelihood of requiring such a response is unknown and is not expected to be significant as construction and maintenance activities associated with the proposed Project would be short-term and temporary. Furthermore, the proposed Project would not induce an increase in population levels. Proposed project activities would include debris and trash removal, maintenance of chain link fencing and gates, and repairs of facilities. These activities are considered to reduce the potential for police service calls to the site through trespass. Implementation of these routine maintenance activities are expected to reduce the potential for law enforcement calls to the site. Therefore, the proposed project would have a less-than-significant impact with respect to disrupting existing police service levels and would not require new or expanded police facilities.

iii) Schools?

No Impact. The proposed Project would have no direct physical impact to schools. During 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. Operation of the proposed Project would not induce an increase in population levels. Therefore, substantial increases in population that would adversely affect local school populations are not expected and the proposed Project would not generate a permanent increase in population that would impact school populations.

iv) Parks?

No Impact. The proposed Project would have no direct physical impact on parks or recreational facilities. Construction and maintenance activities would not generate a permanent increase in population that would impact park facilities or conditions. No impact on parks or demand for recreational areas would occur.

v) Other Public Facilities?

No Impact. Construction and maintenance activities would not generate a permanent increase in population that would impact public facilities, such as post office and library services. 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.

Mitigation Measures

None Required.

Public Services Impact Conclusions

No significant adverse impacts are identified or anticipated, and no mitigation measures are required.

16. 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?				X
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?				X

Environmental Setting

The proposed Project is located in a low density, residential community that borders undeveloped open space. The nearest recreational facility is a baseball diamond adjacent to the eastern side of the proposed alignment, immediately south of St. John Bosco Mission between Merris Street and Abbey Way (Google Earth, 2018). Two additional recreational facilities located further north of the project site include: (1) Arroyo Verde Elementary School approximately 800 feet north of Old Greenspot Road, which has publicly accessible recreation facilities (i.e., basketball courts, playgrounds, playfields); and (2) East Highlands Ranch Community approximately 1,200 feet north of Old Greenspot Road, which has privately owned facilities (i.e., tennis courts, pool, running track, baseball diamond) that are accessible to members of the Homeowners Association (City of Highland, 2006).

Impact Analysis

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. The proposed Project would not influence the use of existing recreational facilities. All construction and maintenance activities would be carried out by District personnel or District contractors. The proposed Project would have a short-term (i.e. 6-month) construction period and minimal (i.e., bi-annual) maintenance work, and therefore would not require an additional workforce to relocate to the project area. The proposed Project would not cause an increase in the local population, and subsequently would not contribute to increased use of community recreational facilities. There would be no physical deterioration of recreational facilities due to the proposed Project. No impact would occur.

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. Activities under the proposed Project would be limited to the construction of flood control improvements within Elder Creek Channel, annual maintenance activities within the channel's concrete sections, bi-annual maintenance activities within the channel's earthen sections, and a one-time maintenance of the Church Street Channel. None of the proposed activities would involve the construction or expansion of recreational facilities. Therefore, no adverse physical effect on the environment would occur.

Mitigation Measures

None Required.

Recreation Impact Conclusions

No potentially significant impacts to recreation are anticipated, and no mitigation measures are required.

17. TRANSPORTATION

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
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?		X		
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?			X	
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?				X
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?			X	
e) Result in inadequate emergency access?		X		
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?		X		

Environmental Setting

Regional and local access to the project site is provided by SR-210, Interstate 10 (I-10), and Greenspot Road. The roadway network within the study area is within the jurisdiction of two public agencies: The County of San Bernardino and the State of California Department of Transportation (Caltrans). These agencies are responsible for the operation and maintenance of the study area roadways. The State highways, which include SR-210 and I-10, are in Caltrans' jurisdiction. The other roadways are in the jurisdiction of San Bernardino County. Average daily traffic (ADT) volumes are unavailable for local roadways providing access or affected by the proposed Project. The most recently published ADT volumes for I-10 near the junction with SR-210 is 189,000 vehicles, with ADT volumes for SR-210 south of Baseline Road (just north of Greenspot Road) of 74,000 vehicles (Caltrans, 2019).

The roadways in unincorporated San Bernardino County must also be consistent with the Circulation and Infrastructure Element of the County of San Bernardino General Plan, which presents goals and objectives for the County's transportation system and establishes a hierarchy of roadway classifications with specific functions and geometric standards for each category. The General Plan addresses vehicular travel as well as alternative modes of transportation such as public transit, bicycles, and pedestrians.

Impact Analysis

- 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?*

Less Than Significant with Mitigation Incorporated. SR-210 and I-10 would provide regional access for construction vehicles, with SR-210 and Greenspot Road providing local access to the project site. SR-210 travels in north-south alignment from its junction with I-10 (west of the project area) where it then travels east-west paralleling I-10 to the north. As shown on Figure 1, project-related construction traffic would access the work areas from the connection between Greenspot Road/Old Greenspot Road at Church Street. Construction of the proposed Project will take approximately 8.5 months, with workers traveling to/from the site as well as deliveries of equipment and materials generating temporary vehicle trips to the area. The estimated maximum addition of 47 daily trips during construction (average of 23 daily trips during construction) would temporarily increase traffic volumes on local roadways and may slightly reduce their performance. However, this impact would be temporary. Construction activities would require periodic and temporary closures of travel lanes on Ypsilantha Street, Old Greenspot Road, Merris Street, and Abbey Way. Construction related trips and temporary lane closures could temporarily decrease the existing level of service (LOS) on all affected roadway segments. Mitigation Measure TR-1 (Construction Area Management Plan) is proposed to reduce this potential impact to a less-than-significant level.

Operation and maintenance of the proposed Project is expected to generate minimal daily traffic volumes and would rarely 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.

- 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?*

Less Than Significant. According to the “San Bernardino County Congestion Management Program” (SANBAG, 2016), the Congestion Management Plan (CMP) roadways in the project area are the State highways, which are SR 210 and I-10. The CMP indicates that a traffic study would be required if the project is expected to generate at least 250 peak hour trips or if the project would add at least 50 daily trips to a State highway. The proposed Project would generate an estimated maximum of 47 vehicle trips daily (worst-case scenario), which is well below the CMP threshold of 250 trips. Additionally, the maximum 47 daily trips would use various travel routes to access the project site, with the proposed Project adding fewer than 50 trips to any particular State highway segment. A CMP traffic analysis, therefore, is not required. Furthermore, the maximum addition of 47 vehicle trips per day to the CMP system would account for a temporary 0.06 percent increase in ADT volumes on SR-210 and a temporary 0.02 percent increase in ADT volumes on I-10. These temporary increases are considered negligible. Therefore, the proposed Project would not conflict with an applicable congestion management program or level of service standard established by the congestion management agency and impacts would be less than significant.

Operation and maintenance of the proposed Project is expected to generate minimal daily traffic volumes and would rarely require any temporary disruptions to travel lanes. Due to the limited nature of operational and maintenance activities, no impacts to CMP roadways is anticipated to occur.

- 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?*

No Impact. The nearest airport to the project site is San Bernardino International Airport, with the closest runway located 2.7 miles to the west/southwest of the project site. The proposed Project would only require a small temporary workforce during construction and maintenance, which would not be subject to any safety hazards from operation of this airport. As a below-grade flood channel, proposed Project features would not result in an aviation safety hazard area.

- d) *Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?*

Less Than Significant. The proposed Project would deepen and slightly widen the existing Elder Creek Channel to improve flood control in the Project area. There are no new or different design features from the existing channel design that would substantially increase hazards or create an incompatible use. Operation and maintenance activities would occur in the same general area as current operations, and therefore would not increase hazards. Impacts would be less than significant. See part “e” for a discussion of impacts related to roadway hazards/emergency access.

- e) *Result in inadequate emergency access?*

Less Than Significant with Mitigation Incorporated. The proposed Project could potentially result in a significant impact relative to emergency access because the presence of large trucks along local roadways and periodic and temporary closures of travel lanes on Ypsilantha Street, Old Greenspot Road, Merris Street, and Abbey Way could increase the response times for emergency vehicles (police, fire, and ambulance/paramedic units) and/or block or disrupt access to adjacent properties. These impacts would be less than significant with implementation of Mitigation Measures TR-1 (Construction Area Management Plan), TR-2 (Notification to Property Owners and Tenants), and TR-3 (Coordinate with Emergency Service Providers). With the implementation of these mitigation measures, the proposed Project’s impacts on emergency access would be less than significant.

Operation and maintenance of the proposed Project is expected to generate minimal daily traffic volumes and would rarely require any temporary disruptions to travel lanes. Due to the limited nature of operational and maintenance activities, no impacts to emergency access is anticipated to occur.

- 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?*

Less Than Significant with Mitigation Incorporated. It is unlikely that the proposed Project would disrupt public transit service because the nearest public transit route to the site is Baseline Road, which would be unaffected during construction and operation with the exception of possible (but unlikely) temporary traffic volumes on this roadway (SBCPT, 2019). Roadway segments that would experience increased traffic and truck volumes during construction and would also be subjected to temporary lane closures do not include any public transit operations. The proposed Project could potentially block or disrupt the movement of pedestrians and bicycles due to periodic and temporary closures of travel lanes on Ypsilantha Street, Old Greenspot Road, Merris Street, and Abbey Way. These impacts would be less than significant with implementation of Mitigation Measures TR-1 (Construction Area Management Plan)

and TR-2 (Notification to Property Owners and Tenants). With the implementation of these measures, the proposed Project's impacts on alternative transportation would be less than significant.

Mitigation Measures

- TR-1 Construction Traffic Management Plan.** A construction traffic management plan shall be prepared by the District and/or its contractor, and include such measures as designated haul routes for trucks, designated site access locations, driveway turning restrictions, temporary lane/roadway closures and detour plans, temporary traffic controls and/or flaggers, and designated parking/staging locations for workers and equipment. This plan shall be subject to review, approval, and inspection by the County of San Bernardino Department of Public Works and the City of Highland.
- TR-2 Notification to Property Owners and Tenants.** The District and/or its contractor shall provide advance written notification to affected property owners and tenants along the haul routes to inform them about the scheduling and duration of construction trucking activities and coordinate any special access or circulation concerns.
- TR-3 Coordinate with Emergency Service Providers.** The District and/or its contractor shall coordinate with emergency service providers (i.e., police, fire, and ambulance/paramedic agencies) serving the project area prior to construction to provide information regarding haul routes, construction schedules, lane closures, etc. and ensure essential emergency access routes through the work area are available throughout construction.

Transportation Impact Conclusions

No significant adverse impacts are identified or anticipated with implementation of Mitigation Measures TR-1 (Construction Area Management Plan), TR-2 (Notification to Property Owners and Tenants), and TR-3 (Coordinate with Emergency Service Providers).

18. TRIBAL CULTURAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a) Listed or eligible for listing in California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or				X
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.				X

Regulatory Setting

Assembly Bill 52. This bill changes sections of the Public Resources Code to add consideration of Native American culture within the CEQA. The goal of AB 52 is to promote the involvement of California Native American Tribes in the decision-making process when it comes to identifying and developing mitigation for impacts to resources of importance to their culture. To reach this goal, the bill establishes a formal role for tribes in the CEQA process. CEQA lead agencies are required to consult with tribes about potential Tribal Cultural Resources (TCR) in the study area, the potential significance of project impacts, the development of project alternatives, and the type of environmental document that should be prepared. AB 52 specifically states that a project that may cause a substantial adverse change in the significance of a TCR is a project that may have a significant effect on the environment (PRC Section 21084.2).

Tribal Cultural Resources (TCRs) can be sites, features, places, cultural landscapes, and sacred places or objects that have cultural value or significance to a Tribe. To qualify as a TCR, it must either be (1) listed on or eligible for listing on the CRHR or a local historic register or, (2) a resource that the lead agency, at its discretion and supported by substantial evidence, determines should be treated as a TCR (PRC Section 21074). TCRs can include “non-unique archaeological resources” (see “unique archaeological resource” below) that, rather than being important for “scientific” value as a resource, can also be significant because of the sacred and/or cultural tribal value of the resource. Tribal representatives are considered experts appropriate for providing substantial evidence regarding the locations, types, and significance of tribal cultural resources within their traditionally and cultural affiliated geographic area (PRC Section 21080.3.1(a)).

Public Resources Code (PRC), Section 5097.9 et seq. (1982) establishes that both public agencies and private entities using, occupying, or operating on state property under public permit, shall not interfere with the free expression or exercise of Native American religion and shall not cause severe or irreparable damage to Native American sacred sites. This section also creates the Native American Heritage Commission (NAHC), charged with identifying and cataloging places of special religious or social significance to Native Americans, identifying and cataloging known graves and cemeteries on private lands, and performing other duties regarding the preservation and accessibility of sacred sites and burials.

Notice of the proposed Project was sent to the County Department of Public Works list of AB 52 tribes on August 26, 2015 and included the Soboba Band of Luiseño Indians, San Manuel Band of Mission Indians, Morongo Band of Mission Indians, and the Gabrieliño Band of Mission Indians – Kizh Nation. The Soboba Band of Luiseño Indians replied on September 22, 2015. The County initiated consultation on October 13, 2015 and held a project meeting with Soboba representatives on October 22, 2015. Consultation was concluded at the meeting with no mitigation measures recommended.

Impact Analysis

- a) *Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?*

No Impact. No known TCRs have been recorded within the Project site or identified through the AB 52 consultation process. Therefore, no impacts to TCRs would result from construction of the proposed Project.

- b) *A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1?*

No Impact. As noted under criterion (a), no known TCRs have been recorded within the Project site or identified through the AB 52 consultation process. Therefore, no impacts to TCRs would result from construction of the proposed Project.

Mitigation Measures

No mitigation measures are recommended.

Tribal Cultural Resources Conclusions

No significant impacts to TCRs are identified.

19. UTILITIES AND SERVICE SYSTEMS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?			X	
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?			X	
c) 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?			X	
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?			X	
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?			X	

Environmental Setting

The project site is an existing flood control channel. Adjacent development is served by existing wastewater, potable water, electrical, natural gas, and telecommunication service providers. It is assumed that roadways crossing the affected portion of the existing Elder Creek system contain utility pipelines.

Impact Analysis

- a) *Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?*

Less Than Significant. Wastewater generation would be limited to construction workers and would be contained within portable toilet facilities or at approved public facilities, both of which would dispose of wastewater with the local treatment provider. Construction and some maintenance/repair activities would require the temporary use of water for dust suppression and possibly equipment wash down, soil compaction, and other miscellaneous uses (such as concrete or grout production). The District would utilize the closest neighborhood fire hydrant(s) for water to support construction activities. However, water used for these purposes would be temporary and not in quantities requiring the construction of new or expanded water supplies. The proposed Project itself would expand and improve storm water drainage. Finally, construction and maintenance of the proposed flood channel improvements would not directly require new or expanded electrical, natural gas, or telecommunication facilities. The proposed Project

would not induce population or other facilities that may place increased demands on these utility services. Less than significant impacts to such facilities would occur.

- b) *Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?*

Less Than Significant. As described above under criterion (a), construction and some maintenance/repair activities would require the temporary use of water for dust suppression and possibly equipment wash down, soil compaction, and other miscellaneous uses (such as concrete or grout production). However, water used for these purposes would be temporary and not in quantities that could impact water supplies, regardless of seasonal rainfall, snowmelt, and groundwater recharge. Additionally, due to the type and amount of water required, it is likely that non-potable (reclaimed) water would be utilized if available to serve project needs. The proposed Project would not induce population or other facilities that may place increased demands on water supplies. Less than significant impacts would occur.

- c) *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?*

Less Than Significant. As described above under criterion (a), wastewater generation would be limited to construction workers and would be either be contained within portable toilet facilities or at approved public facilities, both of which would dispose of wastewater with the local treatment provider. Due to the temporary and short-term nature of the proposed construction and maintenance activities, the volume of wastewater generated would not impact the capacity of wastewater treatment providers serving the project area.

- d) *Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?*

Less Than Significant. Construction and maintenance activities would generate waste in the form of vegetation, soil spoils, trash and refuse, and aggregate construction materials (cement, rebar, rock, etc.). Material that is not suitable for reuse will be disposed of at an approved off-site facility. The County of San Bernardino Solid Waste Management Division (SWMD) is responsible for the operation and management of the County's solid waste disposal system, which consists of five regional landfills and nine transfer stations. Vegetation and other simple wastes (trash, etc.) would likely be disposed of locally at waste disposal facilities accepting green waste. Other inert construction-type material wastes would likely be disposed of at the Mid-Valley Sanitary Landfill located at 2390 North Alder Avenue in Rialto, located approximately 8 miles west or other approved construction/demolition waste recycling/disposal facility. Most SWMD landfills are permitted to accept construction and demolition debris and are assumed to have sufficient combined throughput and capacity to accommodate waste generated by the proposed Project. Waste generated during construction and maintenance of the proposed Project would be limited and is not expected to be at a level that could impact daily throughput or overall capacity of any landfill or waste disposal facility.

- e) *Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?*

Less Than Significant. The proposed Project would generate solid waste during construction and routine maintenance, 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 project design. The proposed Project would reuse and recycle material to the extent feasible. Furthermore, some waste generated during construction and maintenance would be green waste (vegetation) and recycled (plastic and aluminum trash, other metals, etc.). Therefore, the proposed Project is consistent with AB 939 and the California Solid Waste Reuse and Recycling Access Act of 1991, resulting in less than significant impacts with respect to compliance with these applicable regulations.

Mitigation Measures

None Required.

Utilities and Service Systems Impact Conclusions

No significant adverse impacts are identified or anticipated, and no mitigation measures are required.

20. WILDFIRE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project?				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?		X		
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?			X	
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?				X
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?				X

Environmental Setting

The project area contains relatively flat terrain, with developed area to the north and open land to the west, south, and east. The proposed Project extends through a small residential community known as "The Village," located south of Old Greenspot Road. Online research indicates no known historic wildfires to have affected the immediate project area. The project site is not located in or near State responsibility areas or lands classified as very high fire hazard severity zones (CalFire, 2019).

Impact Analysis

a) *Substantially impair an adopted emergency response plan or emergency evacuation plan?*

Less Than Significant with Mitigation Incorporated. Roadways affected by the proposed Project are not known to be part of an adopted or designated emergency evacuation route or plan. However, the proposed Project could potentially result in a significant impact relative to emergency access and evacuation due to periodic and temporary closures of travel lanes on Ypsilantha Street, Old Greenspot Road, Merris Street, and Abbey Way. These impacts would be less than significant with implementation of Mitigation Measures TR-1 (Construction Area Management Plan), TR-2 (Notification to Property Owners and Tenants), and TR-3 (Coordinate with Emergency Service Providers). With implementation of these mitigation measures, the proposed Project's impacts on emergency access and evacuation would be less than significant.

Operation and maintenance of the proposed Project is expected to generate minimal daily traffic volumes and would rarely require any temporary disruptions to travel lanes. Due to the limited nature of operational and maintenance activities, no impacts to emergency access and evacuation is anticipated to occur.

- b) *Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?*

Less Than Significant. The project site is not located within or adjacent to forest areas nor does it have slopes or other landscape features that exacerbate fire risks or make the site or adjacent areas more susceptible to wildfire. Construction of the proposed Project would include the use of motorized vehicles and equipment adjacent to open lands. Because the proposed Project includes upgrades to an existing flood channel within a previously disturbed easement, sparks or heat from vehicle and equipment engines are not expected to create a significant potential for fire ignition that could spread outside the immediate work area. Additionally, the Project work and staging areas would be clear of flammable vegetation and all construction and maintenance work would be conducted in accordance with standard safety measures to reduce the potential for fire ignition. The proposed Project would not introduce new development or population and would not introduce a significant wildfire risk that could expose persons to pollutant concentrations from a wildfire.

- c) *Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?*

No Impact. The proposed Project would expand and improve an existing storm water drainage channel. Construction and maintenance of the proposed flood channel improvements would not directly require new or expanded infrastructure that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.

- d) *Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?*

No Impact. The project site is not located within or adjacent to forest areas nor does it have slopes or other landscape features that exacerbate fire risks or make the site or adjacent areas more susceptible to wildfire. The proposed Project would occur within an existing flood channel, with developed areas to the north and open lands to the west, south, and east. Once completed, the proposed Project would expand and improve an existing storm water drainage channel, thus improving storm water flows to decrease flooding of the adjacent area. This is considered a beneficial impact with respect to drainage changes to the area. Finally, the proposal Project would not introduce new development or population and would not expose people or structures to flooding or landslide risks due to post-fire instability.

Mitigation Measures

- MM TR-1 Construction Traffic Management Plan.** (see full text under Section 17, Transportation)
- MM TR-2 Notification to Property Owners and Tenants.** (see full text under Section 17, Transportation)
- MM TR-3 Coordinate with Emergency Service Providers.** (see full text under Section 17, Transportation)

Wildfire Impact Conclusions

No significant adverse impacts are identified or anticipated, and no mitigation measures are required.

21. MANDATORY FINDINGS 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 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 animal community, substantially 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?		X		
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)?		X		
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?		X		

a) Does the project have 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 animal community, substantially 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?

Less Than Significant with Mitigation Incorporated. As described in Section 4, Part 4 (Biological Resources), the proposed Project could result in impacts to habitats that support sensitive species, riparian habitats, and wetlands, and substantially interfere with the movement of native wildlife species. However, implementation of Mitigation Measures BIO-1 through BIO-12 would reduce these impacts to less-than-significant levels.

Section 4, Part 5 (Cultural Resources) shows the project will not have any direct or indirect impacts on known historical resources; however, the area was utilized by the Gabrieliño and Serrano for millennia such that the possibility of encountering buried cultural resources is high. Mitigation Measures CUL-1 and CUL-2 would reduce these impacts to a less-than-significant level.

Section 4, Part 7 (Geology and Soils) discussed paleontological resources, noting that due to the type of geologic soils in the Project area deeper excavations may encounter sediments old enough to produce resources. To reduce impacts to a less-than-significant level, Mitigation Measures PAL-1 through PAL-4 are recommended.

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)?

Less Than Significant with Mitigation Incorporated. CEQA defines a cumulative impact as an effect that is created as a result of the combination of a 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 4, Part 1 (Aesthetics) through Part 20 (Wildfire), 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 biological resources, noise, transportation, and wildfire) could combine with similar effects of other projects being built in the area. However, impacts would be less than significant with implementation of all proposed mitigation measures (see Part 5, Summary of Mitigation Measures).

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

Less Than Significant with Mitigation Incorporated. The preceding sections of this IS/MND discuss various types of impacts that could have adverse effects on human beings, including:

- Hazardous conditions occurring in the event emergency access is blocked due to periodic lane closures during construction (see Section 4, Part 9, Hazards and Hazardous Materials);
- Water quality standards, waste discharge requirements, and erosion control (see Section 4, Part 10, Hydrology and Water Quality);
- Noise and vibration generated by construction and operation (see Section 4, Part 13, Noise);
- Construction-related traffic and emergency access (see Section 4, Part 17, Transportation); and
- Wildfire response due to impaired emergency access (see Section 4, Part 20, Wildfire).

These are temporary impacts associated with the proposed Project's construction activities. Each type of impact with the potential to cause substantial adverse effects on human beings has been evaluated, and this IS/MND concludes that with implementation of mitigation measures (MM HYD-1, NOISE-1 through NOISE-8, and TR-1 through TR-3), these impacts are less than significant.

SECTION 5 – SUMMARY OF MITIGATION MEASURES

The following mitigation measures were identified to reduce impacts to less than significant:

BIOLOGICAL RESOURCES

- BIO-1 Consult and Obtain Permits for San Bernardino Kangaroo Rat.** The County of San Bernardino, Department of Public Works (County) or lead agency shall consult with the US Fish and Wildlife Service (USFWS) to obtain take for San Bernardino kangaroo rat that have a potential to be present during the Project. The County or lead agency shall also obtain an Incidental Take Permit from California Department of Fish and Wildlife (CDFW) for impacts to San Bernardino kangaroo rat.
- BIO-2 Small Mammal Exclusion Plan.** The County of San Bernardino, Department of Public Works shall prepare and implement a small mammal exclusion plan. The plan will include the following details (1) type of physical barrier that will be installed around the perimeter of the project site to exclude small mammals, (2) small mammal trapping by a permitted San Bernardino kangaroo rat biologist during appropriate weather conditions to capture the target species, (3) relocation of small mammals to adjacent intact suitable habitat, and (4) periodic monitoring of the physical barrier to ensure that small mammal re-entry to the project site is not possible.
- BIO-3 Assign Project Biologist.** The County of San Bernardino, Department of Public Works (County) shall assign a qualified biologist to conduct pre-construction surveys (MM BIO-4), implement nesting bird avoidance (MM BIO-5), conduct burrowing owl surveys (MM BIO-6), ensure that work is limited to the approved disturbance area (MM BIO-7), monitor initial ground disturbance and vegetation clearing (MM BIO-8), and conduct worker trainings (MM BIO-9). A "qualified biologist" is defined as a person with appropriate education, training, and experience to conduct the required surveys, monitor Project activities, provide worker education programs, and supervise or perform other monitoring-related actions. The Project Biologist shall be authorized by the County to temporarily halt Project activities if needed to prevent take of listed species or harm to any other special-status species.
- BIO-4 Pre-construction Clearance Survey.** Prior to the start of any ground disturbance or vegetation clearing, the Project Biologist shall survey the work area to determine if Santa Ana River woollystar are present. During the survey the Project Biologist should also search for small mammal burrows, nesting birds, or any other special-status species within the work area. Any special-status species or sensitive resources shall be flagged and avoided, as feasible.
- BIO-5 Nesting Bird Avoidance Measures.** Vegetation removal and initial ground disturbance shall be completed outside the breeding season (i.e., no removal of potential nesting habitat from February 15 through August 15), or after a pre-construction nesting bird survey has been completed. The qualified biologist shall confirm that no birds are nesting in or adjacent to areas to be disturbed. If native birds are nesting on the site, then construction will be postponed until nesting is completed or the Project Biologist shall designate appropriate avoidance buffers around nests to protect nesting birds. No Project related disturbance will be allowed within these buffers.

- BIO-6 Burrowing Owl Avoidance Measures.** The Project Biologist shall survey the project site in advance of vegetation and soil clearing to determine burrowing owl presence or absence. If burrowing owls are present on the site outside of the nesting season (September 1 to January 31), then the California Department of Fish and Wildlife (CDFW) shall be consulted and the Project Biologist may be authorized to exclude them from the site using passive exclusion methods described in the most recent CDFW staff report on burrowing owl mitigation (CDFG, 2012). If burrowing owls are present on the site during nesting season (February 1 through August 31), then construction shall either be postponed until nesting is completed, or no disturbance will be allowed within an appropriate buffer area to be established by the Project Biologist in accordance with the CDFW staff report on burrowing owl mitigation (CDFG, 2012).
- BIO-7 Limit Disturbance Area.** Prior to the initiation of any ground-disturbing activity, the Project Biologist shall work with County of San Bernardino, Department of Public Works staff and contractors to clearly demarcate the approved work area with fencing, flagging, lathe and rope, or other devices. The demarcated area shall be limited to the mapped project disturbance area shown in Figure 1 of the Initial Study/Mitigated Negative Declaration. No construction-related activity shall be permitted outside the marked area.
- BIO-8 Biological Monitoring.** The Project Biologist or another qualified biological resources monitor shall be present on the work site during all initial ground disturbance or vegetation clearing to document compliance with the avoidance and minimization measures and any additional mitigation, and to provide guidance in avoiding or minimizing impacts to biological resources. Once initial ground disturbance and clearing is completed the biological monitor shall return on at least a weekly basis to ensure special-status species are being avoided and to inspect all the special-status species and evaluate the buffer distance.
- BIO-9 Worker Training.** The assigned Project Biologist will conduct training to ensure that all workers on the Project site (including contractors) are aware of all applicable Conservation Measures for biological resources. Specifically, workers will be required to (1) limit all activities to approved work areas; (2) report any Santa Ana River woollystar, small mammals, burrowing owl, or other special-status species, or bird nest observation in the work areas and access routes to the supervisor or Project Biologist; (3) avoid contact with any wildlife that may approach a work area and be aware of potential venomous reptile bites from carelessness or unnecessary harassment; (4) pick up and properly dispose of any food, trash or construction refuse; and (5) report any spilled materials (oil, fuel, solvent, engine coolant, raw concrete, or other material potentially hazardous to wildlife), to the supervisor or on-site Project Biologist. During the training, the instructor will briefly discuss special-status species that may occur in the work areas, their habitats, and requirements to avoid or minimize impacts. In addition, all workers will be informed of civil and criminal penalties for violations of the federal Endangered Species Act, California Endangered Species Act, and the Migratory Bird Treaty Act.
- BIO-10 Limit Work Hours.** No work will be allowed to take place at night near biologically sensitive habitat areas.
- BIO-11 Wetland and Streambed Creation.** The County of San Bernardino, Department of Public Works will develop and implement a Habitat Restoration Plan to create wetland, riparian, and upland vegetation within the project site. The plan will provide details on the timing of the restoration, maintenance and monitoring plan, plant palette, and other details. The wetlands will be designed and constructed to maintain hydrology, hydric soils, and hydrophytic vegetation.

- BIO-12 Obtain Required Permits.** The County of San Bernardino, Department of Public Works will obtain all required permits from the US Army Corps of Engineers, Regional Water Quality Control Board, and California Department of Fish and Wildlife for impacts to jurisdictional waters of the state and non-wetland waters of the U.S.

CULTURAL RESOURCES

- CUL-1 Cultural Monitoring.** All initial grading and all excavation activities shall be monitored by a Project archaeologist retained by the District or its contractor. The Project archaeologist shall be present full-time during the excavation of native soils (undisturbed non-fill alluvial deposits) that have the potential to contain cultural deposits. The monitor shall document all monitoring activity. The Project archaeologist shall be qualified for historic resource evaluation, as defined in CEQA and by Office of Historic Preservation (OHP). The qualified archaeologist shall be listed, or be eligible for listing, in the Register of Professional Archaeologist (RPA).

In the event of a discovery, or when requested by the Project archaeologist, the construction contractor shall divert, direct, or temporarily halt ground disturbing activities in the area of the discovery in order to evaluate potentially significant archaeological resources.

It shall be the responsibility of the Project archaeologist to:

1. Determine the scope and significance of the find, and
2. Determine the appropriate documentation, preservation, conservation, and/or relocation of the find; and determine when grading/excavation activities may resume in the area of the find.

If the find is determined to be a “unique archaeological resource”, then the District or its contractor, in conjunction with the recommendation of the Project archaeologist, shall comply with California Public Resources Code Section 21083.2, subdivisions (b) through (f). If at any time the Project area, or a portion of the Project area, is determined to be a historical resource as defined in California Code of Regulations Chapter 3, Article 1, Section 15064.5, subdivision (a), the Project archaeologist shall prepare and issue a mitigation plan in conformance with Section 15126.4, subdivision (b). If the Project archaeologist determines that continuation of the Project or Project-related activities will result in an adverse impact on a discovered historical resource which cannot be mitigated, all further activities resulting in the impact shall immediately cease, and the District’s Project Manager shall be contacted for further evaluation and direction. The District or its contractor shall comply with the recommendations of the Project archaeologist with respect to the documentation, preservation, conservation, and/or relocation of finds.

Monitoring activities may cease when initial grading and all excavation activities have concluded; or by written consent of the Project archaeologist agreeing that no further monitoring is necessary. At the conclusion of monitoring activities, and only if archaeological materials were encountered, the Project archaeologist shall prepare and submit a report of the findings to the District and the South-Central Coastal Information Center.

- CUL-2 Treatment of Human Remains.** If human remains are encountered during excavation activities, all work shall halt in the vicinity of the remains and the County Coroner shall be notified (California Public Resources Code, Section 5097.98). The Coroner will determine whether the remains are of forensic interest. If the Coroner, with the aid of a qualified Archaeologist, determines that the remains are prehistoric, s/he will contact the Native

American Heritage Commission (NAHC). The NAHC will be responsible for designating the most likely descendant (MLD), who will be responsible for the ultimate disposition of the remains, as required by Section 7050.5 of the California Health and Safety Code. The MLD shall make his/her recommendation within 48 hours of being granted access to the site. If feasible, the MLD's recommendation shall be followed and may include scientific removal and non-destructive analysis of the human remains and any items associated with Native American burials (California Health and Safety Code, Section 7050.5). If the landowner rejects the MLD's recommendations, the landowner shall rebury the remains with appropriate dignity on the property in a location that will not be subject to further subsurface disturbance (California Public Resources Code, Section 5097.98).

PALEONTOLOGICAL RESOURCES

PAL-1 Retention of a Qualified Paleontologist and the Preparation of a Paleontological Resources Mitigation and Monitoring Plan (PRMMP). A Qualified Paleontologist shall be retained before the initiation of construction activities to develop a PRMMP for the project. The function of the PRMMP will be to explain Project geology, paleontological sensitivity, and procedures that will comply with State statutes and County of San Bernardino's requirements so that potential impacts to significant paleontological resources are minimized or eliminated. The Qualified Paleontologist will draw on geotechnical reports, grading and excavation plans, and the construction schedule in order to formulate the proper monitoring methods, places, and times. The Qualified Paleontologist shall participate in a preconstruction meeting with the San Bernardino County Flood Control District's staff and project contractors so that an understanding of construction mitigation measures is ensured and so that clear communication procedures are formulated. Full-time paleontological monitoring is recommended when Project earth-moving activities reach a depth of nine (9) feet below original ground level. This minimum depth will be stipulated in the PRMMP.

The County of San Bernardino defines a qualified paleontologist as:

- Education: An advanced degree (Masters or higher) in geology, paleontology, biology or related disciplines (exclusive of archaeology).
- Professional Experience: At least five years professional experience with paleontological (not including cultural) resources, including the collection, identification and curation of the resources.

PAL-2 Worker Environmental Appreciation Training. Prior to commencement of or participation in Project earth-moving activities, all construction personnel shall participate in training that shall provide examples of possible paleontological resources that could be encountered on the project. Construction personnel shall be trained on the procedures that shall be followed if a potential paleontological resource is encountered. The training shall include an explanation of applicable federal, State, and local laws. The training shall include instruction on the procedure to follow if construction personnel encounter a possible paleontological resource when a monitor is not present. The training shall emphasize the responsibility to notifying the construction supervisor when possible fossils are encountered when a monitor is not present. Construction work shall immediately cease within a 20-foot radius of the discovery. The paleontological monitor or the Qualified Paleontologist shall be summoned so that the find can be assessed, and appropriate steps taken if it proves to be significant.

PAL-3 Paleontological Monitoring in Excavations Below Nine Feet. Earth-moving activities shall be monitored by the paleontological monitor or the Qualified Paleontologist any time excavations reach a level of nine (9) feet or greater below original ground surface. The

paleontological monitor and the Qualified Paleontologist shall have proper tools and supplies to quickly salvage fossils when they are encountered and to minimize construction delays. If excavations below nine (9) feet encounter sediments that are appropriate for preserving fossils of small invertebrates and/or vertebrates, samples of the sediment shall be tested for the presence of significant paleontological resources. If the horizon is in danger of being back-filled or otherwise rendered inaccessible before the sediment sample is tested, approximately 3 cubic yards of the horizon in question shall be stockpiled onsite in a safe place so that it can further tested or processed later. In the event of a possible fossil discovery, the paleontological monitor and the Qualified Paleontologist shall have authority to temporarily halt or divert equipment to allow for inspection or salvage. If test samples indicate the presence of fossils in the sample, the stockpile shall be wet-screened in a location agreeable to the construction supervisor and the Qualified Paleontologist. The resulting concentrate shall be sorted with the aid of a binocular dissecting microscope. Pertinent data, including precise location and precise depth of a specimen shall be recorded in a field notebook. Site stratigraphy shall be recorded in photographs and sketches.

PAL-4 Fossil Preparation, Identification, Curation, and Reporting. Any identifiable and significant fossils recovered during monitoring and/or sediment sample processing shall be cleaned, stabilized, repaired, identified to the lowest taxonomic level possible, reported, and curated in a qualified repository. Each fossil shall be labeled with a locality number, the collector's name, date collected, taxon, and element. All appropriate fossil locality information shall be provided to the San Bernardino County Museum. All fossil specimens shall be curated at the San Bernardino County Museum if it is equipped to receive and curate specimens at that time. If not, the specimens shall be curated in a qualified paleontological repository as defined by the Society of Vertebrate Paleontology (2010).

If significant paleontological resources are recovered, the Qualified Paleontologist shall prepare a final summary report. It shall include discussion of the monitoring and recovery methods employed, stratigraphic context of any and all specimens recovered, significance of specimens recovered, and an itemized list of fossil(s) recovered. A copy of the report shall be provided to the San Bernardino County Flood Control District and a copy shall accompany the collection to its institution where it is curated.

HYDROLOGY AND WATER QUALITY

HYD-1 Stormwater Pollution Prevention Plan (SWPPP). Prior to construction, the District or its contractor shall prepare a Storm Water Pollution Prevention Plan (SWPPP) that includes all State Water Resources Control Board requirements as well as the following Best Management Practices (BMPs) to ensure that disturbed soils do not impact water quality downstream. The SWPPP shall include, but not be limited to, the following BMPs.

BMP 1 Avoid Channel Work during the Rainy Season to the Greatest Extent Practicable. To the greatest extent practicable, construction and routine maintenance activities in earthen channels and in channels with soft bottoms and bank protection shall be avoided during the rainy season. In the Santa Ana watershed (Valley Areas), the rainy season is typically from October through April. If work must occur within the channel, water diversion structures shall be in place to protect water quality downstream.

- BMP 2 Clear Water Diversion.** Should water be encountered during construction and maintenance, clear water diversion structures such as diversion ditches, berms, dikes, cofferdams, slope drains, rock, gravel bags, filter fabric or turbidity curtains, drainage and interceptor swales, pipes or flumes shall be employed as needed to protect water quality downstream.
- BMP 3 Avoid Spills and Leaks.** The District or its contractor shall ensure that equipment operating in and near the facility is in good working condition and free of leaks. No equipment maintenance and/or refueling shall occur within District facilities. Equipment used during construction and routine maintenance activities shall be parked outside of channels and/or washes on the road tops and/or adjacent roadway. All operations staff working with heavy equipment shall have been trained in the use of the equipment and in spill containment and response for any unforeseeable accidents that may occur. A spill kit shall always be kept on-site while construction or maintenance crews are working at the site. Special care shall be taken to prevent liquid paint from entering aquatic resources while painting associated with graffiti removal is conducted. Any spills that occur shall be reported to California State Warning Center (Cal OES) at (800) 852-7550. Additionally, a copy of the Cal OES California Hazardous Materials Spill/Release Notification Guidance shall be kept on-site while all maintenance activities take place. If necessary, operations staff shall follow up with the appropriate agencies as outlined in the Cal OES guidelines, which can be located on the Cal OES website at www.calema.ca.gov.
- BMP 4 Avoid Road Base Discharge.** The District or its contractor shall not discharge road base, fill, sediment, concrete, and/or asphalt beyond the previously established roadbed when maintaining existing driveways and dirt access roads within the construction and maintenance activity area.
- BMP 5 Concrete Washout Protocols.** The District or its contractor shall implement the appropriate waste management practices during on-site construction operations. Waste management practices shall be applied to the stockpiling of concrete, curing, and finishing of concrete as well as concrete washout operations. Waste management practices shall be adequate to ensure that all fluids associated with the curing, finishing, and washout of concrete shall not be discharged into any area with the potential to enter an aquatic resource. Further, all concrete waste shall be stockpiled separately from sediment and protected with erosion control measures to ensure that concrete dust and/or debris is not discharged into an aquatic resource. The District or its contractor shall determine the appropriate waste management practices based on considerations of flow velocities, site conditions, availability of stockpile locations, availability of erosion control materials, construction costs, and other requirements that may be outlined within the District's MS4 permits.
- BMP 6 Location of Temporary Stockpiles and Staging Areas.** Stockpile locations and staging areas shall be located within the disturbed/graded areas outside of the facility bottom and at the tops of the levees/banks to the greatest feasible extent. Silt fences, berms, or other methods of erosion control may be used if stockpiles are to remain in designated areas for longer than 10 days. Additionally, heavy equipment may be staged on the access roads within the maintenance activity area,

but shall be confined to those locations where potential pollutants cannot enter an aquatic resource.

BMP 7 Location of Permanent Stockpiles. Any permanent or long-term stockpiles onsite shall be located outside of areas identified as Waters of the State and Waters of the U.S. Any material not placed onsite shall be removed by the District or its contractor and placed at the nearest Operations yard.

BMP 8 Application of Pesticides, Herbicides, and Fertilizers. The District Aquatic Pesticides permit outlines a schedule of monitoring requirements, BMPs, and conditions designed to promote the reduction of pollutants in stormwater discharges. The permit (Order Number 2013-0002-DWQ) requires the District to manage pesticides and herbicide applications under specific criteria.

General Requirements. Apply pesticides and herbicides in accordance with California Department of Pesticide Regulation requirements: (1) Read and follow manufacturers' label requirements before each application; (2) Check sprinkler system for overflows into the streets and storm drain; (3) As much as possible, utilize safer alternatives such as insecticidal soaps and horticultural oils.

Herbicide Applicator Training Requirement. The San Bernardino County Department of Agriculture/Weights and Measures (Ag) is contracted by the District to spray various flood control facilities throughout the County for vegetation control. Many times, the Ag spray rigs are not able to spray close to fence lines and in tight areas. Spotty re-growth also occurs and is required to be re-sprayed.

The District consulted with Ag to develop a plan for weed abatement that is an extension of Ag's current weed abatement program; using the same herbicide (Monsanto Roundup Pro Concentrate or similar glyphosate product). The application process has been approved by Ag and is determined not to require a California State Qualified Applicator License (QAL) or Certificate (CAC) per 3CCR section 6504. The District application of herbicide shall be under the constant monitoring of Ag, who will be dispensing the herbicide and conducting random monitoring inspections in the field. District staff shall complete daily records of herbicide use by amount and location. These logs shall be turned in to Ag monthly, to ensure no overuse of herbicides occurs.

At least annually, Ag shall provide training to District staff consisting of:

1. Classroom instruction on the laws and regulations governing the application of herbicides in the State of California.
2. Review of the functions of the Department of Agriculture/Weights and Measures Pest Management Division Written Employee Training Program for Pesticide Applicators, Herbicide Applications; including:
 - a. Safety Procedures;
 - b. MSDS for Monsanto Roundup Pro Concentrate (or similar glyphosate product), signs, symptoms & effects of exposure;
 - c. Pesticide Safety Series N1, N2, N4, N5, N7, N8;
 - d. Review of the Dept of Ag Pesticide Monitoring Inspection form;
 - e. Instruction on completing and submission of the required daily use log;

- f. Practical demonstration of identification and proper use of items required for safe transport, mixing, pouring, application, clean up, storage, disposal of wastes, and emergency procedures associated with the Roundup Pro Concentrate (or similar glyphosate product) herbicide application procedure;
 - g. The required personal protective equipment and hygiene practices.
- 3. Employee will perform a proficiency demonstration of knowledge of the above training items.
- 4. Employee will successfully complete a verbal/written post test on the above training. Herbicides shall be applied by the District on a limited basis. Licensing standards and procedures are established by DPR and are described in: 1998 California Code of Regulations, Title 3 (Food and Agriculture); and 1997 California Food and Agriculture Code (Divisions 6, 7, and 13).

BMP 9 Invasive Plant Removal Protocols. Invasive plant species shall be removed in a manner that prevents propagation of those species in the same location and/or in other locations throughout the facility and/or County. Where maintenance activities are required, Operations staff shall spray and/or mow invasive plant species before seeds ripen. All cut/removed invasive vegetation shall be taken to an approved refuse facility as a load designated for destruction. Operations staff shall prevent cut stems and/or seed material from being transported downstream and/or being left behind to allow the seed to propagate. In the case of giant reed (*Arundo donax*) removal, the District shall minimize ground disturbance and use foliar glyphosate treatment on smaller infestations. Stems shall be removed only when the plants are determined to be dead and unable to re-sprout and/or propagate.

BMP 10 Remove Debris. Remove litter and debris from facility as necessary.

BMP 11 Wind Erosion. Prevent dust and wind erosion by applying water or other dust palliatives as necessary to reduce or alleviate dust nuisance generated by construction activities.

NOISE

NOISE-1 Proper Mufflers. During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise-sensitive receivers nearest the Project site.

NOISE-2 Siting Staging Areas. The District or its construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site during all Project construction (i.e., south of Abbey Way).

NOISE-3 Delivery Routes. The District or its contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

NOISE-4 Notification of Construction. Residences and other noise-sensitive land uses within 100 feet of Project construction shall be notified of the construction in writing. The notification shall describe the activities anticipated, provide dates and hours of activity, and provide contact information with a description of a noise and/or vibration complaint and response procedure. The notification shall also advise residents to remain indoors with windows closed when construction activity is occurring outside of their homes to avoid elevated exterior noise and/or vibration levels.

NOISE-5 Noise Barriers or Relocation. The following measures shall be implemented to reduce impacts at sensitive receiver locations (if occupied):

- Install the following temporary construction noise barriers at the minimum heights specified for each receiver location when Project construction activities are within 25 feet of occupied noise-sensitive residential homes:
 - Minimum 10-foot high temporary noise barriers for occupied residential homes represented by receiver locations R1, and R3 to R9. The County may elect to provide additional noise barrier coverage;
 - The temporary noise control barriers shall be located at the edge of Project construction activities and must have a solid face from top to bottom. The noise control barrier must meet the minimum height and be constructed as follows:
 - The temporary noise barrier shall provide a minimum transmission loss of 20 dBA (Federal Highway Administration, Noise Barrier Design Handbook). The noise barrier shall be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts. Example photos are provided in Appendix 7.3;
 - The noise barrier must be maintained, and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired;
 - The noise control barrier and associated elements shall be completely removed, and the site appropriately restored upon the conclusion of the construction activity.
- Relocation and/or Hours Restrictions
 - If the above is not feasible then relocation of residents, and/or hours restrictions to day(s)/time(s) when the impacted receiver(s) are unoccupied, shall be provided for the duration of activities within 25 feet of the affected receiver location(s).

NOISE-6 Use of Non-Impact Pile Driving Equipment. The use of impact pile driving equipment shall be prohibited. Instead, alternative pile driving methods and equipment (e.g., drilling or non-impact alternative) shall be used.

NOISE-7 Protection of Sensitive Structures and Receptors

- Pre- and post-construction surveys of the nearby residential structure(s), documenting the condition of the interior and exterior of the structures, shall be provided for residential structures represented by receiver locations R1, and R3 to R8, adjacent to the channel between Old Greenspot Road and Merris Street (refer to Appendix D, Exhibit 7-A).
- Ground-borne vibration monitoring of nearby residential structures, represented by receiver locations R1, and R3 to R8 adjacent to the channel between Old Greenspot Road and Merris Street, shall be required for the duration of Project construction between Old Greenspot Road and Merris Street. The monitoring shall be based on the Caltrans residential building damage threshold of 0.3 in/sec PPV and 0.2 in/sec PPV County

threshold for human annoyance. Though Caltrans identifies a residential building damage threshold of 0.3 in/sec PPV, the County of San Bernardino may require that vibration levels do not exceed a more conservative threshold (e.g., lower) at their discretion.

NOISE-8 Limit Vibration Annoyance. If monitored vibration levels exceed the County of San Bernardino 0.2 in/sec PPV annoyance threshold, then relocation of residents, and/or hours restrictions to day(s)/time(s) when the impacted receiver(s) are unoccupied, shall be provided for the duration of activities within 25 feet of the affected receiver location(s). The District may elect to implement this mitigation measure in advance of NOISE-7.

HAZARDS, TRANSPORTATION, AND WILDFIRE

- TR-1 Construction Traffic Management Plan.** A construction traffic management plan shall be prepared by the District and/or its contractor that includes but is not limited to such measures as designated haul routes for trucks, travel time restrictions for trucks to avoid peak periods on selected roadways, designated site access locations, driveway turning restrictions, temporary lane/roadway closures and detour plans, temporary traffic controls and/or flaggers, and designated parking/staging locations for workers and equipment. This plan shall be subject to review, approval, and inspection by the County of San Bernardino Department of Public Works.
- TR-2 Notification to Property Owners and Tenants.** The District and/or its contractor shall provide advance written notification to affected property owners and tenants along the haul routes to inform them about the scheduling and duration of construction trucking activities and coordinate any special access or circulation concerns.
- TR-3 Coordinate with Emergency Service Providers.** The District and/or its contractor shall coordinate with emergency service providers (i.e., police, fire, and ambulance/paramedic agencies) serving the project area prior to construction to provide information regarding haul routes, construction schedules, lane closures, etc. and ensure essential emergency access routes through the work area are available throughout construction.

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None

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None

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None

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None

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Appendix A

Air Quality Calculations

Elder Creek Channel Improvement Project

Project and Emissions Estimate Assumptions

General Assumption

- 1) Work occurs during daytime hours, up to 8 hours of active operation per day.

Onroad Equipment Emission Calculations Assumptions

- 1) CARB EMFAC2014 model emission factors for South Coast Air Basin in 2019 are used to estimate on-road emissions. Passenger vehicle emissions are an all fuels composite of LDA, LDT1, LDT2, LHDT1, LHDT2, and MCY vehicles, all delivery and heavy duty trucks are assumed to be diesel-fueled (MHDT and HDDT, respectively). Emissions factors (lb/mile) for each of the three vehicle types based on the total emissions divided by the total miles traveled.
- 2) Trip estimates for heavy trucks based on materials quantity estimates provided by the County. Additional trips are assumed for inspectors/management staff and sanitary and fuel delivery. Worker trips conservatively estimated as average during each main task.
- 3) Trip distance assumptions based on County estimate of 20 mile maximum round trip distance for trucks. Employee commutes are based on SCAG regional averages (rounded to 30 mile round trip).
- 4) Unpaved travel would be limited for this project, with the assumption that bulk material import/export trips require 1/4 mile travel average per trip in unpaved areas. Worker and "delivery" trucks are not assumed to travel on unpaved surfaces.

Offroad Equipment Emission Calculation Assumptions

- 1) Offroad equipment emissions estimates completed using CARB OFFROAD model fleet average emissions factors.
- 2) Offroad equipment use estimates were provided by the County.

Fugitive Dust Emission Calculations Assumptions

- 1) Grading fugitive dust emissions are calculated using USEPA AP-42 section 11.9. Soil handling emission factors for truck loading/unloading and other bulk material drops are calculated using the recent version of USEPA AP-42 Section 13.2.4.
- 2) Paved road emission factors are calculated using the most current version of USEPA AP-42 Section 13.2.1 and use the following assumptions:
 - A) Silt loading is 0.06 g/m² for 5,000<ADT<10,000 of Table 13.2.1-2; B) average vehicle weight is calculated on VMT average basis.
- 2) Unpaved road emission factors are calculated using the most current version of USEPA AP-42 Section 13.2.2 and use the following assumptions:
 - A) Silt loading is assumed to be 8.5 percent; B) average vehicle weight is calculated on VMT average basis.
- 3) Windblown emissions are not assumed to increase from baseline stockpile conditions.
- 4) Watering and vehicle speed reduction will be required for SCAQMD Rule 403 compliance, and emissions include implementation of these control measures.

(other notes and specific assumptions may be provided on the following calculation sheets)

Elder Creek Channel Improvement Project

Emissions Summary

Criteria Pollutant Emissions Summary

Maximum Daily Regional Emissions - Scenario 1 - Peak Traffic Emissions Period (Church Street Channel muck out and Rock Slope Protection)

Emissions Source	VOC (lb/day)	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Onroad	0.66	4.25	10.75	0.04	0.06	0.05
Offroad	1.10	11.82	10.26	0.02	0.54	0.50
Fugitive Dust	--	--	--	--	13.21	1.85
Total	1.76	16.06	21.01	0.06	13.81	2.40

(This is the regional maximum PM10/PM2.5 case, due to peak daily fugitive dust emissions)

Maximum Daily Regional Emissions - Scenario 2 - Sheet Piling Option w/Overlapping Tasks

Emissions Source	VOC (lb/day)	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Onroad	0.72	4.91	8.21	0.04	NA	NA
Offroad	2.58	21.42	24.68	0.04	NA	NA
Fugitive Dust	--	--	--	--	NA	NA
Total	3.30	26.33	32.89	0.08	NA	NA

(See Scenario 1 for peak PM10/PM2.5 regional daily emissions)

Maximum Daily Regional Emissions - Scenario 3 - Paving Period with Overlapping Task

Emissions Source	VOC (lb/day)	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Onroad	0.63	4.20	8.35	0.04	NA	NA
Offroad	1.67	16.17	16.64	0.02	NA	NA
Fugitive Dust	--	--	--	--	NA	NA
Total	2.29	20.37	24.99	0.06	NA	NA

(See Scenario 1 for peak PM10/PM2.5 regional daily emissions)

Maximum Daily On-site LST Emissions

Emissions Source	VOC (lb/day)	CO (lb/day)	NOX (lb/day)	SOX (lb/day)	PM10 (lb/day)	PM2.5 (lb/day)
Onroad	NA	NA	NA	NA	NA	NA
Offroad	NA	6.46	12.28	NA	0.52	0.47
Fugitive Dust	--	--	--	--	Neg.	Neg.
Total	NA	6.46	12.28	NA	0.52	0.47

Elder Creek Channel Improvement Project

Emissions Summary

GHG Emissions Summary

Base Case

Emissions Source	CO ₂ e MT
Onroad	229
Offroad	110
Indirect Water Use	7
Total	347

Sheet Pile Option

Emissions Source	CO ₂ e MT
Onroad	235
Offroad	157
Indirect Water Use	7
Total	399

Note CO₂ is nearly equivalent to CO₂e for on- and off-road engine emissions sources, a conservative five percent increase adjustment is made for the CH₄ and N₂O emissions.

Elder Creek Channel Improvement Project

On-Road Vehicle Emissions

Assumptions:

1. Vehicle emissions are based on fleet average for 2020.

Emissions Factors lbs/mile (EMFAC2014 2020 - Coast Air Basin)

Vehicle	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
Passenger	0.0004	0.0031	0.0003	0.0000	0.0000	0.0000	0.8413691
Delivery	0.0002	0.0008	0.0051	0.0000	0.0001	0.0001	2.54916171
HDDT	0.0003	0.0019	0.0106	3.55E-05	4.41E-05	4.22E-05	3.85559141

Total Vehicle Travel (Off-site) Emissions

		Emissions (lbs)						
Vehicle	Total VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
Passenger	124,020	50.79	386.68	39.18	1.05	0.77	0.71	104,347
Delivery	15,640	3.18	11.74	80.01	0.38	1.76	1.69	39,869
HDDT	70,200	23.60	130.15	746.40	2.49	3.09	2.96	270,663
Totals		77.57	528.56	865.59	3.92	5.63	5.36	414,878

Total Vehicle Travel (Off-site) Emissions - Sheet Pile Option

		Emissions (lbs)						
Vehicle	Total VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
Passenger	136,020	55.70	424.09	42.97	1.15	0.85	0.78	114,443
Delivery	15,640	3.18	11.74	80.01	0.38	1.76	1.69	39,869
HDDT	70,600	23.74	130.89	750.65	2.51	3.11	2.98	272,205
Totals		82.62	566.72	873.63	4.03	5.72	5.45	426,517

Total On-site Vehicle Working Emissions

		Emissions (lbs)						
Vehicle	Total VMT	VOC	CO	NOx	SOx	PM10	PM2.5	CO2
HDDT	17,200	5.78	31.89	182.88	0.61	0.76	0.73	66,316

Maximum Daily Emissions - Scenario 1 - Peak Traffic Emissions Period (Church Street Channel muck out and Rock Slope Protection)

		Emissions (lbs)					
Vehicle	Total VMT	VOC	CO	NOx	SOx	PM10	PM2.5
Passenger	780	0.32	2.43	0.25	0.01	0.00	0.00
Delivery	100	0.02	0.08	0.51	0.00	0.01	0.01
HDDT	940	0.32	1.74	9.99	0.03	0.04	0.04
Totals		0.66	4.25	10.75	0.04	0.06	0.05

Elder Creek Channel Improvement Project

On-Road Vehicle Emissions

Alternative Maximum Daily Emissions - Scenario 2 - Sheet Piling Option

		Emissions (lbs)					
Vehicle	Total VMT	VOC	CO	NOx	SOx	PM10	PM2.5
Passenger	1140	0.47	3.55	0.36	0.01	0.01	0.01
Delivery	80	0.02	0.06	0.41	0.00	0.01	0.01
HDDT	700	0.24	1.30	7.44	0.02	0.03	0.03
Totals		0.72	4.91	8.21	0.04	0.05	0.04

Alternative Maximum Daily Emissions - Scenario 3 - Paving Abbey and Merris

		Emissions (lbs)					
Vehicle	Total VMT	VOC	CO	NOx	SOx	PM10	PM2.5
Passenger	900	0.37	2.81	0.28	0.01	0.01	0.01
Delivery	80	0.02	0.06	0.41	0.00	0.01	0.01
HDDT	720	0.24	1.33	7.66	0.03	0.03	0.03
Totals		0.63	4.20	8.35	0.04	0.05	0.04

Elder Creek Channel Improvement Project

Offroad Equipment Tailpipe Emissions

Assumption:

1) All work tasks are done using single set of work crews and equipment except for Demo north of Meris which uses two crews working in different areas of the channel.

Equipment Emissions Factors (lbs/hour)

	HP	VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Loader	164	0.04935	0.43881	0.45834	0.00063	0.02523	0.02321	68.67
Excavator	162	0.03158	0.41866	0.31053	0.00066	0.01509	0.01389	71.60
Skip Loader	104	0.02679	0.30175	0.27214	0.00041	0.01703	0.01567	44.75
Generator	50	0.03027	0.31768	0.24091	0.00030	0.01065	0.00980	32.32
Breakdown Roller	100.6	0.03186	0.29497	0.32021	0.00041	0.02037	0.01874	44.46
Paving Machine	142	0.03662	0.39609	0.38895	0.00064	0.01918	0.01765	69.36
Steel Roller	100.6	0.03186	0.29497	0.32021	0.00041	0.02037	0.01874	44.46
Rubber Tire Roller	100.5	0.03182	0.29468	0.31989	0.00041	0.02035	0.01872	44.42
Grader	130	0.06522	0.42005	0.63662	0.00057	0.03554	0.03269	61.99
Backhoe/Loader	104	0.02679	0.30175	0.27214	0.00041	0.01703	0.01567	44.75

Alternative Maximum Onsite Emissions Equipment - Silent Sheet Piling (North of Merris RCB Demo)

Power Unit	316	0.09329	0.46961	0.67126	0.00189	0.02914	0.02681	204.29
Crane	300	0.07194	0.33770	0.86341	0.00093	0.03530	0.03248	101.19

Task Emissions

Remove Stockpile		Daily Emissions (lbs/day)							Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5	Days	VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Excavator	4	0.126	1.675	1.242	0.003	0.060	0.056	137	17.31	229.43	170.17	0.36	8.27	7.61	39,235
Loader	4	0.197	1.755	1.833	0.003	0.101	0.093	137	27.04	240.47	251.17	0.35	13.83	12.72	37,629

Channel North of Merris

Demo existing channel and RCB (2 crews)	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Excavator	16	0.505	6.699	4.968	0.011	0.241	0.222	40	20.21	267.94	198.74	0.42	9.66	8.89	45,822
Skip Loader	16	0.429	4.828	4.354	0.007	0.272	0.251	40	17.14	193.12	174.17	0.26	10.90	10.03	28,643

Grade subgrade	Daily Emissions (lbs/day)							Total Emissions (lbs)							
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5	Days	VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Loader	8	0.395	3.510	3.667	0.005	0.202	0.186	1	0.39	3.51	3.67	0.01	0.20	0.19	549

Place steel invert and forms	Daily Emissions (lbs/day)							Total Emissions (lbs)							
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5	Days	VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Skip Loader	8	0.214	2.414	2.177	0.003	0.136	0.125	5	1.07	12.07	10.89	0.02	0.68	0.63	1,790

Elder Creek Channel Improvement Project

Offroad Equipment Tailpipe Emissions

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place concrete invert	8	0.242	2.541	1.927	0.002	0.085	0.078	4	0.97	10.17	7.71	0.01	0.34	0.31	1,034

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place steel for channel walls and forms	8	0.214	2.414	2.177	0.003	0.136	0.125	10	2.14	24.14	21.77	0.03	1.36	1.25	3,580

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place concrete walls	8	0.242	2.541	1.927	0.002	0.085	0.078	8	1.94	20.33	15.42	0.02	0.68	0.63	2,069

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place 48" RCP and Headwall	8	0.214	2.414	2.177	0.003	0.136	0.125	1	0.21	2.41	2.18	0.00	0.14	0.13	358
Backhoe/Loader	8	0.242	2.541	1.927	0.002	0.085	0.078	1	0.24	2.54	1.93	0.00	0.09	0.08	259

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Backfill walls and grading	8	0.214	2.414	2.177	0.003	0.136	0.125	2	0.43	4.83	4.35	0.01	0.27	0.25	716

RCB at Merris

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Demo asphalt and RCB	8	0.253	3.349	2.484	0.005	0.121	0.111	3	0.76	10.05	7.45	0.02	0.36	0.33	1,718
Excavator	8	0.214	2.414	2.177	0.003	0.136	0.125	3	0.64	7.24	6.53	0.01	0.41	0.38	1,074

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Relocate utilities	4	0.107	1.207	1.089	0.002	0.068	0.063	3	0.32	3.62	3.27	0.00	0.20	0.19	537

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Grade subgrade	8	0.395	3.510	3.667	0.005	0.202	0.186	1	0.39	3.51	3.67	0.01	0.20	0.19	549

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place steel and forms for RCB invert	8	0.214	2.414	2.177	0.003	0.136	0.125	1	0.21	2.41	2.18	0.00	0.14	0.13	358

Elder Creek Channel Improvement Project

Offroad Equipment Tailpipe Emissions

	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place concrete for RCB invert	8	0.242	2.541	1.927	0.002	0.085	0.078	1	0.24	2.54	1.93	0.00	0.09	0.08	259

	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place steel and forms for walls and deck	8	0.214	2.414	2.177	0.003	0.136	0.125	2	0.43	4.83	4.35	0.01	0.27	0.25	716

	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place concrete for RCB walls and deck	8	0.242	2.541	1.927	0.002	0.085	0.078	1	0.24	2.54	1.93	0.00	0.09	0.08	259

	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
backfill RCB after 7 days	4	0.197	1.755	1.833	0.003	0.101	0.093	2	0.39	3.51	3.67	0.01	0.20	0.19	549
Loader	4	0.126	1.675	1.242	0.003	0.060	0.056	2	0.25	3.35	2.48	0.01	0.12	0.11	573

Concrete Channel btw Abbey and Merris

	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Grade subgrade	8	0.253	3.349	2.484	0.005	0.121	0.111	2	0.51	6.70	4.97	0.01	0.24	0.22	1,146
Excavator	8	0.395	3.510	3.667	0.005	0.202	0.186	2	0.79	7.02	7.33	0.01	0.40	0.37	1,099

	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place steel and forms for channel invert	8	0.214	2.414	2.177	0.003	0.136	0.125	2	0.43	4.83	4.35	0.01	0.27	0.25	716

	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place concrete invert	8	0.242	2.541	1.927	0.002	0.085	0.078	3	0.73	7.62	5.78	0.01	0.26	0.24	776

	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place steel in walls and forms	8	0.214	2.414	2.177	0.003	0.136	0.125	5	1.07	12.07	10.89	0.02	0.68	0.63	1,790

	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place concrete walls	8	0.242	2.541	1.927	0.002	0.085	0.078	4	0.97	10.17	7.71	0.01	0.34	0.31	1,034

Elder Creek Channel Improvement Project

Offroad Equipment Tailpipe Emissions

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Backfill Walls and grading															
Excavator with sheep foot	8	0.253	3.349	2.484	0.005	0.121	0.111	2	0.51	6.70	4.97	0.01	0.24	0.22	1,146
Loader	8	0.395	3.510	3.667	0.005	0.202	0.186	2	0.79	7.02	7.33	0.01	0.40	0.37	1,099

RCB at Abbey

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Demo asphalt and RCB															
Excavator	8	0.253	3.349	2.484	0.005	0.121	0.111	3	0.76	10.05	7.45	0.02	0.36	0.33	1,718
Skip Loader	8	0.214	2.414	2.177	0.003	0.136	0.125	3	0.64	7.24	6.53	0.01	0.41	0.38	1,074

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Relocate utilities															
Backhoe/Loader	4	0.107	1.207	1.089	0.002	0.068	0.063	3	0.32	3.62	3.27	0.00	0.20	0.19	537

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Grade subgrade															
Loader	8	0.395	3.510	3.667	0.005	0.202	0.186	1	0.39	3.51	3.67	0.01	0.20	0.19	549

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place steel and forms for RCB invert															
Skip Loader	8	0.214	2.414	2.177	0.003	0.136	0.125	1	0.21	2.41	2.18	0.00	0.14	0.13	358

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place concrete for RCB invert															
Generator	8	0.242	2.541	1.927	0.002	0.085	0.078	1	0.24	2.54	1.93	0.00	0.09	0.08	259

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place steel and forms for walls and deck															
Skip Loader	8	0.214	2.414	2.177	0.003	0.136	0.125	2	0.43	4.83	4.35	0.01	0.27	0.25	716

	Hours/Day	Daily Emissions (lbs/day)						Days	Total Emissions (lbs)						
		VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Place concrete for RCB walls and deck															
Generator	8	0.242	2.541	1.927	0.002	0.085	0.078	2	0.48	5.08	3.85	0.00	0.17	0.16	517

Elder Creek Channel Improvement Project

Offroad Equipment Tailpipe Emissions

Backfill RCB after 7 days	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Loader	8	0.395	3.510	3.667	0.005	0.202	0.186	2	0.79	7.02	7.33	0.01	0.40	0.37	1,099
Excavator with sheep foot	8	0.253	3.349	2.484	0.005	0.121	0.111	2	0.51	6.70	4.97	0.01	0.24	0.22	1,146

Paving Abbey and Merris	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Loader	8	0.395	3.510	3.667	0.005	0.202	0.186	1	0.39	3.51	3.67	0.01	0.20	0.19	549
Breakdown Roller	8	0.255	2.360	2.562	0.003	0.163	0.150	1	0.25	2.36	2.56	0.00	0.16	0.15	356
Paving machine	8	0.293	3.169	3.112	0.005	0.153	0.141	1	0.29	3.17	3.11	0.01	0.15	0.14	555
Steel roller	8	0.255	2.360	2.562	0.003	0.163	0.150	1	0.25	2.36	2.56	0.00	0.16	0.15	356
Rubber tire roller	8	0.255	2.357	2.559	0.003	0.163	0.150	1	0.25	2.36	2.56	0.00	0.16	0.15	355

Concrete Channel downstream of Abbey

Grading downstream of Abbey	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Excavator	8	0.253	3.349	2.484	0.005	0.121	0.111	5	1.26	16.75	12.42	0.03	0.60	0.56	2,864
Loader	8	0.395	3.510	3.667	0.005	0.202	0.186	5	1.97	17.55	18.33	0.03	1.01	0.93	2,747
Grader	8	0.522	3.360	5.093	0.005	0.284	0.262	5	2.61	16.80	25.46	0.02	1.42	1.31	2,480

Place steel and forms for invert	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Skip Loader	8	0.214	2.414	2.177	0.003	0.136	0.125	4	0.86	9.66	8.71	0.01	0.54	0.50	1,432

Place concrete for invert	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Generator	8	0.242	2.541	1.927	0.002	0.085	0.078	2	0.48	5.08	3.85	0.00	0.17	0.16	517

Place steel and forms for walls	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Skip Loader	8	0.214	2.414	2.177	0.003	0.136	0.125	7	1.50	16.90	15.24	0.02	0.95	0.88	2,506

Place Concrete for walls	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Generator	8	0.242	2.541	1.927	0.002	0.085	0.078	4	0.97	10.17	7.71	0.01	0.34	0.31	1,034

Elder Creek Channel Improvement Project

Offroad Equipment Tailpipe Emissions

Backfill and Grading	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Loader	8	0.395	3.510	3.667	0.005	0.202	0.186	2	0.79	7.02	7.33	0.01	0.40	0.37	1,099
Excavator with sheep foot	8	0.253	3.349	2.484	0.005	0.121	0.111	2	0.51	6.70	4.97	0.01	0.24	0.22	1,146

Grade earthen channel	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Excavator	8	0.253	3.349	2.484	0.005	0.121	0.111	5	1.26	16.75	12.42	0.03	0.60	0.56	2,864
Loader	8	0.395	3.510	3.667	0.005	0.202	0.186	5	1.97	17.55	18.33	0.03	1.01	0.93	2,747
Grader	8	0.522	3.360	5.093	0.005	0.284	0.262	5	2.61	16.80	25.46	0.02	1.42	1.31	2,480

Fencing	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Skip Loader	8	0.214	2.414	2.177	0.003	0.136	0.125	10	2.14	24.14	21.77	0.03	1.36	1.25	3,580
Generator	8	0.242	2.541	1.927	0.002	0.085	0.078	10	2.42	25.41	19.27	0.02	0.85	0.78	2,586

Church Street Channel muck out	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Loader	8	0.395	3.510	3.667	0.005	0.202	0.186	3	1.18	10.53	11.00	0.02	0.61	0.56	1,648

Rock slope protection and cobble on berm	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Excavator	8	0.253	3.349	2.484	0.005	0.121	0.111	10	2.53	33.49	24.84	0.05	1.21	1.11	5,728

Final grading/cleanup	Daily Emissions (lbs/day)							Days	Total Emissions (lbs)						
	Hours/Day	VOC	CO	NOX	SOX	PM10	PM2.5		VOC	CO	NOX	SOX	PM10	PM2.5	CO2
Loader	8	0.395	3.510	3.667	0.005	0.202	0.186	5	1.97	17.55	18.33	0.03	1.01	0.93	2,747
Skip Loader	8	0.214	2.414	2.177	0.003	0.136	0.125	5	1.07	12.07	10.89	0.02	0.68	0.63	1,790
Grader	8	0.522	3.360	5.093	0.005	0.284	0.262	5	2.61	16.80	25.46	0.02	1.42	1.31	2,480

Alternative Maximum Day Emissions - Scenario 1 - Peak Traffic Emissions Period (Church Street Channel muck out and Rock Slope Protection)

Maximum Daily Emissions (lbs/day)					
VOC	CO	NOX	SOX	PM10	PM2.5
1.104	11.815	10.255	0.016	0.544	0.500

Total Project Offroad Emissions (lbs)						
VOC	CO	NOX	SOX	PM10	PM2.5	CO2
135.75	1481.19	1304.76	2.14	70.53	64.88	231698.79

Elder Creek Channel Improvement Project

Offroad Equipment Tailpipe Emissions

Alternative Maximum Day Emissions - Scenario 2 - Sheet Pile Option w/Task Overlaps (two crews for North of Merris work)

	Hours/Day	Maximum Daily Emissions (lbs/day)					
		VOC	CO	NOX	SOX	PM10	PM2.5
Power Unit	8	0.746	3.757	5.370	0.015	0.233	0.214
Crane	8	0.576	2.702	6.907	0.007	0.282	0.260
Demo Phase/Stockpile Removal Overlap		1.258	14.957	12.398	0.022	0.675	0.621
Totals		2.579	21.415	24.676	0.045	1.191	1.095

Total Project Offroad Emissions (lbs) - Sheet Pile Option						
VOC	CO	NOX	SOX	PM10	PM2.5	CO2
188.62	1739.53	1795.85	3.04	91.15	83.85	329451.08

While the offroad emissions are higher during the potential option for sheet piling, the onroad emissions would be considerably lower, so the regional maximum could occur during other overlaps, so these other potential maximum overlaps are estimated.

Alternative Maximum Day - Scenario 3 - Paving Abbey and Merris w/overlapping task

	Maximum Daily Emissions (lbs/day)					
	VOC	CO	NOX	SOX	PM10	PM2.5
Total Emissions	1.666	16.170	16.638	0.023	0.980	0.902

LST Maximum - Single construction activity at or north of Merris near residential receptors (sheet pile option - single crew)

	Maximum Daily Emissions (lbs/day)					
	VOC	CO	NOX	SOX	PM10	PM2.5
LST Emissions	NA	6.459	12.277	NA	0.516	0.474

Elder Creek Channel Improvement Project

Indirect Greenhouse Gas Emissions

Indirect Water Use CO2e Emissions

Assumption:

1. This is assumed to be based on 11.111 MWh per million gallons or 3.62 MWh per acre-foot (Navigant, 2006; p. 2), with approximately 16 acre-feet of water required during construction (~12,000 gallons per day average); and 661.24 lbs of CO2e/MWh (equivalent to approximately 1.2 tons of CO2e/acre-foot of water).

	Acre-feet	MWh/Ac-ft	CO2e/MWh	CO2E
Construction	6.7	3.62	661.24	7.28
			lbs/MWh	Metric Tons

Elder Creek Channel Improvement Project

Fugitive Dust Emissions

General Assumptions:

1. Fugitive dust emissions are estimated using AP-42.
2. Rule 403 compliance is assumed, so "unmitigated" emissions factors include watering/moist soil, track out control, and vehicle speed reduction on unpaved surfaces.

Emission Categories

- 1) Earthmoving
 - a) Grading
 - b) Material Loading/Handling
- 2) Paved Road Dust
- 3) Unpaved Road Dust

1) Earthmoving

- a) Grading (AP-42 Section 11.9)

$$E = k \times 0.051 \times (S)^{2.0} \text{ for PM}_{10} \text{ and } k \times 0.040 \times (S)^{2.5} \text{ for PM}_{2.5}$$

$$E = \text{lb/VMT}$$

$$k = \text{Scaling Constant (0.60 for PM}_{10} \text{ and 0.031 for PM}_{2.5})$$

$$S = \text{Mean Vehicle Speed assumed to be 3 mph}$$

$$\text{Assumes VMT} = 3 \times \text{hours in use}$$

Emission Factor, lb/VMT

PM10	PM2.5
0.08813	0.00619

Emission Control
68%

Watering is assumed as Rule 403 control measure.

Maximum Daily Grader Use

Hrs	VMT/day	
8	24	Daily
120	360	Total

Grading Emissions (Lbs)

PM10	PM2.5	
2.12	0.15	Daily
31.73	2.23	Total

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

$$E = (k)(0.0032)[(U/5)^{1.3}]/[(M/2)^{1.4}]$$

$$E = \text{lb/ton}$$

$$k = \text{Particle Size Constant (0.35 for PM}_{10} \text{ and 0.053 for PM}_{2.5})$$

$$U = \text{average wind speed} = 15 \text{ MPH worst-case/average}$$

$$M = \text{moisture content} = 12\% \text{ per compliance with Rule 403}$$

Two separate drops are assumed for bulk material movement as a worst-case daily (one drop for localized daily)

Bulk material trips are assumed to be 25 tons per trip

Throughput	Tons	
31 Trips	1550	Maximum Daily
12 Trips	300	Maximum Localized Daily
2414 Trips	120700	Total

Emission Factors and Emissions

Emission Factors

PM10	PM2.5
0.00038	0.00006

Emissions (Lbs)

PM10	PM2.5	
0.59	0.09	Daily
0.11	0.02	Maximum Localized Daily
45.90	6.95	Total

2) Paved Road Dust

$$E = [k \times (sL)^{0.91} \times (W)^{1.02}] \times (1-P/4N)$$

$$E = \text{lb/VMT}$$

k = Constant (0.0022 for PM10 and 0.00054 for PM2.5)

sL = Silt Loading (conservatively assumed to be 0.06 g/m² - Table 13.2.1-2)

W = Average weight of vehicles in tons (calculated below)

P = Days of precipitation (34 assumed for project total calculation)

N = Days in period (365 for project total calculation)

Average Vehicle Weight Calculation

Assumptions

Passenger Vehicles = 2 tons average

Midsized "Delivery" Vehicles = 12 ton average

Heavy-Heavy Duty Trucks = 27 tons average (loaded 40 tons, unloaded 14 tons)

VMT	Passenger Vehicles	Delivery/Work Vehicles	Heavy-Heavy Duty Vehicles	Total Paved VMT	Average Weight (Tons)
Maximum Day	780	100	940	1,820	17.0
Project Total	124,020	15,640	70,200	209,860	12.1

Daily Emission Factors (lb/VMT)

Case	PM10 Daily	PM2.5 Daily
Maximum Day	0.00212	0.00052

Emissions (Lbs/day)

Max Day	PM10	PM2.5
Maximum Daily	3.85	0.95

Project Total Emission Factors (lb/VMT)

Max Day	PM10 Daily	PM2.5 Daily
Project Total	0.00113	0.00028

Emissions (Lbs)

Max Day	PM10	PM2.5
Project Total	236.14	59.34

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 8.5%, USEPA for overburden for dirt roads and 4% for gravel road - SCAQMD handbook)

W = avg. vehicle weight = calculated below

P = Days of precipitation (34 assumed for project total calculation)

Average Vehicle Weight Calculation

Assumptions:

Passenger Vehicles = 2 tons average

Midsized "Delivery" Vehicles = 12 ton average

Heavy-Heavy Duty Trucks = 27 tons average (loaded 40 tons, unloaded 14 tons)

VMT	Passenger Vehicles	Delivery/Work Vehicles	Heavy-Heavy Duty Vehicles	Total Unpaved VMT	Average Weight
Max Daily	0	0	11	11	27.0
Total	0	0	750	750	27.0

Controlled Emissions (assumes Rule 403 required 55% for watering and 57% for 15 MPH speed limit, for total of 80 percent)

Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Maximum Daily	0.59	0.06
Total	0.54	0.05

Emissions (Lbs)

	PM10	PM2.5
Maximum Daily	6.65	0.67
Total	402.11	40.21

Fugitive Dust Emissions Summary

Maximum Day

	Maximum Lbs/Day		Project Total Lbs	
	PM10	PM2.5	PM10	PM2.5
Grading	2.12	0.15	31.73	2.23
Material Loading/Handling	0.59	0.09	45.90	6.95
Paved Road Dust	3.85	0.95	236.14	59.34
Unpaved Road Dust	6.65	0.67	402.11	40.21
Total	13.21	1.85	715.86	108.73

Maximum Day for regional particulate emissions is based on maximum vehicle emissions day.

Localized Maximum Day

	Maximum Lbs/Day		
	PM10	PM2.5	
Grading	NA	NA	Use of graders does not occur near sensitive receptors
Material Loading/Handling	0.11	0.02	
Paved Road Dust	NA	NA	Paved road dust is not an onsite emissions source
Unpaved Road Dust	NA	NA	Negligible unpaved travel near sensitive receptors
Total	0.11	0.02	

Elder Creek Channel Improvement Project

Onsite DPM Emissions Distributed Screening Level Risk Receptor Annual Concentration Calculation

Main Construction Task/Area	Offroad Emissions	Onroad Emissions	Emissions Interval	Distance to Receptor	SCAQMD X/Q	Emissions Fraction	Calculated ug/M3
North of Merris	44.94	NA	250.00	25	3.76	10.00%	0.008
				50	1.92	10.00%	0.004
				75	1.38	10.00%	0.003
				100	0.97	35.00%	0.008
				200	0.28	35.00%	0.002
Paving/RCB @ Merris	4.71	0.76	NA	25	3.76	100%	0.010
Between Abbey and Merris	3.45	NA	150.00	25	3.76	16.67%	0.001
				50	1.92	16.67%	0.001
				75	1.38	16.67%	0.000
				100	0.97	16.67%	0.000
				150	0.625	33.33%	0.000
Paving/RCB @ Abbey	2.91	NA		150	0.625	100%	0.001
South of Merris	35.14	NA	NA	200	0.28	100%	0.005
Total							0.044

Notes:

- 1) Emissions are total offroad emissions and the on-site on-road emissions (water trucks and concrete pump trucks), where the on-road emissions are conservatively all distributed within 25 meters of the maximum exposed receptor.
- 2) The emissions interval is the length of the construction area that requires emissions to be distributed at different distances from the maximum exposed receptor.
- 3) The distance to receptor provides emissions estimates within specific distances to the maximum exposed receptor from that main construction task.
- 4) The SCAQMD X/Q is in units of [$\mu\text{g}/\text{m}^3$]/[ton/year], and it is from the SCAQMD Risk Assessment Procedures for Rules 1401, 1401.1, and 212, Permit Application Package "N" Table 10.4 A for Redlands and engines rating total between 400 and 600 hp.

Appendix B

Biological Resources Technical Report

BIOLOGICAL RESOURCES TECHNICAL REPORT

Elder Creek Channel Improvement Project

Prepared for:

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



Prepared by:

Aspen Environmental Group
615 North Benson Avenue, Suite E
Upland, CA 91786



July 2019

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Attachments

Attachment 1: Figures

Figure 1: Project Overview

Figure 2: Project Site

Figure 3: Vegetation and Land Cover

Figure 4: Biological Resources

Attachment 2: Representative Site Photos

Attachment 3: Observed Species List

Attachment 4: CNDDDB Query Results

Attachment 5: Special-Status Species Not Addressed

1. Executive Summary

This report was prepared under contract to the San Bernardino County Flood Control District (District) to describe biological resources at the Elder Creek Channel Improvement Project (project) site. The project site is located within Highland in San Bernardino County, California (Figure 1; note that all figures are included within Attachment 1). The District proposes to concrete-line much of the Elder Creek Channel between Old Greenspot Road and Plunge Creek. The project seeks to improve flood protection and enhance public safety for properties and infrastructure in the vicinity. This report describes the methods and results of a field survey for biological resources conducted by Aspen Environmental Group (Aspen) in 2019 and evaluates potential occurrence of special-status plants and animals, as well as sensitive vegetation communities or habitats. The term “special-status” species includes numerous designations, ranging from State or federally listed threatened or endangered species to agency “watch-lists,” as defined in Table 2.

Two State or federally listed species were observed during the surveys, but were both beyond the limits of project impacts. San Bernardino kangaroo rat is a federally listed endangered species and was trapped just beyond the project impact area to the west of Church Channel. Santa Ana River woollystar is a State and federally listed species that was also observed at several locations around the perimeter of the project. No other listed species were observed, but several have at least a moderate potential to be present.

Three California Department of Fish and Wildlife (CDFW) Species of Special Concern were observed during the surveys, including northwestern San Diego pocket mouse, Los Angeles pocket mouse, and San Diego woodrat. Several additional CDFW Species of Special Concern have at least a moderate potential to be present. These species include burrowing owl, San Diego black-tailed jackrabbit, southern California legless lizard, California glossy snake, coast horned lizard, coastal whiptail, and loggerhead shrike. Several additional special-status animals including Cooper’s hawk, white-tailed kite, and California horned lark have at least a moderate potential to be present.

Several special-status plants also have at least a moderate potential to be present and include Parry’s spineflower, Plummer’s mariposa-lily, and Robinson’s pepper-grass.

Critical habitat for San Bernardino kangaroo rat is present in the southern portion of the project site (USFWS, 2008). Critical habitat for Santa Ana sucker (*Catostomus santaanae*) is present in the Santa Ana River, approximately 1.2 miles to the south of the project site (USFWS, 2010b).

Two of the vegetation types that are present within the project site are likely to be considered sensitive natural communities by CDFW, although they are not ranked as sensitive by the California Native Plant Society (CNPS). The project site is not within any mapped essential connectivity areas or natural landscape blocks. Due to surrounding land uses, the project site is not likely to serve as a significant wildlife movement route, although it may be used as a forage or dispersal area for wildlife in the immediate vicinity. Additionally, the nature of the project would not present a barrier to terrestrial wildlife movement.

2. Project and Property Description

2.1 Project Description

The San Bernardino County Flood Control District (District) proposes to construct and maintain flood control improvements along approximately 2,100 linear feet of the Elder Creek system within the City of Highland, San Bernardino County (Figure 1). The project limits are from Old Greenspot Road, to approximately 700 feet downstream of Abbey Way. The Elder Creek Channel Improvement Project (proposed Project) would increase the capacity of the Elder Creek system to handle a 100-year (Q100) storm event and allow for proper conveyance of flows into Plunge Creek. Currently, the Elder Creek system is undersized, and the downstream portion of the Creek is at a higher elevation than Plunge Creek downstream, resulting in flows backing up at the confluence with Plunge Creek. The portion of the Elder Creek system to be improved currently consists of reinforced concrete box, which transitions into an open channel, which then confluent with Plunge Creek downstream. The open channel contains both concrete and earthen segments. Proposed improvements include removing existing channel infrastructure and installing a deeper and slightly wider concrete rectangular channel between Old Greenspot Road and Abbey Way, constructing a concrete bypass rectangular channel and enlarging the existing earthen channel (low-flow channel) between Abbey Way and Plunge Creek. The intent of leaving the low-flow channel in place is to avoid impacts to federal wetlands that may be present; widening the channel would also create additional federal wetlands. Above the earthen channel, a small sedimentation basin is proposed to prevent excess sediment from entering the earthen channel. Grouted rip-rap would be placed at the confluence of the low-flow earthen channel, by-pass channel, and Church Street Channel to control erosion and reduce flow velocity. Other improvements include regrading and improving the existing side channel (East Highland Storm Drain), replacing two existing box culverts at the road crossings of Merris Street and Abbey Way, constructing a berm to protect the earthen channel, and revegetating the existing stockpile area southeast of the low-flow channel. The proposed Project also includes a one-time maintenance of Church Street Channel.

The project also includes routine maintenance of the new channel, which is expected to occur 1-2 times a year or every few years, depending on storms, and consist primarily of debris, trash, and graffiti removal, and fence and appurtenant structure repairs. Maintenance of the low-flow earthen channel is expected to be minimal and occur approximately twice a year, and would include invasive species removal, vegetation management that includes removing large tree species, thinning as required to ensure a healthy ecology and to allow vector control staff to address vector control concerns when they arise, and application of rodenticide as needed. Sediment removal would occur a few times a year within the sedimentation basin.

2.2 Project Location

The project site is located just south of Greenspot Road and approximately 0.5 miles east of Orange Street near Highland, California. The project site can be found on the Redlands, California United States Geological Survey (USGS) 7.5' Quadrangle. Representative latitude-longitude coordinates for the project site are 34°06'19.93"N, 117°10'23.02"W. The project site consists of the existing Elder Creek and Church Channels, unvegetated stockpile areas, access roads, and open areas adjacent to residential development, and a limited amount of native wash vegetation along the margins. The topography of the project site is relatively flat and slopes towards the south. The elevation within the project site ranges from approximately 1,320 to 1,340 feet above mean sea level (MSL). Surrounding land uses include natural open space, flood control, commercial, and residential.

3. Methods

Justin M. Wood of Aspen Environmental Group (Aspen) reviewed available literature to identify special-status plants and wildlife known from the vicinity. Data from the California Natural Diversity Database (CNDDDB; CDFW, 2019) was reviewed for the following USGS 7.5-minute topographic quadrangles (topo quads): Harrison Mountain, Keller Peak, Redlands, San Bernardino North, San Bernardino South, and Yucaipa. CNDDDB search results are provided in Attachment 4. Soil maps for the survey area were reviewed using the Soil Web Survey (NRCS, 2019). All State listed, federally listed, and other special-status plants and wildlife from comparable habitats within the region are addressed below in the results section. Many of the special-status plants and wildlife identified during the literature search occur only in specialized native habitats that are absent from the survey area (i.e., meadows or alpine) or occur only at substantially higher or lower elevations. These plants and wildlife are listed in Attachment 5 and are not addressed further in this report.

On April 19, 2019, Mr. Wood completed a focused botanical survey, special-status species survey, and habitat assessment. During the survey Mr. Wood walked throughout all accessible portion of the survey area to search for plants and animals. All plant species observed were either identified in the field or vouchered with photographs or collections for later identification. Plants were identified using keys, descriptions, and illustrations in Baldwin et al. (2012) and other regional references. All plant and wildlife species observed during the field surveys are listed in Attachment 3. The field survey constitutes 100 percent coverage of the survey area for special-status plants (see Figure 1). Mr. Wood used binoculars to search for birds in vegetation, flipped rocks and debris to look for reptiles and invertebrates, searched through leaf litter for invertebrates and reptiles, looked for burrowing animals, and listened for bird calls. Several reference sites for special-status plants were also visited to ensure they were present and identifiable in 2019.

In conformance with CDFW (formerly California Department of Fish and Game) guidelines (CDFW, 2018a), botanical surveys were (a) conducted during flowering seasons for the special status plants known from the area, (b) floristic in nature, (c) consistent with conservation ethics, (d) systematically covered all habitat types on the sites, and (e) well documented, by this report, photos that will be uploaded to CalPhotos (BSCIT, 2019), and by voucher specimens to be deposited at Rancho Santa Ana Botanic Gardens and other herbaria. GPS location data, as well as habitat, phenology, and other environmental variables were collected for all special status species documented within the survey area.

During the survey Mr. Wood drew tentative vegetation boundaries on high-resolution aerial images. Following the field visit, Mr. Wood digitized vegetation and land cover types (see Figure 3). Digitizing was done using 1-meter-pixel aerial imagery. The minimum mapping unit is approximately 0.1 acre (about 4,400 square feet). Vegetation was mapped according to the nomenclature and descriptions in *A Manual of California Vegetation* (Sawyer et al. 2009). Mapped vegetation boundaries are accurate to within approximately 10 feet. Any vegetation map is subject to imprecision for several reasons:

1. Vegetation types tend to intergrade on the landscape so that there are no true boundaries in the vegetation itself. In these cases, a mapped boundary represents best professional judgment.
2. Vegetation types as they are named and described tend to intergrade; that is, a given stand of real-world vegetation may not fit into any named type in the classification scheme used. Thus, a mapped and labeled polygon is given the best name available in the classification, but this name does not imply that the vegetation unambiguously matches its mapped name.

3. Vegetation tends to be patchy. Small patches of one named type are often included within mapped polygons of another type. The size of these patches varies, depending on the minimum mapping units and scale of available aerial imagery.

In addition to the focused biological survey described above, a focused non-breeding season survey for coastal California gnatcatcher was conducted and focused trapping was also conducted for San Bernardino kangaroo rat (Carter, 2019 and Origin Biological, 2019). Focused trapping for San Bernardino kangaroo rat was also conducted in 2018 (Romich, 2018). Results from these focused surveys have been incorporated into this report.

4. Biological Survey Results

4.1 General Setting

The climate in the region consists of warm, dry summers and mild, wet winters. The average annual high temperature is about 80.1°F and the average annual low is about 51.7°F (U.S. Climate Data, 2019). Roughly 75 percent of the rain falls from December through March. The mean seasonal precipitation for the region is approximately 16.37 inches as reported at the San Bernardino International Airport (U.S. Climate Data, 2019). Rainfall was above average in the region during the 2018-2019 rainfall year (July 1 through June 30) with approximately 17.99 inches falling throughout the region (San Bernardino County, 2019).

The project site is located on an extensive alluvial fan that ranges in elevation from approximately 1,320 to 1,340 feet above mean sea level. Soils in the area are loam, sand, and gravel derived from alluvial fans originating in the San Bernardino Mountains to the north. Four soil types are mapped within the project site: Soboba gravelly loamy sand (0 to 9 percent slopes), Soboba stony loamy sand (2 to 9 percent slopes), Tujunga loamy sand (0 to 5 percent slopes), and psamments, fluvents and frequently flooded soils (NRCS, 2019).

4.2 Vegetation and Land Cover Types

Vegetation within the project site includes wetland vegetation, such as cattail marshes in Elder Creek and Church Channels. A very small strip of native upland vegetation is also present along the southeast side of the project site, but is not expected to be impacted by the project. Riparian vegetation is also present just outside of the project site to the southwest; however, this vegetation is not expected to be directly impacted by the project. Most of the project site is regularly maintained and is unvegetated. Vegetation is further described below.

Table 1: Acreage of Vegetation and Land Cover within the Project Site

Vegetation or Cover Types	Area within the Project Site (Acres)
Annual brome grassland	0.39
Arroyo willow thickets	<0.01
California buckwheat scrub	0.19
Cattail marshes	0.26
Developed	1.59
Disturbed	6.87
Open water	0.03
Smartweed-cocklebur patches	0.42

Total	9.76
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Riparian and Wetland Vegetation Types

Arroyo willow thickets (*Salix lasiolepis* Woodland Alliance). Arroyo willow thickets are present at the downstream end of the project site. These are winter deciduous woodlands which have a dense canopy of arroyo willow (*Salix lasiolepis*), Fremont cottonwood (*Populus fremontii*), and black willow (*Salix gooddingii*). Other species such as narrow leaved willow (*Salix exigua*), mulefat (*Baccharis salicifolia*), and tall cyperus (*Cyperus eragrostis*) are also present.

Cattail marshes [*Typha (angustifolia, domingensis, latifolia)* Herbaceous Alliance]. Cattail marshes within the project site are dominated by a dense monotypic stand of broadleaf cattail (*Typha latifolia*). Other cattails such as narrow leaf cattail (*Typha angustifolia*) were also present in lower abundance. They are present within the wettest portion of the project site, which includes much of Elder Creek Channel and Church Channel (see Photo 1 in Attachment 2). This vegetation is seasonally removed by scouring flows, but quickly recolonizes the channels after flows subside.

Smartweed - cocklebur patches (*Polygonum lapathifolium* - *Xanthium strumarium* Herbaceous Alliance). Smartweed-cocklebur patches within the project area are dominated by common knotweed (*Persicaria lapathifolia*), water speedwell (*Veronica anagallis-aquatica*), and cocklebur (*Xanthium strumarium*). Other species such as watercress (*Nasturtium officinale*), Mexican sprangletop (*Leptochloa fusca* ssp. *uninervia*), and yellow monkey flower (*Mimulus guttatus*) were also present. Smartweed-cocklebur patches are present along the margins of Elder Creek Channel within the project site.

Upland Vegetation Types

Annual brome grassland. This upland vegetation type is present along the western edge of Church Channel and is dominated by ripgut brome (*Bromus diandrus*) and red brome (*Bromus madritensis* ssp. *rubens*). Other non-native species such as filarees (*Erodium* sps.) are also present.

California buckwheat scrub. California buckwheat scrub is a native upland vegetation type that is present along the southeast edge of the project site (see Photos 3 and 4 in Attachment 2). It is dominated by California buckwheat (*Eriogonum fasciculatum*), with other native species such as scalebroom (*Lepidospartum squamatum*), prickly pear (*Opuntia littoralis*), and California juniper (*Juniperus californica*) also present. Although not mapped, several patches of California juniper woodland (*Juniperus californica* Woodland Alliance) are also present just beyond the project site and are dominated by California juniper.

Other Land Cover Types

Developed. This cover types includes developed areas within the project site and includes paved roads, concrete flood control structures, and other structures.

Disturbed. This cover type includes disturbed unvegetated land surrounding the Elder Creek flood control facility.

Open water. This cover type includes a small area of open water within Church Channel that has accumulated because sediment in the channel is preventing the water from leaving the channel.

4.3 Sensitive Natural Communities

Sensitive vegetation communities have been previously defined by CDFW as, "...communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental

effects of projects.” More recently they have defined Sensitive Natural Communities as Natural Communities with ranks of S1-S3 which need to be addressed in the environmental review processes of CEQA and its equivalents (CDFW, 2018b). The literature review identified nine sensitive vegetation communities recorded in the vicinity: canyon live oak ravine forest, Riversidian alluvial fan sage scrub, southern coast live oak riparian forest, southern cottonwood willow riparian forest, southern mixed riparian forest, southern riparian forest, southern riparian scrub, southern sycamore alder riparian woodland, and southern willow scrub.

Although not specifically mapped within the project site, the California buckwheat scrub vegetation matches the description of Riversidian alluvial fan sage scrub. The arroyo willow thickets that are present also match the description of southern willow scrub. CDFW is likely to recognize these two communities as sensitive even though they do not have an S rank of S1-S3. Regardless, impacts to these vegetation types should be evaluated in future CEQA documents.

4.4 Wildlife

Wildlife and wildlife sign observed during the field survey included species common in the region, such as common side-blotched lizard (*Uta stansburiana*), black phoebe (*Sayornis nigricans*), California towhee (*Melospiza crissalis*), mourning dove (*Zenaidura macroura*), deer mouse (*Peromyscus maniculatus*), and raccoon (*Procyon lotor*). San Bernardino kangaroo rat and northwestern San Diego pocket mouse were the only special-status wildlife species observed during the field surveys. Other wildlife species common in developed landscapes and open sparsely vegetated habitats throughout the region are also likely to be present but were not observed.

5. Special-status Species Results

Plants or wildlife may be ranked as special-status species due to declining populations, vulnerability to habitat change, or restricted distributions. Certain species have been listed as threatened or endangered under the Federal Endangered Species Act (FESA) or California Endangered Species Act (CESA). Others have not been listed, but declining populations or habitat availability cause concern for their long-term viability. These species of conservation concern appear on lists compiled by resource agencies or private conservation organizations. In this report, “special-status species” includes all plants and wildlife listed as threatened or endangered or included in these other compilations. All special-status plants and wildlife occurring in the region in habitats like those found within the survey area are addressed in Table 2, with brief descriptions of habitat and distribution, conservation status, and probability of occurrence.

5.1 Special-status Plants

One special-status plant, Santa Ana River woollystar, was found during the surveys but was beyond the limits of the project. There is at least a moderate potential for several other special-status plants to be present. Table 2 lists all special-status plants that were identified in the literature review that have at least a low potential to be present within the project site. Many special-status species known from the region occur in habitats that are absent from the survey area (e.g., meadows or chaparral) or at elevations much higher than the site. These plants and animals are listed in Attachment 5 and are not addressed further in this report.

Table 2. Special-Status Plants with Potential to Occur within the Project Site

Scientific Name Common Name	Conservation Status	Habitat Type/ Blooming Period/ Elevation Range/ General Geographic Range	Potential for Occurrence in the Project Site
<i>Calochortus plummerae</i> Plummer's mariposa-lily	Fed: none CA: S4 CRPR: 4.2	Chaparral, alluvial fans, pine forest, below ±5600 ft. elev.; widespread but uncommon throughout S. Calif. mts., foothills & valleys. May-Jul.	Moderate. Although not observed during the surveys, this species is likely to be present within less than 0.5 miles in the habitat adjacent to the project site.
<i>Chorizanthe parryi</i> var. <i>parryi</i> Parry's spineflower	Fed: none CA: S2 CRPR: 1B.1	Shrublands, open sandy places on alluvial slopes below about 4300 ft. elev.; Inland Empire and also coastal LA Co., Banning Pass, Cajon Pass. Apr-Jun.	Moderate. Although not observed during the surveys, this species is likely to be present within less than 0.5 miles in the habitat adjacent to the project site.
<i>Chorizanthe xanti</i> var. <i>leucotheca</i> White-bracted spineflower	Fed: none CA: S3 CRPR: 1B.2	Desert shrubland, pinyon-juniper woodland, about 1000-4000 ft. elev.; San Bernardino, Riverside, and San Diego Cos. Apr-Jun.	Low. Not observed during survey; suitable habitat is present; known from within about 2 miles of the project site.
<i>Dodecahema leptoceras</i> Slender-horned spineflower	Fed: END CA: END, S1 CRPR: 1B.1	Annual; open, sandy alluvial benches in valleys and canyons; San Fernando Valley, Santa Ana River Valley, western Riverside Co.; about 600-2500 ft. elev. Apr-Jun.	Low. Not observed during survey; suitable habitat is present; known historically from within 0.5 miles of the project site.
<i>Eriastrum densifolium</i> ssp. <i>sanctorum</i> Santa Ana River woollystar	Fed: END CA: END, S1 CRPR: 1B.1	Shrubland, alluvial fans and plains; endemic to Santa Ana River watershed, primarily in San Bern. Co.; below about 2000 ft. elev. May-Sep.	Present. 110 plants observed in the habitat immediately adjacent to the project site.
<i>Lepidium virginicum</i> var. <i>robinsonii</i> Robinson's pepper-grass	Fed: none CA: S3 CRPR: 4.3	Annual herb; shrublands below about 1700 ft. elev.; Los Angeles Co, inland to Riverside & San Bernardino Cos, and S to Baja Calif. Jan-Jul.	Moderate. Although not observed during the surveys, this species is likely to be present within less than 0.5 miles in the habitat adjacent to the project site.

Source: CDFW, 2019; CCH, 2019; CNPS, 2019

Conservation Status

Federal (Fed.) designations: (federal Endangered Species Act, U.S. Fish and Wildlife Service).

FE: Federally listed, endangered.

FT: Federally listed, threatened.

Prop.: Proposed for listing.

FC: Federal species of concern

State (CA) designations: (California Endangered Species Act, California Department of Fish and Wildlife (CDFW))

SE: State listed, endangered.

ST: State listed, threatened.

CAND.: Candidate for State listing.

SR: State listed as rare (applied only to certain plants).

SC: California species of special concern. Considered vulnerable to extinction due to declining numbers, limited geographic ranges, or ongoing threats.

FP: Fully protected. May not be taken or possessed without permit from CDFW.

State (S) ranking: The state rank is assigned much the same way as the global rank, but state ranks refer to the imperilment status only within California's state boundaries.

S1: Critically Imperiled—Critically imperiled in the state because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

S2: Imperiled—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.

S3: Vulnerable—Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state.

S4: Apparently Secure—Uncommon but not rare in the state; some cause for long-term concern due to declines or other factors.

S5: Secure—Common, widespread, and abundant in the state.

California Native Plant Society Rare Plant Rank (CRPR) designations. Note: According to CNPS

(<http://www.cnps.org/cnps/rareplants/ranking.php>), plants ranked as California Rare Plant Rank (CRPR) 1A, 1B, and 2 meet definitions as threatened or endangered and are eligible for state listing. That interpretation of the state Endangered Species Act is not in general use.

Table 2. Special-Status Plants with Potential to Occur within the Project Site

Scientific Name Common Name	Conservation Status	Habitat Type/ Blooming Period/ Elevation Range/ General Geographic Range	Potential for Occurrence in the Project Site
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- 1A: Plants presumed extinct in California.
 1B: Plants rare and endangered in California and throughout their range.
 2: Plants rare, threatened or endangered in California but more common elsewhere in their range.
 3: Plants about which we need more information; a review list.
 4: Plants of limited distribution; a watch list.

California Rare Plant Rank Threat designations:

- .1 Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
 .2 Fairly endangered in California (20-80% occurrences threatened)
 .3 Not very endangered in California (<20% of occurrences threatened or no current threats known)

Definitions of occurrence probability: Estimated occurrence probabilities based on literature sources cited earlier and field surveys and habitat analyses reported here.

Present: Taxa were observed along the Project alignment during recent botanical surveys.

High: Both a documented recent record (within 10 years) exists of the taxa along the Project alignment or in the immediate vicinity (approximately 5 miles) and the environmental conditions (including soil type) associated with taxa are present.

Moderate: Both a documented recent record (within 10 years) exists of the taxa along the Project alignment or the immediate vicinity (approximately 5 miles) and the environmental conditions associated with taxa presence are marginal and/or limited along the Project alignment or the Project alignment is located within the known current distribution of the taxa and the environmental conditions (including soil type) associated with taxa are present.

Low: A historical record (over 10 years) exists of the taxa along the Project alignment or in the general vicinity (approximately 10 miles) and the environmental conditions (including soil type) associated with taxa are present but marginal and/or limited.

Minimal: Species not observed along the Project alignment, outside of the known range, and conditions unsuitable for occurrence.

5.2.1 Listed Threatened or Endangered Plants

This section includes plant species listed as threatened or endangered under the FESA or CESA. One listed plant, Santa Ana River woollystar, was observed during surveys immediately adjacent to the project site. Slender-horned spineflower was not observed, but has a moderate potential to be present in the mature wash vegetation to the east of the project site.

Slender-horned spineflower (*Dodecahema leptoceras*). Slender-horned spineflower is listed as endangered under both the FESA and the CESA and has a California Rare Plant Rank (CRPR) of 1B.1 (CDFW, 2019 and USFWS, 1987). It is a low-growing annual, typically flowering between April and May (CNPS, 2019). Its numbers vary greatly from year to year according to rainfall, and in years of low rainfall it may not come up at all. Slender-horned spineflower's usual habitat is open, slightly depressed sites within mature shrublands of broad alluvial systems (Allen, 1996; Wood and Wells, 1996). Occupied habitat is found on relatively flat surfaces with substrates ranging in age from about 100 years to several thousand years since the material was last deposited or scoured by flooding. Surrounding vegetation varies among sites and apparently does not affect habitat suitability. Similarly, cryptogamic soil crusts were found at some sites, but did not correlate with spineflower occupancy. Spineflower microsites are slightly lower than surrounding surfaces and have higher silt content and lower mineral, organic, and plant nutrient content than surrounding areas. Young and coauthors (2000) found that slender-horned spineflower does not require mycorrhizal associations, although it can host some mycorrhizae species.

It occurs in Los Angeles, Riverside, and San Bernardino counties. Within the vicinity of the project site, it is known from numerous occurrences in the Santa Ana River wash near Highland. The nearest historic occurrence is within about 0.25 miles of the project site on a mature alluvial terrace, just north of Plunge Creek. The nearest known extant occurrence is about 0.5 miles to the southeast near a mining haul route. This extant population was visited by Mr. Wood in 2019 and supported approximately 1,000 plants while,

other populations in the region had no plants present. Specific micro-climates and rainfall seem to vary greatly in region and although not observed near the project site in 2019, there is a moderate potential for them to germinate and be present in a year with above average rainfall.

Santa Ana River woollystar (*Eriastrum densifolium* ssp. *sanctorum*). Santa Ana River woollystar is federally and state listed as endangered (CDFW, 2019 and USFWS, 1987). The USFWS released a draft recovery plan in 1996, but a final recovery plan has not been adopted. There has been no proposed or final critical habitat designation. It is a shrub or subshrub occurring in open washes and early-successional alluvial shrublands. It is found on sandy or gravelly soils on floodplains of the Santa Ana River watershed in southwestern San Bernardino County. It is a short-lived species, typically lasting between five and ten years. Santa Ana River woollystar flowers relatively late in the season (between June and August) and its large blue floral displays can be conspicuous. On the Santa Ana River and Mill Creek floodplain, it occurs from the base of the San Bernardino Mountains to the former Norton Air Force Base (now San Bernardino International Airport). It also occurs farther west, in the Lytle Creek and Cajon Wash floodplains (tributary to the Santa Ana River). Within the Cajon Wash floodplain, Santa Ana River woollystar occurs from about 2000 feet elevation near Devore, south to about 1200 feet elevation where Lytle Creek and Cajon Wash enter a flood control basin (CDFW, 2019). Habitat farther downstream is routinely impacted by large flood events which scour the sediment and remove the plants. The last large scouring flood event was in 2010 which has allowed numerous populations of Santa Ana River woolly-star to become established downstream to the vicinity of Rialto Channel.

Santa Ana River woollystar is identified in the field by its stature (shrub or subshrub), gray-woolly foliage, and long tubular flowers (25-37 mm long; De Groot et al., 2019). This description is based on plants in the eastern part of its range (e.g., north of Redlands) and is only partially accurate for the Cajon Wash and Lytle Creek floodplain occurrences. These western occurrences have shorter flower tubes (ca. 14-23 mm.; Tierra Madre Consultants, 1988), but otherwise are similar to the eastern occurrences. These have been considered hybrids or intergrades between the eastern *Eriastrum densifolium* ssp. *sanctorum* populations and the more common subspecies (ssp. *densifolium* and possibly ssp. *elongatum*), which occur throughout much of the southern California area, including local mountains, valleys, and deserts (Wheeler, 1988; Burk et al., 1989). But the USFWS continues to recognize the Lytle Creek and Cajon Wash occurrences as the endangered Santa Ana River woollystar.

A total of 110 individual plants were mapped within approximately 200 feet of the project site (see Figure 4). The nearest plant is within about 40 feet of the project site (see Photo 2 in Attachment 2). None of these plants are expected to be impacted by the project; however, additional plants have a low potential to germinate within the project site prior to the start of project activities.

5.2.2 Other Special-status Plants

Parry's spineflower (*Chorizanthe parryi* var. *parryi*). Parry's spineflower has a CRPR of 1B.1 (CDFW, 2019). It is an annual herb in the buckwheat (Polygonaceae) family. Parry's spineflower is endemic to southern California and occurs in San Bernardino, Riverside, and San Diego Counties. It is found on sandy or gravelly soils in coastal scrub, Riversidian alluvial fan sage scrub, Mojavean desert scrub, and pinyon juniper woodland at elevations from 900 to 4000 feet, and flowers from April to June (CNPS, 2019). There is suitable habitat for this species on the project site along the southeastern edge of the stockpile. The nearest known extant occurrence is about 0.5 miles to the southeast near a mining haul route. There is a moderate potential for this species to germinate and be present in a year with above average rainfall.

California Rare Plant Rank 4 Species. No additional special-status species were found during focused plant surveys, but two have at least a moderate potential to be present: Robinson's pepper-grass (*Lepidium virginicum* var. *robinsonii*) and Plummer's mariposa-lily (*Calochortus plummerae*). Plummer's mariposa-lily is known from within about 1.5 miles of the project site. Robinson's pepper-grass is known from within about 1.0 mile of the project site. Suitable habitat is present for both species and they have a moderate potential to be present. Both plants are ranked as CRPR 4 species (i.e., a "watch list," not indicating rarity) and none are listed as threatened or endangered.

5.2 Special-status Wildlife

San Bernardino kangaroo rat and northwestern San Diego pocket mouse were the only special-status wildlife species observed during the biological surveys. Table 3 lists special-status wildlife species that were identified in the literature review except those excluded due to elevation or habitat (see Attachment 5). Special-status species with at least a moderate potential to be present are discussed in paragraphs following the table.

Table 3. Special-Status Wildlife with Potential to Occur Within the Project Site

Name	Status	Habitat Type	Occurrence Potential
INVERTEBRATES AND MOLLUSCS			
<i>Bombus crotchii</i> Crotch bumble bee	Fed: none CA: CAND., S1S2	Colonial insect; open grassland and scrub; underground colonies, often in old rodent burrows. Food plants include many native species such as <i>Chaenactis</i> , <i>Lupinus</i> , <i>Phacelia</i> , <i>Salvia</i> , and <i>Eriogonum</i> . Much of southern and central CA, SW Nevada and Baja.	Low. Not observed during survey; suitable habitat is limited on the project site and limited food plants are present; historical records from within 5 miles.
REPTILES			
<i>Anniella stebbinsi</i> Southern California legless lizard	Fed: none CA: SC, S3	Generally, south of the Transverse Range, south to NW Baja Calif. Sandy or loose loamy soils under sparse vegetation; soils typically have high moisture content.	Moderate. Not observed during survey; marginally suitable habitat present; known from within less than 0.5 miles.
<i>Arizona elegans occidentalis</i> California glossy snake	Fed: none CA: SC, S2	Patchily distributed from the east. San Francisco Bay, so. San Joaquin Valley, and the Coast, Transverse, and Peninsular ranges, south to Baja Calif. Loose sandy soils in coastal sage scrub and grasslands.	High. Observed within less than one mile of the project site during 2019. Suitable habitat present within the project site.
<i>Aspidoscelis tigris stejnegeri</i> Coastal whiptail	Fed: none CA: SC, S3	Found in deserts and semi-arid areas with sparse vegetation and open areas. Also found in woodland & riparian areas. Coastal Calif., Transverse, and Peninsular ranges, south to Baja Calif.	High. Although not observed during the surveys, this species is likely to be present on or immediately adjacent to the project site.
<i>Phrynosoma blainvillii</i> Coast horned lizard	Fed: none CA: SC, S3S4	A variety of habitats, including coastal sage scrub, chaparral, oak woodland, riparian woodland, and coniferous forest. Friable, sandy soils in areas with an abundant prey base of native ants are key habitat components.	Moderate. Not observed during survey; marginally suitable habitat present; known from within about 2 miles.
<i>Salvadora hexalepis virgulata</i> Coast patch-nosed snake	Fed: none CA: SC, S2S3	Coastal scrub and other shrubby vegetation types along coastal southern California; Requires small mammal burrows for refuge.	Low. Not observed during survey; marginally suitable habitat present; known from within about 5 miles.

Table 3. Special-Status Wildlife with Potential to Occur Within the Project Site

Name	Status	Habitat Type	Occurrence Potential
<i>Thamnophis hammondi</i> Two striped gartersnake	Fed: none CA: SC, S3S4	Distributed along Coastal California from Salinas to Baja. Found in a variety of habitats around perennial freshwater, including marshes, wetlands, swamps, as well as riparian scrub and woodland.	Low. Not observed during survey; minimally suitable habitat present; known from within about 2.5 miles.
BIRDS			
<i>Accipiter cooperii</i> Cooper's hawk	Fed: none CA: WL, S4	Hunts in broken woodland and habitat edges. Nests in dense stands of live oak, riparian deciduous or other forest habitats near water used most frequently. Migrates out of southern Calif. during winter.	Moderate (foraging only). Not observed during surveys; suitable foraging habitat is present.
<i>Agelaius tricolor</i> Tricolored blackbird	Fed: none CA: THR, SC, S1S2	Highly colonial species; requires open water, protected nesting substrate, and foraging areas with insect prey within a few kilometers of colony. Year-round.	Low. Not observed during surveys; minimally suitable nesting and foraging habitat is present.
<i>Aimophila ruficeps canescens</i> Southern California rufous-crowned sparrow	Fed: none CA: S3	Coastal sage scrub, open chaparral; S Calif. and NW Baja Calif.; Year-round.	Low. Not observed during surveys; suitable habitat is present; known from foothills of the San Bernardino Mountains.
<i>Artemisiospiza belli</i> Bell's sage sparrow	Fed: none CA: S3	Coastal sage scrub, chaparral, saltbush scrub, cismontane cent. and S Calif., NW Baja Calif. Active year-round.	Low. Not observed during survey; minimally suitable habitat present; known from within about 3 miles of the survey area.
<i>Athene cunicularia</i> Burrowing owl	Fed: none CA: SC, S3	Nests mainly in rodent burrows, usually in open grassland or shrubland; forages in open habitat; increasingly uncommon in S Calif.; through W US and Mexico.	Moderate. Not observed during survey; suitable habitat is present; known from within about 5 miles of the project site.
<i>Buteo swainsoni</i> Swainson's hawk	Fed: none CA: THR, S3	Breeds in open habitats (e.g., grassland), Central Valley and W Mojave Desert (Calif.) and east to cent. US, S. Canada, New Mexico; winters in S America; Spring–Summer.	Low (migration only). Does not nest in the region; suitable foraging habitat present only; migrates through the region.
<i>Elanus leucurus</i> White-tailed kite	Fed: none CA: S3S4, FP	Typically nests at lower elevations in riparian trees, including oaks, willows, and cottonwoods; forages over open country. Throughout much of cismontane California. Year-round.	Moderate (foraging only). Suitable foraging habitat present; nesting habitat is found elsewhere in region.
<i>Eremophila alpestris actia</i> California horned lark	Fed: none CA: S3	Open, flat lands incl. sparse sagebrush or grassland, meadows, alkali flats; wide elev. range; breeds in western Calif (San Diego Co through Humboldt Co) and Baja Calif; winters in same range.	Moderate (migration only). Does not nest in the region; suitable foraging habitat present only; migrates through the region.
<i>Falco columbarius</i> Merlin	Fed: none CA: S3S4	Uncommon wintering species in S Calif. desert and valleys (breeds in northern N America and Eurasia). Wintering only.	Low (wintering only). Does not nest in the region; suitable foraging habitat present only; winters throughout the region.
<i>Icteria virens</i> Yellow-breasted chat	Fed: none CA: SC, S3	Inhabits riparian thickets of willow and other brushy tangles near water courses; nests in low, dense riparian vegetation; nests and forages within 10 feet of ground.	Low. Not observed during surveys; minimally suitable nesting and foraging habitat is present.
<i>Lanius ludovicianus</i> Loggerhead shrike	Fed: none CA: SC, S4	Woodlands, shrublands, open areas with scattered perch sites; not dense forest; widespread in N America; valley floors to about 7,000 ft. elev. Year-around.	High. Not observed during surveys; suitable nesting and foraging habitat is present; known from numerous records within about 1 mile.

Table 3. Special-Status Wildlife with Potential to Occur Within the Project Site

Name	Status	Habitat Type	Occurrence Potential
<i>Poliophtila californica californica</i> Coastal California gnatcatcher	Fed: FT CA: SC, S2	Coastal sage scrub; will utilize adjacent habitats, including grasslands, chaparral, and riparian habitats for foraging and dispersal; year-round resident.	Low. Not observed during focused surveys; marginally suitable habitat present; known from within about 3 miles of the project site.
<i>Setophaga petechia</i> Yellow warbler	Fed: none CA: SC, S3S4	Riparian vegetation; prefers willows, cottonwoods, aspens, sycamores, and alders for nesting and foraging. Throughout much of southern Calif. Spring-summer.	Low. Not observed during surveys; minimally suitable nesting and foraging habitat is present.
<i>Vireo bellii pusillus</i> Least Bell's vireo	Fed: FE CA: CE , S2	Found in low riparian habitat, including riparian forest, scrub, woodland in Southern California. Found in vicinity to water or dry river beds. Nest in margins and openings of riparian vegetation; Summer resident.	Low. Not observed during surveys; minimally suitable nesting and foraging habitat is present.
MAMMALS			
<i>Antrozous pallidus</i> Pallid bat	Fed: none CA: SC, S3	Desert, grassland, shrubland, woodland, forest; most common in open, dry habitats with rocky areas for roosting. Spring-summer.	Minimal (roosting). No suitable roost sites are present. Moderate (foraging). Suitable foraging habitat is present.
<i>Chaetodipus fallax fallax</i> Northwestern San Diego pocket mouse	Fed: none CA: SC, S3S4	Open shrublands and sandy areas; coastal and interior valleys of SW Calif. (E LA Co., Orange, Riverside, San Bern., San Diego Cos.) and NW Baja Calif.	Present. 18 animals captured on or adjacent to the project site during focused small mammal trapping.
<i>Dipodomys merriami parvus</i> San Bernardino kangaroo rat	Fed: FE CA: SC, S1	Alluvial shrubland; interior valleys of S Calif., Cajon Pass and San Geronio Pass west to Colton area and south to Aguanga.	Present. One individual captured immediately west of the project site during focused small mammal trapping.
<i>Eumops perotis californicus</i> Greater Western mastiff bat	Fed: none CA: SC, S3S4	Lowlands (rare exceptions); cent. and S Calif., S Ariz., NM, SW Tex., N Mexico; roost in deep rock crevices, forage over wide area.	Minimal (roosting). No suitable roost sites are present. Moderate (foraging). Suitable foraging habitat is present.
<i>Lasiurus xanthinus</i> Western yellow bat	Fed: none CA: SC, S3	Mexico and Cent. Amer., north to S AZ; Riv., Imperial and San Diego Cos.; riparian and wash habitats; roosts in trees; evidently migrates from Calif. during winter.	Minimal (roosting). No suitable roost sites are present. Moderate (foraging). Suitable foraging habitat is present.
<i>Lepus californicus bennettii</i> San Diego black-tailed jackrabbit	Fed: none CA: SC, S3S4	Most habitat types, especially shrublands; W Calif. and NW Baja Calif.	High. Not observed during survey; suitable habitat is present; known from the Santa Ana River Wash to the south of the project site.
<i>Neotoma lepida intermedia</i> San Diego desert woodrat	Fed: none CA: SC, S3S4	Coastal scrub with a moderate to dense canopies preferred. Particularly abundant in rock outcrops, rocky cliffs, and slopes. So. California from San Diego to San Luis Obispo Cos.	Present. One individual captured immediately west of the project site during focused small mammal trapping.
<i>Nyctinomops femorosaccus</i> Pocketed tailed bat	Fed: none CA: SC, S3	Deserts and arid lowlands, SW US, Baja Calif., mainland Mexico; Roost mainly in crevices of high cliffs; forage over water and open shrubland.	Minimal (roosting). No suitable roost sites are present. Moderate (foraging). Suitable foraging habitat is present.
<i>Perognathus longimembris brevinasus</i> Los Angeles pocket mouse	Fed: none CA: SC, S1S2	Open shrublands, grasslands; often sandy alluvial benches; S Calif. valleys, LA, SW San Bernardino and W Riverside Cos.	Present. Two individuals were captured in focused trapping in August 2018. One individual was within the project site and one was just outside of the project site.

Table 3. Special-Status Wildlife with Potential to Occur Within the Project Site

Name	Status	Habitat Type	Occurrence Potential
<i>Taxidea taxus</i> American badger	Fed: none CA: S3, CSC	Mountains, deserts, interior valleys where burrowing animals are avail as prey and soil allows digging; throughout cent and W N America. Year-round	Low. Marginally suitable habitat present, no recent occurrences in project vicinity.

See Table 2 for definition of Conservation Status and Occurrence Probability.

Source: American Ornithologists' Union, 1998; CDFW, 2019; ebird.org, 2019; Feldhamer et al., 2003; Garrett and Dunn, 1981; Grinnell and Miller, 1944; Hall, 1981; Harvey et al., 1999; Hatfield et al., 2015; iNaturalist, 2019; Jennings and Hayes, 1994; Nafis, 2019; Parham and Papenfuss, 2013; Pianka, 1970; Wilson and Ruff, 1999; and Zeiner et al., 1990.

5.2.1 Listed Threatened or Endangered Wildlife

San Bernardino kangaroo rat (*Dipodomys merriami parvus*). San Bernardino kangaroo rat was proposed for emergency listing as endangered under the FESA in 1998 (USFWS, 1998), followed by a Final Rule issued later that year (USFWS, 1998). It is one of three subspecies of the more common Merriam's kangaroo rat (*Dipodomys merriami*) found in California. The San Bernardino kangaroo rat is a small, burrowing rodent that occupies alluvial floodplains and adjacent upland habitats along the Santa Ana River and Lytle, Cajon, and Cable Creeks in San Bernardino County and the San Jacinto River and Bautista Creek in Riverside County. It is generally associated with Riversidean alluvial fan sage scrub (USFWS, 2009).

San Bernardino kangaroo rat is primarily nocturnal and lives in burrow systems (precincts), which are typically occupied by a single adult or female with young. This species is nocturnal and eats mainly seeds, supplementing its diet with insects and vegetation (USFWS, 2009).

Kangaroo rat populations typically experience large fluctuations in response to changes in plant productivity, often related to annual variation in rainfall. The areas which San Bernardino kangaroo rat occupies are subject to periodic flooding, which may destroy burrows, drown animals, and scour out food sources. Therefore, local survival of the species depends on the presence of animals in nearby occupied habitat that is not damaged by stormflows, typically alluvial terraces or benches in areas elevated above the main channel and supporting a vegetation community comprised mainly of shrubs and short-lived perennial plant species. Preservation of San Bernardino kangaroo rat populations depends on maintaining the hydrologic regime in the alluvial fans that support its habitat and retaining habitat connectivity between upland terraces and the alluvial floodplain (USFWS, 2009).

San Bernardino kangaroo rat is known from several locations in the Santa Ana River Wash near the project site (CDFW, 2019). San Bernardino kangaroo rats were not captured within the project site in 2018 but were captured in 2019 when the trapping area was expanded into adjacent natural habitats. One individual was captured in a trap, approximately 90 feet from the project site (see Photo 2 in Attachment 2). San Bernardino kangaroo rat may occasionally forage within the project footprint, but are not expected to burrow within the project site.

Coastal California gnatcatcher (*Poliophtila californica californica*). Coastal California gnatcatcher was listed as federally threatened in 1993 (USFWS, 1993). It inhabits coastal sage scrub in low-lying foothills and valleys up to about 2,000 feet elevation in southwestern California and Baja California year-round. Coastal California gnatcatchers may also occur in chaparral or other habitats adjacent to occupied coastal sage scrub, for foraging and dispersal but they are tied to coastal sage scrub for reproduction (USFWS 2010a). They are typically associated with coastal sage scrub plants such as California sagebrush, California buckwheat, sunflowers (*Encelia* spp.), and sages (*Salvia* spp.) (USFWS 2010a).

Coastal California gnatcatcher are known to nest in the Santa Ana River Wash, just north of the Redland Airport, about 2.3 miles of the project site. Within the Santa Ana River Wash, they tend to nest in coastal sage scrub that is dominated by brittlebush (*Encelia farinosa*) and California buckwheat. They are likely to expand their range in the wash in the future but at this time they are limited to this southern bench within the wash. Focused surveys were conducted within the project site in late 2018 and early 2019 and during May and June of 2010 and no coastal California gnatcatchers were observed (Carter, 2019 and Brandman, 2011). No CAGN were determined to be on site.

5.2.2 CDFW Species of Special Concern

Southern California legless lizard (*Anniella stebbinsi*). Southern California legless lizard is found throughout much of coastal southern California. It is found in a variety of habitats including broadleaved upland forest, chaparral, coastal dunes, and coastal scrub. It is largely fossorial, and its preferred micro-habitat is loose sandy soils (CDFW, 2019). It has been reported from numerous locations within the Santa Ana River Wash including one record within less than 0.5 miles of the project site. Although not observed during the surveys, there is a moderate potential for this species to be present.

California glossy snake (*Arizona elegans occidentalis*). California glossy snake has a patchy distribution in California that includes eastern portions of the San Francisco Bay, the southern San Joaquin Valley, the Coast and Transverse Ranges, and south along the Peninsular ranges into Baja California (CDFW, 2019). It lives in a variety of scrub and grassland habitats. It has been reported from numerous locations within the Santa Ana River Wash including one record within less than 2.0 miles of the project site. During 2019, Mr. Wood also observed a roadkill California glossy snake on Greenspot Road near Plunge Creek, within about 1.3 miles of the project site. Although not observed during the surveys, there is a high potential for this species to be present.

Coast horned lizard (*Phrynosoma blainvillii*). Coast horned lizard is found throughout much of coastal southern California, inland as far as the southern Mojave Desert and to about 6000 feet elevation in the mountains. Coast horned lizards occur in sandy soils in a variety of shrubland, grassland, and woodland habitat types. They have been extirpated from much of their historic range by land use changes, but they remain fairly common in natural open space areas where their primary prey (native ants) are found. They have been documented in the Santa Ana River Wash to the south of the project site. Suitable habitat is present and there is a moderate potential for them to be present within the project site.

Coastal whiptail (*Aspidoscelis tigris stejnegeri*). Coastal western whiptail is a CDFW Species of Special Concern. It occurs in woodlands, chaparral, washes, and annual grasslands. It is most common in dense vegetation but are also found around sandy areas along gravelly arroyos or washes. It is found in coastal southern California, mostly west of the Peninsular Ranges and south of the Transverse Ranges. Its range extends north into Ventura County and south to Baja California. Coastal whiptail is known from numerous locations throughout the Santa Ana River Wash and is expected to be present within the project site.

Burrowing owl (*Athene cunicularia*). The burrowing owl is a CDFW Species of Special Concern and, as a native bird, is protected by the federal Migratory Bird Treaty Act (MBTA) and the California Fish and Game Code. It is a small, terrestrial owl of open country. During the breeding season, it ranges throughout most of the western U.S. It occurs year-round in southern California, but may be more numerous during fall and winter, when migratory individuals from farther north join the regional resident population. Burrowing owl favors flat, open annual or perennial grassland or gentle slopes and sparse shrub or tree cover. It uses the burrows of ground squirrels and other rodents for shelter and nesting, and availability of suitable burrows is an important habitat component. Where ground squirrel burrows are not available, the owl may use alternate burrow sites or man-made features such as drain pipes, debris piles, or concrete slabs.

Burrowing owl nesting season, as recognized by the California Burrowing Owl Consortium (CBOC, 1993), is 1 February through 31 August. The nearest record of burrowing owl is about 5 miles west of the project site, near the San Bernardino International Airport. No burrowing owl or burrowing owl sign was observed within the project site during the surveys; however, suitable burrows were observed and there is a moderate potential for burrowing owls to be present in the future.

Loggerhead shrike (*Lanius ludovicianus*). Loggerhead shrike is a widespread bird of arid environments in southern California. It is found in a variety of habitats including woodlands, savannahs, pinyon-juniper Joshua tree woodlands, and riparian woodlands. It is also frequently found in open shrubland and grassland habitats. Loggerhead shrike have been reported from dozens of locations in the Santa Ana River Wash including along Plunge Creek about 1.3 miles to the east. Although not observed during the surveys, there is a high potential for this species to forage and nest on or adjacent to the project site.

Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*). The northwestern San Diego pocket mouse is a small burrowing rodent found in areas with rocky or gravelly soil in coastal sage scrub, alluvial fan sage scrub, chaparral, desert scrub, and scrub-grassland ecotones. It may be fairly common in suitable habitats. It occurs in Orange County and western San Diego, Riverside and San Bernardino counties. It feeds primarily on grass seeds, and is active nocturnally (Hall, 1981). Habitat within the project site and several individuals we captured in and adjacent to the project site.

San Diego desert woodrat (*Neotoma lepida intermedia*). San Diego desert woodrat is known from coastal and desert scrub and rocky outcrops throughout much of southern California (CDFW, 2019). It frequently builds large middens (piles of sticks and debris arranged to form a shelter) in rock outcrops or around the bases of shrubs. In some portions of its range it builds middens primarily at the bases of cactus (*Opuntia* spp.) and yucca (*Yucca* spp.) plants (Feldhamer et al., 2003). Habitat within the project site is suitable and one individual was captured during the surveys just to the west of Church Channel. San Diego desert woodrat is likely to forage within the project site and may also construct middens within the project site.

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). San Diego black-tailed jackrabbit is found in arid scrub and grassland habitats in coastal portions of Los Angeles, Riverside, and San Bernardino counties. It inhabits open land but requires some shrubs for cover. The San Diego black-tailed jackrabbit does not typically use burrows; shallow depressions under shrubs are used for nesting. It is primarily nocturnal and feeds on grasses, forbs, and shrubs (Hall, 1981). Suitable habitat is present on the project site and this species has been reported from the region. There is a moderate potential for San Diego black-tailed jackrabbit to be present in the future.

Los Angeles pocket mouse (*Perognathus longimembris brevinasus*). Los Angeles pocket mouse is one of eight subspecies of the little pocket mouse (*Perognathus longimembris*) in California. This small burrowing rodent hibernates in the winter, generally from October to February, and also enters periods of torpor. It feeds mainly on seeds, and also forbs and insects. Its habitat is lower elevation grassland, alluvial sage scrub, and coastal sage scrub (Brylski, 1998). This species historically occurred in the coastal basins of southern California, from the San Fernando Valley East to Cabazon, south through the San Jacinto and Temecula Valleys. However, it has been extirpated from most or all of the San Fernando and San Bernardino valleys. The species is still uncommon to common at various localities from the base of the San Bernardino Mountains east to Cabazon and south to Temecula and the surrounding foothills. However, habitat has been fragmented by development and many extant populations are small and disjunct, and in danger of extirpation (Brylski, 1998). Habitat on the project site is suitable for Los Angeles pocket mouse and two individuals were captured during focused trapping late 2018. One of these was captured within the project site and one was just northwest of the project site along Church Channel.

Bats. Four special-status bat species have a moderate potential to forage over the survey area: pallid bat (*Antrozous pallidus*), western yellow bat (*Lasiurus xanthinus*), greater western mastiff bat (*Eumops perotis californicus*), and pocketed free-tailed bat (*Nyctinomops femorosaccus*). All four of these bats forage over riparian or scrub habitats. These species all have a moderate potential to forage over the project site. These species are not expected to roost in the project site because there is no suitable roosting habitat.

5.2.3 Other Special-status Wildlife Species

Raptors: Several special-status birds of prey are found seasonally in the region, especially during winter and during migration. These are Cooper's hawk (*Accipiter cooperii*; CDFW Watch List species), and white-tailed kite (*Elanus leucurus*; CDFW fully protected). Suitable winter or migratory season foraging habitat for these raptors is widely available throughout the region. These species, if present may forage on the Project site but would not nest because of a lack of suitable habitat.

Other special-status birds: One additional special-status bird species is reported from the surrounding area (CDFW, 2019; Table 2): California horned lark (*Eremophila alpestris actia*; CDFW Watch List Species). This species was not observed on the Project site during field surveys. California horned lark are known from throughout the region and this species is likely to forage on the project site but is not expected to nest on the project site.

5.3 Designated Critical Habitat

Critical habitat for San Bernardino kangaroo rat is present in the southern portion of the project site (USFWS, 2008). Critical habitat for Santa Ana sucker is present in the Santa Ana River, approximately 1.2 miles to the south of the project site (USFWS, 2010b). All other designated critical habitat in the region is more than five miles from the project site.

5.4 Wildlife Movement

The ability for wildlife to move freely among populations and habitat areas is important to long-term genetic variation and demography. Fragmentation and isolation of natural habitat may cause loss of native species diversity in fragmented habitats. In the short term, wildlife movement may also be important to individual animals' ability to occupy their home ranges, if their ranges extend across a potential movement barrier. These considerations are especially important for rare, threatened, or endangered species, and wide-ranging species such as large mammals, which exist in low population densities.

The California Essential Habitat Connectivity Project was commissioned by the California Department of Transportation (Caltrans) and CDFW to create a statewide assessment of essential habitat connectivity to be used for conservation and infrastructure planning (Caltrans and CDFW, 2010). One of its goals was to create the Essential Connectivity Map, which depicts large, relatively natural habitat blocks that support native biodiversity (natural landscape blocks) and areas essential for ecological connectivity between them (essential connectivity areas). This map does not reflect the needs of particular species but is based on overall biological connectivity and ecological integrity. A more detailed analysis is required to assess local and regional needs for connectivity and develop linkage designs based on the requirements of individual species (Caltrans and CDFW, 2010).

The Essential Connectivity Map (Caltrans and CDFW, 2010) identifies the San Bernardino Mountains approximately 1.3 miles to the north of the project site as a natural landscape block. It also maps a portion of the foothills to the north as an essential connectivity area to allow movement along the base of the San Bernardino Mountains. The project site is largely within an urbanized environment with some native intact

habitat and open space to the south. The project site provides localized wildlife movement opportunity, but fences, paved roads, residential development, and infrastructure greatly reduce the potential for wildlife movement in the area. The project site is likely to be used by local wildlife to move up and down the Elder Creek and Church Channels and between some other areas of open space. It is not expected to be used for regional migration. Additionally, the nature of the project would not present a barrier to terrestrial wildlife movement.

5.5 Nesting Birds

Nesting birds are protected under the federal MBTA and California Fish and Game Code Sections 3503, 3503.5, and 3513 which prohibit take of migratory birds, including eggs or active nests, except as permitted by regulation (e.g., licensed hunting). No birds were nesting in the survey area at the time of the survey, but several bird species were present, and are likely to nest there in some years. These include Anna's hummingbird (*Calypte anna*), black phoebe (*Sayornis nigricans*), and killdeer (*Charadrius vociferus*). Many other common birds such as lesser goldfinch (*Spinus psaltria*), and mallard (*Anas platyrhynchos*) are also expected to nest within the project site.

6. Summary

San Bernardino kangaroo rat and Santa Ana River woollystar are the only listed species determined to be present in the habitat adjacent to the project site. No other State or federally listed species were present but several have at least a moderate potential to be present.

Northwestern San Diego pocket mouse, Los Angeles pocket mouse, and San Diego desert woodrat were the only CDFW Species of Special Concern that were observed during the surveys. Several additional species have at least a moderate potential to be present including the following:

- Southern California legless lizard
- California glossy snake
- Coast horned lizard
- Coastal whiptail
- Burrowing owl
- Cooper's hawk
- White-tailed kite
- California horned lark
- Loggerhead shrike
- San Diego black-tailed jackrabbit

Several additional special-status plants have at least a moderate potential to be present including Parry's spineflower, Plummer's mariposa-lily, and Robinson's pepper-grass.

Two of the vegetation types that are present within the project site are likely to be considered sensitive natural communities by CDFW although they are not ranked as sensitive by CNPS. The survey area is not within any designated wildlife corridors and is not likely to serve as a significant wildlife movement route, although it may be used as a forage or dispersal area for wildlife in the immediate vicinity.

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Attachment 1 - Figures

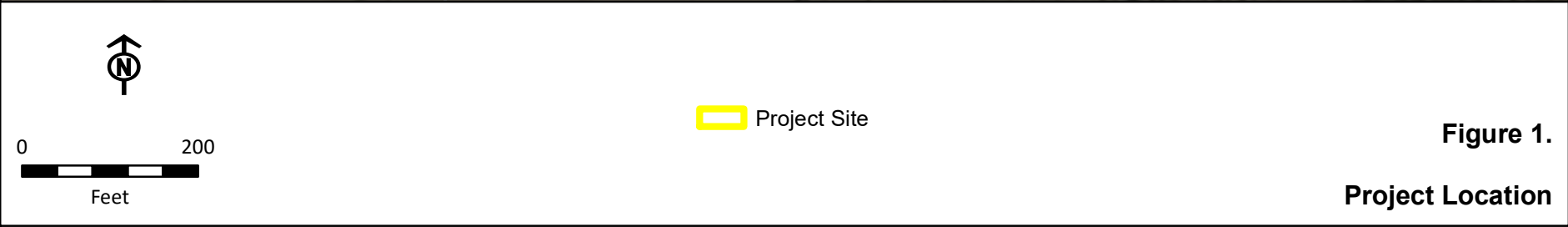
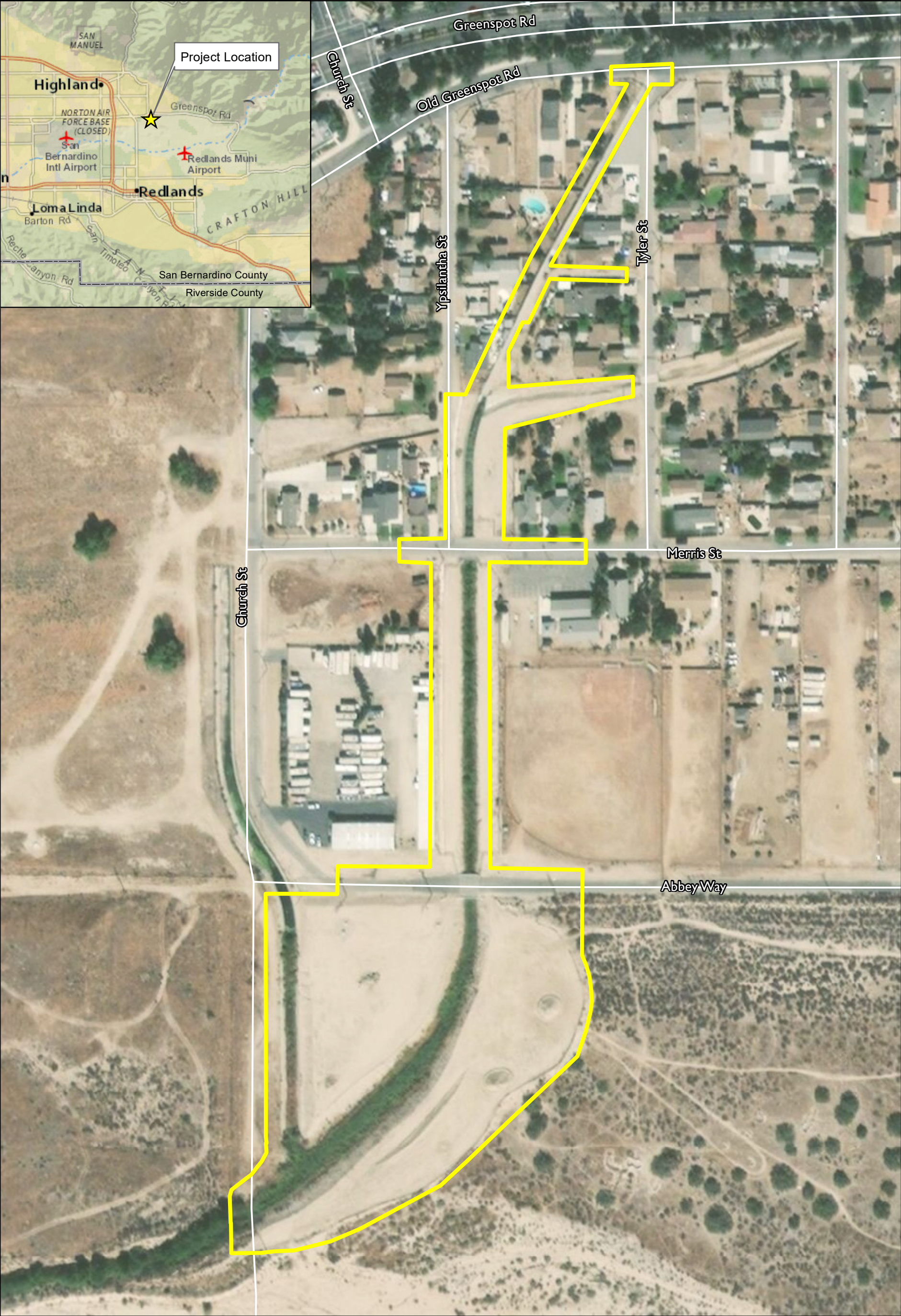


Figure 1.
Project Location

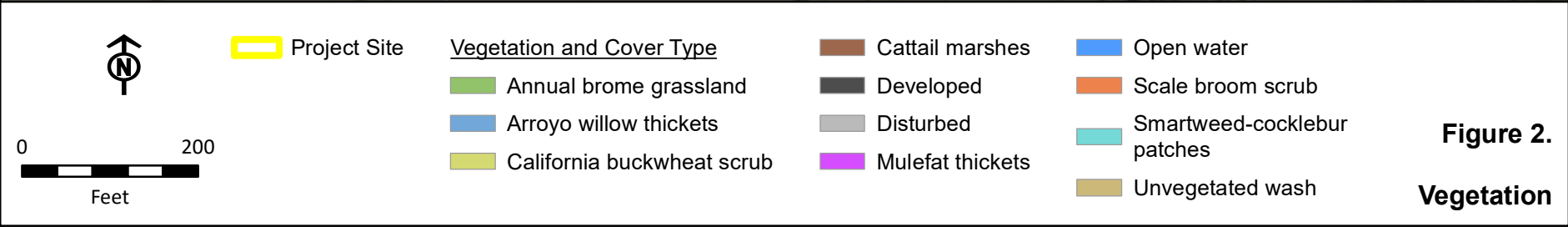
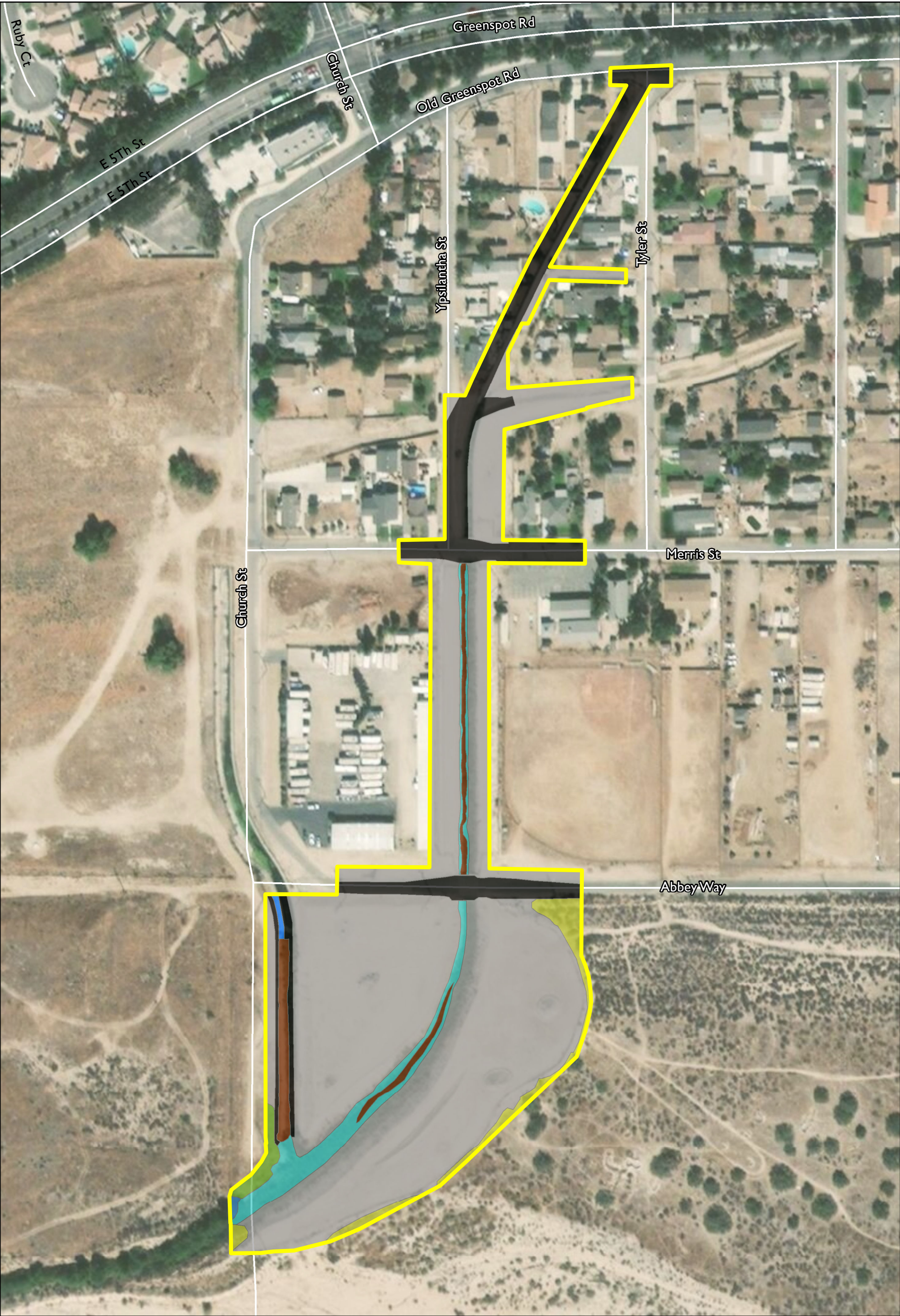
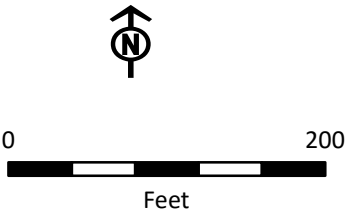


Figure 2.
Vegetation



- Project Site
- Santa Ana River woollystar
- Los Angeles pocket mouse
- San Bernardino kangaroo rat

Figure 3.

Biological Resources

Attachment 2 – Representative Site Photos



Photo 1: North-facing view Elder Creek Chanel just upstream of Abbey Way.



Photo 2: West-facing view of Santa Ana River woollystar just west of the project site. This is the same general location where a San Bernardino kangaroo rat was captured.



Photo 3: Northeast-facing view of the upland vegetation along the project site that may be temporarily impacted by the project.



Photo 4: West-facing view of upland vegetation that may be temporarily impacted by project construction.

Attachment 3 – Observed Species List

Attachment 3. Observed Species List

Latin Name	Common Name
Vascular Plants	
CUPRESSACEAE	CYPRESS FAMILY
<i>Juniperus californica</i>	California juniper
AMARANTHACEAE	AMARANTH FAMILY
<i>Amaranthus blitoides</i>	Prostrate pigweed
ANACARDIACEAE	CASHEW FAMILY
<i>Rhus ovata</i>	Sugarbush
ASTERACEAE	ASTER FAMILY
<i>Ambrosia acanthicarpa</i>	Annual bur-sage
<i>Artemisia californica</i>	California sagebrush
<i>Artemisia douglasiana</i>	Mugwort
<i>Artemisia dracunculus</i>	Tarragon
<i>Baccharis salicifolia</i>	Mule fat
<i>Bebbia juncea</i>	Sweetbush
<i>Bidens frondosa</i>	Sticktight
<i>Chaenactis glabriuscula</i>	Common yellow chaenactis
<i>Eclipta prostrata</i>	False daisy
<i>Encelia farinosa</i>	Brittlebush
<i>Erigeron bonariensis</i>	Flax-leaved horseweed
<i>Helianthus annuus</i>	Hairy leaved sunflower
<i>Heterotheca grandiflora</i>	Telegraph weed
<i>Heterotheca sessiliflora</i>	Golden aster
* <i>Hypochaeris glabra</i>	Smooth cats ear
* <i>Lactuca serriola</i>	Prickly lettuce
<i>Lasthenia coronaria</i>	Royal goldfields
<i>Lepidospartum squamatum</i>	Scale-broom
<i>Lessingia glandulifera</i> var. <i>glandulifera</i>	Sticky lessingia
<i>Logfia filaginoides</i>	California cottonrose
* <i>Logfia gallica</i>	Narrowleaf cottonrose
* <i>Sonchus asper</i>	Prickly sow thistle
<i>Stephanomeria pauciflora</i>	Wire lettuce
<i>Symphyotrichum subulatum</i>	Eastern annual saltmarsh aster
<i>Uropappus lindleyi</i>	Silver puffs
<i>Xanthium strumarium</i>	Cocklebur
BORAGINACEAE	BORAGE FAMILY
<i>Amsinckia intermedia</i>	Common fiddleneck
<i>Cryptantha intermedia</i>	Common cryptanth
<i>Emmenanthe penduliflora</i>	Whispering bells
<i>Eriodictyon trichocalyx</i>	Hairy yerba santa
<i>Pectocarya penicillata</i>	Winged pectocarya
<i>Phacelia distans</i>	Common phacelia
<i>Phacelia minor</i>	Wild canterbury bells
<i>Phacelia ramosissima</i>	Branching phacelia
<i>Plagiobothrys canescens</i>	Valley popcorn
BRASSICACEAE	MUSTARD FAMILY
* <i>Brassica fruticulosa</i>	Mediterranean cabbage
* <i>Brassica tournefortii</i>	Saharan mustard
* <i>Hirschfeldia incana</i>	Shortpod mustard
* <i>Lepidium didymum</i>	Lesser swine cress
<i>Lepidium nitidum</i>	Shining pepper grass

Attachment 3. Observed Species List

Latin Name	Common Name
<i>Nasturtium officinale</i>	Water cress
* <i>Raphanus sativus</i>	Jointed charlock
CACTACEAE	CACTUS FAMILY
<i>Cylindropuntia californica</i> var. <i>parkeri</i>	Brownspined pricklypear
<i>Opuntia vaseyi</i>	Vasey's prickly pear
CARYOPHYLLACEAE	PINK FAMILY
<i>Loeflingia squarrosa</i>	Spreading loeflingia
* <i>Stellaria media</i>	Chickweed
CHENOPODIACEAE	GOOSEFOOT FAMILY
<i>Chenopodium album</i>	Lambs quarters
<i>Chenopodium berlandieri</i>	Pit seed goosefoot
<i>Chenopodium</i> sp.	Unid. goosefoot
* <i>Dysphania ambrosioides</i>	Mexican tea
* <i>Salsola tragus</i>	Russian thistle
CONVOLVULACEAE	MORNING-GLORY FAMILY
<i>Calystegia</i> sp.	Unid. Morning-glory
CRASSULACEAE	STONECROP FAMILY
<i>Crassula connata</i>	Sand pygmy weed
EUPHORBIACEAE	SPURGE FAMILY
<i>Croton californicus</i>	California croton
* <i>Euphorbia maculata</i>	Spotted spurge
* <i>Ricinus communis</i>	Castor bean
FABACEAE	LEGUME FAMILY, PEA FAMILY
<i>Acmispon glaber</i>	Deerweed
* <i>Bauhinia variegata</i>	Mountain ebony
<i>Lupinus hirsutissimus</i>	Stinging lupine
<i>Lupinus truncatus</i>	Blunt leaved lupine
* <i>Mellilotus albus</i>	White sweetclover
* <i>Spartium junceum</i>	Spanish broom
GERANIACEAE	CERANIUM FAMILY
<i>Erodium botrys</i>	Big heron bill
LAMIACEAE	MINT FAMILY
* <i>Lamium amplexicaule</i>	Henbit
<i>Salvia columbariae</i>	Chia
LEMNACEAE	DUCKWEED FAMILY
<i>Lemna minuta</i> (?)	Least duckweed
LYTHRACEAE	LOOSESTRIFE FAMILY
<i>Ammannia coccinea</i>	Red ammannia
MALVACEAE	MALLOW FAMILY
* <i>Malva parviflora</i>	Cheeseweed
MORACEAE	FIG FAMILY
* <i>Morus alba</i>	White mulberry
ONAGRACEAE	EVENING-PRIMROSE FAMILY
<i>Camissoniopsis bistorta</i>	California sun cup
<i>Epilobium ciliatum</i>	Willow-herb
<i>Eulobus californicus</i>	California primrose
<i>Oenothera elata</i> ssp. <i>hirsutissima</i>	Great marsh evening primrose
PAPAVERACEAE	POPPY FAMILY
<i>Dendromecon rigida</i>	Bush poppy
PHRYMACEAE	LOPSEED FAMILY
<i>Erythranthe cardinalis</i>	Cardinal monkey flower

Attachment 3. Observed Species List

Latin Name	Common Name
<i>Erythranthe guttata</i>	Seep monkeyflower
PLANTAGINACEAE	PLANTAIN FAMILY
* <i>Plantago lanceolata</i>	English plantain, rib-grass
* <i>Veronica anagallis-aquatica</i>	Water speedwell
PLATANACEAE	SYCAMORE FAMILY
<i>Platanus racemosa</i>	California sycamore
POLEMONIACEAE	PHLOX FAMILY
** <i>Eriastrum densifolium</i> ssp. <i>sanctorum</i>	Santa Ana River woollystar
POLYGONACEAE	BUCKWHEAT FAMILY
<i>Eriogonum elongatum</i>	Longstem buckwheat
<i>Eriogonum fasciculatum</i>	California buckwheat
<i>Eriogonum gracile</i> var. <i>gracile</i>	Slender buckwheat
<i>Lastarriaea coriacea</i>	Leather spineflower
<i>Persicaria lapathifolium</i>	Willow weed, willow smartweed
<i>Persicaria punctata</i>	Dotted smartweed
* <i>Polygonum aviculare</i>	Common knotweed
* <i>Rumex crispus</i>	Curly dock
PORTULACACEAE	PURSLANE FAMILY
* <i>Portulaca oleracea</i>	Common purslane
RHAMNACEAE	BUCKTHORN FAMILY
<i>Rhamnus crocea</i>	Redberry
SALICACEAE	WILLOW FAMILY
<i>Populus fremontii</i>	Fremont cottonwood
<i>Salix exigua</i>	Narrow-leaf willow
<i>Salix gooddingii</i>	Goodding's black willow
<i>Salix laevigata</i>	Red willow
<i>Salix lasiandra</i>	Pacific willow
<i>Salix lasiolepis</i>	Arroyo willow
SAPINDACEAE	SOAPBERRY FAMILY
* <i>Koelreuteria bipinnata</i>	Goldenrain tree
SCROPHULARIACEAE	FIGWORT FAMILY
* <i>Verbascum thapsus</i>	Woolly mullein
* <i>Verbascum virgatum</i>	Wand mullein
SIMAROUBACEAE	QUASSIA FAMILY
* <i>Ailanthus altissima</i>	Tree of heaven
SOLANACEAE	NIGHTSHADE FAMILY
<i>Datura wrightii</i>	Jimsonweed, tolguacha
* <i>Nicotiana glauca</i>	Tree tobacco
<i>Solanum</i> sp.	Unid. Nightshade
TAMARICACEAE	TAMARISK FAMILY
* <i>Tamarix ramosissima</i>	Tamarisk
ZYGOPHYLLACEAE	CALTROP FAMILY
* <i>Tribulus terrestris</i>	Puncture vine
ARECACEAE	PALM FAMILY
* <i>Washingtonia robusta</i>	Mexican fan palm
CYPERACEAE	SEDGE FAMILY
<i>Cyperus eragrostis</i>	Tall umbrella sedge
<i>Cyperus esculentus</i>	Nut grass
* <i>Cyperus niger</i>	Black flatsedge
<i>Eleocharis acicularis</i>	Needle spikerush
POACEAE	GRASS FAMILY

Attachment 3. Observed Species List

Latin Name	Common Name
* <i>Agrostis stolonifera</i>	Redtop
* <i>Avena fatua</i>	Wild oat
* <i>Bromus catharticus</i>	Rescue grass
* <i>Bromus diandrus</i>	Ripgut brome
* <i>Bromus hordeaceus</i>	Soft chess
* <i>Bromus madritensis ssp. rubens</i>	Red brome
* <i>Bromus tectorum</i>	Downy chess
* <i>Cynodon dactylon</i>	Bermuda grass
* <i>Digitaria sanguinalis</i>	Crabgrass
* <i>Echinochloa colona</i>	Jungle rice
* <i>Eragrostis cilianensis</i>	Stinkgrass
* <i>Festuca perennis</i>	Awed Italian ryegrass
* <i>Festuca myuros</i>	Rattail sixweeks grass
<i>Hordeum sp.</i>	Unid. Barley
* <i>Leptochloa fusca ssp. uninervia</i>	Mexican sprangletop
* <i>Paspalum dilatatum</i>	Dallis grass
* <i>Polypogon monspeliensis</i>	Rabbitsfoot grass
* <i>Polypogon viridis</i>	Water bentgrass
* <i>Setaria parviflora</i>	Marsh bristlegrass
* <i>Sorghum halepense</i>	Johnsongrass
* <i>Stenotaphrum secundatum</i>	St. Augustine grass
* <i>Piptatherum miliaceum</i>	Smilgrass
THEMIDACEAE	BRODIAEA FAMILY
<i>Dichelostemma capitatum</i>	Blue dicks
TYPHACEAE	CATTAIL FAMILY
<i>Typha domingensis</i>	Cattail
<i>Typha latifolia</i>	Broad-leaved cattail
VERTEBRATE ANIMALS	
REPTILIA	REPTILES
HYLIDAE	TRUE TREEFROGS
<i>Pseudacris regilla</i>	Pacific chorus frog
PHRYNOSOMATIDAE	LIZARDS
<i>Sceloporus occidentalis</i>	Western fence lizard
<i>Uta stansburiana</i>	Side-blotched lizard
VIPERIDAE	RATTLESNAKES
<i>Crotalus oreganus helleri</i>	Southern Pacific rattlesnake
AVES	BIRDS
CHARADRIIDAE	PLOVERS
<i>Charadrius vociferus</i>	Killdeer
ANATIDAE	DUCKS
<i>Anas platyrhynchos</i>	Mallard
GALLIFORMES	NEW WORLD QUAIL
<i>Callipepla californica</i>	California quail
ACCIPITRIDAE	HAWKS, EAGLES, HARRIERS
<i>Buteo jamaicensis</i>	Red-tailed hawk
<i>Falco sparverius</i>	American kestrel
COLUMBIDAE	PIGEONS, DOVES
* <i>Columba livia</i>	Rock dove

Attachment 3. Observed Species List

Latin Name	Common Name
<i>Zenaida macroura</i>	Mourning dove
CORVIDAE	CROWS, JAYS, MAGPIES
<i>Corvus corax</i>	Common raven
<i>Aphelocoma californica</i>	California scrub-jay
TROCHILIDAE	HUMMINGBIRDS
<i>Calypte anna</i>	Anna's hummingbird
HIRUNDINIDAE	SWALLOWS
<i>Stelgidopteryx serripennis</i>	Northern rough-winged swallow
TYRANNIDAE	TYRANT FLYCATCHERS
<i>Sayornis nigricans</i>	Black phoebe
<i>Sayornis saya</i>	Say's phoebe
<i>Tyrannus vociferans</i>	Cassin's Kingbird
FRINGILLIDAE	FINCHES
<i>Carduelis psaltria</i>	Lesser goldfinch
<i>Carpodacus mexicanus</i>	House finch
TROGLODITIDAE	WRENS
<i>Thryomanes bewickii</i>	Bewick's wren
POLIOPTILIDAE	GNATCATCHERS
<i>Poliophtila caerulea</i>	Blue-gray gnatcatcher
MIMIDAE	MIMIDS
<i>Mimus polyglottos</i>	Northern mockingbird
STURNIDAE	STARLINGS
<i>Sturnis vulgaris</i>	European Starling
EMBERIZIDAE	SPARROWS AND TANAGERS
<i>Melospiza melodia</i>	Song sparrow
<i>Melozona crissalis</i>	California towhee
<i>Zonotrichia leucophrys</i>	White-crowned sparrow
ICTERIDAE	ORIOLES, BLACKBIRDS
<i>Agelaius phoeniceus</i>	Red-winged Blackbird
PASSERIDAE	OLD WORLD SPARROWS
<i>Passer domesticus</i>	House sparrow
MAMMALIA	
CRICETIDAE	VOLES, RATS, MICE
** <i>Neotoma lepida intermedia</i>	Desert woodrat
<i>Peromyscus fraterculus</i>	Northern Baja deer mouse
<i>Peromyscus maniculatus</i>	Deer mouse
<i>Reithrodontomys megalotis</i>	Western harvest mouse
HETEROMYIDAE	KANGAROO RATS, POCKET MICE
** <i>Chaetodipus fallax fallax</i>	Northwest San Diego pocket mouse
** <i>Dipodomys merriami parvus</i>	San Bernardino kangaroo rat
** <i>Perognathus longimembris brevinasus</i>	Los Angeles pocket mouse
LAGOMORPHIDAE	RABBITS, HARES
<i>Sylvilagus audubonii</i>	Desert cottontail
SCIURIDAE	SQUIRRELS
<i>Otospermophilus beecheyi</i>	California ground squirrel

Attachment 3. Observed Species List

Latin Name	Common Name
PROCYONIDAE	RACOONS AND RINGTAILS
<i>Procyon lotor</i>	Raccoon
CANIDAE	DOGS, WOLVES, COYOTES
* <i>Canis familiaris</i>	Domestic dog
<i>Canis latrans</i>	Coyote

Species introduced to California are indicated by an asterisk. Special-status species are indicated by two asterisks. This list includes only species observed within the survey area. Other species may have been overlooked or unidentifiable due to season. Plants were identified using keys, descriptions, and illustrations in Baldwin et al (2012) and other regional references. Wildlife taxonomy and nomenclature generally follow Stebbins (2003) for amphibians and reptiles, AOU (1998) for birds, and Wilson and Ruff (1999) for mammals.

Attachment 4 – CNDDDB Query Results



Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database



Query Criteria: Quad< IS (Keller Peak (3411721) OR Harrison Mtn. (3411722) OR Redlands (3411712) OR Yucaipa (3411711) OR San Bernardino South (3411713) OR San Bernardino North (3411723))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<i>Accipiter cooperii</i> Cooper's hawk	ABNKC12040	None	None	G5	S4	WL
<i>Agelaius tricolor</i> tricolored blackbird	ABPBXB0020	None	Threatened	G2G3	S1S2	SSC
<i>Aimophila ruficeps canescens</i> southern California rufous-crowned sparrow	ABPBX91091	None	None	G5T3	S3	WL
<i>Allium howellii</i> var. <i>clokeyi</i> Mt. Pinos onion	PMLIL02161	None	None	G4T2	S2	1B.3
<i>Anniella stebbinsi</i> southern California legless lizard	ARACC01060	None	None	G3	S3	SSC
<i>Antrozous pallidus</i> pallid bat	AMACC10010	None	None	G5	S3	SSC
<i>Arenaria paludicola</i> marsh sandwort	PDCAR040L0	Endangered	Endangered	G1	S1	1B.1
<i>Arizona elegans occidentalis</i> California glossy snake	ARADB01017	None	None	G5T2	S2	SSC
<i>Artemisiospiza belli belli</i> Bell's sage sparrow	ABPBX97021	None	None	G5T2T3	S3	WL
<i>Aspidoscelis hyperythra</i> orange-throated whiptail	ARACJ02060	None	None	G5	S2S3	WL
<i>Aspidoscelis tigris stejnegeri</i> coastal whiptail	ARACJ02143	None	None	G5T5	S3	SSC
<i>Astragalus hornii</i> var. <i>hornii</i> Horn's milk-vetch	PDFAB0F421	None	None	G4G5T1T2	S1	1B.1
<i>Athene cunicularia</i> burrowing owl	ABNSB10010	None	None	G4	S3	SSC
<i>Baeolophus inornatus</i> oak titmouse	ABPAW01100	None	None	G4	S4	
<i>Batrachoseps gabrieli</i> San Gabriel slender salamander	AAAAD02110	None	None	G2G3	S2S3	
<i>Berberis nevinii</i> Nevin's barberry	PDBER060A0	Endangered	Endangered	G1	S1	1B.1
<i>Bombus crotchii</i> Crotch bumble bee	IIHYM24480	None	None	G3G4	S1S2	
<i>Bombus morrisoni</i> Morrison bumble bee	IIHYM24460	None	None	G4G5	S1S2	
<i>Brodiaea filifolia</i> thread-leaved brodiaea	PMLIL0C050	Threatened	Endangered	G2	S2	1B.1



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Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<i>Buteo swainsoni</i> Swainson's hawk	ABNKC19070	None	Threatened	G5	S3	
<i>Calochortus palmeri</i> var. <i>palmeri</i> Palmer's mariposa-lily	PMLIL0D122	None	None	G3T2	S2	1B.2
<i>Calochortus plummerae</i> Plummer's mariposa-lily	PMLIL0D150	None	None	G4	S4	4.2
<i>Canyon Live Oak Ravine Forest</i> Canyon Live Oak Ravine Forest	CTT61350CA	None	None	G3	S3.3	
<i>Carex comosa</i> bristly sedge	PMCYP032Y0	None	None	G5	S2	2B.1
<i>Carolella busckana</i> Busck's gallmoth	IILEM2X090	None	None	G1G3	SH	
<i>Castilleja cinerea</i> ash-gray paintbrush	PDSCR0D0H0	Threatened	None	G1G2	S1S2	1B.2
<i>Castilleja lasiorhyncha</i> San Bernardino Mountains owl's-clover	PDSCR0D410	None	None	G2?	S2?	1B.2
<i>Catostomus santaanae</i> Santa Ana sucker	AFCJC02190	Threatened	None	G1	S1	
<i>Centromadia pungens</i> ssp. <i>laevis</i> smooth tarplant	PDAST4R0R4	None	None	G3G4T2	S2	1B.1
<i>Chaetodipus fallax fallax</i> northwestern San Diego pocket mouse	AMAFD05031	None	None	G5T3T4	S3S4	SSC
<i>Charina umbratica</i> southern rubber boa	ARADA01011	None	Threatened	G2G3	S2S3	
<i>Chloropyron maritimum</i> ssp. <i>maritimum</i> salt marsh bird's-beak	PDSCR0J0C2	Endangered	Endangered	G4?T1	S1	1B.2
<i>Chorizanthe parryi</i> var. <i>parryi</i> Parry's spineflower	PDPGN040J2	None	None	G3T2	S2	1B.1
<i>Chorizanthe xanti</i> var. <i>leucotheca</i> white-bracted spineflower	PDPGN040Z1	None	None	G4T3	S3	1B.2
<i>Coccyzus americanus occidentalis</i> western yellow-billed cuckoo	ABNRB02022	Threatened	Endangered	G5T2T3	S1	
<i>Coleonyx variegatus abbotti</i> San Diego banded gecko	ARACD01031	None	None	G5T3T4	S1S2	SSC
<i>Crotalus ruber</i> red-diamond rattlesnake	ARADE02090	None	None	G4	S3	SSC
<i>Cuscuta obtusiflora</i> var. <i>glandulosa</i> Peruvian dodder	PDCUS01111	None	None	G5T4?	SH	2B.2
<i>Diadophis punctatus modestus</i> San Bernardino ringneck snake	ARADB10015	None	None	G5T2T3	S2?	
<i>Dipodomys merriami parvus</i> San Bernardino kangaroo rat	AMAFD03143	Endangered	None	G5T1	S1	SSC



Selected Elements by Scientific Name
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Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<i>Dipodomys stephensi</i> Stephens' kangaroo rat	AMAFD03100	Endangered	Threatened	G2	S2	
<i>Dodecahema leptoceras</i> slender-horned spineflower	PDPGN0V010	Endangered	Endangered	G1	S1	1B.1
<i>Elanus leucurus</i> white-tailed kite	ABNKC06010	None	None	G5	S3S4	FP
<i>Empidonax traillii extimus</i> southwestern willow flycatcher	ABPAE33043	Endangered	Endangered	G5T2	S1	
<i>Eremophila alpestris actia</i> California horned lark	ABPAT02011	None	None	G5T4Q	S4	WL
<i>Eriastrum densifolium ssp. sanctorum</i> Santa Ana River woollystar	PDPLM03035	Endangered	Endangered	G4T1	S1	1B.1
<i>Euchloe hyantis andrewsi</i> Andrew's marble butterfly	IILEPA5032	None	None	G3G4T1	S1	
<i>Eumops perotis californicus</i> western mastiff bat	AMACD02011	None	None	G5T4	S3S4	SSC
<i>Euphydryas editha quino</i> quino checkerspot butterfly	IILEPK405L	Endangered	None	G5T1T2	S1S2	
<i>Falco columbarius</i> merlin	ABNKD06030	None	None	G5	S3S4	WL
<i>Fimbristylis thermalis</i> hot springs fimbristylis	PMCYP0B0N0	None	None	G4	S1S2	2B.2
<i>Galium californicum ssp. primum</i> Alvin Meadow bedstraw	PDRUB0N0E6	None	None	G5T2	S2	1B.2
<i>Gila orcuttii</i> arroyo chub	AFCJB13120	None	None	G2	S2	SSC
<i>Glaucomys oregonensis californicus</i> San Bernardino flying squirrel	AMAFB09021	None	None	G5T1T2	S1S2	SSC
<i>Haliaeetus leucocephalus</i> bald eagle	ABNKC10010	Delisted	Endangered	G5	S3	FP
<i>Helianthus nuttallii ssp. parishii</i> Los Angeles sunflower	PDAST4N102	None	None	G5TH	SH	1A
<i>Heuchera parishii</i> Parish's alumroot	PDSAX0E0S0	None	None	G3	S3	1B.3
<i>Horkelia cuneata var. puberula</i> mesa horkelia	PDROS0W045	None	None	G4T1	S1	1B.1
<i>Icteria virens</i> yellow-breasted chat	ABPBX24010	None	None	G5	S3	SSC
<i>Imperata brevifolia</i> California satintail	PMPOA3D020	None	None	G4	S3	2B.1
<i>Ivesia argyrocoma var. argyrocoma</i> silver-haired ivesia	PDROS0X021	None	None	G2T2	S2	1B.2



Selected Elements by Scientific Name
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Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<i>Lampropeltis zonata (parvirubra)</i> California mountain kingsnake (San Bernardino population)	ARADB19062	None	None	G4G5	S2?	WL
<i>Lanius ludovicianus</i> loggerhead shrike	ABPBR01030	None	None	G4	S4	SSC
<i>Lasiurus xanthinus</i> western yellow bat	AMACC05070	None	None	G5	S3	SSC
<i>Laterallus jamaicensis coturniculus</i> California black rail	ABNME03041	None	Threatened	G3G4T1	S1	FP
<i>Lepidium virginicum var. robinsonii</i> Robinson's pepper-grass	PDBRA1M114	None	None	G5T3	S3	4.3
<i>Leptonycteris yerbabuenae</i> lesser long-nosed bat	AMACB03030	Delisted	None	G4	S1	SSC
<i>Lepus californicus bennettii</i> San Diego black-tailed jackrabbit	AMAEB03051	None	None	G5T3T4	S3S4	SSC
<i>Lilium parryi</i> lemon lily	PMLIL1A0J0	None	None	G3	S3	1B.2
<i>Lycium parishii</i> Parish's desert-thorn	PDSOL0G0D0	None	None	G4	S1	2B.3
<i>Malacothamnus parishii</i> Parish's bush-mallow	PDMAL0Q0C0	None	None	GXQ	SX	1A
<i>Monardella macrantha ssp. hallii</i> Hall's monardella	PDLAM180E1	None	None	G5T3	S3	1B.3
<i>Monardella pringlei</i> Pringle's monardella	PDLAM180J0	None	None	GX	SX	1A
<i>Nasturtium gambelii</i> Gambel's water cress	PDBRA270V0	Endangered	Threatened	G1	S1	1B.1
<i>Neotamias speciosus speciosus</i> lodgepole chipmunk	AMAFB02172	None	None	G4T2T3	S2S3	
<i>Neotoma lepida intermedia</i> San Diego desert woodrat	AMAFF08041	None	None	G5T3T4	S3S4	SSC
<i>Nyctinomops femorosaccus</i> pocketed free-tailed bat	AMACD04010	None	None	G4	S3	SSC
<i>Oncorhynchus mykiss irideus pop. 10</i> steelhead - southern California DPS	AFCHA0209J	Endangered	None	G5T1Q	S1	
<i>Onychomys torridus ramona</i> southern grasshopper mouse	AMAFF06022	None	None	G5T3	S3	SSC
<i>Packera bernardina</i> San Bernardino ragwort	PDAST8H0E0	None	None	G2	S2	1B.2
<i>Perideridia parishii ssp. parishii</i> Parish's yampah	PDAP11N0C2	None	None	G4T3T4	S2	2B.2
<i>Perognathus alticola alticola</i> white-eared pocket mouse	AMAFD01081	None	None	G1G2TH	SH	SSC



Selected Elements by Scientific Name
California Department of Fish and Wildlife
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Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<i>Perognathus longimembris brevinasus</i> Los Angeles pocket mouse	AMAFD01041	None	None	G5T1T2	S1S2	SSC
<i>Phrynosoma blainvillii</i> coast horned lizard	ARACF12100	None	None	G3G4	S3S4	SSC
<i>Polioptila californica californica</i> coastal California gnatcatcher	ABPBJ08081	Threatened	None	G4G5T2Q	S2	SSC
<i>Rana draytonii</i> California red-legged frog	AAABH01022	Threatened	None	G2G3	S2S3	SSC
<i>Rana muscosa</i> southern mountain yellow-legged frog	AAABH01330	Endangered	Endangered	G1	S1	WL
<i>Rhaphiomidas terminatus abdominalis</i> Delhi Sands flower-loving fly	IIDIP05021	Endangered	None	G1T1	S1	
<i>Rhinichthys osculus ssp. 3</i> Santa Ana speckled dace	AFCJB3705K	None	None	G5T1	S1	SSC
<i>Ribes divaricatum var. parishii</i> Parish's gooseberry	PDGRO020F3	None	None	G5TX	SX	1A
<i>Riversidian Alluvial Fan Sage Scrub</i> Riversidian Alluvial Fan Sage Scrub	CTT32720CA	None	None	G1	S1.1	
<i>Salvadora hexalepis virgultea</i> coast patch-nosed snake	ARADB30033	None	None	G5T4	S2S3	SSC
<i>Schoenus nigricans</i> black bog-rush	PMCYP0P010	None	None	G4	S2	2B.2
<i>Senecio aphanactis</i> chaparral ragwort	PDAST8H060	None	None	G3	S2	2B.2
<i>Setophaga petechia</i> yellow warbler	ABPBX03010	None	None	G5	S3S4	SSC
<i>Sidalcea hickmanii ssp. parishii</i> Parish's checkerbloom	PDMAL110A3	None	Rare	G3T1	S1	1B.2
<i>Sidalcea malviflora ssp. dolosa</i> Bear Valley checkerbloom	PDMAL110FH	None	None	G5T2	S2	1B.2
<i>Sidalcea neomexicana</i> salt spring checkerbloom	PDMAL110J0	None	None	G4	S2	2B.2
<i>Sidalcea pedata</i> bird-foot checkerbloom	PDMAL110L0	Endangered	Endangered	G1	S1	1B.1
<i>Southern Coast Live Oak Riparian Forest</i> Southern Coast Live Oak Riparian Forest	CTT61310CA	None	None	G4	S4	
<i>Southern Cottonwood Willow Riparian Forest</i> Southern Cottonwood Willow Riparian Forest	CTT61330CA	None	None	G3	S3.2	
<i>Southern Mixed Riparian Forest</i> Southern Mixed Riparian Forest	CTT61340CA	None	None	G2	S2.1	
<i>Southern Riparian Forest</i> Southern Riparian Forest	CTT61300CA	None	None	G4	S4	



Selected Elements by Scientific Name
California Department of Fish and Wildlife
California Natural Diversity Database



Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
<i>Southern Riparian Scrub</i> Southern Riparian Scrub	CTT63300CA	None	None	G3	S3.2	
<i>Southern Sycamore Alder Riparian Woodland</i> Southern Sycamore Alder Riparian Woodland	CTT62400CA	None	None	G4	S4	
<i>Southern Willow Scrub</i> Southern Willow Scrub	CTT63320CA	None	None	G3	S2.1	
<i>Spea hammondi</i> western spadefoot	AAABF02020	None	None	G3	S3	SSC
<i>Sphenopholis obtusata</i> prairie wedge grass	PMPOA5T030	None	None	G5	S2	2B.2
<i>Streptanthus bernardinus</i> Laguna Mountains jewelflower	PDBRA2G060	None	None	G3G4	S3S4	4.3
<i>Streptanthus campestris</i> southern jewelflower	PDBRA2G0B0	None	None	G3	S3	1B.3
<i>Symphyotrichum defoliatum</i> San Bernardino aster	PDASTE80C0	None	None	G2	S2	1B.2
<i>Taxidea taxus</i> American badger	AMAJF04010	None	None	G5	S3	SSC
<i>Thamnophis hammondi</i> two-striped gartersnake	ARADB36160	None	None	G4	S3S4	SSC
<i>Thelypteris puberula var. sonorensis</i> Sonoran maiden fern	PPTHE05192	None	None	G5T3	S2	2B.2
<i>Vireo bellii pusillus</i> least Bell's vireo	ABPBW01114	Endangered	Endangered	G5T2	S2	

Record Count: 115

Attachment 5 – Special-Status Species Not Addressed

Attachment 5. Special-status species not addressed

Scientific Name	Common Name	Reason for Exclusion
PLANTS		
<i>Allium howellii</i> var. <i>clokeyi</i>	Mt. Pinos onion	Well below elevation range.
<i>Arenaria paludicola</i>	Marsh sandwort	No suitable alkali habitat.
<i>Astragalus hornii</i> var. <i>hornii</i>	Horn's milk-vetch	No suitable alkali habitat.
<i>Berberis nevini</i>	Nevin's barberry	Large shrub, no records within 5 miles.
<i>Brodiaea filifolia</i>	Thread-leaved brodiaea	No suitable clay soils.
<i>Calochortus palmeri</i> var. <i>palmeri</i>	Palmer's mariposa-lily	Well below elevation range.
<i>Carex comosa</i>	Bristly sedge	No suitable wetland or other mesic habitat.
<i>Castilleja cinerea</i>	Ash-gray paintbrush	Well below elevation range, no suitable montane habitat.
<i>Castilleja lasiorhyncha</i>	San Bernardino Mountains owl's-clover	Well below elevation range, no suitable montane habitat.
<i>Centromadia pungens</i> ssp. <i>laevis</i>	Smooth tarplant	No suitable alkali substrates.
<i>Chloropyron maritimum</i> ssp. <i>maritimum</i>	Salt marsh bird's-beak	No suitable alkali substrates.
<i>Cuscuta obtusiflora</i> var. <i>glandulosa</i>	Peruvian dodder	No suitable wetland or other mesic habitat.
<i>Fimbristylis thermalis</i>	Hot springs fimbriatylis	No suitable wetland or other mesic habitat.
<i>Galium californicum</i> ssp. <i>primum</i>	Alvin Meadow bedstraw	Outside of species' geographic range.
<i>Helianthus nuttallii</i> ssp. <i>parishii</i>	Los Angeles sunflower	Considered to be extirpated.
<i>Heuchera parishii</i>	Parish's alumroot	Well below elevation range, no suitable montane habitat.
<i>Horkelia cuneate</i> var. <i>puberula</i>	Mesa horkelia	Outside of species' geographic range.
<i>Imperata brevifolia</i>	California satintail	No suitable wetland or mesic habitat.
<i>Ivesia argyrocoma</i> var. <i>argyrocoma</i>	Silver-haired ivesia	Well below elevation range, no suitable montane habitat.
<i>Lilium parryi</i>	Lemon lily	No suitable mesic meadow habitat, well below the elevational range.
<i>Malacothamnus parishii</i>	Parish's bush-mallow	Not likely to be a recognized species.
<i>Monardella macrantha</i> ssp. <i>hallii</i>	Hall's monardella	Below elevation range.
<i>Monardella pringlei</i>	Pringle's monardella	No suitable sand habitat, likely north of the species' geographic range.
<i>Nasturtium gambelii</i>	Gambel's water cress	No suitable wetland, extirpated from southern CA.
<i>Packera bernardina</i>	San Bernardino ragwort	Outside of geographic range.
<i>Perideridia parishii</i> ssp. <i>parishii</i>	Parish's yampah	Outside of geographic range.
<i>Ribes divaricatum</i> var. <i>parishii</i>	Parish's gooseberry	No suitable riparian or wetland habitat
<i>Schoenus nigricans</i>	Black bog-rush	No suitable wetland or mesic habitat.
<i>Senecio aphanactis</i>	Chaparral ragwort	Outside of species' geographic range.
<i>Sidalcea hickmanii</i> ssp. <i>parishii</i>	Parish's checkerbloom	Outside of geographic range.
<i>Sidalcea malviflora</i> ssp. <i>dolosa</i>	Bear Valley checkerbloom	Outside of geographic range.
<i>Sidalcea neomexicana</i>	Salt Spring checkerbloom	No suitable alkali substrate.
<i>Sidalcea pedata</i>	bird-foot checkerbloom	Outside of geographic range.
<i>Sphenopholis obtusata</i>	Prairie wedge grass	No suitable wetland or mesic habitat.
<i>Streptanthus bernardinus</i>	Laguna Mountains jewelflower	Well below the elevational range.
<i>Streptanthus campestris</i>	Southern jewelflower	Well below the elevational range.

Attachment 5. Special-status species not addressed

Scientific Name	Common Name	Reason for Exclusion
<i>Symphotrichum defoliatum</i>	San Bernardino aster	No suitable wetland or mesic habitat.
<i>Thelypteris puberula</i> var. <i>sonorensis</i>	Sonoran maiden fern	No suitable mesic canyon habitat.
INVERTEBRATES AND MOLLUSCS		
<i>Bombus morrisoni</i>	Morrison bumble bee	Outside of species' geographic range.
<i>Carolella busckana</i>	Busck's gallmoth	Outside of species' geographic range, considered to be extirpated.
<i>Euchloe hyantis andrewsi</i>	Andrew's marble butterfly	Well below elevation range.
<i>Euphydryas editha quino</i>	Quino checkerspot butterfly	Outside of species' geographic range.
<i>Rhaphiomidas terminatus abdominalis</i>	Delhi Sands flower-loving fly	No suitable Delhi Sands on or near the project site.
FISHES		
<i>Catostomus santaanae</i>	Santa Ana sucker	No perennial aquatic habitat present.
<i>Gila orcuttii</i>	Arroyo chub	No perennial aquatic habitat present.
<i>Oncorhynchus mykiss irideus</i>	Steelhead - South California DPS	No perennial aquatic habitat present.
<i>Rhinichthys osculus</i> ssp. 3	Santa Ana speckled dace	No perennial aquatic habitat present.
AMPHIBIANS		
<i>Batrachoseps gabrieli</i>	San Gabriel slender salamander	Outside of species' geographic range, no suitable habitat present.
<i>Rana draytonii</i>	California red-legged frog	No suitable habitat, no extant occurrences within 5 miles.
<i>Rana muscosa</i>	Southern mountain yellow-legged frog	No suitable habitat.
<i>Spea hammondi</i>	Western spadefoot	No suitable breeding pools.
REPTILES		
<i>Aspidoscelis hyperythra</i>	Orange-throat whiptail	Outside of species' geographic range.
<i>Charina umbratica</i>	Southern rubber boa	Well below elevation range.
<i>Coleonyx variegatus abbotti</i>	San Diego banded gecko	No suitable granite outcrops.
<i>Crotalus ruber</i>	Red-diamond rattlesnake	Outside of species' geographic range.
<i>Diadophis punctatus modestus</i>	San Bernardino ringneck snake	Well below elevation range.
<i>Lampropeltis zonata parvubra</i>	California mountain kingsnake	Well below elevation range.
BIRDS		
<i>Baeolophus inornatus</i>	Oak titmouse	No suitable oak woodland habitat.
<i>Coccyzus americanus occidentalis</i>	Western yellow-billed cuckoo	No suitable riparian habitat.
<i>Empidonax traillii extimus</i>	Southwestern willow flycatcher	No suitable riparian habitat.
<i>Haliaeetus leucocephalus</i>	Bald eagle	No suitable nesting or foraging habitat.
<i>Laterallus jamaicensis coturniculus</i>	California black rail	No suitable marsh habitat.
MAMMALS		
<i>Dipodomys stephensi</i>	Stephen's kangaroo rat	Outside of species' geographic range.
<i>Glaucomys oregonensis californicus</i>	San Bernardino flying squirrel	Outside of species' geographic range.
<i>Leptonycteris yerbabuenae</i>	Lesser long-nosed bat	Outside of species' geographic range.
<i>Neotamias speciosus</i>	Lodgepole chipmunk	Outside of species' geographic range.
<i>Onychomys torridus ramona</i>	Southern grasshopper mouse	Outside of species' geographic range.
<i>Perognathus alticola</i>	White-eared pocket mouse	Outside of species' geographic range.

Appendix C

Jurisdictional Delineation

PRELIMINARY JURISDICTIONAL WATERS AND WETLANDS DELINEATION REPORT Elder Creek Channel Improvement Project

Prepared for:

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



Prepared by:

Aspen Environmental Group
615 North Benson Avenue, Suite E
Upland, CA 91786

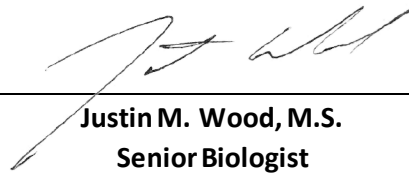


August 2019

Preliminary Jurisdictional Waters and Wetlands Delineation Report

Elder Creek Channel Improvement 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.



Justin M. Wood, M.S.
Senior Biologist
Aspen Environmental Group

August 2019

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1.0 Introduction

This report presents the findings of an investigation of jurisdictional features conducted by Aspen Environmental Group (Aspen) for the Elder Creek Channel Improvement Project (Project). The project site is located within the City of Highland in San Bernardino County, California (Figure 1; note that all figures are included within Attachment 1). Elder Creek Channel carries flows from Elder Creek and developed areas of Highland to the north, downstream into Plunge Creek. The project seeks to improve flood protection and enhance public safety for properties and infrastructure in the immediate vicinity.

1.1 Lead Agency Name and Address

San Bernardino County Flood Control District (SBCFCD or District)
825 East Third Street
San Bernardino, CA 92415

1.2 Contact Person and Phone Number

Michele Derry
Senior Planner, Environmental Management Division
Department of Public Works
825 East Third Street
San Bernardino, CA 92415
Phone: 909.387.8114
Email: mderry@dpw.sbcounty.gov

2.0 Project Location and Description

The San Bernardino County Flood Control District (District) proposes to construct and maintain flood control improvements along approximately 2,100 linear feet of the Elder Creek system within the City of Highland, San Bernardino County (Figure 1). The project limits are from Old Greenspot Road, to approximately 700 feet downstream of Abbey Way. The Elder Creek Channel Improvement Project (proposed Project) would increase the capacity of the Elder Creek system to handle a 100-year (Q100) storm event and allow for proper conveyance of flows into Plunge Creek. Currently, the Elder Creek system is undersized, and the downstream portion of the Creek is at a lower elevation than Plunge Creek downstream, resulting in stormwater and urban runoff backing up at the confluence with Plunge Creek. The portion of the Elder Creek system to be improved currently consists of reinforced concrete box, which transitions into an open channel, which then confluent with Plunge Creek downstream. The open channel contains both concrete and earthen segments.

Proposed improvements include removing existing channel infrastructure and installing a deeper and slightly wider concrete rectangular channel between Old Greenspot Road and Abbey Way, constructing a concrete bypass rectangular channel and enlarging the existing earthen channel (low-flow channel) between Abbey Way and Plunge Creek. The intent of leaving the low-flow channel in place is to avoid impacts to federal wetlands that may be present; widening the channel would also create additional federal wetlands. Above the earthen channel, a small sedimentation basin is proposed to prevent excess sediment from entering the earthen channel. Grouted rip-rap would be placed at the confluence of the low-flow earthen channel, by-pass channel, and Church Street Channel to control erosion and reduce flow velocity. Other improvements include regrading and improving the existing side channel (East Highland

Storm Drain), replacing two existing box culverts at the road crossings of Merris Street and Abbey Way, constructing a berm to protect the earthen channel, and revegetating the existing stockpile area southeast of the low-flow channel. The proposed Project also includes a one-time maintenance of Church Street Channel.

The proposed Project also includes routine maintenance of the new channel, which is expected to occur 1-2 times a year or every few years, depending on storms, and consist primarily of debris, trash, and graffiti removal, and fence and appurtenant structure repairs. Maintenance of the low-flow earthen channel is expected to be minimal and occur approximately twice a year, and would include invasive species removal, vegetation management that includes removing large tree species, thinning as required to ensure a healthy ecology and to allow vector control staff to address vector control concerns when they arise, and application of rodenticide as needed. Sediment removal would occur a few times a year within the sedimentation basin.

2.1 Topography and Surrounding Land Uses

The project site is located just south of Greenspot Road and approximately 0.5 miles east of Orange Street near Highland, California. The project site can be found on the Redlands, California United States Geological Survey (USGS) 7.5' Quadrangle (USGS, 1966). Representative latitude-longitude coordinates for the project site are 34°06'19.93"N, 117°10'23.02"W. The project site consists of the existing Elder Creek and Church Channels, unvegetated stockpile areas, access roads, and open areas adjacent to residential development, and a limited amount of native wash vegetation along the margins. The topography of the project site is relatively flat and slopes towards the south. The elevation within the project site ranges from approximately 1,320 to 1,340 feet above mean sea level (MSL). Surrounding land uses include natural open space, flood control, commercial, and residential.

2.2 Vegetation

Vegetation within the project site includes wetland vegetation, such as cattail marshes in Elder Creek and Church Channels. A very small strip of native upland vegetation is also present along the southeast side of the project site, but is not expected to be impacted by the Project. Riparian vegetation is also present just outside of the project site to the southwest; however, this vegetation is not expected to be directly impacted by the Project. Most of the project site is regularly maintained and is unvegetated. Vegetation is further described below and shown in Figure 2.

Table 1: Acreage of Vegetation and Land Cover within the Project Site

Vegetation or Cover Types	Permanent Impact Area	Temporary Impact Area	Total Impact Area
Annual brome grassland	0.06	0.02	0.08
Arroyo willow thickets	0.01	0.00	0.01
California buckwheat scrub	0.02	0.23	0.24
Cattail marshes	0.08	0.18	0.26
Developed	0.04	1.35	1.39
Disturbed	1.43	5.00	6.42
Open water	0.00	0.01	0.01
Smartweed-cocklebur patches	0.25	0.18	0.43
Total	1.89	6.97	8.84

Riparian and Wetland Vegetation Types

Arroyo willow thickets (*Salix lasiolepis* Woodland Alliance). Arroyo willow thickets are present at the downstream end of the project site. These are winter deciduous woodlands which have a dense canopy of arroyo willow (*Salix lasiolepis*), Fremont cottonwood (*Populus fremontii*), and black willow (*Salix gooddingii*). Other species such as narrow leaved willow (*Salix exigua*), mulefat (*Baccharis salicifolia*), and tall cyperus (*Cyperus eragrostis*) are also present.

Cattail marshes [*Typha (angustifolia, domingensis, latifolia)* Herbaceous Alliance]. Cattail marshes within the project site are dominated by a dense monotypic stand of broadleaf cattail (*Typha latifolia*). Other cattails such as narrow leaf cattail (*Typha angustifolia*) were also present in lower abundance. They are present within the wettest portion of the project site, which includes much of Elder Creek Channel and Church Channel (see Photo 1 in Attachment 2). This vegetation is seasonally removed by scouring flows, but quickly recolonizes the channels after flows subside.

Smartweed - cocklebur patches (*Polygonum lapathifolium* - *Xanthium strumarium* Herbaceous Alliance). Smartweed-cocklebur patches within the project area are dominated by common knotweed (*Persicaria lapathifolia*), water speedwell (*Veronica anagallis-aquatica*), and cocklebur (*Xanthium strumarium*). Other species such as watercress (*Nasturtium officinale*), Mexican sprangletop (*Leptochloa fusca* ssp. *uninervia*), and yellow monkey flower (*Mimulus guttatus*) were also present. Smartweed-cocklebur patches are present along the margins of Elder Creek Channel within the project site.

Upland Vegetation Types

Annual brome grassland. This upland vegetation type is present along the western edge of Church Channel and is dominated by ripgut brome (*Bromus diandrus*) and red brome (*Bromus madritensis* ssp. *rubens*). Other non-native species such as filarees (*Erodium* sps.) are also present.

California buckwheat scrub. California buckwheat scrub is a native upland vegetation type that is present along the southeast edge of the project site (see Photos 3 and 4 in Attachment 2). It is dominated by California buckwheat (*Eriogonum fasciculatum*), with other native species such as scalebroom (*Lepidospartum squamatum*), prickly pear (*Opuntia littoralis*), and California juniper (*Juniperus californica*) also present. Although not mapped, several patches of California juniper woodland (*Juniperus californica* Woodland Alliance) are also present just beyond the project site and are dominated by California juniper.

Other Land Cover Types

Developed. This cover types includes developed areas within the project site and includes paved roads, concrete flood control structures, and other structures.

Disturbed. This cover type includes disturbed unvegetated land surrounding the Elder Creek flood control facility.

Open water. This cover type includes a small area of open water within Church Channel that has accumulated because sediment in the channel is preventing the water from leaving the channel.

2.3 Climate

The climate in the region consists of warm, dry summers and mild, wet winters. The average annual high temperature is about 79.7°F and the average annual low is about 50.3°F (U.S. Climate Data, 2018). Roughly

75 percent of the rain falls from December through March. The mean seasonal precipitation for the region is approximately 13.28 inches (U.S. Climate Data, 2018).

2.4 Hydrology and Geomorphology

Surface flows from Elder Canyon, are conveyed through the community of Highland to the north, to the project site via existing underground storm drains. Elder Creek Channel is an enclosed box channel that is approximately 1.5 miles long before transitioning to an open-top, earthen-bottomed, trapezoidal channel. The project site includes approximately 590 feet of the enclosed box channel, approximately 830 feet of the trapezoidal channel, and about 700 feet of earthen channel. It also includes approximately 450 feet of Church Channel.

Downstream of the project site, Elder Creek confluences with Plunge Creek and continues towards the west under Orange Street and Interstate 210 before merging with City Creek. Flows from these tributaries then enter the Santa Ana River, approximately 3.0 miles downstream of the project site. The Santa Ana River flows to Prado Basin, and finally to the Pacific Ocean. The Pacific Ocean is recognized by the U.S. Army Corps of Engineers (USACE) as traditional navigable water thereby establishing surface connectivity of Elder Creek Channel to navigable waters.

Based on field observations of vegetation and invertebrates, saturated soils or surface water appear to be present perennially in the low flow channel within Elder Creek Channel. Surface water was present in Elder Creek Channel and Church Channel during the field visit conducted in September 2018. All surface water observed during the survey appears to be fed from upstream urban runoff.

There are numerous blue-line streams mapped within the survey area, including Elder Creek and Plunge Creek (Figure 1), although land use and flood control improvements have substantially altered the historical surface hydrology. The project site is within the Upper Santa Ana Valley Groundwater Basin (CDWR, 2004). It is also within the Santa Ana River hydrologic unit of the South Coast Hydrologic Region as designated by the California Regional Water Quality Control Board (CDWR, 2016).

2.5 Soils and Geology

The project site is located on an extensive alluvial bajada below the San Bernardino Mountains. Soils on the site are loam, sand, and gravel. Historic soil data from the National Resource Conservation Society (NRCS) were reviewed to identify any hydric soils that may have been historically present in the survey area. No hydric soils are mapped in the survey area. However, small patches of hydric soils may be found within non-hydric polygons based on NRCS minimum mapping units. Four soil types are mapped within the survey area and are described below based on the official soil series descriptions (NRCS, 2019c).

Psamments, Fluvents and Frequently flooded soils (Ps). Psamments, fluvents and frequently flooded soils are somewhat excessively drained soils found on alluvial fans. They are found in areas with 0 to 5 percent slope and from elevations of about 10 to 1,500 feet. Water table depth is typically more than 80 inches and these areas are rarely flooded. The substrates are composed of sand (0-12 inches), fine sand (12-48 inches), and stratified gravelly sand to gravelly loam sand (48-60 inches). It is present along Plunge Creek within the survey area (see Figure 3).

Soboba gravelly loamy sand, 0 to 9 percent slopes (SoC). Soboba gravelly loamy sand is an excessively drained soil that is found on alluvial fans and is derived from granite. It is found in areas with 0 to 9 percent slope and from elevations of about 30 to 4,200 feet. Water table depth is typically more than 80 inches and these areas are rarely flooded. The substrate is composed of gravelly loamy sand (0-12 inches), very

gravelly loamy sand (12-36 inches), and very stony sand (36-60 inches). It is present in the central portion of the survey area (see Figure 3).

Soboba stony loamy sand, 2 to 9 percent slopes (SpC). Soboba stony loamy sand is an excessively drained soil that is found on alluvial fans and is derived from granite. It is found in areas with 2 to 9 percent slope and from elevations of about 960 to 3,690 feet. Water table depth is typically more than 80 inches and these areas are rarely flooded. The substrate is composed of stony loamy sand (0-10 inches), very stony loamy sand (10-24 inches), and very stony sand (24-60 inches). It is present in the western portion of the survey area (see Figure 3).

Tujunga loamy sand, 0 to 5 percent slope (TuB). Tujunga loamy sand is a somewhat excessively drained soil that is found on alluvial fans and is derived from granite. It is found in areas with 0 to 5 percent slope and from elevations of about 650 to 3,110 feet. Water table depth is typically more than 80 inches and these areas are rarely flooded. The substrate is composed of loamy sand (0-6 inches), loamy sand (6-18 inches), and loamy sand (18-60 inches). It is present in the northern portion of the survey area (see Figure 3).

3.0 Regulatory Background

Jurisdictional waters, including some wetlands and riparian habitats, may be regulated by the USACE, the California Department of Fish and Wildlife (CDFW; formerly California Department of Fish and Game), and the Santa Ana Regional Water Quality Control Board (SARWQCB). The USACE Regulatory Program regulates activities pursuant to Section 404 of the federal Clean Water Act (CWA); the CDFW regulates activities under the Fish and Game Code Section 1600-1607; and the SARWQCB regulates activities under Section 401 of the CWA and the California Porter-Cologne Water Quality Control Act. Refer to Attachment 5 for additional details on regulatory authorities and background.

4.0 Waters and Wetlands Delineation Methodology

The assessment of jurisdictional wetlands, other (non-wetland) waters of the United States (waters of the U.S.), waters of the State, and riparian habitat was conducted by Aspen biologist Justin Wood on September 27, 2018. Mr. Wood also field verified his mapping of the vegetation and drainages on October 29, 2018. Prior to conducting the field assessment Mr. Wood reviewed current and historic aerial photographs, the San Bernardino County Soil Survey (NRCS, 2019a), and the local and state hydric soil list (NRCS, 2019b) to evaluate the potential active channels and wetland features in the survey area. Wood also reviewed the District Master Storm Water System Maintenance Program (MSWSMP) Portal (SBCFCD, 2019).

A series of transect locations were determined prior to conducting fieldwork, based on methods in the USACE Wetland Delineation Manual (1987). Each transect was walked perpendicular to the channel and locations where each transect intersected with a state or federally jurisdictional water a GPS point was collected. Attachment 3 contains the Wetland Determination Data Forms completed during the assessment.

During the field assessment, vegetation, hydrology, and locations of sample locations were mapped using a Trimble Juno 3B GPS unit and identified on aerial photographs (Figures 2 and 4). Field maps were digitized using Global Information System (GIS) and total state and federal jurisdictional areas were calculated.

Vegetation was classified using the names and descriptions in *A Manual of California Vegetation* (Sawyer et al., 2009). Mapping was done by drawing tentative boundaries onto high-resolution aerial images during the site visits, then digitizing these boundaries into GIS shapefiles. Vegetation was mapped digitally using ArcGIS (version 10.1) and one-foot pixel aerial imagery on a 22-inch diagonal flat screen monitor. The smallest mapping unit was approximately 0.10 acre and most mapped vegetation boundaries are accurate to within approximately 3 feet. Any vegetation map is subject to imprecision for several reasons:

1. Vegetation types tend to intergrade on the landscape so that there are no true boundaries in the vegetation itself. In these cases, a mapped boundary represents best professional judgment.
2. Vegetation types as they are named and described tend to intergrade; that is, a given stand of real-world vegetation may not fit into any named type in the classification scheme used. Thus, a mapped and labeled polygon is given the best name available in the classification, but this name does not imply that the vegetation unambiguously matches its mapped name.
3. Vegetation tends to be patchy. Small patches of one named type are often included within mapped polygons of another type. The size of these patches varies, depending on the minimum mapping units and scale of available aerial imagery.

4.1 Federal Wetlands

Jurisdictional wetlands were delineated using a routine determination according to the methods outlined in the USACE Wetland Delineation Manual (USACE, 1987) and the Arid West Supplement (USACE, 2008) based on three wetland parameters: dominant hydrophytic vegetation, wetland hydrology, and hydric soils. The three parameters were evaluated at a series of sample points throughout the survey area. The locations of these sample points were selected at locations judged most likely and least likely to meet wetlands criteria. Soil pits were excavated at these locations to evaluate the presence of hydric soils (Figure 4).

Hydrophytic Vegetation

At each sample location, the aerial cover of all plant species in each vegetation type was visually estimated. Plant species in each stratum (tree, sapling and 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 and Summary of Wetland Indicator Status (Reed, 1988), the California sub-region of the National List of Vascular Plant Species that Occur in Wetlands: 1996 National Summary (USFWS, 1997), the Arid West Region of The National Wetland Plant List (USACE, 2012), and the On-line Plants Database (USDA, 2019). 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 met (refer to Table 3 of Attachment 4).

Wetland Hydrology

At each sample location, the presence or absence of wetland hydrology was evaluated by observing indicators of hydrology (USACE, 2008). These indicators are divided into two categories (primary and secondary indicators). Presence of one primary indicator is evidence of wetland hydrology. Presence of two or more secondary indicators can also be evidence of wetland hydrology. The Arid West Supplement includes two additional indicator groups that can be utilized during dry conditions or in areas where surface water and saturated soils are not present including Group B (evidence of recent inundation) and

Group C (evidence of recent soil saturation) (USACE, 2008). For additional information regarding wetland hydrology indicators refer to Tables 4 and 5 in Attachment 4.

Hydric Soils

Soil pits were excavated at each sample location using a shovel. Whenever possible they were excavated to a depth of 20 inches (USACE, 2008). At each soil pit, the soil texture and color were recorded by comparison with a Munsell soil color chart (2000). Any other indicators of hydric soils, such as redoximorphic features, hydrogen sulfide odor, buried organic matter, organic streaking, reduced soil conditions, gleyed or low-chroma soils were also recorded (refer to Tables 6 and 7 of Attachment 4).

4.2 Federal Non-Wetland 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 physical and biological features such as bank erosion, deposited vegetation or debris, and vegetation characteristics. See Tables 1 and 2 in Attachment 4 (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.

4.3 CDFW Jurisdictional Waters

CDFW jurisdiction was delineated to the tops of the channel banks or to the edge of the riparian canopy. Throughout the Project site the CDFW jurisdictional area extended beyond the OHWM. Therefore, the total acreage of CDFW jurisdictional waters is greater than the federal jurisdictional waters of the U.S.

5.0 Results

Based on the results of the field surveys and mapping, Aspen's professional opinion on acreage of jurisdictional waters, wetlands, and CDFW habitat is shown below in Table 1. Additional information for each location can be found on the field data sheets (Attachment 3).

Table 2: Acreage of Jurisdictional Waters, Wetlands, and CDFW Habitat

	USACE Jurisdictional Waters of The U.S. (Acres)		State Jurisdictional Waters (Acres)
	Non-wetland waters of U.S.	Wetlands	
Permanent Impact Area	0.19	0.15	0.86
Temporary Impact Area	0.41	0.08	1.13
Total Impact Area	0.59	0.23	1.99

- (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, SARW QCB, and CDFW; as such, wetland acreages are not additive.

5.1 Federal Wetlands

Based on this assessment of hydrology, vegetation, and soils, and Aspen's professional opinion, approximately 0.08 acres of the temporary impact area and 0.15 acres of the permanent impact area satisfies the federal criteria as wetlands (USACE, 1987; USACE, 2008). Additional information for each location can be found on the field data sheets (Attachment 3).

Hydrophytic Vegetation

Ten obligate (OBL), sixteen facultative wetland (FACW), and fourteen facultative (FAC) species were observed within or immediately adjacent to the project site (Attachment 6). Many other plants with an

indicator status of facultative upland (FACU), upland (UPL), or not classified were also observed (Attachment 6). Refer to the Wetland Determination Data Forms for specific information about the vegetation at each sample location (Attachment 3).

Wetland Hydrology

Surface water was present within the survey area. Surface flows in Elder Creek Channel entered from the enclosed box culvert at the north end of the survey area and continued approximately 1,980 feet downstream before flows became sub-surface. Surface flows in Church Channel are intermittent and pond in the concrete-lined section of the channel before merging with flows from Elder Creek Channel. Several other indicators were also present including drift deposits, aquatic invertebrates, hydrogen sulfide odor, presence of reduced iron, and saturation visible on aerial imagery.

Hydric Soils

The soil pit at sample locations 2 and 3 within Elder Creek Channel both showed indicators of hydric soils (Figure 4). The soil pit at sample location 2 had a sandy redox which is an indicator of hydric soils. The soil pit at sample location 3 had a strong odor of hydrogen sulfide and a well-established sandy gleyed matrix, which are both indicators of hydric soils. The soil pit at sample location 1 was near flowing water and hydrophytic vegetation was present but the soil showed no indicators of being hydric. Flows in this section of the channel are likely intermittent and water has not been present for a long enough period to develop hydric soils. Downstream of sample location 1, the water percolates through the substrate and the channel becomes dry. Upstream of sample location 3, the vegetation, hydrology, and indicators of hydric soil (i.e. hydrogen sulfide odor) remain present so additional soil pits were not needed.

5.2 Federal Non-Wetland Waters

Based on this assessment of OHWMs and Aspen's professional opinion, approximately 0.41 acres of the temporary impact area and 0.19 acres of the permanent impact area meet the definition of waters of the U.S. as outlined in 33 CFR Part 328 (Figure 4). Some of the key hydrology indicators noted during the delineation included the following. See Tables 1 and 2 in Attachment 4 for additional information.

- A1 – Surface Water
- A2 – High Water Table
- A3 – Saturation
- B2 – Active floodplain
- B3 – Drift Deposits
- B13 – Drift (organic debris, larger than twigs)
- C1 – Hydrogen Sulfide Odor

Federal non-wetland waters of the U.S. include part of the channel bottom within the survey area and extended up the side slopes slightly depending on the location of drift deposits and vegetation (i.e., the OHWM). A review of historical aerial photography (1995 – 2018) on Google Earth confirms the approximate location and extent of federal non-wetland waters of the U.S. identified during our site visit. Additional non-wetland waters of the U.S. are also present downstream of the project area, within the survey area.

5.3 CDFW Waters

Based on this assessment and Aspen's professional opinion, 0.86 acres within the permanent impact area and 1.13 acres within the temporary impact area meet the definition of CDFW jurisdictional waters of the State as outlined in Sections 1600-1616 of the California Fish and Game Code (Figure 4). This conclusion is primarily based on the presence of bed and bank and extent of riparian vegetation.

6.0 Summary and Conclusions

The project site includes jurisdictional waters of the State and waters of the U.S. including federally jurisdictional wetlands and USACE non-wetland waters as follows:

- 0.23 acres of federally jurisdictional wetland were mapped in areas that support hydrophytic vegetation, show evidence of wetland hydrology, and contain hydric soils. Approximately 0.15 acres of these federal wetlands are within the permanent impact area and 0.08 acres are within the temporary impact area.
- 0.59 acres of jurisdictional non-wetland waters of the United States were mapped in areas that did not meet the hydrophytic vegetation or hydric soils criteria for wetlands but where evidence of hydrology or a discernible OHWM was visible. This included 0.19 acres within the permanent impact area and 0.41 acres within the temporary impact area.
- 1.99 acres of CDFW jurisdictional waters were mapped based on riparian vegetation, bed and bank delineation, and field observations. This included 0.86 acres within the permanent impact area and 1.13 acres within the temporary impact area.

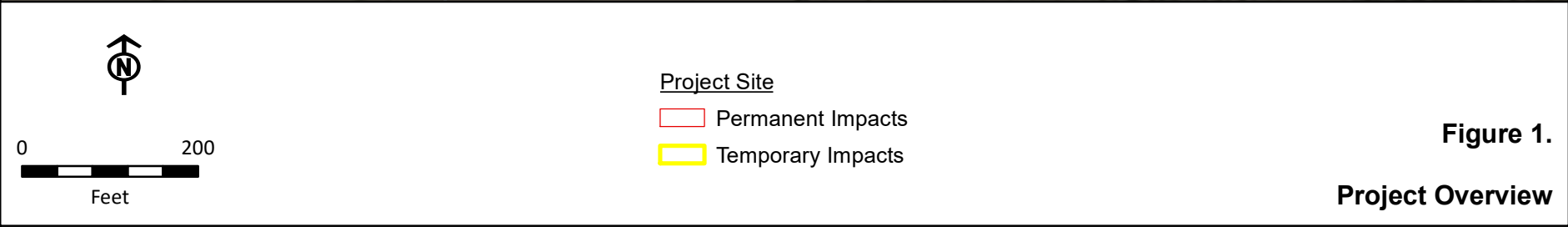
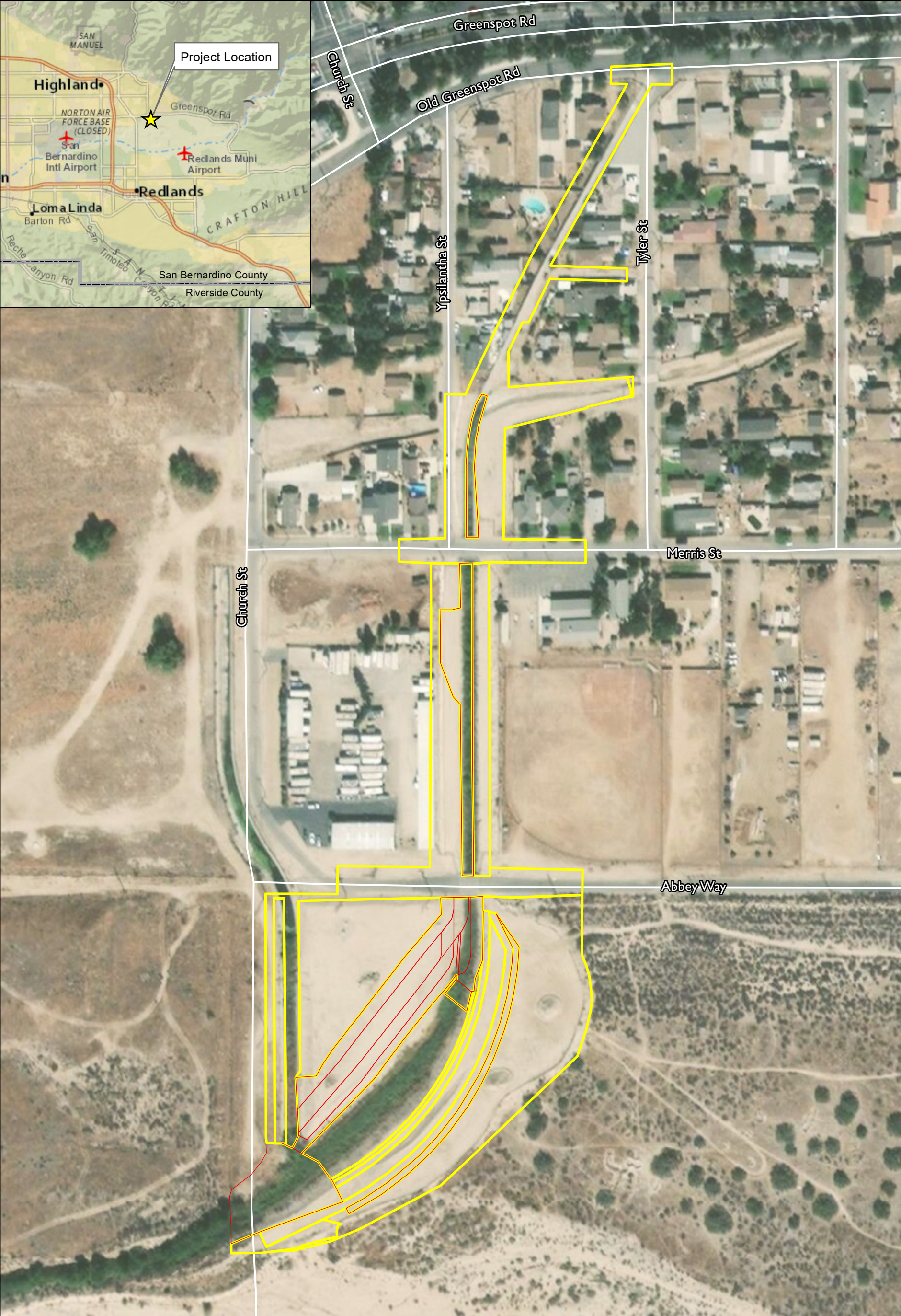
Note that these acreages overlap and are not additive. All USACE jurisdictional waters are included within the CDFW jurisdictional waters of the State. The conclusions presented above represent Aspen's professional opinion based on our knowledge and experience with the USACE and CDFW, including their regulatory guidance documents and manuals. However, the USACE and CDFW have final authority in determining the status and presence of jurisdictional wetlands and waters and the extent of their boundaries.

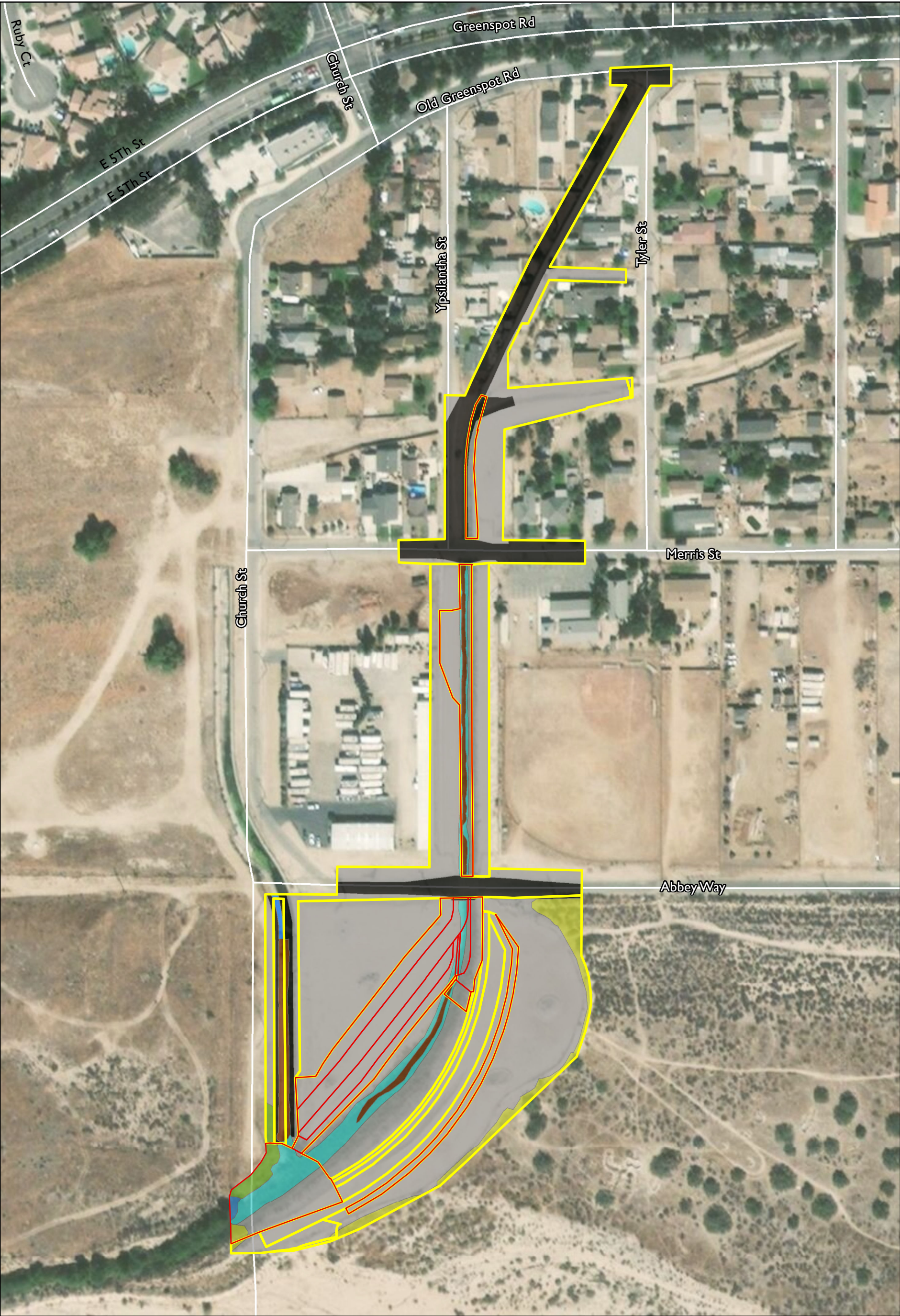
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Attachment 1 - Figures

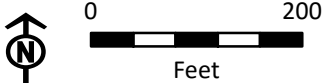


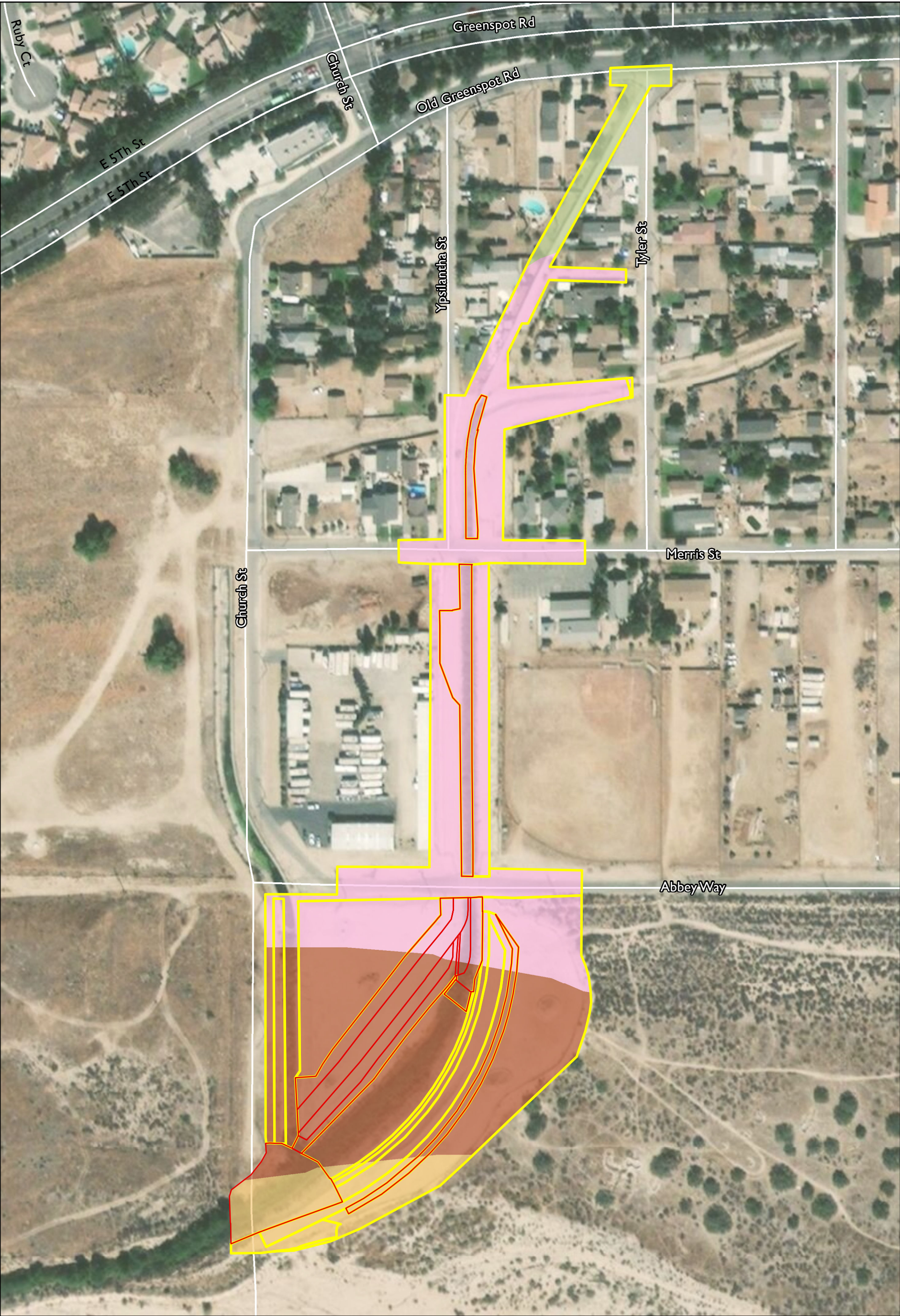


- | | |
|---|---|
| <div></div> Permanent Impacts | <div></div> Temporary Impacts |
| Vegetation and Cover Type (Permanent Impacts/Temporary Impacts) | |
| <div></div> Annual brome grassland (0.06 ac/0.02 ac) | <div></div> Developed (0.04 ac/1.35 ac) |
| <div></div> Arroyo willow thickets (0.01 ac/0 ac) | <div></div> Disturbed (1.41 ac/5.01 ac) |
| <div></div> California buckwheat scrub (0.02 ac/0.25 ac) | <div></div> Open water (0 ac/0.02 ac) |
| <div></div> Cattail marshes (0.08 ac/0.18 ac) | <div></div> Smartweed-cocklebur patches (0.25 ac/0.18 ac) |

Figure 2.

Vegetation





Permanent Impacts Temporary Impacts

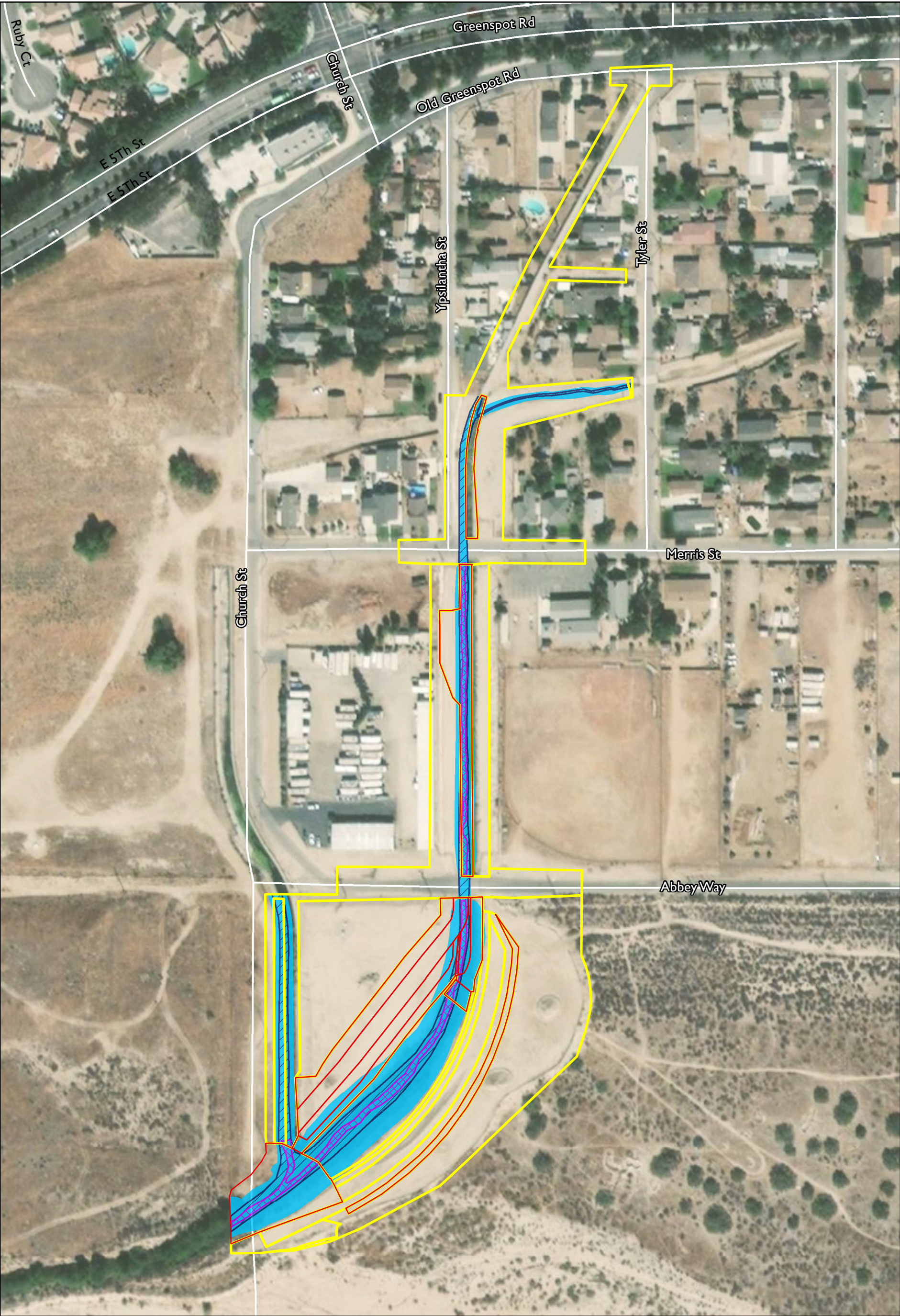
Soil Type

- Psammments, Fluvents and Frequently flooded soils (1.25 ac)
- Soboba gravelly loamy sand, 0 to 9 percent slopes (5.99 ac)

- Soboba stony loamy sand, 2 to 9 percent slopes (5.24 ac)
- Tujunga loamy sand, 0 to 5 percent slopes (0.48 ac)

Figure 3.
Soils





Permanent Impacts Temporary Impacts

Jurisdictional Waters (Permanent Impacts/Temporary Impacts)

- Waters of the State (0.85 ac/1.14 ac)
- Waters of the US (0.19 ac/0.41 ac)
- Federal wetlands (0.15 ac/0.08 ac)

Figure 4.

Jurisdictional Waters



Attachment 2 – Representative Site Photos



Photo 1: South-facing view of wetland vegetation within Church Channel.



Photo 2: Northeast-facing view of wetland vegetation in Elder Channel.



Photo 3: Southwest-facing view of wetland vegetation within the lower portion of Elder Channel.



Photo 4: South-facing view of wetland vegetation in the upper portion of Elder Channel.

Attachment 3 – Field Data Sheets

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Elder Creek Channel City/County: Highland/San Bernardino Co. Sampling Date: 27-Sept-2018
 Applicant/Owner: San Bernardino County Department of Public Works State: CA Sampling Point: JD 1
 Investigator(s): Justin M. Wood Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Broad wash Local relief (concave, convex, none): concave Slope (%): 0-2
 Subregion (LRR): Southern California Coastal Plain Lat: 34° 06' 15.51" Long: 117° 10' 31.11" Datum: NAD 83
 Soil Map Unit Name: Psammments, Fluvents and Frequently flooded soils NWI classification: R5UBF
 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 <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland?	Yes _____ No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes _____ No <input checked="" type="checkbox"/>		
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No _____		
Remarks:			

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>45</u> x 1 = <u>45</u> FACW species <u>35</u> x 2 = <u>70</u> FAC species <u>50</u> x 3 = <u>150</u> FACU species <u>10</u> x 4 = <u>40</u> UPL species _____ x 5 = _____ Column Totals: <u>140</u> (A) <u>305</u> (B) Prevalence Index = B/A = <u>2.2</u>
Sapling/Shrub Stratum (Plot size: <u>5-m radius</u>) 1. <u>Baccharis salicifolia</u> <u>30</u> Yes <u>FAC</u> 2. <u>Salix lasiandra</u> <u>30</u> Yes <u>FACW</u> 3. _____ 4. _____ 5. _____ _____ = Total Cover				
Herb Stratum (Plot size: <u>1-m radius</u>) 1. <u>Persicaria punctata</u> <u>35</u> Yes <u>OBL</u> 2. <u>Xanthium stramineum</u> <u>20</u> Yes <u>FAC</u> 3. <u>Helianthus annuus</u> <u>10</u> No <u>FACU</u> 4. <u>Typha domingensis</u> <u>10</u> No <u>OBL</u> 5. <u>Cyperus eragrostis</u> <u>5</u> No <u>FACW</u> 6. _____ 7. _____ 8. _____ _____ = Total Cover				
Woody Vine Stratum (Plot size: _____) 1. _____ 2. _____ _____ = Total Cover				
% Bare Ground in Herb Stratum <u>20</u> % Cover of Biotic Crust _____				
Remarks:				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____				

SOIL

Sampling Point: JD 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-7	10YR 6/2	100					Sand	
7-9	10YR 3/2	100					Loamy sand	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- | | |
|--|---|
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Stripped Matrix (S6) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Loamy Mucky Mineral (F1) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) |
| <input type="checkbox"/> Stratified Layers (A5) (LRR C) | <input type="checkbox"/> Depleted Matrix (F3) |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR D) | <input type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Redox Depressions (F8) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Vernal Pools (F9) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | |

Indicators for Problematic Hydric Soils³:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- | | |
|--|--|
| <input checked="" type="checkbox"/> Surface Water (A1) | <input type="checkbox"/> Salt Crust (B11) |
| <input checked="" type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Biotic Crust (B12) |
| <input type="checkbox"/> Saturation (A3) | <input type="checkbox"/> Aquatic Invertebrates (B13) |
| <input type="checkbox"/> Water Marks (B1) (Nonriverine) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) |
| <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine) | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) (Nonriverine) | <input type="checkbox"/> Presence of Reduced Iron (C4) |
| <input type="checkbox"/> Surface Soil Cracks (B6) | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Thin Muck Surface (C7) |
| <input type="checkbox"/> Water-Stained Leaves (B9) | <input type="checkbox"/> 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)
- ☐ 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): 5

Saturation Present? Yes ☒ No _____ Depth (inches): 5
(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Elder Creek Channel City/County: Highland/San Bernardino Co. Sampling Date: 27-Sept-2018
 Applicant/Owner: San Bernardino County Department of Public Works State: CA Sampling Point: JD 2
 Investigator(s): Justin M. Wood Section, Township, Range: 10, T1S, R3W (Redlands)
 Landform (hillslope, terrace, etc.): Broad wash Local relief (concave, convex, none): concave Slope (%): 0-2
 Subregion (LRR): Southern California Coastal Plain Lat: 34° 06' 15.81" Long: 117° 10' 29.14" Datum: NAD 83
 Soil Map Unit Name: Psammments, Fluvents and Frequently flooded soils NWI classification: R5UBF
 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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks:	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>45</u> x 1 = <u>45</u> FACW species <u>25</u> x 2 = <u>50</u> FAC species <u>50</u> x 3 = <u>150</u> FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: <u>120</u> (A) <u>245</u> (B) Prevalence Index = B/A = <u>2.04</u>
Sapling/Shrub Stratum (Plot size: <u>5-m radius</u>) 1. <u>Baccharis salicifolia</u> <u>40</u> Yes <u>FAC</u> 2. <u>Salix lasiolepis</u> <u>10</u> Yes <u>FACW</u> 3. _____ 4. _____ 5. _____ _____ = Total Cover				
Herb Stratum (Plot size: <u>1-m radius</u>) 1. <u>Persicaria punctata</u> <u>35</u> Yes <u>OBL</u> 2. <u>Typha latifolia</u> <u>10</u> Yes <u>OBL</u> 3. <u>Cyperus eragrostis</u> <u>10</u> Yes <u>FACW</u> 4. <u>Helianthus annuus</u> <u>5</u> No <u>FACW</u> 5. <u>Xanthium stramineum</u> <u>5</u> No <u>FAC</u> 6. <u>Artemisia douglasiana</u> <u>5</u> No <u>FAC</u> 7. _____ 8. _____ _____ = Total Cover				
Woody Vine Stratum (Plot size: _____) 1. _____ 2. _____ _____ = Total Cover				
% Bare Ground in Herb Stratum <u>30</u> % Cover of Biotic Crust _____				
Remarks:				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				

SOIL

Sampling Point: JD 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-5	10YR 3/2	70	7.5YR 5/8	30	RM	M	Loamy san	
5-15	10YR 4/3	100					Loamy sar	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- | | |
|--|--|
| <input type="checkbox"/> Histosol (A1) | <input checked="" type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Stripped Matrix (S6) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Loamy Mucky Mineral (F1) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) |
| <input type="checkbox"/> Stratified Layers (A5) (LRR C) | <input type="checkbox"/> Depleted Matrix (F3) |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR D) | <input type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Redox Depressions (F8) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Vernal Pools (F9) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | |

Indicators for Problematic Hydric Soils³:

- ☐ 1 cm Muck (A9) (LRR C)
☐ 2 cm Muck (A10) (LRR B)
☐ Reduced Vertic (F18)
☐ Red Parent Material (TF2)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- | | |
|--|--|
| <input checked="" type="checkbox"/> Surface Water (A1) | <input type="checkbox"/> Salt Crust (B11) |
| <input checked="" type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Biotic Crust (B12) |
| <input type="checkbox"/> Saturation (A3) | <input type="checkbox"/> Aquatic Invertebrates (B13) |
| <input type="checkbox"/> Water Marks (B1) (Nonriverine) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) |
| <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine) | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) (Nonriverine) | <input checked="" type="checkbox"/> Presence of Reduced Iron (C4) |
| <input type="checkbox"/> Surface Soil Cracks (B6) | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Thin Muck Surface (C7) |
| <input type="checkbox"/> Water-Stained Leaves (B9) | <input type="checkbox"/> 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)
☐ 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): 4

Saturation Present? Yes ☒ No ☐ Depth (inches): 4
 (includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Elder Creek Channel City/County: Highland/San Bernardino Co. Sampling Date: 27-Sept-2018
 Applicant/Owner: San Bernardino County Department of Public Works State: CA Sampling Point: JD 3
 Investigator(s): Justin M. Wood Section, Township, Range: 10, T1S, R3W (Redlands)
 Landform (hillslope, terrace, etc.): Broad wash Local relief (concave, convex, none): concave Slope (%): 0-2
 Subregion (LRR): Southern California Coastal Plain Lat: 34° 06' 18.53" Long: 117° 10' 23.19" Datum: NAD 83
 Soil Map Unit Name: Psammments, Fluvents and Frequently flooded soils NWI classification: R5UBF
 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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Remarks:	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>55</u> x 1 = <u>55</u> FACW species <u>10</u> x 2 = <u>20</u> FAC species <u>30</u> x 3 = <u>90</u> FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: <u>95</u> (A) <u>165</u> (B) Prevalence Index = B/A = <u>1.74</u>
Sapling/Shrub Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Dominance Test is >50% <input checked="" type="checkbox"/> Prevalence Index is ≤3.0 ¹ _____ Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation ¹ (Explain)
Herb Stratum (Plot size: <u>1-m radius</u>)				
1. <u>Persicaris punctata</u>	<u>55</u>	<u>Yes</u>	<u>OBL</u>	
2. <u>Xanthium stramineum</u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>	
3. <u>Leptochloa fusca</u>	<u>10</u>	<u>No</u>	<u>FACW</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum <u>5</u>	% Cover of Biotic Crust _____			Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

Remarks:

SOIL

Sampling Point: JD 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-9	GLE2 3/5	100					Loamy san	Hydrogen sulfide smell present
9-11	10YR 3/1	100					Sand	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

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 Soils³:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☒ 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 Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ 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)
- ☐ 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): 4

Saturation Present? Yes ☒ No ☐ Depth (inches): 4
(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

**Attachment 4 – 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	1. Valley flat	1. Desert pavement
2. Crested ripples	2. Active floodplain	2. Rock varnish
3. Flaser bedding	3. Benches: low, mid, most prominent	3. Clast weathering
4. Harrow marks	4. Highest surface of channel bars	4. Salt splitting
5. Gravel sheets to rippled sands	5. Top of point bars	5. Carbonate etching
6. Meander bars	6. Break in bank slope	6. Depositional topography
7. Sand tongues	7. Upper limit of sand-sized particles	7. Caliche rubble
8. Muddy point bars	8. Change in particle size distribution	8. Soil development
9. Long gravel bars	9. Staining of rocks	9. Surface color/tone
10. Cobble bars behind obstructions	10. Exposed root hairs below intact soil layer	10. Drainage development
11. Scour holes downstream of obstructions	11. Silt deposits	11. Surface relief
12. Obstacle marks	12. Litter (organic debris, small twigs and leaves)	12. Surface rounding
13. Stepped-bed morphology in gravel	13. Drift (organic debris, larger than twigs)	
14. Narrow berms and levees		
15. Streaming lineations		
16. Desiccation/mud cracks		
17. Armored mud balls		
18. Knick Points		

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 ruderals 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 codominant 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 5 – 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 Corps 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 Corps regulation changed with the 2001 SWANCC (Solid Waste Agency of Northern Cook County) ruling. The U.S. Supreme Court held that the Corps 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 Corps 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 Corps 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.

Appendix D

Noise Impact Analysis Report



Elder Creek Channel Improvements

NOISE IMPACT ANALYSIS

CITY OF HIGHLAND

PREPARED BY:

Bill Lawson, PE, INCE
blawson@urbanxroads.com
(949) 336-5979

Alex Wolfe, INCE
awolfe@urbanxroads.com
(949) 336-5977

JULY 11, 2019

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
ANSI	American National Standards Institute
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
L_{min}	Minimum level measured over the time interval
mph	Miles per hour
PPV	Peak Particle Velocity
Project	Elder Creek Channel Improvements
RMS	Root-mean-square
VdB	Vibration Decibels

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EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures, if any, for the proposed Elder Creek Channel Improvements ("Project"). The Project site is located between Old Greenspot to approximately 650 feet southwest of Abbey Road in the City of Highland. The proposed Project includes the construction of improvements to the Elder Creek Channel beginning downstream of Old Greenspot Road, and terminating just below the confluence of Elder and Church Channel. This study has been prepared consistent with applicable City of Highland noise standards, and significance criteria based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1)

CONSTRUCTION NOISE ANALYSIS

Construction activities are expected to create temporary and intermittent high-level noise conditions at receiver locations surrounding the Project site. This analysis includes an evaluation of typical construction equipment activities in addition to providing a focused assessment of potential impacts related to pile-driving equipment. While public works projects, such as the Elder Creek Channel Improvements, are considered exempt from the noise standards of the City of Highland Municipal Code, neither the General Plan nor Municipal Code establish numeric construction source noise level thresholds at potentially affected receivers for analysis under CEQA. Therefore, this noise analysis relies on the National Institute for Occupational Safety and Health (NIOSH) threshold of 85 dBA L_{eq} , which is consistent with and more conservative than the Federal Transit Administration (FTA) threshold of 90 dBA L_{eq} for daytime construction activities.

TYPICAL CONSTRUCTION ACTIVITY NOISE LEVELS

The highest unmitigated construction noise levels at each receiver location are expected to range from 75 to 92 dBA L_{eq} , and will exceed the 85 dBA L_{eq} threshold at 6 of the 13 receiver locations: R1, R3, R5, R6, R8, and R9. Therefore, unmitigated Project construction noise levels from typical construction activities are considered *potentially significant* impacts at receiver locations R1, R3, R5, R6, R8, and R9, if they represent occupied, sensitive receiver locations (e.g., residential use) at the time of Project construction. As a part of the Construction Mitigation Plan for the Project, temporary construction noise mitigation measures are, therefore, required to reduce the impacts at receiver locations R1, R3, R5, R6, R8, and R9. This includes construction noise mitigation in the form of minimum 10-foot high temporary noise barriers when activities are within 25 feet of nearby, occupied receiver locations. The temporary construction noise barrier mitigation will reduce the construction noise levels at the potentially impacted receiver locations to satisfy the 85 dBA L_{eq} threshold for noise-sensitive receiver locations. Therefore, the noise impact due to typical Project construction activities is considered a *less than significant* impact with mitigation for receiver locations R1, R3, R5, R6, R8, and R9. The construction noise mitigation plan further outlines the required mitigation measures to reduce construction noise impacts.

PILE DRIVING CONSTRUCTION NOISE LEVELS

The pile driving construction noise analysis shows that the highest construction noise levels will occur if impact pile driving equipment is used at the closest point from the edge of primary construction activity to each of the nearby receiver locations. The impact pile driving equipment noise levels, ranging from 76 to 108 dBA L_{eq} will exceed the 85 dBA L_{eq} construction noise level threshold at 10 of the 13 receiver locations: R1 to R10. Pile driving equipment noise levels with alternative drilling equipment, instead of impact devices, are shown to range from 59 to 91 dBA L_{eq} and will exceed the 85 dBA L_{eq} construction noise level threshold at four of the 13 receiver locations: R1, R3, R5, and R8. Therefore, both the unmitigated impact and drilling pile driving equipment noise levels represent *potentially significant* noise impacts.

Construction noise mitigation measures are therefore required to reduce the impacts at the nearby, occupied sensitive receiver locations. Non-impact pile driving equipment (e.g., drilling or other non-impact methods) shall be required to reduce the pile driving equipment noise levels at adjacent receiver locations. Further, mitigation in the form of minimum 10-foot high temporary noise barriers when activities are within 25 feet of nearby receiver locations shall be required. The temporary construction noise barrier mitigation will reduce the pile driving (e.g., drilling or non-impact alternative) equipment noise levels at the potentially impacted, occupied receiver locations to satisfy the 85 dBA L_{eq} threshold for noise-sensitive receiver locations. Therefore, the noise impact due to typical Project construction activities is considered a *less than significant* impact with mitigation for receiver locations R1, R3, R5, and R8 during pile driving (e.g., drilling or non-impact alternative) activities. The Construction Mitigation Plan further outlines the required mitigation measures to reduce pile driving noise impacts.

CONSTRUCTION VIBRATION ANALYSIS

Construction activities are expected to create temporary and intermittent high-level vibration conditions at receivers surrounding the Project site. This analysis includes an evaluation of typical construction equipment activities in addition to providing a focused assessment of potential impacts related to pile-driving equipment.

TYPICAL CONSTRUCTION ACTIVITY VIBRATION LEVELS

At distances ranging from 10 to 73 feet from the Project site, typical construction activity vibration velocity levels are expected to range from 0.018 to 0.352 in/sec PPV. As such, Project construction vibration levels will exceed the County of San Bernardino Development Code threshold of 0.2 in/sec PPV at receiver locations R1, R3, and R8. In addition, construction vibration levels are shown to exceed the building damage threshold of 0.3 in/sec PPV at receiver locations R3 and R8. Therefore, the unmitigated temporary construction-related vibration levels are considered a *potentially significant* impact.

Temporary construction vibration mitigation measures are required to reduce the impacts at nearby sensitive receiver locations. The Construction Mitigation Plan outlined in this report identifies the measures required to satisfy the 0.3 in/sec PPV building damage vibration threshold at nearby sensitive receiver locations to *less than significant* impacts after mitigation. Mitigation includes ground-borne vibration monitoring of nearby residential structures, represented by receiver locations R1, and R3 to R8 adjacent to the channel between Old Greenspot Road and Merris Street, shall be required for the duration of Project construction between Old Greenspot Road and Merris Street. The monitoring shall be based on the Caltrans residential building damage threshold of 0.3 in/sec PPV. Though Caltrans identifies a residential building damage threshold of 0.3 in/sec PPV, the County of San Bernardino may require that vibration levels do not exceed a more conservative threshold (e.g., lower) at their discretion.

However, vibration levels will still exceed the human annoyance threshold of 0.2 in/sec PPV at receiver locations R1, R3, and R8, and therefore, Project typical construction vibration levels represent a *potentially significant* impact at occupied residential homes in relation to human annoyance with mitigation. The Construction Mitigation Plan outlined in this report identifies the measures required to satisfy the County's 0.2 in/sec PPV threshold at nearby sensitive receiver locations to *less than significant* impacts after mitigation. If monitored vibration levels exceed the 0.2 in/sec PPV annoyance threshold then relocation of residents, and/or hours restrictions to day(s)/time(s) when the impacted receiver(s) are unoccupied, shall be provided for the duration of activities within 25 feet of the affected receiver location(s).

Further, vibration levels at the site of the closest sensitive receiver are unlikely to be sustained during the entire construction period, but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site perimeter. Moreover, construction at the Project site will be restricted to daytime hours consistent with City requirements thereby eliminating potential vibration impacts during the sensitive nighttime hours.

PILE DRIVING CONSTRUCTION VIBRATION LEVELS

At distances ranging from 10 to 384 feet from pile driving (impact) activities, vibration velocity levels are expected to range from 0.011 to 2.530 in/sec PPV. The Project construction vibration levels will exceed the County's threshold of 0.2 in/sec PPV at receiver locations R1 to R8. In addition, pile driving (impact) vibration levels are shown to exceed the building damage threshold of 0.3 in/sec PPV at receiver locations R1, and R3 to R8. Therefore, the unmitigated temporary impact pile driving-related vibration levels are considered a *potentially significant* impact.

Temporary construction vibration mitigation measures are required to reduce the impacts at nearby sensitive receiver locations during pile driving activities. Consistent with the pile driving measures identified in this report to reduce impact pile driving noise levels, the use of alternative pile driving equipment (e.g., drilling or non-impact alternative) shall be required instead of impact devices. The mitigated pile driving vibration levels with alternative equipment (e.g., drilling or non-impact alternative) will be reduced to range from 0.001 to 0.352 in/sec PPV, and will still exceed the Caltrans 0.3 in/sec PPV building damage threshold for older residential structures at receiver locations R3 and R8. Therefore, the vibration monitoring as part of the Construction

Mitigation Plan identified in this noise study shall be required to reduce impacts to *less than significant* levels.

In addition, pile driving (e.g., drilling or non-impact alternative) equipment vibration levels will potentially exceed the human annoyance threshold of 0.2 in/sec PPV at receiver locations R1, R3, and R8, and therefore, Project pile driving (e.g., drilling or non-impact alternative) vibration levels represent a *potentially significant* impact at occupied residential homes in relation to human annoyance with mitigation. However, the Construction Mitigation Plan outlined in this report identifies the measures required to satisfy the 0.2 in/sec PPV human annoyance vibration threshold at nearby sensitive receiver locations to *less than significant* impacts after mitigation.

CONSTRUCTION MITIGATION PLAN

The following construction noise and vibration mitigation plan is required to reduce potential impacts at adjacent, sensitive residential structures, and occupied sensitive residential receiver locations. Table ES-1 outlines the mitigated measures listed below.

1. MITIGATION MEASURES REQUIRED TO REDUCE IMPACTS AT SENSITIVE STRUCTURES

- The use of impact pile driving equipment shall be prohibited. Instead, alternative pile driving methods and equipment (e.g., drilling or non-impact alternative) shall be used to reduce Project construction noise and vibration levels.
- Pre- and post-construction surveys of the nearby residential structure(s), documenting the condition of the interior and exterior of the structures, shall be provided for residential structures represented by receiver locations R1, and R3 to R8, adjacent to the channel between Old Greenspot Road and Merris Street.
- Ground-borne vibration monitoring of nearby residential structures, represented by receiver locations R1, and R3 to R8 adjacent to the channel between Old Greenspot Road and Merris Street, shall be required for the duration of Project construction between Old Greenspot Road and Merris Street. The monitoring shall be based on the Caltrans residential building damage threshold of 0.3 in/sec PPV. Though Caltrans identifies a residential building damage threshold of 0.3 in/sec PPV, the County of San Bernardino may require that vibration levels do not exceed a more conservative threshold (e.g., lower) at their discretion.

2. MITIGATION MEASURES REQUIRED TO REDUCE IMPACTS AT SENSITIVE RECEIVER LOCATIONS (IF OCCUPIED)

- If monitored vibration levels exceed the County of San Bernardino 0.2 in/sec PPV annoyance threshold then relocation of residents, and/or hours restrictions to day(s)/time(s) when the impacted receiver(s) are unoccupied, shall be provided for the duration of activities within 25 feet of the affected receiver location(s).
- Install the following temporary construction noise barriers at the minimum heights specified for each receiver location when Project construction activities are within 25 feet of occupied noise-sensitive residential homes:
 - Minimum 10-foot high temporary noise barriers for occupied residential homes represented by receiver locations R1, and R3 to R9;
 - The temporary noise control barriers shall be located at the edge of Project construction activities and must have a solid face from top to bottom. The noise control barrier must meet the minimum height and be constructed as follows:
 - The temporary noise barrier shall provide a minimum transmission loss of 20 dBA (Federal Highway Administration, Noise Barrier Design Handbook). The noise barrier shall be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts. Example photos are provided in Appendix 7.3;
 - The noise barrier must be maintained, and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired;

- The noise control barrier and associated elements shall be completely removed, and the site appropriately restored upon the conclusion of the construction activity.

Relocation and/or Hours Restrictions

- If the above is not feasible then relocation of residents, and/or hours restrictions to day(s)/time(s) when the impacted receiver(s) are unoccupied, shall be provided for the duration of activities within 25 feet of the affected receiver location(s).

STANDARD MEASURES REQUIRED THROUGHOUT PROJECT CONSTRUCTION

- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise-sensitive receivers nearest the Project site.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site during all Project construction (i.e., south of Abbey Way).
- The contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.
- Residences and other noise-sensitive land uses within 100 feet of Project construction shall be notified of the construction in writing. The notification shall describe the activities anticipated, provide dates and hours of activity, and provide contact information with a description of a noise and/or vibration complaint and response procedure. The notification shall also advise residents to remain indoors with windows closed when construction activity is occurring outside of their homes to avoid elevated exterior noise and/or vibration levels.

TABLE ES-1: CONSTRUCTION NOISE & VIBRATION MITIGATION MEASURES

Construction Activity	Vibration Level Threshold (in/sec PPV)	Temporary Noise Barrier Screening Distance (Feet)	Noise Level Threshold (dBA L_{eq})	When Required?
MITIGATION MEASURES REQUIRED TO REDUCE IMPACTS AT SENSITIVE STRUCTURES				
Pile Driving Impact	The use of impact pile driving equipment shall be prohibited. Instead, alternative pile driving methods and equipment (e.g., drilling or non-impact alternative) shall be used to reduce Project construction noise and vibration levels.			
All Construction Activities Between Old Greenspot Road and Merris Street	0.3 in/sec PPV <i>Building Damage at sensitive structures</i>	-	-	Ground-borne vibration monitoring of nearby residential structures, represented by receiver locations R1, and R3 to R8 adjacent to the channel between Old Greenspot Road and Merris Street, shall be required for the duration of Project construction between Old Greenspot Road and Merris Street. The County of San Bernardino may require that vibration levels do not exceed a more conservative threshold (e.g., lower) at their discretion.
MITIGATION MEASURES REQUIRED TO REDUCE IMPACTS AT SENSITIVE RECEIVER LOCATIONS (IF OCCUPIED)				
Activities Generating Vibration Levels in Excess of 0.2 in/sec PPV At Occupied Sensitive Receiver Locations	0.2 in/sec PPV <i>Annoyance at occupied sensitive receiver locations</i>	-	-	If monitored vibration levels exceed the County's 0.2 in/sec annoyance threshold then relocation of residents, and/or hours restrictions to day(s)/time(s) when the impacted receiver(s) are unoccupied, shall be provided for the duration of activities within 25 feet of the affected receiver location(s).
All Construction Activities Noise-specific mitigation	-	25'	85 dBA L_{eq} <i>at occupied sensitive receiver locations</i>	Temporary 10-foot high noise barriers required if construction activity occurs within 25 feet of occupied sensitive receivers.
				If the noise level threshold cannot be satisfied, relocation of residents, and/or hours restrictions to day(s)/time(s) when the impacted receiver(s) are unoccupied, shall be provided.

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1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Elder Creek Channel Improvements (“Project”). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, describes the local regulatory setting, and provides the study methods and procedures for construction noise analysis.

1.1 SITE LOCATION

The proposed Elder Creek Channel Improvements Project is located between Old Greenspot to approximately 650 feet southwest of Abbey Road in the City of Highland, as shown on Exhibit 1-A. Existing noise-sensitive land uses in the Project study area include residential homes immediately adjacent to the Project site.

1.2 PROJECT DESCRIPTION

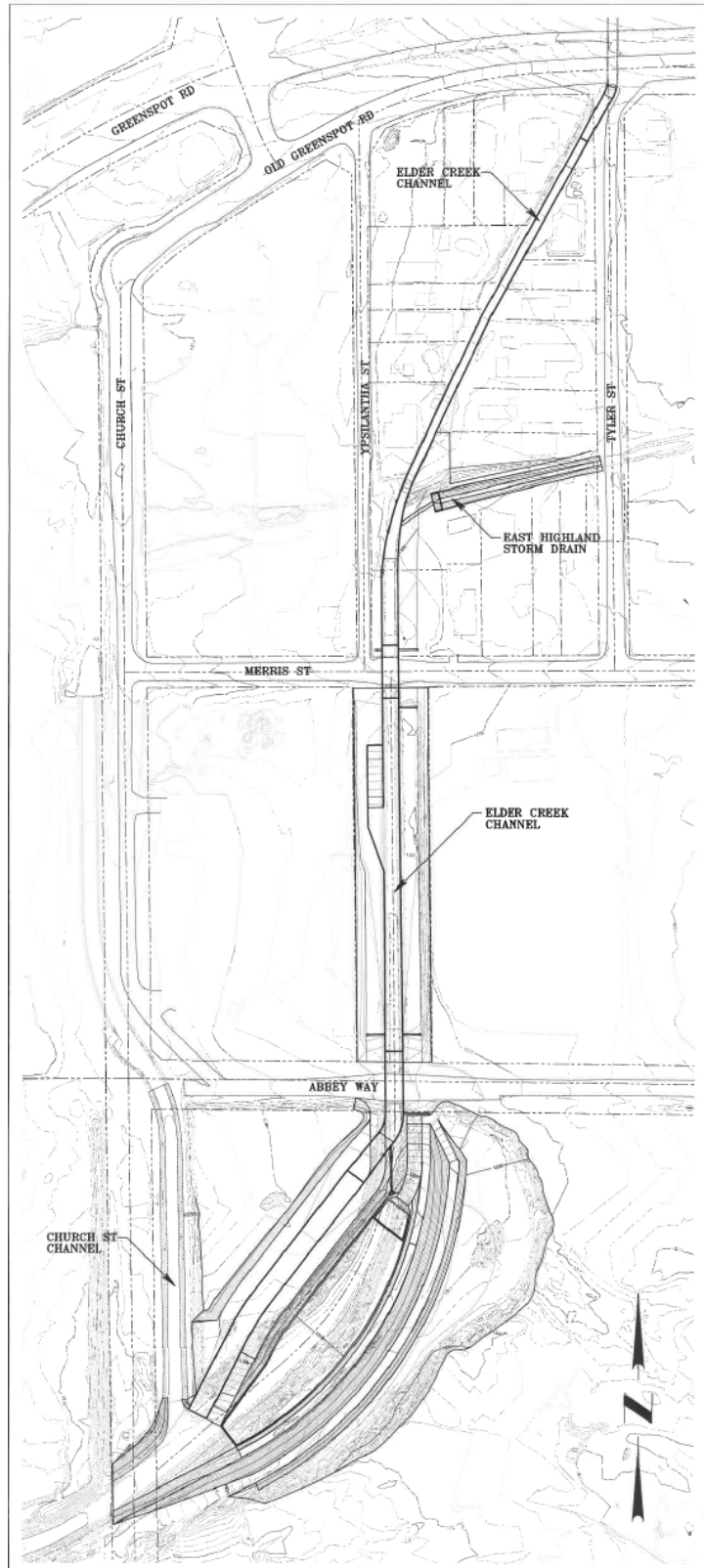
The proposed Project begins downstream of Old Greenspot Road, and terminates just below the confluence of Elder and Church Channel, as shown on Exhibit 1-B. With this Project, the Reinforced Concrete Box (RCB) between Old Greenspot Road and Merris Street will be deepened and may be redesigned as an open concrete channel. Additionally, the existing, open concrete channel just downstream of the RCB will be widened to approximately 26 feet and deepened to provide needed flow capacity. Downstream of this open concrete channel, the existing rip-rap and revetment-improved earthen channel between Merris Street and Abbey Way will be reconfigured to a 26-foot wide open horizontal concrete channel and deepened to meet the flows upstream. Dual access roads will remain at this location. Additionally, there will be two road box culverts replaced with approximately 26-foot wide culverts, one at Merris Street and one at Abbey Way. Downstream of Abbey Way, the proposed improvements consists of constructing an open concrete channel, approximately 26-foot wide, with a low flow diversion that feeds the existing earthen channel. The open concrete channel ties into existing Elder Creek approximately 600 linear feet below Abbey Way.

The system will require periodic maintenance, including the low-flow channel and possibly of the rip-rap tie-in-point of the Elder and Church Channel. The maintenance is anticipated to be minimal, occurring once a year or every few years, depending on duration and intensity of future storms. There may be a one-time maintenance of approximately 700 linear feet of Church Channel just upstream of the confluence with Elder, including sediment and vegetation and debris removal, prior to completion of the Project.

EXHIBIT 1-A: LOCATION MAP



EXHIBIT 1-B: SITE PLAN



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2 FUNDAMENTALS

Noise has been simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	SPEECH INTERFERENCE
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (2) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 100 feet, which can cause serious discomfort. (3) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most commonly used figure is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the “average” noise levels within the environment.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when sound appears louder. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The City of Highland relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The way noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (2)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually

sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (4)

2.3.3 ATMOSPHERIC EFFECTS

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (2)

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby resident. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The FHWA does not consider the planting of vegetation to be a noise abatement measure. (4)

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for an observation point or receptor by controlling the noise source, transmission path, receptor, or all three. This concept is known as the source-path-receptor concept. In general, noise control measures can be applied to these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receptor. Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (4)

2.6 LAND USE COMPATIBILITY WITH NOISE

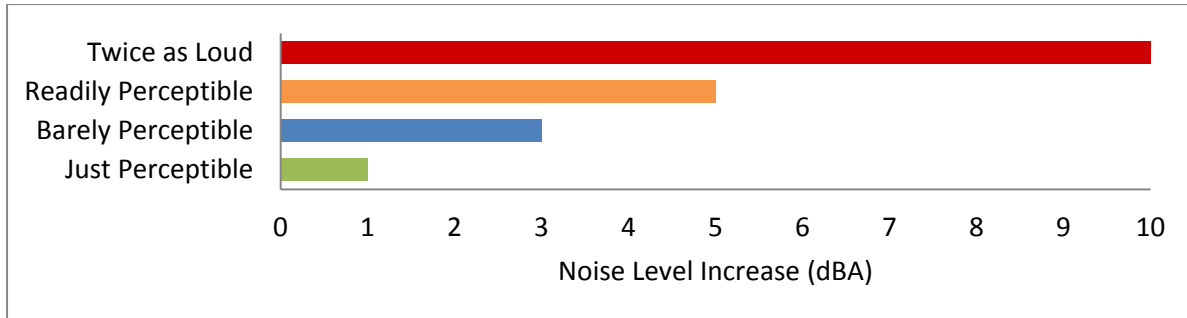
Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (5)

2.7 COMMUNITY RESPONSE TO NOISE

Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon everyone's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

- Fear associated with noise producing activities;
- Socio-economic status and educational level;
- Perception that those affected are being unfairly treated;
- Attitudes regarding the usefulness of the noise-producing activity;
- Belief that the noise source can be controlled.

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Another twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (6) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (6) Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments, a change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (4)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION

2.8 EXPOSURE TO HIGH NOISE LEVELS

The Occupational Safety and Health Administration (OSHA) sets legal limits on noise exposure in the workplace. The permissible exposure limit (PEL) for a worker over an eight-hour day is 90 dBA. The OSHA standard uses a 5 dBA exchange rate. This means that when the noise level is increased by 5 dBA, the amount of time a person can be exposed to a certain noise level to receive the same dose is cut in half. The National Institute for Occupational Safety and Health (NIOSH) has recommended that all worker exposures to noise should be controlled below a level equivalent to 85 dBA for eight hours to minimize occupational noise induced hearing loss. NIOSH also recommends a 3 dBA exchange rate so that every increase by 3 dBA doubles the amount of the noise and halves the recommended amount of exposure time. (7)

OSHA has implemented requirements to protect all workers in general industry (e.g. the manufacturing and the service sectors) for employers to implement a Hearing Conservation Program where workers are exposed to a time weighted average noise level of 85 dBA or higher over an eight-hour work shift. Hearing Conservation Programs require employers to measure noise levels, provide free annual hearing exams and free hearing protection, provide training, and conduct evaluations of the adequacy of the hearing protectors in use unless changes to tools, equipment and schedules are made so that they are less noisy and worker exposure to noise is less than the 85 dBA. This noise study does not evaluate the noise exposure of workers within a project or construction site based on CEQA requirements, and instead, evaluates Project-related operational and construction noise levels at the nearby sensitive receiver locations in the Project study area. Further, periodic exposure to high noise levels in short duration, such as Project construction, is typically considered an annoyance and not impactful to human health. It would take several years of exposure to high noise levels to result in hearing impairment. (8)

2.9 VIBRATION

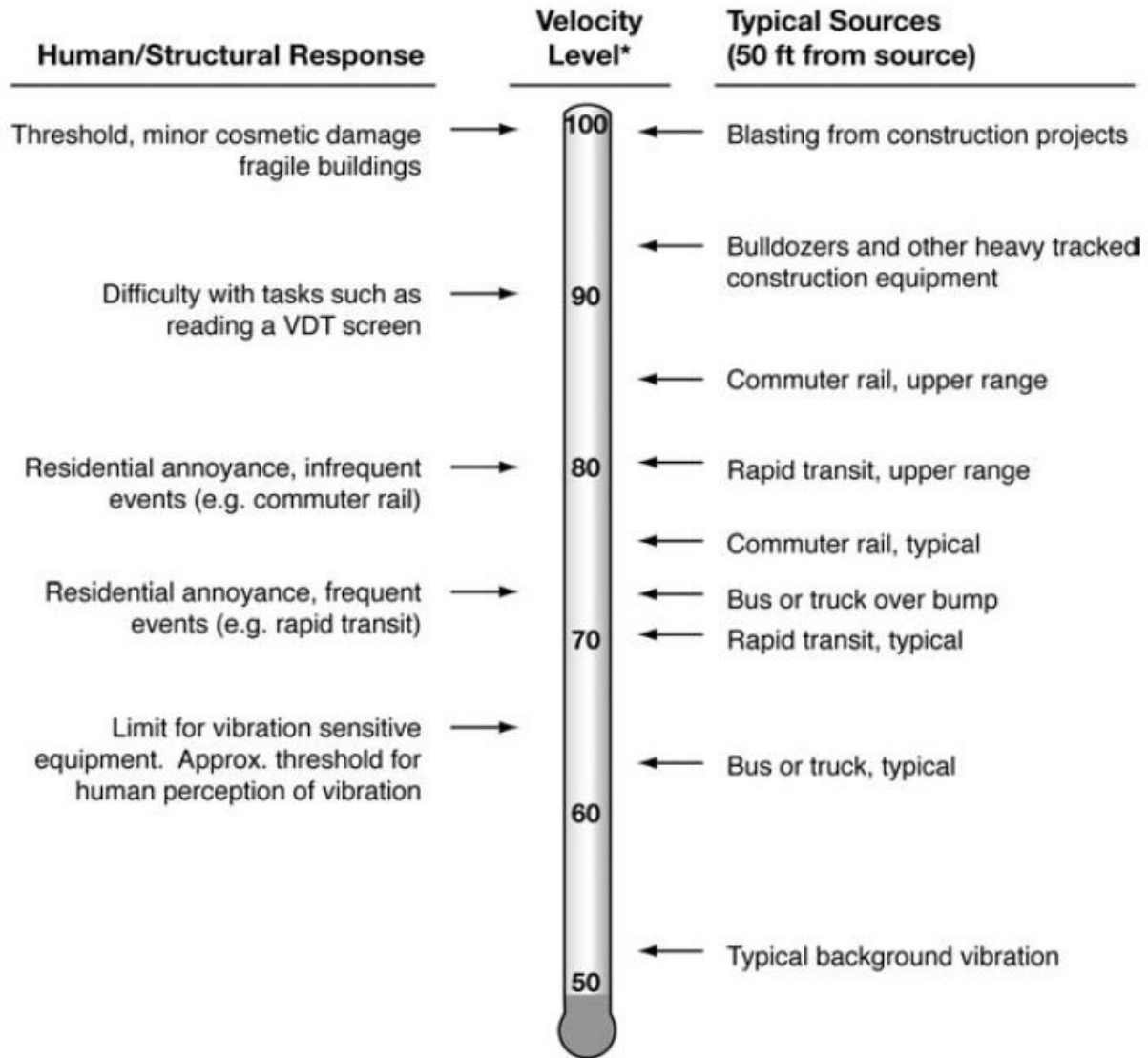
Per the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Assessment* (9), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions.

As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment.

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



* RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second

Source: Federal Transit Administration (FTA) Transit Noise Impact and Vibration Assessment.

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3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research. (10) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 CITY OF HIGHLAND GENERAL PLAN NOISE ELEMENT

The City of Highland has adopted a Noise Element of the General Plan to provide goals and strategies to ensure a quiet noise environment for residents, employees, and visitors to Highland. (11) To ensure a quiet noise environment, the City of Highland General Plan Noise Element contains the following goals:

- 7.1 *Protect sensitive land uses and the citizens of Highland from annoying and excessive noise through diligent planning and regulation.*
- 7.2 *Encourage the reduction of noise from transportation-related noise sources such as automobile and truck traffic.*
- 7.3 *Protect residents from the effects of "spill over" or nuisance noise.*

The Policies and Actions specified in the City of Highland Noise Element provide the guidelines necessary to satisfy these goals. For example, Goal 7.3, Action 1 indicates that construction, as a condition of approval, shall be limited to daytime hours between 7:00 a.m. to 6:00 p.m. on weekdays. (11)

3.3 CONSTRUCTION NOISE STANDARDS

To control noise impacts associated with the construction of the proposed Project, the City of Highland has established limits to the hours of operation. The City of Highland General Plan Noise Element, Goal 7.3, Action 1 indicates that construction, as a condition of approval, shall be limited to daytime hours between 7:00 a.m. to 6:00 p.m. on weekdays. (11) Further, Section 8.50.060(K) of the City of Highland Municipal Code indicates that construction activities for public works projects, such as the Elder Creek Channel Improvements are considered exempt from the noise standards of the Municipal Code. However, the City's General Plan and Municipal Code do not establish numeric maximum acceptable construction source noise levels at potentially affected receivers, which would allow for a quantified determination of what CEQA constitutes as the *generation of noise levels in excess of standards* or as a *substantial temporary or periodic noise increase*, the following construction noise level thresholds are used in this noise study.

To evaluate whether the Project will generate potentially significant construction noise levels at off-site sensitive receiver locations, a construction-related noise level threshold is adopted from the *Criteria for Recommended Standard: Occupational Noise Exposure* prepared by the National Institute for Occupational Safety and Health (NIOSH). (12) A division of the U.S. Department of Health and Human Services, NIOSH identifies a noise level threshold based on the duration of exposure to the source. The construction related noise level threshold starts at 85 dBA for more than eight hours per day, and for every 3 dBA increase, the exposure time is cut in half. This results in noise level thresholds of 88 dBA for more than four hours per day, 92 dBA for more than one hour per day, 96 dBA for more than 30 minutes per day, and up to 100 dBA for more than 15 minutes per day. (12) For the purposes of this analysis, the lowest, more conservative construction noise level threshold of 85 dBA L_{eq} is used as an acceptable threshold for construction noise at the nearby sensitive receiver locations. Since this construction-related noise level threshold represents the energy average of the noise source over a given time, they are expressed as L_{eq} noise levels. Therefore, the noise level threshold of 85 dBA L_{eq} over a period of eight hours or more is used to evaluate the potential Project-related construction noise level impacts at the nearby sensitive receiver locations.

The 85 dBA L_{eq} threshold is also consistent with the FTA *Transit Noise and Vibration Impact Assessment* criteria for construction noise which identifies an hourly construction noise level threshold of 90 dBA L_{eq} during daytime hours, and 80 dBA L_{eq} during nighttime hours for construction for general assessment at noise-sensitive uses (e.g., residential, medical/hospital, school, etc.). (9) Therefore, the Noise Study relies on the NIOSH 85 dBA L_{eq} threshold, which is more conservative than the 90 dBA L_{eq} FTA general assessment criteria, for noise-sensitive uses and represents an appropriate threshold for construction noise analysis.

3.4 CONSTRUCTION VIBRATION STANDARDS

The City of Highland General Plan and Municipal Code do not identify specific vibration level standards. Therefore, applicable vibration standards identified by the California Department of Transportation (“Caltrans”) *Transportation and Construction Vibration Guidance Manual* are used in this noise study to assess potential building damage impacts. (13) According to the Caltrans vibration manual, large mobile equipment, and large loaded trucks (e.g., haul trucks) used during construction activities can produce vibration which can potentially cause annoyance at sensitive land uses within the Project study area, or damage to adjacent structures. The Caltrans vibration manual establishes thresholds for determining potential vibration impacts resulting in building damage for older residential structures of 0.3 in/sec PPV.

In addition, the County of San Bernardino Development Code, Section 83.01.090 identifies vibration standards of 0.2 in/sec PPV which are used in this noise study to evaluate potential impacts related to human annoyance at nearby sensitive receiver locations. (14)

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4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

- A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
- B. Generation of excessive ground-borne vibration or ground-borne noise levels?
- C. For a project located within the vicinity of a private airstrip or 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?

While the City of Highland General Plan Guidelines provide direction on noise compatibility and establish noise standards by land use type that are sufficient to assess the significance of noise impacts, they do not define the levels at which increases are considered substantial for use under Guideline A. CEQA Appendix G Guideline C applies to nearby public and private airports, if any, and the Project's land use compatibility. The Project site is not located within two miles of a public airport; nor is the Project within the vicinity of a private airstrip. As such, the Project site would not be exposed to excessive noise levels from airport operations, and therefore, impacts are considered *less than significant*, and no further noise analysis is conducted in relation to Guidelines E and F.

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix.

CONSTRUCTION NOISE

- If temporary Project-related construction activities create noise levels which exceed the 85 dBA L_{eq} acceptable noise level threshold at the nearby noise-sensitive receiver locations (NIOSH, Criteria for Recommended Standard: Occupational Noise Exposure).

CONSTRUCTION VIBRATION

- If temporary Project-related construction activities generate vibration levels which:
 - exceed the Caltrans building damage vibration level threshold for older residential structures of 0.3 in/sec PPV (Caltrans Transportation and Construction Vibration Guidance Manual, Tables 19 & 20); or
 - the human annoyance vibration level threshold of 0.2 in/sec PPV at nearby sensitive receiver locations (County of San Bernardino Development Code, Section 83.01.090).

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Receiving Land Use	Condition(s)	Significance Criteria	
			Daytime	Nighttime
Construction	Noise-Sensitive	Noise Level Threshold ¹	85 dBA L _{eq}	n/a
		Vibration Level Threshold (Building Damage) ²	0.3 in/sec PPV	n/a
		Vibration Level Threshold (Human Annoyance) ³	0.2 in/sec PPV	n/a

¹ Source: NIOSH, Criteria for Recommended Standard: Occupational Noise Exposure, June 1998.

² Source: Caltrans Transportation and Construction Vibration Guidance Manual, September 2013, Tables 19 & 20.

³ Source: County of San Bernardino Development Code, Section 83.01.090 .

"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.; "PPV" = peak particle velocity; "n/a" = No nighttime construction activity is permitted or planned, so no nighttime construction noise level limits are identified.

5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, five 24-hour noise level measurements were taken at receiver locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Friday, June 22nd, 2018. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (15)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent any part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources.* (2) Further, FTA guidance states, *that it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community.* (9)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (9) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels

and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Further, only the daytime noise levels are presented below based on the daytime-only Project construction activity analyzed in this noise study, however, the full 24-hour noise level measurement data is provided in Appendix 5.2. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) noise levels at each noise level measurement location. Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

- Location L1 represents the noise levels north of the Project site on Old Greenspot Road near existing residential homes. The energy (logarithmic) average daytime noise level was calculated at 65.1 dBA L_{eq} .
- Location L2 represents the noise levels at the eastern Project site boundary adjacent to existing residential homes on Tyler Street. The energy (logarithmic) average daytime noise level was calculated at 49.8 dBA L_{eq} .
- Location L3 represents the noise levels at the eastern Project site boundary adjacent to existing residential homes on Tyler Street. The energy (logarithmic) average daytime noise level was calculated at 46.2 dBA L_{eq} .
- Location L4 represents the noise levels west of the Project site on Church Street near vacant land and existing residential homes. The energy (logarithmic) average daytime noise level was calculated at 50.5 dBA L_{eq} .
- Location L5 represents the noise levels on Merris Street within the Project site boundaries adjacent to existing residential homes and commercial uses. The energy (logarithmic) average daytime noise level was calculated at 52.3 dBA L_{eq} .
- Location L6 represents the noise levels on Abbey Way adjacent to the Project site near existing vacant land. The energy (logarithmic) average daytime noise level was calculated at 51.8 dBA L_{eq} .

Table 5-1 provides the (energy average) noise levels used to describe the daytime ambient conditions. These daytime energy average noise levels represent the average of all hourly noise levels observed during this time period expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L_1 , L_2 , L_5 , L_8 , L_{25} , L_{50} , L_{90} , L_{95} , and L_{99} percentile noise levels observed during the daytime and nighttime periods.

TABLE 5-1: AMBIENT NOISE LEVEL MEASUREMENTS

Location¹	Distance to Project Boundary (Feet)	Description	Energy Average Daytime Noise Level (dBA L_{eq})²
L1	10'	Located north of the Project site on Old Greenspot Road near existing residential homes.	65.1
L2	0'	Located at the eastern Project site boundary adjacent to existing residential homes on Tyler Street.	49.8
L3	0'	Located at the eastern Project site boundary adjacent to existing residential homes on Tyler Street.	46.2
L4	350'	Located west of the Project site on Church Street near vacant land and existing residential homes.	50.5
L5	0'	Located on Merris Street within the Project site boundaries adjacent to existing residential homes and commercial uses.	52.3
L6	0'	Located on Abbey Way adjacent to the Project site near existing vacant land.	51.8

¹ See Exhibit 5-A for the noise level measurement locations.

² Energy (logarithmic) average hourly levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.

"Daytime" = 7:00 a.m. to 10:00 p.m.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS



6 RECEIVER LOCATIONS

To assess the potential for short-term construction noise impacts, the following receiver locations as shown on Exhibit 6-A were identified as representative locations for focused analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include: schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include: multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, natural open space, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

Noise-sensitive receivers near the Project site include existing residential homes, as described below. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures.

- R1: Located approximately 13 feet west of the Project site, R1 represents an existing residential home south of Old Greenspot Road.
- R2: Location R2 represents the existing residential home located approximately 46 feet southeast of the Project site on Tyler Street.
- R3: Location R3 represents an existing residential home east of the Project site on Tyler Street at roughly 10 feet.
- R4: Location R4 represents the outdoor living area (backyard) and pool of an existing residential property on Ypsilantha Street located roughly 38 feet west of the Project site.
- R5: Location R5 represents the existing residential home located roughly 18 feet east of the Project site on Tyler Street.
- R6: Location R6 represents existing outdoor area living area (backyard) of a residential property on Ypsilantha Street at roughly 21 feet west of the Project site.
- R7: Located approximately 23 feet east of the Project site, R7 represents an existing outdoor living area (backyard) of a residential home on Tyler Street.
- R8: Location R8 represents an existing residential home on Ypsilantha Street which is located approximately 10 feet west of the Project site.
- R9: Location R9 represents an existing residential home north of the Project site on Tyler Street at an approximate distance of 21 feet.
- R10: Location R10 represents the residential homes located roughly 73 feet northwest of the Project site on Ypsilantha Street.
- R11: Location R11 represents the existing residential home located roughly 24 feet west of the Project site on Merris Street.

- R12: Location R12 represents existing outdoor living area (backyard) of a residential home at roughly 26 feet east of the Project site on Merris Street.
- R13: Location R13 represents an existing church use at roughly 69 feet west of the Project site.

EXHIBIT 6-A: RECEIVER LOCATIONS



LEGEND:

- Receiver Locations
- Distance from receiver to Project site boundary (in feet)
- Existing Barrier Height (in feet)
- Existing Barrier

7 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 7-A shows the construction activity boundaries in relation to the nearby sensitive receiver locations.

7.1 CONSTRUCTION ANALYSIS INPUTS

Noise generated by the Project construction equipment can reach high levels at adjacent receiver locations. This analysis focuses on typical construction equipment activities, in addition to providing a focused assessment of potential impacts related to pile-driving equipment:

Typical Construction Activities

- Church Street Channel Muck Out
- Construction of the Channel Downstream of Abbey Way
- Construction of a Reinforced Concrete Box (RCB) at Abbey Way
- Construction of the Channel between Abbey Way and Merris Street
- Construction of a RCB at Merris Street
- Paving
- Construction of the Channel north of Merris Street
- Fencing & Cleanup

Pile Driving Activities

- Pile Driving Equipment

This construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels. (16) The RCNM equipment database, as shown in Appendix 7.1, provides a comprehensive list of the noise generating characteristics for specific types of construction equipment. In addition, the database provides an acoustical usage factor to estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation. The usage factor is a key input variable of the RCNM noise prediction model that is used to calculate the average L_{eq} noise levels using the L_{max} noise levels measured at a distance of 50 feet.

Noise levels generated by heavy construction equipment can range from approximately 68 dBA to in excess of 80 dBA when measured at 50 feet. Hard site conditions are used in the construction noise analysis which result in noise levels that attenuate (or decrease) at a rate of 6 dBA for each doubling of distance from a point source (i.e. construction equipment). For example, a noise level of 80 dBA measured at 50 feet from the noise source to the receiver would be reduced to 74 dBA at 100 feet from the source to the receiver and would be further reduced to 68 dBA at 200 feet from the source to the receiver. The number and mix of construction equipment by construction stage used in this analysis is consistent with data provided by the San Bernardino County Flood Control District. (17)

EXHIBIT 7-A: CONSTRUCTION ACTIVITY AND RECEIVER LOCATIONS



LEGEND:



● Receiver Locations

—● Distance from receiver to Project site boundary (in feet)

6' Existing Barrier Height (in feet)

— Existing Barrier

▨ Pile Driving Activity

—● Distance from receiver to pile driving activity (in feet)

7.2 TYPICAL CONSTRUCTION ACTIVITY NOISE LEVELS

Tables 7-1 to 7-6 show the typical Project construction stages and the reference construction noise levels used for each stage at 50 feet. Table 7-7 provides a summary of the noise levels from each stage of construction at each of the sensitive receiver locations based on the distance to the Project site boundary. Based on the reference construction noise levels, the Project-related typical construction activity noise levels when the highest reference noise level is operating at the edge of primary construction activity nearest each sensitive receiver location will range from 71 to 92 dBA L_{eq} at the sensitive receiver locations, as shown on Table 7-7.

TABLE 7-1: CHURCH STREET MUCK OUT & ABBEY CHANNEL EQUIPMENT NOISE LEVELS

Equipment Type ¹	Quantity	Usage Factor ²	Hours of Operation ³	Reference Noise Level @ 50 Feet (dBA L_{max})	Combined Level @ 50 Feet (dBA L_{eq})
Church Street Channel Muck Out					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Dump Truck	2	40%	3.2	76.0	75.0
Water Trucks	1	40%	3.2	76.0	72.0
Grade Downstream Abbey					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Excavators	1	40%	3.2	81.0	77.0
Dump Truck	1	40%	3.2	76.0	72.0
Water Trucks	1	40%	3.2	76.0	72.0
Steel for Channel Invert					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Concrete for Invert					
Concrete Mixer Truck	2	40%	3.2	79.0	78.0
Concrete Pump Trucks	1	20%	1.6	81.0	74.0
Generator Sets	1	50%	4.0	81.0	78.0
Steel for Walls					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Concrete for Walls					
Concrete Mixer Truck	2	40%	3.2	79.0	78.0
Concrete Pump Trucks	1	20%	1.6	81.0	74.0
Generator Sets	1	50%	4.0	81.0	78.0

¹ Source: FHWA's Roadway Construction Noise Model, January 2006.

² Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.

³ Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.

TABLE 7-2: RCB AT ABBEY EQUIPMENT NOISE LEVELS

Equipment Type ¹	Quantity	Usage Factor ²	Hours of Operation ³	Reference Noise Level @ 50 Feet (dBA L _{max})	Combined Level @ 50 Feet (dBA L _{eq})
Relocate Utilities					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Demo Asphalt at RCB					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Excavators	1	40%	3.2	81.0	77.0
Dump Truck	1	40%	3.2	76.0	72.0
Water Trucks	1	40%	3.2	76.0	72.0
Grade Subgrade					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Steel for Invert					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Concrete Invert					
Concrete Mixer Truck	2	40%	3.2	79.0	78.0
Concrete Pump Trucks	1	20%	1.6	81.0	74.0
Generator Sets	1	50%	4.0	81.0	78.0
Steel for Walls and Deck					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Concrete Walls and Deck					
Concrete Mixer Truck	2	40%	3.2	79.0	78.0
Concrete Pump Trucks	1	20%	1.6	81.0	74.0
Generator Sets	1	50%	4.0	81.0	78.0
Backfill RCB					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Excavators	1	40%	3.2	81.0	77.0
Water Trucks	1	40%	3.2	76.0	72.0

¹ Source: FHWA's Roadway Construction Noise Model, January 2006.² Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.³ Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.

TABLE 7-3: ABBEY TO MERRIS CHANNEL EQUIPMENT NOISE LEVELS

Equipment Type ¹	Quantity	Usage Factor ²	Hours of Operation ³	Reference Noise Level @ 50 Feet (dBA L _{max})	Combined Level @ 50 Feet (dBA L _{eq})
Grade Subgrade					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Excavators	1	40%	3.2	81.0	77.0
Water Trucks	1	40%	3.2	76.0	72.0
Steel for Invert					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Concrete for Invert					
Concrete Mixer Truck	2	40%	3.2	79.0	78.0
Concrete Pump Trucks	1	20%	1.6	81.0	74.0
Generator Sets	1	50%	4.0	81.0	78.0
Steel for Walls					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Concrete for Walls & Grading					
Concrete Mixer Truck	2	40%	3.2	79.0	78.0
Concrete Pump Trucks	1	20%	1.6	81.0	74.0
Water Trucks	1	40%	3.2	76.0	72.0
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Excavators	1	40%	3.2	81.0	77.0
Generator Sets	1	50%	4.0	81.0	78.0

¹ Source: FHWA's Roadway Construction Noise Model, January 2006.

² Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.

³ Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.

TABLE 7-4: RCB AT MERRIS EQUIPMENT NOISE LEVELS

Equipment Type ¹	Quantity	Usage Factor ²	Hours of Operation ³	Reference Noise Level @ 50 Feet (dBA L _{max})	Combined Level @ 50 Feet (dBA L _{eq})
Relocate Utilities					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Demo Asphalt at RCB					
Tractor/Loader/Backhoes	2	40%	3.2	78.0	77.0
Dump Truck	1	40%	3.2	76.0	72.0
Excavators	1	40%	3.2	81.0	77.0
Water Trucks	1	40%	3.2	76.0	72.0
Grade Subgrade					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Steel for Invert					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Concrete for Invert					
Concrete Mixer Truck	2	40%	3.2	79.0	78.0
Concrete Pump Trucks	1	20%	1.6	81.0	74.0
Generator Sets	1	50%	4.0	81.0	78.0
Steel for Walls and Deck					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Concrete for Walls and Deck					
Concrete Mixer Truck	2	40%	3.2	79.0	78.0
Concrete Pump Trucks	1	20%	1.6	81.0	74.0
Generator Sets	1	50%	4.0	81.0	78.0
Backfill RCB					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Excavators	1	40%	3.2	81.0	77.0
Water Trucks	1	40%	3.2	76.0	72.0

¹ Source: FHWA's Roadway Construction Noise Model, January 2006.² Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.³ Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.

TABLE 7-5: PAVING & CHANNEL NORTH OF MERRIS EQUIPMENT NOISE LEVELS

Equipment Type ¹	Quantity	Usage Factor ²	Hours of Operation ³	Reference Noise Level @ 50 Feet (dBA L _{max})	Combined Level @ 50 Feet (dBA L _{eq})
Paving					
Pickup Trucks	2	40%	3.2	75.0	74.0
Water Trucks	1	40%	3.2	76.0	72.0
Pavers	1	50%	4.0	77.0	74.0
Rollers	3	20%	1.6	80.0	77.8
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Demo Channel and RCB					
Tractor/Loader/Backhoes	2	40%	3.2	78.0	77.0
Excavators	1	40%	3.2	81.0	77.0
Dump Truck	1	40%	3.2	76.0	72.0
Water Trucks	1	40%	3.2	76.0	72.0
Grade Subgrade					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Steel for Invert					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Concrete for Invert					
Concrete Mixer Truck	2	40%	3.2	79.0	78.0
Concrete Pump Trucks	1	20%	1.6	81.0	74.0
Generator Sets	1	50%	4.0	81.0	78.0
Steel for Walls					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Concrete for Walls					
Concrete Mixer Truck	2	40%	3.2	79.0	78.0
Concrete Pump Trucks	1	20%	1.6	81.0	74.0
Generator Sets	1	50%	4.0	81.0	78.0

¹ Source: FHWA's Roadway Construction Noise Model, January 2006.

² Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.

³ Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.

TABLE 7-6: FENCING & CLEANUP EQUIPMENT NOISE LEVELS

Equipment Type ¹	Quantity	Usage Factor ²	Hours of Operation ³	Reference Noise Level @ 50 Feet (dBA L _{max})	Combined Level @ 50 Feet (dBA L _{eq})
Fencing					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Generator Sets	1	50%	4.0	81.0	78.0
Remove Stockpile					
Excavators	1	40%	3.2	81.0	77.0
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Dump Truck	1	40%	3.2	76.0	72.0
Grade Earthen Channel					
Tractor/Loader/Backhoes	1	40%	3.2	78.0	74.0
Excavators	1	40%	3.2	81.0	77.0
Water Trucks	1	40%	3.2	76.0	72.0
Rock Slope Protection					
Excavators	1	40%	3.2	81.0	77.0
Dump Truck	1	40%	3.2	76.0	72.0
Final Grading/Cleanup					
Tractor/Loader/Backhoes	2	40%	3.2	78.0	77.0
Dump Truck	1	40%	3.2	76.0	72.0

¹ Source: FHWA's Roadway Construction Noise Model, January 2006.

² Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.

³ Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.

TABLE 7-7: UNMITIGATED EQUIPMENT NOISE LEVEL SUMMARY (DBA L_{EQ})

Construction Stage & Activities	Highest Equipment Noise Level @ 50 Feet (dBA L _{eq})	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
		Distance to Edge of Construction Activity (Feet)												
		13'	46'	10'	38'	18'	21'	23'	10'	21'	73'	24'	26'	69'
Church Street Channel Muck Out														
Church Street Channel Muck Out	75	87	76	89	77	84	83	82	89	83	72	81	81	72
Channel Downstream of Abbey														
Grade Downstream Abbey	77	89	78	91	79	86	85	84	91	85	74	83	83	74
Steel for Channel Invert	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Concrete for Invert	78	90	79	92	80	87	86	85	92	86	75	84	84	75
Steel for Walls	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Concrete for Walls	78	90	79	92	80	87	86	85	92	86	75	84	84	75
RCB at Abbey														
Relocate Utilities	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Demo Asphalt at RCB	77	89	78	91	79	86	85	84	91	85	74	83	83	74
Grade Subgrade	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Steel for Invert	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Concrete Invert	78	90	79	92	80	87	86	85	92	86	75	84	84	75
Steel for Walls and Deck	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Concrete Walls and Deck	78	90	79	92	80	87	86	85	92	86	75	84	84	75
Backfill RCB	77	89	78	91	79	86	85	84	91	85	74	83	83	74
Channel Between Abbey & Merris														
Grade Subgrade	77	89	78	91	79	86	85	84	91	85	74	83	83	74
Steel for Invert	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Concrete for Invert	78	90	79	92	80	87	86	85	92	86	75	84	84	75
Steel for Walls	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Concrete for Walls & Grading	78	90	79	92	80	87	86	85	92	86	75	84	84	75
RCB at Merris														
Relocate Utilities	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Demo Asphalt at RCB	77	89	78	91	79	86	85	84	91	85	74	83	83	74
Grade Subgrade	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Steel for Invert	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Concrete for Invert	78	90	79	92	80	87	86	85	92	86	75	84	84	75
Steel for Walls and Deck	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Concrete for Walls and Deck	78	90	79	92	80	87	86	85	92	86	75	84	84	75
Backfill RCB	77	89	78	91	79	86	85	84	91	85	74	83	83	74
Paving & Channel North of Merris														
Paving	78	89	79	92	80	87	85	85	92	85	74	84	83	75
Demo Channel and RCB	77	89	78	91	79	86	85	84	91	85	74	83	83	74
Grade Subgrade	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Steel for Invert	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Concrete for Invert	78	90	79	92	80	87	86	85	92	86	75	84	84	75
Steel for Walls	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Concrete for Walls	78	90	79	92	80	87	86	85	92	86	75	84	84	75
Fencing & Cleanup														
Fencing	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Remove Stockpile	77	89	78	91	79	86	85	84	91	85	74	83	83	74
Grade Earthen Channel	74	86	75	88	76	83	82	81	88	82	71	80	80	71
Rock Slope Protection	77	89	78	91	79	86	85	84	91	85	74	83	83	74
Final Grading/Cleanup	77	89	78	91	79	86	85	84	91	85	74	83	83	74

7.3 TYPICAL CONSTRUCTION ACTIVITY NOISE LEVEL COMPLIANCE

The construction noise analysis shows that the highest construction noise levels will occur when construction activities take place at the closest point from the edge of primary construction activity to each of the nearby receiver locations. As shown on Table 7-8, the highest unmitigated construction noise levels at each receiver location are expected to range from 75 to 92 dBA L_{eq} , and will exceed the 85 dBA L_{eq} threshold at six of the 13 receiver locations: R1, R3, R5, R6, R8, and R9. Therefore, unmitigated Project construction noise levels from typical construction activities are considered *potentially significant* impacts at occupied receiver locations R1, R3, R5, R6, R8, and R9.

TABLE 7-8: UNMITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL COMPLIANCE

Receiver Location ¹	Construction Noise Levels (dBA L_{eq})		
	Highest Levels ²	Threshold ³	Threshold Exceeded? ⁴
R1	90	85	Yes
R2	79	85	No
R3	92	85	Yes
R4	80	85	No
R5	87	85	Yes
R6	86	85	Yes
R7	85	85	No
R8	92	85	Yes
R9	86	85	Yes
R10	75	85	No
R11	84	85	No
R12	84	85	No
R13	75	85	No

¹ Noise-sensitive receiver locations are shown on Exhibit 7-A.

² Highest construction noise levels during peak operating conditions at each receiver location, as shown on Table 7-7.

³ Construction noise level threshold as shown on Table 4-1.

⁴ Do the estimated Project construction noise levels exceed the construction noise level threshold?

Temporary, minimum 10-foot high construction noise mitigation measures are, therefore, required to reduce the impacts at occupied receiver locations R1, R3, R5, R6, R8, and R9. The construction noise mitigation measures are outlined in the Construction Mitigation Plan and Executive Summary.

The noise attenuation provided through temporary noise barriers depends on many factors including cost, wind loading, the location of the receiver, and the ability to place barriers such that the line-of-sight of the receiver is blocked to the noise source, among others. This analysis assumes a temporary noise barrier constructed using frame-mounted materials such as vinyl acoustic curtains or quilted blankets attached to the construction site perimeter fence.

As shown on Table 7-9, the temporary construction noise barrier mitigation will reduce the construction noise levels at the potentially impacted, occupied receiver locations to range from 75 to 80 dBA L_{eq} and will satisfy the 85 dBA L_{eq} threshold for noise-sensitive receiver locations. Therefore, the noise impact due to typical Project construction activities is considered a *less than significant* impact with mitigation for receiver locations R1, R3, R5, R6, R8, and R9. Appendix 7.2 includes the temporary construction noise barrier attenuation calculations. Sample temporary noise barrier photos are provided in Appendix 7.3 for reference.

TABLE 7-9: MITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL COMPLIANCE

Receiver Location ¹	Construction Noise Levels (dBA L_{eq})				
	Highest Levels ²	10' Temporary Noise Barrier Attenuation	Mitigated Construction Noise Levels	Threshold ³	Threshold Exceeded? ⁴
R1	90	-11	78	85	No
R3	92	-12	80	85	No
R5	87	-11	76	85	No
R6	86	-11	75	85	No
R8	92	-12	80	85	No
R9	86	-11	75	85	No

¹ Noise-sensitive receiver locations are shown on Exhibit 7-A.

² Highest construction noise levels during peak operating conditions at each receiver location, as shown on Table 7-8.

³ Construction noise level threshold as shown on Table 4-1.

⁴ Do the mitigated Project construction noise levels exceed the construction noise level threshold?

7.4 PILE DRIVING CONSTRUCTION NOISE LEVELS

Table 7-10 shows the Project construction noise levels due to pile driving (impact) equipment at the nearby sensitive receiver locations, based on the pile driving activity location and distances previously shown on Exhibit 7-A. As shown on Table 7-10, pile driving (impact) equipment noise levels will range from 76 to 108 dBA L_{eq} at the nearby sensitive receiver locations.

TABLE 7-10: PILE DRIVING (IMPACT) EQUIPMENT NOISE LEVELS

Equipment Type ¹	Quantity	Usage Factor ²	Hours Of Operation ³	Reference Noise Level @ 50 Feet (dBA L_{max})	Noise Level @ 50 Feet (dBA L_{eq})
Pile Driver (Impact)	1	20%	1.6	101.0	94
Hourly Noise Levels 50 Feet (dBA L_{eq})					94

Construction Noise Reference Distance	Distance To Closest Pile Driving Activity (Feet) ⁴	Distance Attenuation (dBA L_{eq}) ⁵	Estimated Noise Barrier Attenuation (dBA L_{eq})	Construction Noise Level (dBA L_{eq})
R1	13'	11.7	0.0	106
R2	46'	0.7	0.0	95
R3	10'	14.0	0.0	108
R4	38'	2.4	0.0	96
R5	18'	8.9	0.0	103
R6	21'	7.5	0.0	102
R7	23'	6.7	0.0	101
R8	10'	14.0	0.0	108
R9	106'	-6.5	0.0	87
R10	118'	-7.5	0.0	87
R11	218'	-12.8	0.0	81
R12	143'	-9.1	0.0	85
R13	384'	-17.7	0.0	76

¹ Source: FHWA's Roadway Construction Noise Model, January 2006.

² Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.

³ Represents the actual hours of peak construction equipment activity out of a typical 8-hour workday.

⁴ Distance from the nearest pile location to the nearest receiver.

⁵ Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.

Given the high construction noise levels generated by impact pile driving equipment, Table 7-11 presents the Project construction noise levels due to pile driving with alternative equipment (e.g., drilling or non-impact alternative) at the nearby sensitive receiver locations. As shown on Table 7-11, pile driving (e.g., drilling or non-impact alternative) equipment noise levels will range from 59 to 91 dBA L_{eq} at the nearby sensitive receiver locations.

TABLE 7-11: PILE DRIVING (DRILLING) EQUIPMENT NOISE LEVELS

Equipment Type ¹	Quantity	Usage Factor ²	Hours Of Operation ³	Reference Noise Level @ 50 Feet (dBA L _{max})	Noise Level @ 50 Feet (dBA L _{eq})
Auger Drill Rig	1	20%	1.6	84.0	77
Hourly Noise Levels 50 Feet (dBA L _{eq})					77

Construction Noise Reference Distance	Distance To Closest Pile Driving Activity (Feet) ⁴	Distance Attenuation (dBA L _{eq}) ⁵	Estimated Noise Barrier Attenuation (dBA L _{eq})	Construction Noise Level (dBA L _{eq})
R1	13'	11.7	0.0	89
R2	46'	0.7	0.0	78
R3	10'	14.0	0.0	91
R4	38'	2.4	0.0	79
R5	18'	8.9	0.0	86
R6	21'	7.5	0.0	85
R7	23'	6.7	0.0	84
R8	10'	14.0	0.0	91
R9	106'	-6.5	0.0	70
R10	118'	-7.5	0.0	70
R11	218'	-12.8	0.0	64
R12	143'	-9.1	0.0	68
R13	384'	-17.7	0.0	59

¹ Source: FHWA's Roadway Construction Noise Model, January 2006.

² Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.

³ Represents the actual hours of peak construction equipment activity out of a typical 8-hour workday.

⁴ Distance from the nearest pile location to the nearest receiver.

⁵ Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.

7.5 PILE DRIVING CONSTRUCTION NOISE LEVEL COMPLIANCE

The pile driving construction noise analysis shows that the highest construction noise levels will occur if impact pile driving equipment is used at the closest point from the edge of primary construction activity to each of the nearby receiver locations. As shown on Table 7-12, the impact pile driving equipment noise levels, ranging from 76 to 108 dBA L_{eq} will exceed the 85 dBA L_{eq} construction noise level threshold at 10 of the 13 receiver locations: R1 to R10, if occupied. The pile driving equipment noise levels with alternative drilling equipment are shown to range from 59 to 91 dBA L_{eq} and will exceed the 85 dBA L_{eq} construction noise level threshold at four of the 13 receiver locations: R1, R3, R5, and R8. Therefore, both the unmitigated impact and drilling pile driving equipment noise levels represent *potentially significant* noise impacts.

TABLE 7-12: UNMITIGATED PILE DRIVING EQUIPMENT NOISE LEVEL COMPLIANCE

Receiver Location ¹	Noise Levels (dBA L _{eq})		Threshold ³	Threshold Exceeded? ⁴	
	Pile Driver (Impact) Noise Levels ²	Pile Driver (Drilling) Noise Levels		Pile Driver (Impact)	Pile Driver (Drilling)
R1	106	89	85	Yes	Yes
R2	95	78	85	Yes	No
R3	108	91	85	Yes	Yes
R4	96	79	85	Yes	No
R5	103	86	85	Yes	Yes
R6	102	85	85	Yes	No
R7	101	84	85	Yes	No
R8	108	91	85	Yes	Yes
R9	87	70	85	Yes	No
R10	87	70	85	Yes	No
R11	81	64	85	No	No
R12	85	68	85	No	No
R13	76	59	85	No	No

¹ Noise-sensitive receiver locations are shown on Exhibit 7-A.

² Estimated construction noise levels during peak operating conditions, as shown on Tables 7-10 and 7-11, respectively.

³ Construction noise level threshold as shown on Table 4-1.

⁴ Do the estimated Project construction noise levels exceed the construction noise level threshold?

Construction noise mitigation measures are therefore required to reduce the impacts at the nearby, occupied sensitive receiver locations. Non-impact pile driving equipment (e.g., drilling or other non-impact alternatives) shall be required to reduce the pile driving equipment noise levels at adjacent receiver locations. Further construction noise mitigation measures are outlined in the Construction Mitigation Plan and Executive Summary.

As shown on Table 7-13, the previously identified temporary construction noise barrier mitigation for typical construction noise levels will also reduce the pile driving (e.g., drilling or non-impact alternative) equipment noise levels at the potentially impacted receiver locations to range from 75 to 79 dBA L_{eq} and will satisfy the 85 dBA L_{eq} threshold for noise-sensitive receiver locations. Therefore, the noise impact due to typical Project construction activities is considered a *less than significant* impact with mitigation for receiver locations R1, R3, R5, and R8.

TABLE 7-13: MITIGATED PILE DRIVING EQUIPMENT NOISE LEVEL COMPLIANCE

Receiver Location ¹	Construction Noise Levels (dBA L _{eq})				
	Highest Pile Driving (Drilling) Levels ²	10' Temporary Noise Barrier Attenuation	Mitigated Construction Noise Levels	Threshold ³	Threshold Exceeded? ⁴
R1	89	-11	77	85	No
R3	91	-12	79	85	No
R5	86	-11	75	85	No
R8	91	-12	79	85	No

¹ Noise-sensitive receiver locations are shown on Exhibit 7-A.

² Estimated construction noise levels during peak operating conditions, as shown on Tables 7-10 and 7-11, respectively.

³ Construction noise level threshold as shown on Table 4-1.

⁴ Do the mitigated Project construction noise levels exceed the construction noise level threshold?

7.6 CONSTRUCTION VIBRATION IMPACTS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type.

7.6.1 CONSTRUCTION VIBRATION ASSESSMENT METHODOLOGY

This analysis focuses on the potential ground-borne vibration associated with construction activities. Ground-borne vibration levels associated with several types of construction equipment are summarized on Table 7-14. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the human response (annoyance) using the vibration thresholds identified by Caltrans. To describe the potential vibration impacts the FTA provides the following equation and reference vibration levels on Table 7-14: $PPV_{\text{equip}} = PPV_{\text{ref}} \times (25/D)^{1.5}$

TABLE 7-14: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089
Pile Driver (Drilling)	0.089
Pile Driver (Impact)	0.644

7.6.2 CONSTRUCTION VIBRATION LEVELS

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration (FTA). Using the vibration source level of construction equipment provided on Table 7-14 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 7-15 presents the expected Project related vibration levels at distances ranging from 10 to 73 feet from construction activity.

Typical Construction Activity Vibration Levels

At distances ranging from 10 to 73 feet from the Project site, typical construction activity vibration velocity levels are expected to range from 0.018 to 0.352 in/sec PPV, as shown on Table 7-15. Table 7-15 shows that the Project construction vibration levels will exceed the human annoyance threshold of 0.2 in/sec PPV at receiver locations R1, R3 and R8. In addition, construction vibration levels are shown to exceed the building damage threshold of 0.3 in/sec PPV at receiver locations R3 and R8. Therefore, the unmitigated temporary construction-related vibration levels are considered a *potentially significant* impact.

Temporary construction vibration mitigation measures are required to reduce the impacts at nearby sensitive receiver locations. The Construction Mitigation Plan outlined in this report identifies the measures required to satisfy the 0.3 in/sec PPV building damage vibration threshold at nearby sensitive receiver locations to *less than significant* impacts after mitigation. Mitigation includes ground-borne vibration monitoring of nearby residential structures, represented by receiver locations R1, and R3 to R8 adjacent to the channel between Old Greenspot Road and Merris Street, shall be required for the duration of Project construction between Old Greenspot Road and Merris Street. The monitoring shall be based on the Caltrans residential building damage threshold of 0.3 in/sec PPV. Though Caltrans identifies a residential building damage threshold of 0.3 in/sec PPV, the County of San Bernardino may require that vibration levels do not exceed a more conservative threshold (e.g., lower) at their discretion.

However, vibration levels will still exceed the human annoyance threshold of 0.2 in/sec PPV at receiver locations R1, R3, and R8, and therefore, Project typical construction vibration levels represent a *potentially significant* impact at occupied residential homes in relation to human annoyance with mitigation. The Construction Mitigation Plan outlined in this report identifies the measures required to satisfy the 0.2 in/sec PPV human annoyance vibration threshold at nearby sensitive receiver locations to *less than significant* impacts after mitigation. If monitored vibration levels exceed the 0.2 in/sec PPV annoyance threshold then relocation of residents, and/or hours restrictions to day(s)/time(s) when the impacted receiver(s) are unoccupied, shall be provided for the duration of activities within 25 feet of the affected receiver location(s).

Further, vibration levels at the site of the closest sensitive receiver are unlikely to be sustained during the entire construction period, but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site perimeter. Moreover, construction at the Project site will be restricted to daytime hours consistent with City

requirements thereby eliminating potential vibration impacts during the sensitive nighttime hours.

Pile Driving Construction Vibration Levels

At distances ranging from 10 to 384 feet from pile driving (impact) activities, vibration velocity levels are expected to range from 0.011 to 2.530 in/sec PPV, as shown on Table 7-15. Table 7-15 shows that the Project construction vibration levels will exceed the County's human annoyance threshold of 0.2 in/sec PPV at receiver locations R1 to R8. In addition, pile driving (impact) vibration levels are shown to exceed the building damage threshold of 0.3 in/sec PPV at receiver locations R1, and R3 to R8. Therefore, the unmitigated temporary impact pile driving-related vibration levels are considered a *potentially significant* impact.

Temporary construction vibration mitigation measures are required to reduce the impacts at nearby sensitive receiver locations during pile driving activities. Consistent with the pile driving measures identified in this report to reduce impact pile driving noise levels, the use of alternative pile driving equipment (e.g., drilling or non-impact alternative) shall be required instead of impact devices. The mitigated pile driving vibration levels with alternative equipment (e.g., drilling or non-impact alternative) will be reduced to range from 0.001 to 0.352 in/sec PPV, and will still exceed the Caltrans 0.3 in/sec PPV building damage threshold for older residential structures at receiver locations R3 and R8, as shown on Table 7-16. Therefore, the vibration monitoring as part of the Construction Mitigation Plan identified in this noise study shall be required to reduce impacts to *less than significant* levels.

In addition, pile driving (e.g., drilling or non-impact alternative) equipment vibration levels will potentially exceed the human annoyance threshold of 0.2 in/sec PPV at receiver locations R1, R3, and R8, and therefore, Project pile driving (e.g., drilling or non-impact alternative) vibration levels represent a *potentially significant* impact at occupied residential homes in relation to human annoyance with mitigation. However, the Construction Mitigation Plan outlined in this report identifies the measures required to satisfy the 0.2 in/sec PPV human annoyance vibration threshold at nearby sensitive receiver locations to *less than significant* impacts after mitigation.

TABLE 7-15: UNMITIGATED CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Receiver ¹	Distance to Const. Activity (Feet)	Typical Construction PPV Levels (in/sec) ²					Pile Driving (PPV) ²		Thresholds (in/sec PPV)		Threshold Exceeded? ³			
		Small Bulldozer (< 80k lbs)	Jack-hammer	Loaded Trucks	Large Bulldozer (> 80k lbs)	Highest Vibration Level	Distance to Pile Driving (Feet)	Pile Driver (Impact)	Human Annoyance	Building Damage	Typical Construction		Pile Driving Impact	
											Human Annoyance	Building Damage	Human Annoyance	Building Damage
R1	13'	0.008	0.093	0.203	0.237	0.237	13'	1.707	0.2	0.3	Yes	No	Yes	Yes
R2	46'	0.001	0.014	0.030	0.036	0.036	46'	0.256	0.2	0.3	No	No	Yes	No
R3	10'	0.012	0.138	0.300	0.352	0.352	10'	2.530	0.2	0.3	Yes	Yes	Yes	Yes
R4	38'	0.002	0.019	0.041	0.047	0.047	38'	0.342	0.2	0.3	No	No	Yes	Yes
R5	18'	0.005	0.057	0.124	0.146	0.146	18'	1.048	0.2	0.3	No	No	Yes	Yes
R6	21'	0.004	0.045	0.099	0.116	0.116	21'	0.831	0.2	0.3	No	No	Yes	Yes
R7	23'	0.003	0.040	0.086	0.101	0.101	23'	0.725	0.2	0.3	No	No	Yes	Yes
R8	10'	0.012	0.138	0.300	0.352	0.352	10'	2.530	0.2	0.3	Yes	Yes	Yes	Yes
R9	21'	0.004	0.045	0.099	0.116	0.116	106'	0.073	0.2	0.3	No	No	No	No
R10	73'	0.001	0.007	0.015	0.018	0.018	118'	0.062	0.2	0.3	No	No	No	No
R11	24'	0.003	0.037	0.081	0.095	0.095	218'	0.025	0.2	0.3	No	No	No	No
R12	26'	0.003	0.033	0.072	0.084	0.084	143'	0.047	0.2	0.3	No	No	No	No
R13	69'	0.001	0.008	0.017	0.019	0.019	384'	0.011	0.2	0.3	No	No	No	No

¹ Receiver locations are shown on Exhibit 7-A.² Based on the Vibration Source Levels of Construction Equipment included on Table 7-14.³ Does the peak vibration exceed the acceptable vibration thresholds?

"PPV" = Peak Particle Velocity

TABLE 7-16: ALTERNATIVE PILE DRIVING CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Receiver ¹	Distance to Const. Activity (Feet)	Pile Drilling (PPV)		Thresholds (in/sec PPV)		Threshold Exceeded?	
		Distance to Pile Driving (Feet)	Pile Driver (Drill)	Human Annoyance	Building Damage	Human Annoyance	Building Damage
R1	13'	13'	0.237	0.2	0.3	Yes	No
R2	46'	46'	0.036	0.2	0.3	No	No
R3	10'	10'	0.352	0.2	0.3	Yes	Yes
R4	38'	38'	0.047	0.2	0.3	No	No
R5	18'	18'	0.146	0.2	0.3	No	No
R6	21'	21'	0.116	0.2	0.3	No	No
R7	23'	23'	0.101	0.2	0.3	No	No
R8	10'	10'	0.352	0.2	0.3	Yes	Yes
R9	21'	106'	0.010	0.2	0.3	No	No
R10	73'	118'	0.009	0.2	0.3	No	No
R11	24'	218'	0.003	0.2	0.3	No	No
R12	26'	143'	0.007	0.2	0.3	No	No
R13	69'	384'	0.001	0.2	0.3	No	No

¹ Receiver locations are shown on Exhibit 7-A.

² Based on the Vibration Source Levels of Construction Equipment included on Table 7-14.

³ Does the mitigated vibration exceed the acceptable vibration thresholds?

"PPV" = Peak Particle Velocity

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8 REFERENCES

1. **State of California.** *California Environmental Quality Act, Appendix G.* 2018.
2. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
3. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* June, 1995.
5. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
6. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
7. **Occupational Safety and Health Administration.** *Standard 29 CFR, Part 1910.*
8. **Center for Disease Control and Prevention.** About Hearing Loss. [Online] [Cited: 04 15, 2016.] <http://www.cdc.gov/healthyschools/noise/signs.htm>.
9. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment.* September 2018.
10. **Office of Planning and Research.** *State of California General Plan Guidelines 2003.* October 2003.
11. **City of Highland.** *General Plan, Noise Element.* March 2006.
12. **National Institute for Occupational Safety and Health.** *Criteria for Recommended Standard: Occupational Noise Exposure.* June 1998.
13. **California Department of Transportation.** *Transportation and Construction Vibration Guidance Manual.* September 2013.
14. **County of San Bernardino.** *Development Code, Chapter 83.01.*
15. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
16. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January, 2006.
17. **San Bernardino County Flood Control District.** *Elder Creek Construction Schedule.* May 2018.

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9 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Elder Creek Channel Improvements Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5979.

Bill Lawson, P.E., INCE
Principal
URBAN CROSSROADS, INC.
260 E. Baker Street, Suite 200
Costa Mesa, CA 92626
(949) 336-5979
blawson@urbanxroads.com



EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

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APPENDIX 3.1:

CITY OF HIGHLAND MUNICIPAL CODE

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Chapter 8.50 NOISE CONTROL

Sections:

- [8.50.010](#) Findings and purpose.
- [8.50.020](#) Definitions.
- [8.50.030](#) Prohibited acts.
- [8.50.040](#) Excessive noise and vibration emanating from a motor vehicle.
- [8.50.050](#) Controlled hours of operation.
- [8.50.060](#) Exemptions.
- [8.50.070](#) Enforcement and administration.
- [8.50.080](#) Enforcement – Interference.
- [8.50.090](#) Violations – Notices – Abatement.
- [8.50.100](#) *Repealed.*
- [8.50.110](#) Violations – Notices – Service – Effect.
- [8.50.120](#) Immediate threats to health and welfare.
- [8.50.130](#) Administrative citations and costs of second and subsequent responses.
- [8.50.140](#) Modification, suspension and/or revocation of validly issued city permit and/or city license.

8.50.010 Findings and purpose.

A. It is the purpose of these regulations to implement the goals and objectives of the noise element of the city's general plan, to establish community-wide noise standards and to serve as a reference for locating other city regulations relating to noise in the community. It is further the purpose of these regulations to recognize that the existence of excessive noise within the city is a condition which is detrimental to the health, safety, welfare and quality of life of the citizens which should be regulated in the public interest.

B. In furtherance of the foregoing purpose, the city council finds and declares as follows:

1. The making, creation or maintenance of such loud, unnecessary, unnatural or unusual noises or vibrations that are prolonged, unusual, annoying, disturbing and unnatural in their time, place and use are a detriment to the public health, comfort, convenience, safety, general welfare and the peace and quiet of the city and its inhabitants; and
2. The public interest necessity for the provisions and prohibitions hereinafter contained and enacted is declared as a matter of legislative determination and public policy, and it is further declared that the provisions and prohibitions hereinafter contained and enacted are in pursuit of and for the purpose of securing and promoting the public health, comfort, convenience, safety, general welfare and property and the peace and quiet of the city and its inhabitants. (Ord. 324 § 2, 2008)

8.50.020 Definitions.

For the purposes of this chapter, the following terms shall have the meanings given:

“Construction equipment” means tools, machinery or equipment used in connection with construction operations, including all types of “special construction” equipment as defined in the pertinent sections of the California Vehicle Code when used in the construction process on any construction site, home improvement site or property maintenance site, regardless of whether such site be located on highway or off highway.

“Enforcement officer” means a city code enforcement officer or peace officer authorized to enforce the provisions and prohibitions of this chapter pursuant to HMC [8.50.070](#).

“Plainly audible” means any sound that can be detected by a person using his or her unaided hearing faculties. As an example, if the sound source under investigation is a portable or personal vehicular sound amplification or reproduction device, the investigating enforcement officer need not determine the title of any music, specific words, or the artist performing the music. The detection of the vibration from the rhythmic bass component of the music is sufficient to constitute a plainly audible sound.

“Public right-of-way” means any street, avenue, boulevard, highway, sidewalk, alley or similar place, owned or controlled by a government entity.

“Public space” means any real property or structure(s) on real property, owned by a government entity and normally accessible to the public, including but not limited to parks and other recreation areas.

“Responsible person” means (1) any person who owns, leases or is lawfully in charge of the property or motor vehicle where the noise violation takes place or (2) any person who owns or controls the source of the noise or violation. If the responsible person is a minor, then the parent or guardian who has custody of the child at the time of the violation shall be the responsible person who is liable under this chapter. (Ord. 324 § 2, 2008)

8.50.030 Prohibited acts.

A. It shall be unlawful for any person to engage in the following activities:

1. Sounding any horn or signal device on any automobile, motorcycle, bus or other motor vehicle in any other manner or circumstance(s) or for any other purpose than required or permitted by the Vehicle Code or other state laws.
2. Racing the engine of any motor vehicle while the vehicle is not in motion, except when necessary to do so in the course of repairing, adjusting or testing the same.
3. Operating or permitting the use of any motor vehicle on any public right-of-way or public place or on private property within a residential zone for which the exhaust muffler, intake muffler or any other noise abatement device has been modified or changed in a manner such that the noise emitted by the motor vehicle is increased above that emitted by the vehicle as originally manufactured.
4. Operating or permitting the use or operation of personal or commercial music or sound amplification or production equipment that is:
 - a. Plainly audible across property boundaries;
 - b. Plainly audible through partitions common to two residences within a building;
 - c. Plainly audible at a distance of 50 feet in any direction from the source of music or sound, between the hours of 7:00 a.m. and 10:00 p.m.; or
 - d. Plainly audible at a distance of 25 feet in any direction from the source of music or sound, between the hours of 10:00 p.m. and 7:00 a.m.
5. The intentional sounding or permitting the sounding outdoors of any fire, burglar, or civil defense alarm, siren, whistle, or any motor vehicle burglar alarm, except for emergency purposes or for testing, unless such alarm is terminated within 15 minutes of activation.
6. Creating excessive noise adjacent to any school, church, court or library while the same is in use, or adjacent to any hospital or care facility, which unreasonably interferes with the workings of such institution, or which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed,

clearly visible to the motoring public, indicating the presence of a school, institution of learning, church, court or hospital.

7. Making or knowingly and unreasonably permitting to be made any unreasonably loud, unnecessary or unusual noise that disturbs the comfort, repose, health, peace and quiet or which causes discomfort or annoyance to any reasonable person of normal sensitivity. The characteristics and conditions that may be considered in determining whether this section has been violated include, but are not limited to, the following:

- a. The level of noise;
- b. Whether the nature of the noise is usual or unusual;
- c. Whether the origin of the noise is natural or unnatural;
- d. The level of the background noise;
- e. The proximity of the noise to sleeping facilities;
- f. The nature and zoning of the area(s) within which the noise emanates;
- g. The density of the inhabitation of the area within which the noise emanates;
- h. The time of day or night the noise occurs;
- i. The duration of the noise; and
- j. Whether the noise is produced by a commercial or noncommercial activity.

B. A violation of this section is a public nuisance.

C. A violation of this section may result in the following:

1. Issuance of an administrative citation, where the fines and penalties shall be assessed as infractions in accordance with HMC [2.56.110](#);
2. Issuance of a notice of public nuisance and abatement pursuant to Chapter [8.28](#) HMC;
3. Imposition of criminal and civil penalties, including those in Chapter [1.24](#) HMC; and
4. Confiscation and impoundment as evidence of the components that are amplifying or transmitting the prohibited noise.

D. An enforcement officer who encounters a violation of this section may issue a written notice to the responsible person demanding immediate abatement of the violation (written notice). The written notice shall inform the recipient that a second violation of the same provision within a 72-hour period may result in the issuance of a criminal citation and/or notice of public nuisance, the imposition of criminal and civil penalties, and confiscation and impoundment as evidence of the components that are amplifying or transmitting the prohibited noise.

E. Any peace officer who encounters a second violation of this section within a 72-hour period following issuance of a written notice is empowered to confiscate and impound as evidence any or all of the components amplifying or transmitting the sound.

F. Any person claiming legal ownership of the items confiscated and impounded under this section may request the return of the item by filing a written request with the police department within seven calendar days of the

confiscation. Such requests shall be processed in accordance with the procedures adopted by the police department. (Ord. 370 § 27, 2012; Ord. 324 § 2, 2008)

8.50.040 Excessive noise and vibration emanating from a motor vehicle.

A. No person shall operate or occupy a motor vehicle on any public right-of-way, public place or private property, while operating or permitting the use or operation of any radio, stereo receiver, musical instrument, television, computer, compact disc player, tape recorder, cassette player or any other device for the production or reproduction of sound from within the motor vehicle, so that the sound is plainly audible at a distance of 50 feet from such vehicle, or in the case of a motor vehicle on private property, beyond the property line.

B. A violation of this section is a public nuisance.

C. A violation of this section may result in the following:

1. Issuance of an administrative citation, where the fines and penalties shall be assessed as infractions in accordance with HMC [2.56.110](#);
2. Issuance of a notice of public nuisance and abatement pursuant to Chapter [8.28](#) HMC;
3. Imposition of criminal and civil penalties, including those in Chapter [1.24](#) HMC; and
4. Immediate confiscation and impoundment as evidence of the components that are amplifying or transmitting the prohibited noises or the immediate confiscation and impoundment of the motor vehicle to which the component is attached if the same may not be removed without causing harm to the vehicle or the component.

D. Any person claiming legal ownership of a motor vehicle confiscated and impounded under this section may request the return of the vehicle by filing a written request with the police department within seven calendar days of the confiscation. Such requests shall be processed in accordance with procedures adopted by the police department.

E. Any person claiming legal ownership of the items confiscated and impounded under this section, other than a motor vehicle, may request the return of the item by filing a written request with the police department, which shall be processed in accordance with procedures adopted by the police department. (Ord. 370 § 28, 2012; Ord. 324 § 2, 2008)

8.50.050 Controlled hours of operation.

It shall be unlawful for any person to engage in the following activities at a time other than between the hours of 5:00 a.m. and 10:00 p.m. on any day in the industrial (I) zone, and between the hours of 7:00 a.m. and 10:00 p.m. on any day in all other zones:

A. Operate or permit the use of powered model vehicles and planes.

B. Load or unload any vehicle, or operate or permit the use of dollies, carts, forklifts, or other wheeled equipment that causes any impulsive sound, raucous or unnecessary noise within 1,000 feet of a residence.

C. Operate or permit the use of domestic power tools, machinery, or any other equipment or tool in any garage, workshop, house or any other structure.

D. Operate or permit the use of gasoline or electric-powered leaf blowers such as commonly used by gardeners and other persons for cleaning lawns, yards, driveways, gutters and other property.

- E. Operate or permit the use of privately operated street/parking lot sweepers or vacuums, except that emergency work and/or work necessitated by unusual conditions may be performed with the written consent of the code enforcement officer.
- F. Operate or permit the use of electrically operated compressor(s), fan(s) and other similar device(s).
- G. Operate or permit the use of pile driver(s), steam or gasoline shovel(s), pneumatic hammer(s), steam or electric hoist(s) or other similar device(s).
- H. Perform ground maintenance on golf course grounds and tennis courts contiguous to golf courses that creates a noise disturbance across a residential or commercial property line.
- I. Operate or permit the use of any motor vehicle with a gross vehicle weight rating in excess of 10,000 pounds, or of any auxiliary equipment attached to such a vehicle, including but not limited to refrigerated truck compressors, for a period longer than 15 minutes in any hour while the vehicle is stationary and on a public right-of-way or public space, except when movement of said vehicle is restricted by other traffic.
- J. Repair, rebuild, reconstruct or dismantle any motor vehicle or other mechanical equipment or device(s) in a manner so as to be plainly audible across property lines.
- K. Load, unload, open, close or otherwise handle garbage cans, recycling bins or other similar objects between the hours of 10:00 p.m. and 7:00 a.m. the following morning, except city-permitted trash collection. (Ord. 352 § 1, 2010; Ord. 324 § 2, 2008)

8.50.060 Exemptions.

The following activities and noise sources shall not be subject to the provisions of this chapter:

- A. Those noise events in the community (e.g., airport noise, arterial traffic noise, railroad noise) that are more accurately measured by application of the general plan noise element policy, utilizing the community noise equivalent level (CNEL) method.
- B. Activities conducted on the grounds of any public or private school during regular hours of operation.
- C. Outdoor gatherings, public dances, shows and sporting and entertainment events, provided said events are authorized by the city.
- D. Legally permitted activities conducted at public places during regular hours of operation.
- E. Any mechanical device, apparatus, or equipment used, related to or connected with emergency machinery, vehicle or work.
- F. All mechanical devices, apparatus, or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.
- G. Mobile noise sounds associated with agricultural operations, provided such operations do not take place between the hours of 10:00 p.m. and 7:00 a.m. on weekdays, including Saturdays, or at any time on Sunday or a state holiday.
- H. Mobile noise sources associated with agricultural pest control through pesticide application.
- I. Warning devices necessary for the protection of the public safety, including, but not limited to, police, fire and ambulance sirens and train horns and sounds for the purpose of alerting persons to the existence of an emergency.

J. Construction, repair or excavation necessary for the immediate preservation of life or property.

K. Construction, operation, maintenance and repair of equipment, apparatus or facilities of the park and recreation department, public work projects or essential public services and facilities, including trash collection and those of public utilities subject to the regulatory jurisdiction of the Public Utilities Commission.

L. Construction, repair or excavation work performed pursuant to a valid written agreement with the city or any of its political subdivisions, which agreement provides for noise mitigation measures.

M. Any activity, to the extent regulation thereof has been preempted by state or federal law.

N. Any specific activity or noise source governed elsewhere in this code. Such activities include, but are not limited to:

1. Security alarm systems (Chapter [8.04](#) HMC);
2. Animal noise (Chapter [6.04](#) HMC);
3. Loud, unruly or disorderly private parties or assemblies (Chapter [9.17](#) HMC). (Ord. 324 § 2, 2008)

8.50.070 Enforcement and administration.

The city manager, chief of police and/or their designees shall be responsible for administering and enforcing the provisions of this chapter. (Ord. 324 § 2, 2008)

8.50.080 Enforcement – Interference.

No person shall interfere with, oppose, or resist any authorized person charged with the enforcement of this chapter while such person is engaged in the performance of his duty. (Ord. 324 § 3, 2008; Ord. 283 § 4, 2002. Formerly 8.50.140)

8.50.090 Violations – Notices – Abatement.

Violations of this chapter shall be prosecuted in the same manner as other violations of this code; provided, however, in the event of an initial violation of the provisions of this chapter, a written notice shall be given the alleged violator which specifies the time by which the condition shall be corrected or, where applicable, an application for a permit shall be received by the planning division. No complaint or further action shall be taken in the event the cause of the violation has been removed or the condition abated or fully corrected within the time period specified in the written notice. (Ord. 370 § 29, 2012; Ord. 324 § 3, 2008; Ord. 283 § 4, 2002. Formerly 8.50.150)

8.50.100 Violations – Penalties.

Repealed by Ord. 370. (Ord. 324 § 3, 2008; Ord. 283 § 4, 2002. Formerly 8.50.160)

8.50.110 Violations – Notices – Service – Effect.

In the event the alleged violator cannot be located in order to serve the violation of intention to prosecute, such notice shall be deemed to be given upon mailing such notice by registered or certified mail to the alleged violator at his last known address or at the place where the violation occurred, in which event the specified time period for abating the violation or applying for a variance shall commence on the date of the day following the mailing of such notice. Subsequent violations of the same offense shall result in the immediate filing of a complaint. (Ord. 370 § 30, 2012; Ord. 324 § 3, 2008; Ord. 283 § 4, 2002. Formerly 8.50.170)

8.50.120 Immediate threats to health and welfare.

A. The city manager may order an immediate halt to any sound which exposes any person, except those excluded pursuant to HMC [8.50.060](#), to continuous sound levels in excess of those described herein. Within two days following the issuance of any such order, the city shall apply to the appropriate court for an injunction to replace the order.

B. No order pursuant to subsection A of this section shall be issued if the only persons exposed to sound levels in excess of those contained herein are exposed as a result of (1) trespassing; (2) an invitation upon private property by the person causing or permitting the sound; or (3) employment by the person or contractor of the person causing or permitting the sound.

C. Any person subject to an order issued pursuant to subsection A of this section shall comply with such order until (1) the sound is brought into compliance with the order, as determined by the city manager; or (2) a judicial order has superseded the order of the city manager. (Ord. 324 § 3, 2008; Ord. 283 § 4, 2002. Formerly 8.50.180)

8.50.130 Administrative citations and costs of second and subsequent responses.

The city manager or his designee, in his/her sole discretion, may prosecute violations of this chapter through the administrative citation process set forth in Chapter [2.56](#) HMC, in lieu of the criminal or nuisance abatement process. In the case of second and subsequent violations of this chapter, the city may assess a second response service fee in compliance with HMC [9.17.030](#) through [9.17.060](#), inclusive. (Ord. 324 § 4, 2008)

8.50.140 Modification, suspension and/or revocation of validly issued city permit and/or city license.

The violation of this chapter by any city permittee or licensee more than twice in any six-calendar-month period, in the course of operating pursuant to a validly issued city permit and/or license, may be grounds for the modification, suspension or revocation of such license subject to normal city processes, in the discretion of the city manager. (Ord. 324 § 4, 2008)

The Highland Municipal Code is current through Ordinance 424, passed March 27, 2018.

Disclaimer: The City Clerk's Office has the official version of the Highland Municipal Code. Users should contact the City Clerk's Office for ordinances passed subsequent to the ordinance cited above.

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APPENDIX 5.1:

STUDY AREA PHOTOS

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JN:11744 Elder Creek



L1_E
34, 6' 34.890000", 117, 10' 18.970000"



L1_N
34, 6' 36.330000", 117, 10' 17.780000"



L1_NE
34, 6' 34.890000", 117, 10' 18.970000"



L1_SE
34, 6' 34.890000", 117, 10' 18.970000"



L1_W
34, 6' 34.890000", 117, 10' 18.970000"



L2_N
34, 6' 31.900000", 117, 10' 20.060000"

JN:11744 Elder Creek



L2_S
34, 6' 31.900000", 117, 10' 20.060000"



L3_N
34, 6' 31.080000", 117, 10' 20.280000"



L3_S
34, 6' 31.080000", 117, 10' 20.280000"



L3_SW
34, 6' 31.080000", 117, 10' 20.280000"



L5_E
34, 6' 27.000000", 117, 10' 21.830000"



L5_N
34, 6' 27.000000", 117, 10' 21.830000"

JN:11744 Elder Creek



L5_S
34, 6' 27.000000", 117, 10' 21.830000"



L5_SE
34, 6' 27.000000", 117, 10' 21.830000"



L5_SW
34, 6' 27.210000", 117, 10' 22.360000"



L6_E
34, 6' 22.600000", 117, 10' 24.850000"



L6_N
34, 6' 21.950000", 117, 10' 20.090000"



L6_S
34, 6' 21.950000", 117, 10' 20.090000"

JN:11744 Elder Creek



L6_SW

34, 6' 21.950000", 117, 10' 20.090000"



L6_W

34, 6' 21.950000", 117, 10' 20.090000"



Site1

34, 6' 34.720000", 117, 10' 18.300000"



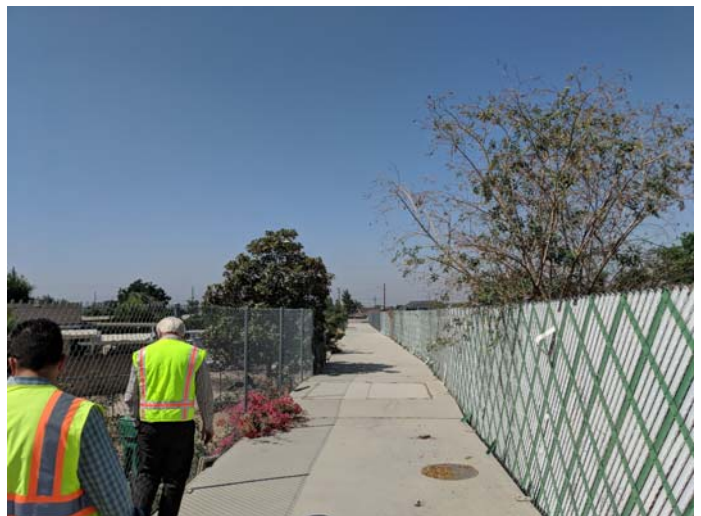
Site2

34, 6' 34.720000", 117, 10' 18.300000"



Site3

34, 6' 33.650000", 117, 10' 18.990000"



Site4

34, 6' 32.880000", 117, 10' 19.540000"

JN:11744 Elder Creek



Site5

34, 6' 32.080000", 117, 10' 19.920000"



Site6

34, 6' 30.330000", 117, 10' 20.870000"



Site7

34, 6' 30.330000", 117, 10' 20.870000"



Site8

34, 6' 30.330000", 117, 10' 20.870000"



Site9

34, 6' 30.090000", 117, 10' 21.230000"



Site10

34, 6' 30.120000", 117, 10' 21.170000"

JN:11744 Elder Creek



Site11

34, 6' 27.980000", 117, 10' 21.660000"



Site12

34, 6' 27.980000", 117, 10' 21.660000"



Site13

34, 6' 27.980000", 117, 10' 21.660000"



Site14

34, 6' 27.980000", 117, 10' 21.660000"

APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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24-Hour Noise Level Measurement Summary

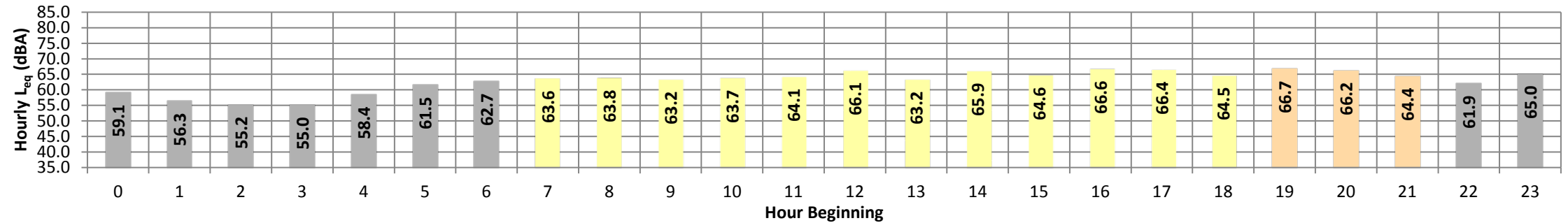
Date: Friday, June 22, 2018
Project: Elder Creek

Location: L1 - Located north of the Project site on Old Greenspot Road
near existing residential homes.

Meter: Piccolo I

JN: 11744
Analyst: A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	59.1	83.5	40.6	69.0	67.0	64.0	63.0	57.0	48.0	42.0	41.0	40.0	59.1	10.0	69.1
	1	56.3	81.2	40.5	68.0	66.0	62.0	58.0	47.0	43.0	40.0	40.0	40.0	56.3	10.0	66.3
	2	55.2	80.9	40.4	67.0	64.0	58.0	55.0	46.0	43.0	40.0	40.0	40.0	55.2	10.0	65.2
	3	55.0	74.9	41.8	66.0	64.0	61.0	59.0	52.0	47.0	43.0	42.0	42.0	55.0	10.0	65.0
	4	58.4	80.4	44.2	68.0	66.0	63.0	61.0	56.0	50.0	46.0	45.0	44.0	58.4	10.0	68.4
	5	61.5	85.0	44.2	72.0	69.0	66.0	65.0	60.0	55.0	48.0	47.0	45.0	61.5	10.0	71.5
	6	62.7	83.5	43.4	72.0	70.0	68.0	66.0	61.0	58.0	51.0	49.0	46.0	62.7	10.0	72.7
Day	7	63.6	85.8	45.9	73.0	71.0	68.0	67.0	62.0	59.0	52.0	50.0	48.0	63.6	0.0	63.6
	8	63.8	91.5	46.3	72.0	70.0	68.0	66.0	61.0	57.0	50.0	49.0	47.0	63.8	0.0	63.8
	9	63.2	84.9	45.2	73.0	70.0	68.0	66.0	62.0	58.0	51.0	49.0	47.0	63.2	0.0	63.2
	10	63.7	81.3	45.4	75.0	72.0	69.0	67.0	62.0	58.0	51.0	50.0	47.0	63.7	0.0	63.7
	11	64.1	82.3	45.2	74.0	73.0	70.0	68.0	63.0	58.0	51.0	49.0	46.0	64.1	0.0	64.1
	12	66.1	89.7	46.4	77.0	74.0	70.0	68.0	63.0	59.0	52.0	50.0	48.0	66.1	0.0	66.1
	13	63.2	82.4	44.4	74.0	71.0	68.0	67.0	62.0	57.0	50.0	48.0	46.0	63.2	0.0	63.2
	14	65.9	90.6	43.7	75.0	72.0	69.0	68.0	63.0	58.0	51.0	49.0	47.0	65.9	0.0	65.9
	15	64.6	83.5	46.4	75.0	73.0	69.0	68.0	64.0	59.0	52.0	51.0	48.0	64.6	0.0	64.6
	16	66.6	91.5	47.0	77.0	74.0	70.0	68.0	64.0	59.0	53.0	51.0	49.0	66.6	0.0	66.6
	17	66.4	89.9	47.2	78.0	74.0	71.0	69.0	64.0	59.0	53.0	52.0	50.0	66.4	0.0	66.4
	18	64.5	91.9	46.4	73.0	70.0	67.0	66.0	63.0	58.0	52.0	51.0	49.0	64.5	0.0	64.5
Evening	19	66.7	95.9	46.6	74.0	72.0	68.0	67.0	62.0	58.0	51.0	50.0	48.0	66.7	5.0	71.7
	20	66.2	90.3	44.3	76.0	73.0	69.0	67.0	63.0	59.0	51.0	50.0	47.0	66.2	5.0	71.2
	21	64.4	87.7	44.3	74.0	72.0	69.0	68.0	63.0	57.0	49.0	47.0	45.0	64.4	5.0	69.4
Night	22	61.9	85.5	41.9	71.0	69.0	67.0	65.0	59.0	53.0	45.0	44.0	43.0	61.9	10.0	71.9
	23	65.0	97.0	40.6	72.0	69.0	66.0	64.0	58.0	50.0	43.0	42.0	41.0	65.0	10.0	75.0
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour L_{eq} (dBA)		
Day	Min	63.2	81.3	43.7	72.0	70.0	67.0	66.0	61.0	57.0	50.0	48.0	46.0	63.9		
	Max	66.6	91.9	47.2	78.0	74.0	71.0	69.0	64.0	59.0	53.0	52.0	50.0			
	Energy Average	64.8	Average:		74.7	72.0	68.9	67.3	62.8	58.3	51.5	49.9	47.7			
Evening	Min	64.4	87.7	44.3	74.0	72.0	68.0	67.0	62.0	57.0	49.0	47.0	45.0	24-Hour CNEL (dBA)		
	Max	66.7	95.9	46.6	76.0	73.0	69.0	68.0	63.0	59.0	51.0	50.0	48.0			
	Energy Average	65.9	Average:		74.7	72.3	68.7	67.3	62.7	58.0	50.3	49.0	46.7			
Night	Min	55.0	74.9	40.4	66.0	64.0	58.0	55.0	46.0	43.0	40.0	40.0	40.0	68.7		
	Max	65.0	97.0	44.2	72.0	70.0	68.0	66.0	61.0	58.0	51.0	49.0	46.0			
	Energy Average	60.7	Average:		69.4	67.1	63.9	61.8	55.1	49.7	44.2	43.3	42.3			

24-Hour Noise Level Measurement Summary

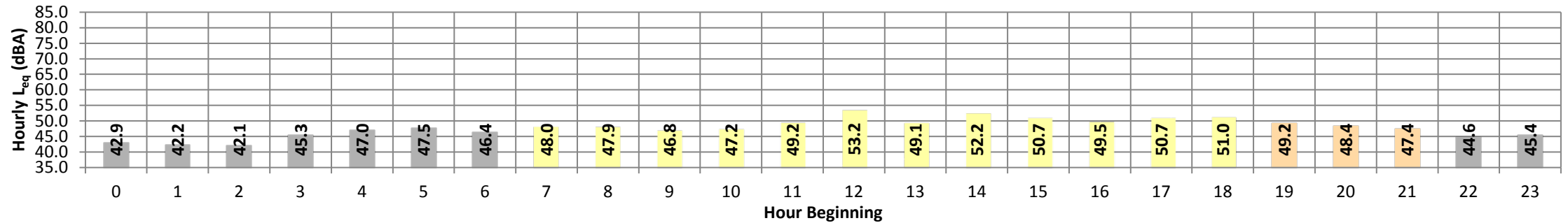
Date: Friday, June 22, 2018
Project: Elder Creek

Location: L2 - Located at the eastern Project site boundary adjacent to existing residential homes on Tyler Street.

Meter: Piccolo I

JN: 11744
Analyst: A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	42.9	58.2	39.4	48.0	47.0	45.0	44.0	43.0	41.0	40.0	39.0	39.0	42.9	10.0	52.9
	1	42.2	58.5	39.4	49.0	46.0	44.0	44.0	42.0	41.0	39.0	39.0	39.0	42.2	10.0	52.2
	2	42.1	61.3	39.3	48.0	45.0	44.0	43.0	41.0	41.0	39.0	39.0	39.0	42.1	10.0	52.1
	3	45.3	58.6	40.6	51.0	50.0	48.0	48.0	46.0	44.0	41.0	41.0	41.0	45.3	10.0	55.3
	4	47.0	56.7	42.5	52.0	51.0	50.0	49.0	47.0	46.0	44.0	43.0	43.0	47.0	10.0	57.0
	5	47.5	60.4	41.8	53.0	51.0	50.0	49.0	48.0	46.0	44.0	43.0	42.0	47.5	10.0	57.5
	6	46.4	63.1	41.1	52.0	51.0	49.0	48.0	47.0	45.0	43.0	42.0	41.0	46.4	10.0	56.4
Day	7	48.0	71.2	43.3	54.0	52.0	50.0	49.0	47.0	46.0	45.0	44.0	44.0	48.0	0.0	48.0
	8	47.9	63.7	42.5	56.0	54.0	52.0	50.0	47.0	45.0	44.0	43.0	43.0	47.9	0.0	47.9
	9	46.8	60.8	41.1	54.0	52.0	50.0	49.0	46.0	45.0	43.0	42.0	42.0	46.8	0.0	46.8
	10	47.2	64.5	39.4	57.0	54.0	51.0	49.0	46.0	44.0	42.0	41.0	39.0	47.2	0.0	47.2
	11	49.2	70.3	40.4	59.0	57.0	53.0	51.0	47.0	45.0	42.0	41.0	41.0	49.2	0.0	49.2
	12	53.2	74.8	41.3	64.0	61.0	56.0	54.0	50.0	48.0	46.0	45.0	42.0	53.2	0.0	53.2
	13	49.1	62.6	44.5	56.0	55.0	52.0	51.0	49.0	47.0	46.0	46.0	45.0	49.1	0.0	49.1
	14	52.2	74.7	44.8	59.0	56.0	52.0	51.0	49.0	48.0	46.0	46.0	45.0	52.2	0.0	52.2
	15	50.7	63.7	42.2	57.0	56.0	55.0	54.0	51.0	49.0	46.0	46.0	45.0	50.7	0.0	50.7
	16	49.5	64.1	41.1	58.0	56.0	53.0	52.0	49.0	47.0	44.0	43.0	42.0	49.5	0.0	49.5
	17	50.7	63.2	43.3	57.0	56.0	54.0	53.0	51.0	49.0	46.0	46.0	44.0	50.7	0.0	50.7
	18	51.0	63.5	43.1	59.0	57.0	55.0	54.0	51.0	49.0	46.0	46.0	44.0	51.0	0.0	51.0
Evening	19	49.2	65.6	41.1	56.0	54.0	52.0	51.0	49.0	48.0	44.0	44.0	42.0	49.2	5.0	54.2
	20	48.4	65.6	39.4	57.0	55.0	52.0	51.0	48.0	46.0	43.0	42.0	41.0	48.4	5.0	53.4
	21	47.4	60.3	39.1	56.0	54.0	51.0	50.0	47.0	45.0	42.0	41.0	40.0	47.4	5.0	52.4
Night	22	44.6	61.0	38.7	53.0	51.0	48.0	47.0	44.0	42.0	40.0	39.0	39.0	44.6	10.0	54.6
	23	45.4	65.9	39.4	53.0	51.0	49.0	47.0	44.0	42.0	41.0	39.0	39.0	45.4	10.0	55.4
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour L_{eq} (dBA)		
Day	Min	46.8	60.8	39.4	54.0	52.0	50.0	49.0	46.0	44.0	42.0	41.0	39.0	48.6		
	Max	53.2	74.8	44.8	64.0	61.0	56.0	54.0	51.0	49.0	46.0	46.0	45.0			
Energy Average		50.1	Average:		57.5	55.5	52.8	51.4	48.6	46.8	44.7	44.1	43.0			
Evening	Min	47.4	60.3	39.1	56.0	54.0	51.0	50.0	47.0	45.0	42.0	41.0	40.0	53.1		
	Max	49.2	65.6	41.1	57.0	55.0	52.0	51.0	49.0	48.0	44.0	44.0	42.0			
Energy Average		48.4	Average:		56.3	54.3	51.7	50.7	48.0	46.3	43.0	42.3	41.0			
Night	Min	42.1	56.7	38.7	48.0	45.0	44.0	43.0	41.0	41.0	39.0	39.0	39.0	53.1		
	Max	47.5	65.9	42.5	53.0	51.0	50.0	49.0	48.0	46.0	44.0	43.0	43.0			
Energy Average		45.2	Average:		51.0	49.2	47.4	46.6	44.7	43.1	41.2	40.4	40.2			

24-Hour Noise Level Measurement Summary

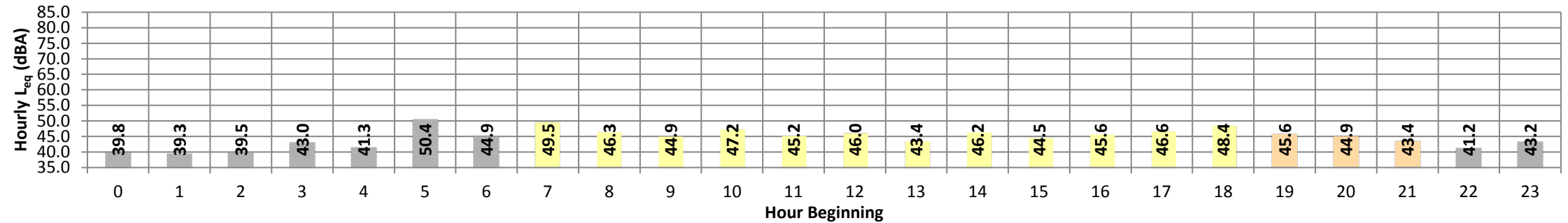
Date: Friday, June 22, 2018
Project: Elder Creek

Location: L3 - Located at the eastern Project site boundary adjacent to existing residential homes on Tyler Street.

Meter: Piccolo I

JN: 11744
Analyst: A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	39.8	58.0	36.3	46.0	44.0	42.0	41.0	39.0	38.0	36.0	36.0	36.0	39.8	10.0	49.8
	1	39.3	54.4	36.3	46.0	43.0	42.0	41.0	39.0	38.0	36.0	36.0	36.0	39.3	10.0	49.3
	2	39.5	57.9	36.2	47.0	44.0	42.0	40.0	39.0	38.0	36.0	36.0	36.0	39.5	10.0	49.5
	3	43.0	57.7	37.8	48.0	47.0	46.0	45.0	43.0	42.0	39.0	38.0	38.0	43.0	10.0	53.0
	4	41.3	56.3	36.3	50.0	47.0	44.0	43.0	41.0	39.0	38.0	38.0	36.0	41.3	10.0	51.3
	5	50.4	67.2	39.1	61.0	59.0	57.0	56.0	46.0	44.0	41.0	41.0	40.0	50.4	10.0	60.4
Day	6	44.9	64.1	38.1	55.0	52.0	47.0	46.0	44.0	42.0	40.0	39.0	39.0	44.9	10.0	54.9
	7	49.5	69.9	41.4	61.0	58.0	54.0	52.0	47.0	44.0	43.0	43.0	42.0	49.5	0.0	49.5
	8	46.3	68.4	40.1	56.0	53.0	49.0	48.0	44.0	43.0	41.0	41.0	41.0	46.3	0.0	46.3
	9	44.9	61.9	38.9	54.0	51.0	48.0	46.0	44.0	42.0	41.0	40.0	39.0	44.9	0.0	44.9
	10	47.2	66.3	37.7	60.0	58.0	50.0	48.0	43.0	41.0	39.0	39.0	38.0	47.2	0.0	47.2
	11	45.2	65.9	37.9	55.0	51.0	48.0	47.0	43.0	41.0	39.0	39.0	38.0	45.2	0.0	45.2
	12	46.0	61.8	38.1	55.0	54.0	51.0	49.0	45.0	42.0	40.0	39.0	39.0	46.0	0.0	46.0
	13	43.4	60.4	37.6	52.0	50.0	47.0	46.0	42.0	41.0	39.0	39.0	38.0	43.4	0.0	43.4
	14	46.2	68.0	37.9	56.0	52.0	48.0	46.0	43.0	41.0	39.0	39.0	38.0	46.2	0.0	46.2
	15	44.5	57.2	37.9	51.0	50.0	49.0	48.0	45.0	42.0	39.0	38.0	38.0	44.5	0.0	44.5
	16	45.6	60.5	38.1	55.0	54.0	50.0	49.0	44.0	42.0	40.0	39.0	39.0	45.6	0.0	45.6
	17	46.6	61.1	39.8	55.0	53.0	51.0	49.0	46.0	44.0	42.0	42.0	41.0	46.6	0.0	46.6
Evening	18	48.4	73.5	40.8	56.0	55.0	53.0	51.0	47.0	45.0	43.0	42.0	41.0	48.4	0.0	48.4
	19	45.6	63.8	38.5	53.0	52.0	49.0	48.0	45.0	44.0	41.0	40.0	40.0	45.6	5.0	50.6
	20	44.9	63.5	38.0	53.0	51.0	49.0	47.0	44.0	42.0	39.0	39.0	38.0	44.9	5.0	49.9
Night	21	43.4	58.0	36.3	52.0	50.0	48.0	46.0	42.0	41.0	39.0	38.0	38.0	43.4	5.0	48.4
	22	41.2	59.9	36.3	49.0	46.0	44.0	43.0	41.0	39.0	38.0	37.0	36.0	41.2	10.0	51.2
	23	43.2	70.5	36.3	51.0	48.0	44.0	43.0	40.0	39.0	37.0	36.0	36.0	43.2	10.0	53.2
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour L_{eq} (dBA)		
Day	Min	43.4	57.2	37.6	51.0	50.0	47.0	46.0	42.0	41.0	39.0	38.0	38.0	45.5		
	Max	49.5	73.5	41.4	61.0	58.0	54.0	52.0	47.0	45.0	43.0	43.0	42.0			
Energy Average		46.5	Average:		55.5	53.3	49.8	48.3	44.4	42.3	40.4	40.0	39.3			
Evening	Min	43.4	58.0	36.3	52.0	50.0	48.0	46.0	42.0	41.0	39.0	38.0	38.0	51.2		
	Max	45.6	63.8	38.5	53.0	52.0	49.0	48.0	45.0	44.0	41.0	40.0	40.0			
Energy Average		44.7	Average:		52.7	51.0	48.7	47.0	43.7	42.3	39.7	39.0	38.7			
Night	Min	39.3	54.4	36.2	46.0	43.0	42.0	40.0	39.0	38.0	36.0	36.0	36.0	51.2		
	Max	50.4	70.5	39.1	61.0	59.0	57.0	56.0	46.0	44.0	41.0	41.0	40.0			
Energy Average		44.2	Average:		50.3	47.8	45.3	44.2	41.3	39.9	37.9	37.4	37.0			

24-Hour Noise Level Measurement Summary

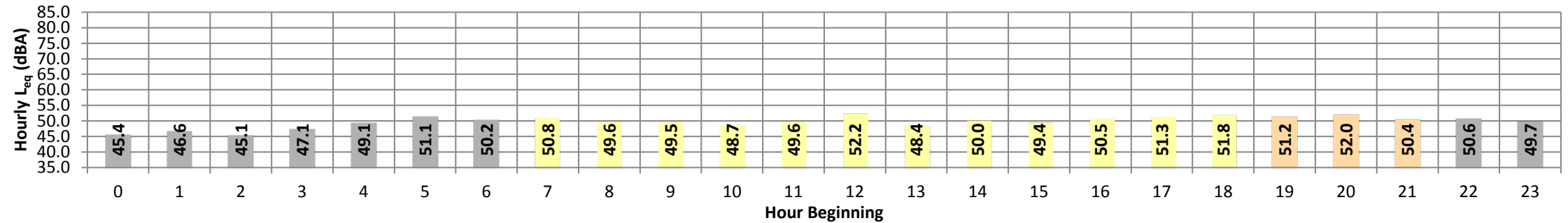
Date: Friday, June 22, 2018
Project: Elder Creek

Location: L4 - Located west of the Project site on Church Street near vacant land and existing residential homes.

Meter: Piccolo I

JN: 11744
Analyst: A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	45.4	65.8	39.1	53.0	51.0	48.0	47.0	45.0	42.0	40.0	39.0	39.0	45.4	10.0	55.4
	1	46.6	66.9	39.1	58.0	56.0	50.0	47.0	44.0	42.0	39.0	39.0	39.0	46.6	10.0	56.6
	2	45.1	66.4	39.1	55.0	51.0	48.0	47.0	44.0	42.0	40.0	39.0	39.0	45.1	10.0	55.1
	3	47.1	61.4	41.0	54.0	52.0	50.0	49.0	47.0	46.0	43.0	42.0	42.0	47.1	10.0	57.1
	4	49.1	58.6	43.9	54.0	54.0	52.0	51.0	49.0	48.0	45.0	45.0	44.0	49.1	10.0	59.1
	5	51.1	68.3	41.0	59.0	57.0	54.0	53.0	50.0	49.0	46.0	45.0	44.0	51.1	10.0	61.1
	6	50.2	63.8	43.0	58.0	56.0	54.0	52.0	50.0	48.0	45.0	44.0	43.0	50.2	10.0	60.2
Day	7	50.8	65.4	46.2	59.0	56.0	53.0	52.0	50.0	49.0	47.0	47.0	46.0	50.8	0.0	50.8
	8	49.6	61.6	44.6	56.0	55.0	52.0	51.0	49.0	48.0	46.0	46.0	45.0	49.6	0.0	49.6
	9	49.5	65.9	42.6	58.0	55.0	52.0	51.0	49.0	48.0	45.0	45.0	43.0	49.5	0.0	49.5
	10	48.7	64.9	40.9	56.0	55.0	52.0	51.0	48.0	47.0	44.0	43.0	42.0	48.7	0.0	48.7
	11	49.6	67.9	40.6	58.0	56.0	53.0	52.0	49.0	47.0	44.0	43.0	42.0	49.6	0.0	49.6
	12	52.2	71.8	40.8	62.0	59.0	56.0	54.0	50.0	48.0	44.0	44.0	42.0	52.2	0.0	52.2
	13	48.4	64.0	39.2	56.0	54.0	51.0	51.0	48.0	46.0	43.0	42.0	41.0	48.4	0.0	48.4
	14	50.0	68.8	40.9	58.0	56.0	54.0	52.0	49.0	47.0	44.0	43.0	42.0	50.0	0.0	50.0
	15	49.4	66.2	40.8	57.0	55.0	53.0	52.0	49.0	47.0	44.0	43.0	42.0	49.4	0.0	49.4
	16	50.5	62.7	42.2	57.0	56.0	54.0	53.0	50.0	49.0	46.0	45.0	44.0	50.5	0.0	50.5
	17	51.3	67.3	43.2	59.0	57.0	54.0	53.0	51.0	49.0	47.0	46.0	44.0	51.3	0.0	51.3
	18	51.8	64.9	43.7	60.0	59.0	56.0	55.0	51.0	50.0	47.0	46.0	45.0	51.8	0.0	51.8
Evening	19	51.2	68.6	41.7	60.0	58.0	55.0	53.0	51.0	49.0	45.0	45.0	43.0	51.2	5.0	56.2
	20	52.0	70.5	42.0	62.0	59.0	56.0	54.0	51.0	48.0	45.0	44.0	43.0	52.0	5.0	57.0
	21	50.4	68.7	40.8	60.0	58.0	55.0	53.0	50.0	47.0	44.0	43.0	42.0	50.4	5.0	55.4
Night	22	50.6	68.0	39.2	62.0	60.0	56.0	53.0	48.0	45.0	42.0	41.0	39.0	50.6	10.0	60.6
	23	49.7	69.3	38.8	62.0	59.0	54.0	51.0	47.0	44.0	40.0	39.0	39.0	49.7	10.0	59.7
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour L_{eq} (dBA)		
Day	Min	48.4	61.6	39.2	56.0	54.0	51.0	51.0	48.0	46.0	43.0	42.0	41.0	50.0		
	Max	52.2	71.8	46.2	62.0	59.0	56.0	55.0	51.0	50.0	47.0	47.0	46.0			
Energy Average		50.3	Average:		58.0	56.1	53.3	52.3	49.4	47.9	45.1	44.4	43.2			
Evening	Min	50.4	68.6	40.8	60.0	58.0	55.0	53.0	50.0	47.0	44.0	43.0	42.0	24-Hour CNEL (dBA)		
	Max	52.0	70.5	42.0	62.0	59.0	56.0	54.0	51.0	49.0	45.0	45.0	43.0			
Energy Average		51.2	Average:		60.7	58.3	55.3	53.3	50.7	48.0	44.7	44.0	42.7			
Night	Min	45.1	58.6	38.8	53.0	51.0	48.0	47.0	44.0	42.0	39.0	39.0	39.0	55.9		
	Max	51.1	69.3	43.9	62.0	60.0	56.0	53.0	50.0	49.0	46.0	45.0	44.0			
Energy Average		48.8	Average:		57.2	55.1	51.8	50.0	47.1	45.1	42.2	41.4	40.9			

24-Hour Noise Level Measurement Summary

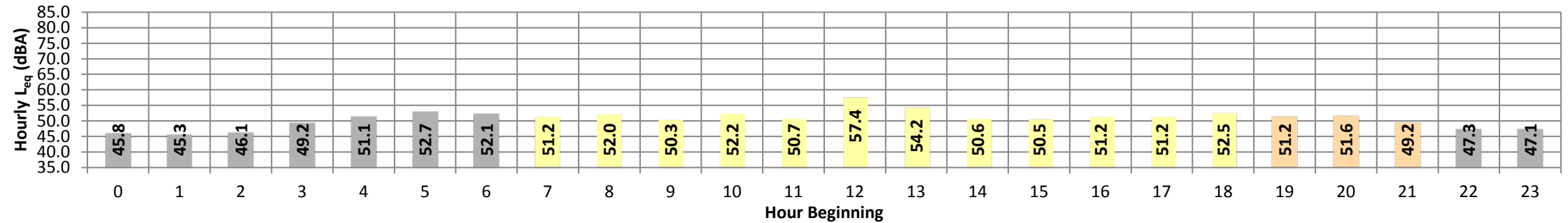
Date: Friday, June 22, 2018
Project: Elder Creek

Location: L5 - Located on Merris Street within the Project site boundaries adjacent to existing residential homes and commercial uses.

Meter: Piccolo I

JN: 11744
Analyst: A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	45.8	58.8	43.0	51.0	49.0	47.0	47.0	45.0	45.0	44.0	43.0	43.0	45.8	10.0	55.8
	1	45.3	56.2	42.8	50.0	49.0	47.0	46.0	45.0	44.0	43.0	43.0	43.0	45.3	10.0	55.3
	2	46.1	62.5	42.7	50.0	49.0	48.0	47.0	46.0	45.0	44.0	43.0	43.0	46.1	10.0	56.1
	3	49.2	62.0	44.7	55.0	53.0	52.0	51.0	49.0	48.0	46.0	45.0	45.0	49.2	10.0	59.2
	4	51.1	62.3	46.0	56.0	55.0	53.0	53.0	51.0	50.0	48.0	48.0	47.0	51.1	10.0	61.1
	5	52.7	70.7	44.4	61.0	58.0	56.0	55.0	52.0	50.0	47.0	46.0	45.0	52.7	10.0	62.7
Day	6	52.1	73.3	44.0	62.0	59.0	55.0	54.0	50.0	48.0	46.0	46.0	45.0	52.1	10.0	62.1
	7	51.2	69.0	46.4	58.0	55.0	53.0	52.0	50.0	49.0	48.0	48.0	47.0	51.2	0.0	51.2
	8	52.0	74.0	45.3	61.0	58.0	55.0	53.0	50.0	49.0	47.0	46.0	46.0	52.0	0.0	52.0
	9	50.3	70.4	43.1	58.0	56.0	54.0	53.0	49.0	47.0	45.0	45.0	44.0	50.3	0.0	50.3
	10	52.2	72.8	41.3	64.0	60.0	54.0	52.0	49.0	46.0	44.0	43.0	42.0	52.2	0.0	52.2
	11	50.7	68.8	41.9	61.0	58.0	54.0	53.0	49.0	46.0	44.0	43.0	43.0	50.7	0.0	50.7
	12	57.4	81.5	40.8	68.0	65.0	59.0	56.0	49.0	47.0	44.0	43.0	42.0	57.4	0.0	57.4
	13	54.2	79.2	40.8	66.0	63.0	58.0	56.0	50.0	46.0	43.0	42.0	41.0	54.2	0.0	54.2
	14	50.6	73.2	40.9	61.0	58.0	54.0	51.0	48.0	46.0	43.0	42.0	42.0	50.6	0.0	50.6
	15	50.5	73.0	41.4	60.0	56.0	52.0	51.0	48.0	46.0	43.0	43.0	42.0	50.5	0.0	50.5
	16	51.2	75.7	41.9	61.0	59.0	54.0	52.0	49.0	48.0	45.0	44.0	43.0	51.2	0.0	51.2
	17	51.2	69.0	44.9	58.0	56.0	54.0	53.0	51.0	49.0	47.0	46.0	46.0	51.2	0.0	51.2
Evening	18	52.5	68.0	44.9	62.0	59.0	56.0	54.0	51.0	50.0	48.0	47.0	46.0	52.5	0.0	52.5
	19	51.2	71.8	44.0	59.0	57.0	55.0	53.0	50.0	49.0	46.0	46.0	45.0	51.2	5.0	56.2
	20	51.6	67.2	44.4	59.0	58.0	56.0	55.0	51.0	49.0	46.0	45.0	45.0	51.6	5.0	56.6
Night	21	49.2	66.9	43.4	57.0	55.0	53.0	51.0	48.0	46.0	45.0	44.0	44.0	49.2	5.0	54.2
	22	47.3	60.1	42.7	55.0	53.0	51.0	49.0	47.0	45.0	44.0	44.0	43.0	47.3	10.0	57.3
Night	23	47.1	63.6	42.1	55.0	54.0	51.0	49.0	46.0	45.0	43.0	43.0	42.0	47.1	10.0	57.1
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour L_{eq} (dBA)		
Day	Min	50.3	68.0	40.8	58.0	55.0	52.0	51.0	48.0	46.0	43.0	42.0	41.0	51.4		
	Max	57.4	81.5	46.4	68.0	65.0	59.0	56.0	51.0	50.0	48.0	48.0	47.0			
Energy Average		52.6	Average:		61.5	58.6	54.8	53.0	49.4	47.4	45.1	44.3	43.7			
Evening	Min	49.2	66.9	43.4	57.0	55.0	53.0	51.0	48.0	46.0	45.0	44.0	44.0	56.6		
	Max	51.6	71.8	44.4	59.0	58.0	56.0	55.0	51.0	49.0	46.0	46.0	45.0			
Energy Average		50.8	Average:		58.3	56.7	54.7	53.0	49.7	48.0	45.7	45.0	44.7			
Night	Min	45.3	56.2	42.1	50.0	49.0	47.0	46.0	45.0	44.0	43.0	43.0	42.0	56.6		
	Max	52.7	73.3	46.0	62.0	59.0	56.0	55.0	52.0	50.0	48.0	48.0	47.0			
Energy Average		49.4	Average:		55.0	53.2	51.1	50.1	47.9	46.7	45.0	44.6	44.0			

24-Hour Noise Level Measurement Summary

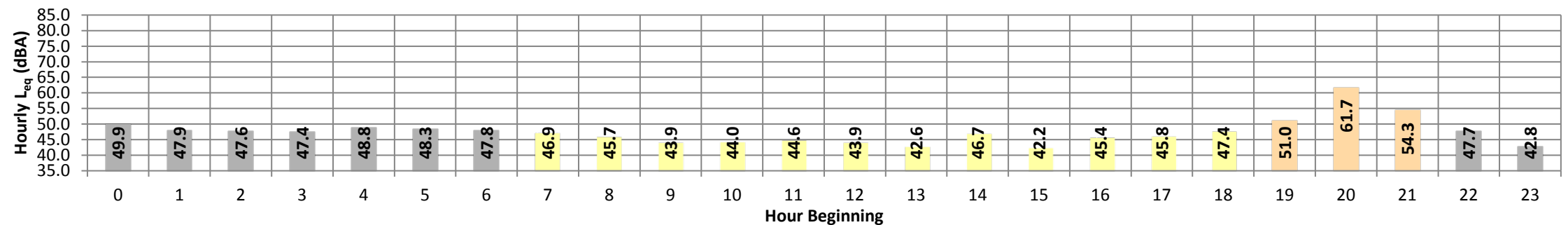
Date: Friday, June 22, 2018
Project: Elder Creek

Location: L6 - Located on Abbey Way adjacent to the Project site near existing vacant land.

Meter: Piccolo I

JN: 11744
Analyst: A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	49.9	61.6	39.9	59.0	58.0	56.0	56.0	45.0	42.0	40.0	40.0	40.0	49.9	10.0	59.9
	1	47.9	55.7	40.8	51.0	50.0	50.0	49.0	48.0	47.0	45.0	44.0	42.0	47.9	10.0	57.9
	2	47.6	56.7	43.6	53.0	52.0	51.0	50.0	47.0	46.0	44.0	44.0	43.0	47.6	10.0	57.6
	3	47.4	55.0	43.6	52.0	51.0	50.0	49.0	47.0	46.0	45.0	44.0	43.0	47.4	10.0	57.4
	4	48.8	58.3	43.6	54.0	53.0	52.0	51.0	49.0	47.0	45.0	44.0	43.0	48.8	10.0	58.8
	5	48.3	61.2	43.5	53.0	52.0	51.0	50.0	49.0	47.0	44.0	44.0	43.0	48.3	10.0	58.3
	6	47.8	66.9	43.5	54.0	52.0	51.0	50.0	47.0	46.0	45.0	45.0	44.0	47.8	10.0	57.8
Day	7	46.9	61.0	42.4	54.0	52.0	51.0	50.0	46.0	44.0	43.0	43.0	43.0	46.9	0.0	46.9
	8	45.7	65.2	42.2	53.0	51.0	48.0	46.0	45.0	44.0	42.0	42.0	42.0	45.7	0.0	45.7
	9	43.9	58.1	40.6	49.0	48.0	46.0	45.0	44.0	43.0	41.0	40.0	40.0	43.9	0.0	43.9
	10	44.0	68.4	38.1	50.0	48.0	45.0	44.0	42.0	41.0	40.0	40.0	40.0	44.0	0.0	44.0
	11	44.6	64.2	38.0	55.0	50.0	46.0	45.0	43.0	42.0	40.0	40.0	40.0	44.6	0.0	44.6
	12	43.9	61.0	37.8	52.0	50.0	47.0	46.0	43.0	42.0	40.0	40.0	40.0	43.9	0.0	43.9
	13	42.6	63.5	37.8	50.0	47.0	45.0	43.0	41.0	40.0	37.0	37.0	37.0	42.6	0.0	42.6
	14	46.7	71.5	37.8	56.0	53.0	48.0	46.0	42.0	41.0	40.0	38.0	37.0	46.7	0.0	46.7
	15	42.2	56.7	37.8	49.0	46.0	45.0	44.0	42.0	40.0	40.0	38.0	37.0	42.2	0.0	42.2
	16	45.4	60.8	37.8	55.0	53.0	49.0	47.0	44.0	43.0	40.0	40.0	40.0	45.4	0.0	45.4
	17	45.8	62.3	40.7	52.0	51.0	49.0	47.0	45.0	44.0	42.0	42.0	41.0	45.8	0.0	45.8
	18	47.4	63.5	40.7	55.0	54.0	50.0	49.0	46.0	45.0	43.0	42.0	41.0	47.4	0.0	47.4
Evening	19	51.0	65.7	40.6	63.0	63.0	55.0	52.0	47.0	45.0	42.0	41.0	40.0	51.0	5.0	56.0
	20	61.7	71.7	42.4	70.0	70.0	69.0	67.0	60.0	52.0	47.0	46.0	44.0	61.7	5.0	66.7
	21	54.3	62.4	41.0	60.0	60.0	59.0	58.0	54.0	53.0	51.0	47.0	44.0	54.3	5.0	59.3
Night	22	47.7	60.2	40.7	56.0	55.0	54.0	51.0	47.0	44.0	42.0	42.0	40.0	47.7	10.0	57.7
	23	42.8	54.4	39.3	47.0	45.0	44.0	44.0	43.0	42.0	40.0	40.0	40.0	42.8	10.0	52.8
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour L_{eq} (dBA)		
Day	Min	42.2	56.7	37.8	49.0	46.0	45.0	43.0	41.0	40.0	37.0	37.0	37.0	50.7		
	Max	47.4	71.5	42.4	56.0	54.0	51.0	50.0	46.0	45.0	43.0	43.0	43.0			
Energy Average		45.2	Average:		52.5	50.3	47.4	46.0	43.6	42.4	40.7	40.2	39.8			
Evening	Min	51.0	62.4	40.6	60.0	60.0	55.0	52.0	47.0	45.0	42.0	41.0	40.0	24-Hour CNEL (dBA)		
	Max	61.7	71.7	42.4	70.0	70.0	69.0	67.0	60.0	53.0	51.0	47.0	44.0			
Energy Average		58.0	Average:		64.3	64.3	61.0	59.0	53.7	50.0	46.7	44.7	42.7			
Night	Min	42.8	54.4	39.3	47.0	45.0	44.0	44.0	43.0	42.0	40.0	40.0	40.0	56.9		
	Max	49.9	66.9	43.6	59.0	58.0	56.0	56.0	49.0	47.0	45.0	45.0	44.0			
Energy Average		47.9	Average:		53.2	52.0	51.0	50.0	46.9	45.2	43.3	43.0	42.0			
														24-Hour CNEL (dBA)		
														56.9		

APPENDIX 7.1:
RCNM EQUIPMENT DATABASE

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U.S. Department
of Transportation

**Federal Highway
Administration**

FHWA-HEP-05-054
DOT-VNTSC-FHWA-05-01

FHWA

Roadway Construction Noise Model

User's Guide

Final Report
January 2006



Prepared for
U.S. Department of Transportation
Federal Highway Administration
Office of Natural and Human Environment
Washington, DC 20590

Prepared by
U.S. Department of Transportation
Research and Innovative Technology Administration
John A. Volpe National Transportation Systems Center
Acoustics Facility
Cambridge, MA 02142

Table 1. CA/T equipment noise emissions and acoustical usage factors database.

CA/T Noise Emission Reference Levels and Usage Factors					
filename: EQUIPLST.xls					
revised: 7/26/05					
	Impact	Acoustical Use Factor	Spec 721.560 Lmax @ 50ft	Actual Measured Lmax @ 50ft	No. of Actual Data Samples
Equipment Description	Device ?	(%)	(dBA, slow)	(dBA, slow)	(Count)
				(samples averaged)	
All Other Equipment > 5 HP	No	50	85	-- N/A --	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar Bender	No	20	80	-- N/A --	0
Blasting	Yes	-- N/A --	94	-- N/A --	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	-- N/A --	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	-- N/A --	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydr. Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	-- N/A --	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarifier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/chipping gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	-- N/A --	0
Tractor	No	40	84	-- N/A --	0
Vacuum Excavator (Vac-truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder / Torch	No	40	73	74	5

APPENDIX 7.2:

TEMPORARY NOISE BARRIER ATTENUATION CALCULATIONS

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STATIONARY SOURCE NOISE PREDICTION MODEL

6/28/2019

Observer Location: R1

Project Name: Elder Creek

Source: Highest Construction Noise Level at 50 F

Job Number: 11744

Condition: Construction Mitigation

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	13.0 feet	Barrier Height:	10.0 feet
Noise Distance to Barrier:	2.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	11.0 feet	Observer Height:	5.0 feet
Observer Elevation:	0.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	0.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	0.0 feet	20 = 6 dBA per doubling of distance 15 = 4.5 dBA per doubling of distance	

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	78.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	13.0	11.7	11.7	11.7	11.7	11.7	11.7
Shielding (Barrier Attenuation)	2.0	-11.4	-11.4	-11.4	-11.4	-11.4	-11.4

STATIONARY SOURCE NOISE PREDICTION MODEL

6/28/2019

Observer Location: R3

Project Name: Elder Creek

Source: Highest Construction Noise Level at 50 F

Job Number: 11744

Condition: Construction Mitigation

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	10.0 feet	Barrier Height:	10.0 feet
Noise Distance to Barrier:	2.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	8.0 feet	Observer Height:	5.0 feet
Observer Elevation:	0.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	0.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	0.0 feet	20 = 6 dBA per doubling of distance 15 = 4.5 dBA per doubling of distance	

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	78.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	10.0	14.0	14.0	14.0	14.0	14.0	14.0
Shielding (Barrier Attenuation)	2.0	-11.9	-11.9	-11.9	-11.9	-11.9	-11.9

STATIONARY SOURCE NOISE PREDICTION MODEL

6/28/2019

Observer Location: R5

Project Name: Elder Creek

Source: Highest Construction Noise Level at 50 F

Job Number: 11744

Condition: Construction Mitigation

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	18.0 feet	Barrier Height:	10.0 feet
Noise Distance to Barrier:	2.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	16.0 feet	Observer Height:	5.0 feet
Observer Elevation:	0.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	0.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	0.0 feet	20 = 6 dBA per doubling of distance 15 = 4.5 dBA per doubling of distance	

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	78.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	18.0	8.9	8.9	8.9	8.9	8.9	8.9
Shielding (Barrier Attenuation)	2.0	-10.9	-10.9	-10.9	-10.9	-10.9	-10.9

STATIONARY SOURCE NOISE PREDICTION MODEL

6/28/2019

Observer Location: R6

Project Name: Elder Creek

Source: Highest Construction Noise Level at 50 F

Job Number: 11744

Condition: Construction Mitigation

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	21.0 feet	Barrier Height:	10.0 feet
Noise Distance to Barrier:	2.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	19.0 feet	Observer Height:	5.0 feet
Observer Elevation:	0.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	0.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	0.0 feet	20 = 6 dBA per doubling of distance 15 = 4.5 dBA per doubling of distance	

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	78.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	21.0	7.5	7.5	7.5	7.5	7.5	7.5
Shielding (Barrier Attenuation)	2.0	-10.8	-10.8	-10.8	-10.8	-10.8	-10.8

STATIONARY SOURCE NOISE PREDICTION MODEL

6/28/2019

Observer Location: R8

Project Name: Elder Creek

Source: Highest Construction Noise Level at 50 F

Job Number: 11744

Condition: Construction Mitigation

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	10.0 feet	Barrier Height:	10.0 feet
Noise Distance to Barrier:	2.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	8.0 feet	Observer Height:	5.0 feet
Observer Elevation:	0.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	0.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	0.0 feet	20 = 6 dBA per doubling of distance 15 = 4.5 dBA per doubling of distance	

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	78.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	10.0	14.0	14.0	14.0	14.0	14.0	14.0
Shielding (Barrier Attenuation)	2.0	-11.9	-11.9	-11.9	-11.9	-11.9	-11.9

STATIONARY SOURCE NOISE PREDICTION MODEL

6/28/2019

Observer Location: R9

Project Name: Elder Creek

Source: Highest Construction Noise Level at 50 F

Job Number: 11744

Condition: Construction Mitigation

Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	21.0 feet	Barrier Height:	10.0 feet
Noise Distance to Barrier:	2.0 feet	Noise Source Height:	8.0 feet
Barrier Distance to Observer:	19.0 feet	Observer Height:	5.0 feet
Observer Elevation:	0.0 feet	Barrier Type (0-Wall, 1-Berm):	0
Noise Source Elevation:	0.0 feet	Drop Off Coefficient:	20.0
Barrier Elevation:	0.0 feet	20 = 6 dBA per doubling of distance 15 = 4.5 dBA per doubling of distance	

NOISE MODEL PROJECTIONS

Noise Level	Distance (feet)	Leq	L50	L25	L8	L2	Lmax
Reference (Sample)	50.0	78.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	21.0	7.5	7.5	7.5	7.5	7.5	7.5
Shielding (Barrier Attenuation)	2.0	-10.8	-10.8	-10.8	-10.8	-10.8	-10.8

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APPENDIX 7.3:

SAMPLE TEMPORARY CONSTRUCTION NOISE BARRIER PHOTOS

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Temporary Construction Noise Barrier Examples



I-Beam & Acoustic Material 01



I-Beam & Acoustic Material 02



I-Beam & Acoustic Material 03



K-Rail Plywood & Acoustic Material



K-Rail Temporary Fence & Acoustic Material



K-Rail-Mounted Acoustic Material 01

Temporary Construction Noise Barrier Examples



Pillar & Acoustic Material



Straw Bales 01



Straw Bales 02



Temporary Fence & Acoustic Material 01



Temporary Fence & Acoustic Material 02

Appendix E

Cultural Resources Reports

CONFIDENTIAL – NOT FOR PUBLIC REVIEW