

**INITIAL STUDY/MITIGATED  
NEGATIVE DECLARATION  
WWTP Recycled Water Reservoir CEQA Project  
City of Redlands, CA**

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## **SECTION 1.0 – PROJECT DESCRIPTION AND ENVIRONMENTAL SETTING**

### **1.1 PROJECT PURPOSE AND BACKGROUND**

The City of Redlands Municipal Utilities and Engineering Department (MUED) is proposing to construct a 2.75 million gallon (MG) recycled water reservoir and pump station (Project/Proposed Project) to be located at the existing City of Redlands Wastewater Treatment Plant (WWTP) in the City of Redlands (City).

In November 2024, California voters adopted Proposition 4 (The Act), the Safe Drinking Water, Wildfire Prevention, Drought Preparedness, and Clean Air Bond Act, which will provide funding to address California's current and future climate impacts. The Act designates approximately \$3,800,000,000 for safe drinking water, drought, flood, and water resiliency projects and programs (Chapter 2, Section 91000). The Proposed Project will be submitted as a candidate for Proposition 4 funding. Submittal for project funding requires compliance with the California Environmental Quality Act (CEQA).

The Proposed Project will safeguard public health by expanding the capacities of the reservoirs to meet water demands, which is critical as the City continues to be impacted by a multi-decade drought. The Proposed Project will allow the City to treat and store more water during wet periods for distribution during dry periods.

### **1.2 PROJECT LOCATION AND SITE CHARACTERISTICS**

#### **1.2.1 Project Site Location**

The new recycled water reservoir and pump station would be located at the WWTP's parcel along Nevada Street at Assessor's Parcel Number (APN): 029204136, and address at 1950 Nevada St, Redlands, CA 92373. The reservoir and pump station will be on the empty lot west of the existing sludge beds on the facility site. The Project is located on the U.S. Geological Survey (USGS) Redlands, California 7.5-minute topographic quadrangle, Township 1 South, Range 3 West.

#### **1.2.2 Project Site History**

The WWTP was constructed in the 1960s, currently employs a staff of 28 people, and is located on approximately 50 acres of land. The treatment capacity is approximately 9.5 MG per day based on annual dry weather flow conditions. Six MG of the capacity is treated via a membrane bioreactor system, and 3.5 MG via a conventional activated sludge process.

#### **1.2.3 Project Site Access and Circulation**

Project site access would be via Nevada Street. Nevada Street is located approximately 1.5 miles north of Interstate 10 (I-10) and 1 mile east of Interstate 210 (I-210). Entrance to the Project Site is off Nevada Street, before Waste Water Road.

#### **1.2.4 General Plan Designation/Zoning**

The Project site is zoned as Educational and Public Institutional (E,EV/PI) according to the City's General Plan Zoning Map (City 2022). Its land use designation according to the City's General Plan is Public/Institutional. EV/PI land use categories permit the operation of public services, buildings, and other related facilities, including schools, government facilities, public utilities, and other public or quasi-public nature. Residential and agricultural uses are also permitted (City 2017).

### **1.2.5 Surrounding Land Uses**

The WWTP is bounded by the Santa Ana River/open space to the north, vacant parcel to the east, and undeveloped and commercial/industrial lands and businesses to the south and west. The Project site is located north of the northern boundary of the East Corridor Specific Plan.

## **1.3 PROJECT DESCRIPTION**

The City of Redlands Municipal Utilities and Engineering Department proposes the construction of a 2.75 MG recycled water reservoir and pump station. The water reservoir and pump station will be constructed on the empty lot west of the existing sludge drying beds, at the southeast corner of Mills Street and Nevada Street within the City's Wastewater Treatment Facility.

### **1.3.1 Parking and Hardscape**

One driveway will connect the reservoir to Waste Water Road. The driveway will be constructed utilizing asphalt/gravel. No additional parking spaces will be required. The site will remain under maintenance by existing staff. No additional staff will be required.

### **1.3.2 Operations and Ongoing Maintenance**

Operations at the treatment plant will continue to function while the new water reservoir and pump station are being constructed. Maintenance will occur on a monthly and as-needed basis by City employees. The Project site will include the installation of ornamental landscaping. The type of landscaping will be selected as recommended by the City and will be maintained by City staff.

### **1.3.3 Construction**

Construction of the Proposed Project will require multiple workers using equipment such as loaders, pick-up trucks, backhoes, a water truck for dust suppression, a crane, asphalt paver and excavators. Project materials will be staged within the existing property managed by the City. Construction of the Proposed Project includes, but is not limited to, excavation and grading to construct water tank pads, internal driveways, and ancillary facilities such as a pump station and valve vaults.

#### Construction Schedule

The Project is expected to break ground in 2026 and be completed by 2027. Construction activities will take place between 07:00 a.m. to 06:00 p.m. Monday through Friday. No construction work will occur on weekends or City observed holidays per Chapter 8.06, *Community Noise Control*, of the City's Municipal Code.

## **1.4 REQUIRED PERMITS AND APPROVALS**

Reviewing Agencies include those agencies that do not have discretionary powers but may review the Initial Study (IS), Environmental Impact Report (EIR), and/or Negative Declaration (ND) for adequacy and accuracy. Responsible Agencies have discretionary approval authority for a project. Potential Reviewing Agencies and Responsible Agencies include the following:

#### Responsible Agencies

- California State Water Resources Control Board Division of Drinking Water

### Reviewing Agencies

- South Coast Air Quality Management District (SCAQMD)
- Native American Heritage Commission (NAHC) and tribes requesting consultation.

#### **1.4.1 Permits and Approvals**

The following permits and approvals may be required prior to construction of the Project:

- Site Plan review
- Grading Permit
- Building Permit

Figure 1 - Project Location and Vicinity



Figure 2 – Site Plan

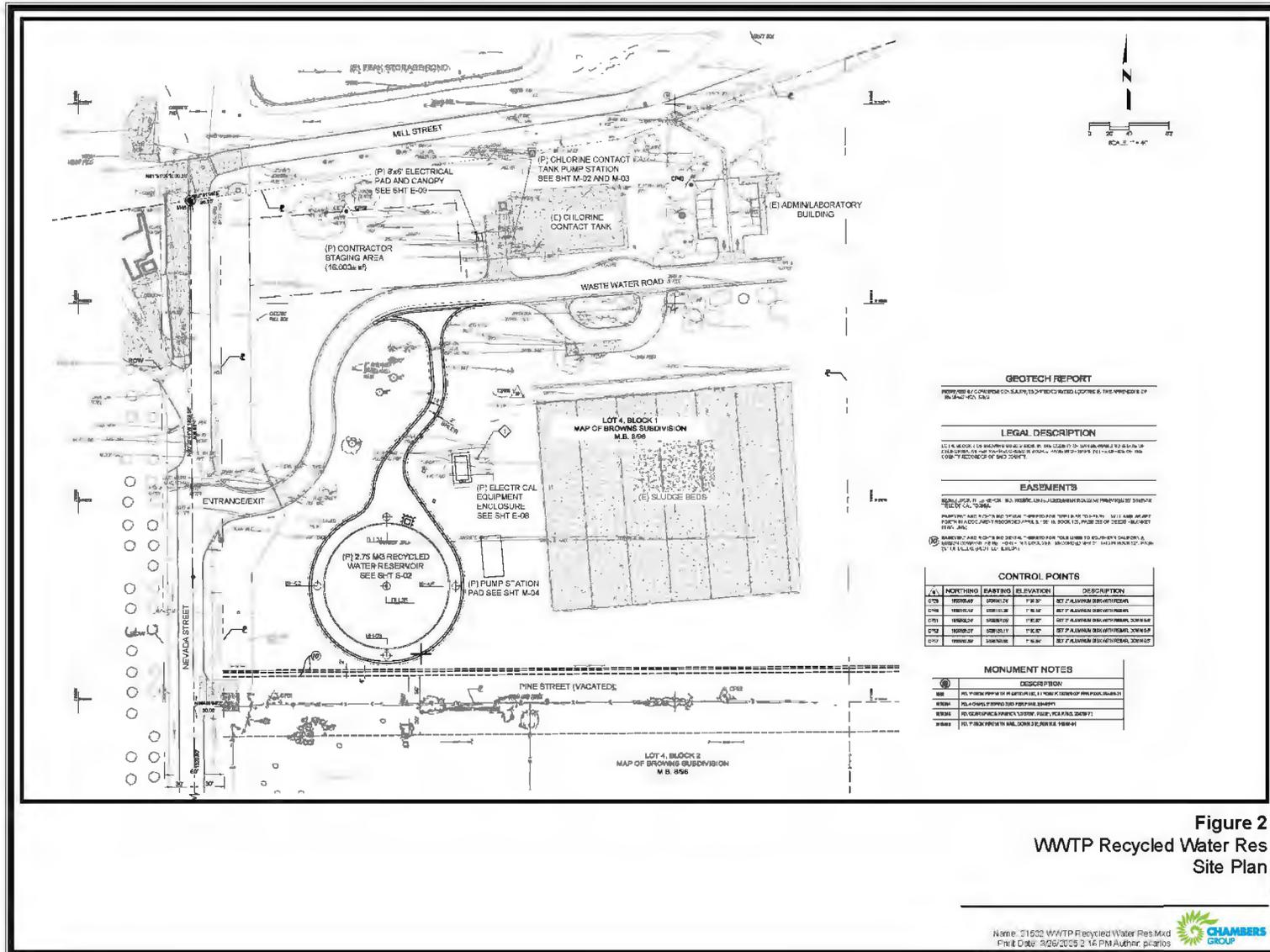
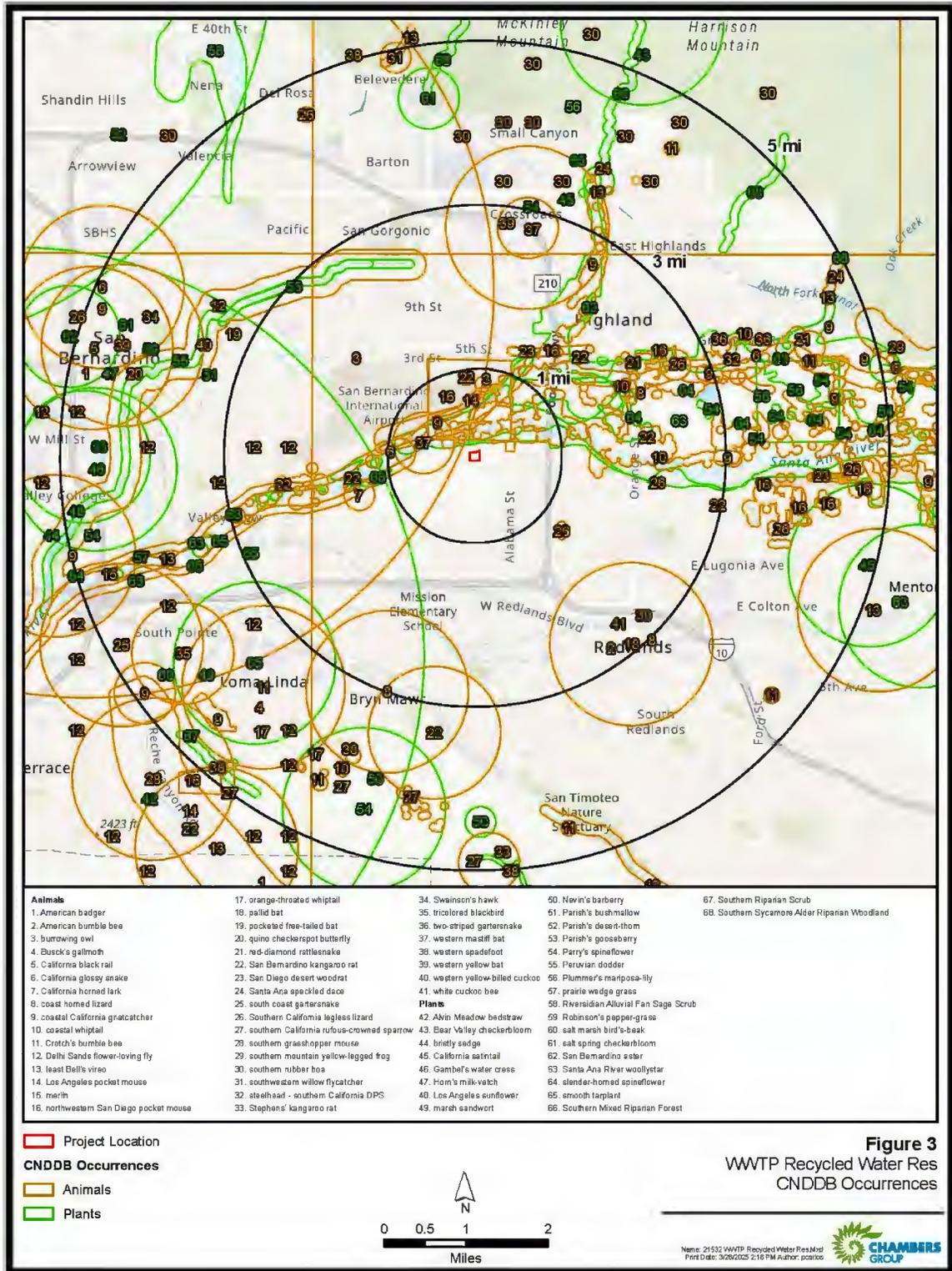


Figure 2  
WWTP Recycled Water Res  
Site Plan

Figure 3 – CNDDDB Occurrences



**SECTION 2.0 – ENVIRONMENTAL DETERMINATION**

**2.1 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:**

The environmental factors checked below would potentially be affected by this project, involving at least one impact that is a “Potentially Significant Impact,” as indicated by the checklists on the following pages. For each of the potentially affected factors, mitigation measures are recommended that would reduce the impacts to less than significant levels.

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Aesthetics                 | <input type="checkbox"/> Agriculture and Forestry Resources | <input type="checkbox"/> Air Quality                          |
| <input 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 type="checkbox"/> Hazards & Hazardous Materials        |
| <input type="checkbox"/> Hydrology /Water Quality   | <input type="checkbox"/> Land Use / Planning                | <input type="checkbox"/> Mineral Resources                    |
| <input type="checkbox"/> Noise                      | <input type="checkbox"/> Population / Housing               | <input type="checkbox"/> Public Services                      |
| <input type="checkbox"/> Recreation                 | <input type="checkbox"/> Transportation                     | <input checked="" type="checkbox"/> Tribal Cultural Resources |
| <input type="checkbox"/> Utilities /Service Systems | <input type="checkbox"/> Wildfire                           | <input type="checkbox"/> Mandatory Findings of Significance   |

**2.2 DETERMINATION**

On the basis of this initial evaluation:

1. I find that the project **could not** have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.
2. I find that although the Proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION (MND)** will be prepared.
3. I find the Proposed Project **may have a significant effect** on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.
4. I find that the Proposed Project **may have a “potentially significant impact” or “potentially significant unless mitigated impact”** on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.
5. I find that although the Proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier **ENVIRONMENTAL IMPACT REPORT** or **NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier **ENVIRONMENTAL IMPACT REPORT** or **NEGATIVE DECLARATION**, including revisions or mitigation measures that are imposed upon the Proposed Project, nothing further is required.

  
Signature

Goutam K. Dabey  
Name

8/28/2025  
Date

City Engineer  
Title

### SECTION 3.0 – EVALUATION OF ENVIRONMENTAL IMPACTS

1. A brief explanation is required for all answers except “No Impact” answers that are adequately supported by the information sources a lead agency cites. A “No Impact” answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A “No Impact” answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).
2. All answers must take account of the whole action involved, including offsite as well as onsite, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.
3. Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. “Potentially Significant Impact” is appropriate if substantial evidence exists that an effect may be significant. If one or more “Potentially Significant Impact” entries are marked when the determination is made, an EIR is required.
4. “Negative Declaration: Less Than Significant With Mitigation Incorporated” applies where the incorporation of mitigation measures has reduced an effect from “Potentially Significant Impact” to a “Less Than Significant Impact.” The lead agency must describe the mitigation measures and briefly explain how they reduce the effect to a less than significant level (mitigation measures from earlier analyses may be cross-referenced).
5. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or ND Section 15063(c)(3)(D) of the CEQA Guidelines. In this case, a brief discussion should identify the following:
  - a. Earlier Analysis Used. Identify and state where they are available for review.
  - b. Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
  - c. Mitigation Measures. For effects that are “Less than Significant with Mitigation Measures Incorporated,” describe the mitigation measures that were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.
6. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.
7. Supporting Information Sources: A source list should be attached, and other sources used, or individuals contacted should be cited in the discussion.
8. The explanation of each issue should identify:
  - a. The significance criteria or threshold, if any, used to evaluate each question; and
  - b. The mitigation measure identified, if any, to reduce the impact to less than significant.

**SECTION 4.0 – CHECKLIST OF ENVIRONMENTAL ISSUES**

**4.1 AESTHETICS**

1.	AESTHETICS. Except as provided in Public Resources Code Section 21099, would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Have a substantial adverse effect on a scenic vista?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b)	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(c)	Substantially degrade the 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 point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(d)	Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**4.1.1 Impact Analysis**

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

**Less Than Significant Impact.** The City implements regulations to protect and enhance the unique visual resources of the City. These visual resources include the community’s hillside setting, diverse topographic forms, and scenic qualities, including the San Bernardino Mountains and San Timoteo Nature Sanctuary. The Project site is bounded by the Santa Ana River/open space to the north, a vacant parcel to the east, and undeveloped land, commercial/industrial lands, and businesses to the south and west. The Santa Ana River lies between the Project site and the San Bernardino International Airport. Although the San Bernardino Mountains are visible from the Project Site, the height of the machinery for construction and the height of the reservoir will not exceed the height of the surrounding buildings. The above-ground height of the reservoir would be 15 feet, which is lower than the height of the surrounding buildings. The Proposed Project would not block views from key public viewpoints, such as major roads, parks, or public trails. None of the public views of the San Bernardino Mountains, San Timoteo Nature Sanctuary, or surrounding community parks would be hindered by the Project site due to the distance from and the height of these scenic vistas. Therefore, impacts would be less than significant.

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

**Less than Significant Impact.** The Project site is located on disturbed land as a result of the existing reservoir infrastructure and adjacent industrial land uses. According to the California Department of Transportation (Caltrans) Scenic Highway System, Route 38 is listed as an eligible scenic highway (Caltrans 2023). Route 38, located approximately 2.33 miles southeast, is not visible from the Project site. The Proposed Project is not located within a state scenic highway, and there are no historic buildings or rock outcroppings within the Proposed Project vicinity. Impacts would be less than significant.

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

**Less than Significant Impact.** The Project Site is currently a vacant and visibly disturbed lot on the property of an existing water reservoir. Aerial images from Google Earth Pro indicate signs of disturbance on the Project site: tire marks, grey-colored ground, and a possibly graded, flat surface. While the Proposed Project would alter the site's existing visual character through the addition of a 15-foot-high recycled water reservoir and pump station, this change would not substantially degrade public views. The site is situated in a predominantly commercial and industrial area, where large-scale infrastructure is common and consistent with the visual context. The proposed facilities would be similar in scale and appearance to nearby structures, ensuring compatibility with the surrounding built environment. Therefore, impacts 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?*

**Less than Significant Impact.** Existing light sources within the Project vicinity include lights from vehicles along adjacent roadways and outdoor lighting from adjacent industrial land uses. Night lighting is present for security purposes on the existing WWTP site. Besides light spillover from existing structures and vehicle lights, no other lighting is currently located within the Project site. During construction, the Proposed Project would generate light and glare from the presence and operation of vehicles and equipment. Construction would be scheduled between the hours of 7:00 a.m. to 6:00 p.m. Monday through Friday. No construction work will occur on weekends or City observed holidays per Chapter 8.06, *Community Noise Control*, of the City's Municipal Code. Once constructed, any security lighting will be designed per the City's Lighting Development Standards, Section 18.156.750 of the Municipal Code. The proposed tanks would be coated with antiglare coating and would blend in with the existing surroundings; therefore, any impacts associated with light and glare would be less than significant.

**4.2 AGRICULTURE & FORESTRY RESOURCES**

2.	<b>AGRICULTURE &amp; FOREST RESOURCES.</b> <b>In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state’s inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:</b>	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b)	Conflict with existing zoning for agricultural use, or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(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))?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(d)	Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(e)	Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use or the conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**4.2.1 Impact Analysis**

a) *Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?*

**Less than Significant Impact.** The Farmland Mapping and Monitoring Program (FMMP), administered by the California Department of Conservation (DOC), produces maps and statistical data to analyze impacts on California’s agricultural resources. Agricultural land is rated according to soil quality and irrigation status. The Proposed Project site is categorized as Urban and Built-Up land, which is land occupied by structures with a building density of at least 1 unit to 1.5 acres (DOC 2022). There is a Citrus Grove that is categorized as Prime Farmland, approximately 85 feet from the western boundary of the Project site. However, the Proposed Project would not encroach onto the Citrus Grove boundaries. Given that the Project site is not within Prime Farmland, Unique Farmland, or Farmland

of Statewide Importance, there will not be a conversion of uses. Impacts would be less than significant.

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

**No Impact.** The Project site is zoned as EV/PI and is designated under the General Plan Land Use Map as Public/Institutional. None of the Project’s parcels are in a Williamson Act contract or conflict with any existing zoning for agricultural use (City 2017). No impact would occur.

c) *Would the project 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 has minimal existing vegetation and is located on a vacant plot. All existing trees on-site will be protected in place under the Proposed Project. The site is not currently zoned for forest land or timberland; the Proposed Project would therefore not conflict with existing zoning of forest land or timberland (DOC 2022). No impact would occur.

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

**No Impact.** See discussion in sections b) and c), above. The Project site is zoned as EV/PI and is not located within forest land or timberland (DOC 2022). All existing trees on-site will be protected in place under the Proposed Project. No forest land would be lost or converted to non-forest uses with the implementation of the Proposed Project. No impact would occur.

e) *Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use or the conversion of forest land to non-forest use?*

**Less than Significant Impact.** The Proposed Project site contains one existing water tank and is adjacent to City-Owned Citrus Groves to the west, the Santa Ana River/open space to the north, a vacant parcel to the east, and undeveloped, commercial/industrial lands, and businesses to the south and west. While City-Owned Citrus Groves located on Prime Farmland are adjacent to the Project site, the Proposed Project will not encroach on the Citrus Grove boundaries, thus will not result in conversion of farmland to nonagricultural use or forest land to non-forest use. The Project site itself is not designated as farmland or forest land, nor does it contain such resources. Therefore, impacts would be less than significant.

### 4.3 AIR QUALITY

3.	<b>AIR QUALITY.</b> <b>Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:</b>	<b>Potentially Significant Impact</b>	<b>Less than Significant With Mitigation Incorporated</b>	<b>Less Than Significant Impact</b>	<b>No Impact</b>
(a)	Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

3.	<b>AIR QUALITY.</b> <b>Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:</b>	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(c)	Expose sensitive receptors to substantial pollutant concentrations?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(d)	Result in other emissions, such as those leading to odors adversely affecting a substantial number of people?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

#### 4.3.1 Impact Analysis

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

**Less than Significant Impact.** An Air Quality, Greenhouse Gas Emissions and Energy Technical Memorandum (Air Report) was prepared for the Proposed Project by Vista Environmental in March 2025. The full report and models are provided in Appendix A.

The Proposed Project would not conflict with or obstruct implementation of the SCAQMD Air Quality Management Plan (AQMP). The following section discusses the Proposed Project’s consistency with the SCAQMD AQMP.

##### **SCAQMD Air Quality Management Plan**

The CEQA requires a discussion of any inconsistencies between a Proposed Project and applicable general plans and regional plans (CEQA Guidelines Section 15125). The regional plan that applies to the Proposed Project includes the SCAQMD AQMP. Therefore, this section discusses any potential inconsistencies of the Proposed Project with the AQMP.

The purpose of this discussion is to set forth the issues regarding consistency with the assumptions and objectives of the AQMP and discuss whether the Proposed Project would interfere with the region’s ability to comply with Federal and State air quality standards. If the decision-makers determine that a Proposed Project is inconsistent, the lead agency may consider Project modifications or the inclusion of mitigation to eliminate the inconsistency.

The SCAQMD CEQA Handbook states that "New or amended GP Elements (including land use zoning and density amendments), Specific Plans, and significant projects must be analyzed for consistency with the AQMP." Strict consistency with all aspects of the plan is usually not required. A proposed project should be considered to be consistent with the AQMP if it furthers one or more policies and does not obstruct other policies. The SCAQMD CEQA Handbook identifies two key indicators of consistency:

- (1) Whether the project will result in an increase in the frequency or severity of existing air quality violations, or cause or contribute to new violations, or delay the timely attainment of air quality standards or the interim emission reductions specified in the AQMP.
- (2) Whether the project will exceed the assumptions in the AQMP or increments based on the year of project buildout and phase.

Both of these criteria are evaluated in the following sections.

**Criterion 1 - Increase in the Frequency or Severity of Violations?**

Based on the air quality modeling analysis contained in Appendix A, short-term regional construction air emissions would not result in significant impacts based on SCAQMD regional thresholds of significance and local thresholds of significance. The ongoing operation of the Proposed Project would generate air pollutant emissions that are inconsequential on a regional basis and would not result in significant impacts based on SCAQMD thresholds of significance. The analysis for long-term local air quality impacts indicates that local pollutant concentrations would not exceed the air quality standards (Table 4-2).

Therefore, based on the information provided above, the Proposed Project would be consistent with the first criterion. A less than significant long-term impact would occur, and no mitigation would be required.

**Criterion 2 - Exceed Assumptions in the AQMP?**

Consistency with the AQMP assumptions is determined by performing an analysis of the Proposed Project in relation to the assumptions used in the AQMP. The emphasis of this criterion is to ensure that the analyses conducted for the Proposed Project are based on the same forecasts as the AQMP. The AQMP is developed using planning forecasts provided in the Connect SoCal and the 2019 Federal Transportation Improvement Program (FTIP). Connect SoCal serves as a major planning document for the regional transportation and land use network within Southern California. It is a federally and state-mandated long-range plan prepared by the Southern California Association of Governments (SCAG) and is updated every four years. The 2019 FTIP provides long-range planning for future transportation improvement projects that are constructed with state and/or federal funds within Southern California. Local governments are required to use these plans as the basis for their planning efforts to ensure consistency with applicable regional plans under CEQA. For this Project, the City's General Plan Land Use Plan defines the assumptions that are represented in AQMP.

The Project site is currently designated as EV/PI in the General Plan. The proposed reservoir and pump stations are an allowed use within this land use designation and would not require a General Plan Amendment. As such, the Proposed Project is not anticipated to exceed the AQMP assumptions for the Project site and is found to be consistent with the AQMP for the second criterion.

Based on the above discussion, the Proposed Project will not result in an inconsistency with the SCAQMD AQMP. Therefore, a less than significant impact will occur in relation to the implementation of the AQMP.

- b) *Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?*

**Less than Significant Impact.** The Proposed Project would not 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.

The analysis below assumes that individual projects that do not generate operational or construction emissions that exceed the SCAQMD's recommended daily thresholds for project-specific impacts would also not cause a cumulatively considerable increase in emissions for those pollutants for which the South Coast Air Basin (Basin) is in nonattainment, and, therefore, would not be considered to have a significant adverse air quality impact. Alternatively, individual project-related construction and operational emissions that exceed SCAQMD thresholds for project-specific impacts would be

considered cumulatively considerable. The following section calculates the potential air emissions associated with the construction and operations of the Proposed Project and compares the emissions to the SCAQMD standards.

**Construction-Related Emissions**

The construction activities for the Proposed Project are anticipated to include site preparation and grading of up to 2.4 acres, building construction of the proposed reservoir and pump station, paving of the access road, and application of architectural coatings. The CalEEMod model has been utilized to calculate the construction-related emissions from the Proposed Project, and the input parameters utilized in this analysis have been detailed in Section 7.1 of the Air Report (Appendix A). The maximum daily construction-related criteria pollutant emissions from the Proposed Project are shown below in Table 4-1.

**Table 4-1. Construction-Related Criteria Pollutant Emissions**

Season and Year of Construction	Maximum Daily Pollutant Emissions					
	VOC	NOx	CO	SO2	PM10	PM2.5
Winter 2026	1.47	12.9	14.6	0.03	2.55	1.45
Summer 2026	1.20	10.2	12.2	0.02	0.45	0.36
Winter 2027	12.9	5.80	8.96	0.01	0.43	0.26
<b>Maximum Daily Construction Emissions</b>	<b>12.9</b>	<b>12.9</b>	<b>14.6</b>	<b>0.03</b>	<b>2.55</b>	<b>1.45</b>
SCQAMD Regional Thresholds	75	100	550	150	150	55
SCAQMD Local Thresholds	--	684	23,304	--	205	104
<b>Exceeds Thresholds?</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

Source: CalEEMod Version 2022.1.

Notes:<sup>1</sup> The nearest sensitive receptor is Packinghouse Christian Academy, located as near as 4,100 feet (1,250 meters) south of the project site. As such, the 500-meter threshold (largest threshold available) was utilized. Calculated from SCAQMD’s Mass Rate Look-up Tables for two acres in Air Monitoring Area 34, San Bernardino Valley.

Table 4-1 shows that none of the analyzed criteria pollutants would exceed either the regional or local emissions thresholds during construction of the Proposed Project. Therefore, a less than significant regional or local air quality impact would occur from the construction of the Proposed Project.

**Long-Term Operational Air Quality Impacts**

The Proposed Project would consist of the operation of the proposed recycled water reservoir and pump station. The Proposed Project would generate air emissions from area sources and energy usage. The operations-related criteria air quality impacts created by the Proposed Project have been analyzed through the use of the CalEEMod model. The worst-case summer or winter volatile organic compounds (VOC), nitrogen oxide (NOx), carbon monoxide (CO), sulfur dioxide (SO2), particulate matter with an aerodynamic diameter less than 10 microns (PM10), and particulate matter with an aerodynamic diameter less than 2.5 microns (PM2.5) daily emissions created from the Proposed Project’s long-term operations are summarized below in Table 4-2, and the CalEEMod emissions printouts are in Appendix A.

**Table 4-2. Operations-Related Criteria Pollutant Emissions**

Emissions Source	Pollutant Emissions(pounds/day)					
	ROG	NOx	CO	SO2	PM10	PM2.5
Mobile Sources <sup>1</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Area Sources <sup>2</sup>	0.42	<0.01	<0.01	<0.01	<0.01	<0.01
Energy Usage <sup>3</sup>	<0/01	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Total Operational Emissions</b>	0.42	<0.01	<0.01	<0.01	<0.01	<0.01
SCQAMD Regional Thresholds	55	55	530	150	150	55
SCAQMD Local Thresholds	--	684	23,304	--	205	104
<b>Exceeds Thresholds?</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

Source: CalEEMod Version 2022.1.

**Notes:**

<sup>1</sup> Mobile sources consist of emissions from vehicles and road dust. As detailed above, the operation of the project would not generate any new trips.

<sup>2</sup> Area sources consist of emissions from consumer products, architectural coatings, and landscaping equipment.

<sup>3</sup> Energy usage consists of emissions from natural gas usage. The project would not include any appliances that use natural gas.

<sup>4</sup> The nearest sensitive receptor is Packinghouse Christian Academy, located as near as 4,100 feet (1,250 meters) south of the project site. As such, the 500-meter threshold (the largest threshold available)

The data provided in Table 4-2 above shows that none of the analyzed criteria pollutants would exceed either the regional or local emissions thresholds during operation of the Proposed Project. In general, the operation of the new reservoir tank and pump station will be passive, as there will be no equipment installed on the reservoir tank that creates air emissions. The existing water tank will continue to function while the new reservoir tank is constructed. Currently, maintenance on the existing water tank occurs on a monthly and as-needed basis by City employees. No change would occur between the maintenance activities for the existing water tank and the proposed reservoir tanks. As such, the operation of the Proposed Project would not create any additional air emissions beyond which is currently being created. Therefore, a less than significant regional or local air quality impact would occur from the operation of the Proposed Project.

c) *Would the project expose sensitive receptors to substantial pollutant concentrations?*

**Less Than Significant Impact.** The Proposed Project would not expose sensitive receptors to substantial pollutant concentrations. The nearest sensitive receptor to the Project site is Packinghouse Christian Academy that is located as near as 4,100 feet (1,250 meters) south of the Project site. As such, the 500-meter (1,640 foot) threshold was utilized in the Air Report. The local concentrations of criteria pollutant and toxic air contaminant emissions that are produced in the nearby vicinity of the Proposed Project, which may expose sensitive receptors to substantial concentrations, have been calculated for both construction and operations, which are discussed separately below.

## **Construction-Related Sensitive Receptor Impacts**

Construction activities may expose sensitive receptors to substantial pollutant concentrations of localized criteria pollutant concentrations and from toxic air contaminant emissions created from on-site construction equipment, which are described below and in Appendix A.

### Local Criteria Pollutant Impacts from Construction

The local air quality impacts from construction of the Proposed Project have been analyzed and found that the construction of the Proposed Project would not exceed the local NO<sub>x</sub>, CO, PM 10, and PM 2.5 thresholds of significance (see Table 4-2). Therefore, construction of the Proposed Project would create a less than significant construction-related impact on local air quality and sensitive receptors, and no mitigation would be required.

### Toxic Air Contaminant Impacts from Construction

The greatest potential for toxic air contaminant emissions would be related to diesel particulate matter (DPM) emissions associated with heavy equipment operations during construction of the Proposed Project. According to SCAQMD methodology, health effects from carcinogenic air toxics are usually described in terms of “individual cancer risk”. “Individual cancer risk” is the likelihood that a person exposed to concentrations of toxic air contaminants over a 70-year lifetime will contract cancer, based on the use of standard risk-assessment methodology. It should be noted that the most current cancer risk assessment methodology recommends analyzing a 30-year exposure period for the nearby sensitive receptors.

Given the relatively limited number of heavy-duty construction equipment, the varying distances that construction equipment would operate to the nearby sensitive receptors, and the short-term construction schedule, the Proposed Project would not result in a long-term (i.e., 30 or 70 years) substantial source of toxic air contaminant emissions and corresponding individual cancer risk. In addition, California Code of Regulations Title 13, Article 4.8, Chapter 9, Section 2449 regulates emissions from off-road diesel equipment in California. This regulation limits the idling of equipment to no more than five minutes, requires equipment operators to label each piece of equipment, and provides annual reports to the California Air Resources Board (CARB) of their fleet’s usage and emissions. This regulation also requires systematic upgrading of the emission Tier level of each fleet, and currently, no commercial operator is allowed to purchase Tier 0, Tier 1, or Tier 2 equipment. In addition to the purchase restrictions, equipment operators need to meet fleet average emissions targets that become more stringent each year between the years 2014 and 2023. By January 2026, 75 percent or more of all contractors’ equipment fleets must be Tier 2 or higher, and by January 2029, 100 percent of all equipment fleets must be Tier 2 or higher. Therefore, no significant short-term DPM impacts would occur during construction of the Proposed Project.

Construction of the Proposed Project would result in a less than significant exposure of sensitive receptors to substantial pollutant concentrations.

## **Operations-Related Sensitive Receptor Impacts**

The Proposed Project would consist of the operation of the proposed recycled water reservoir and pump station. The Proposed Project would generate air emissions from area sources and energy usage. The operations-related criteria air quality impacts created by the Proposed Project have been analyzed through the use of the CalEEMod model. The worst-case summer or winter VOC, NO<sub>x</sub>, CO,

SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> daily emissions created from the Proposed Project's long-term operations are summarized in Table 4-2, and the CalEEMod emissions printouts are in Appendix A.

The data provided in Table 4-2 above shows that none of the analyzed criteria pollutants would exceed either the regional or local emissions thresholds during operation of the Proposed Project. In general, the operation of the new reservoir tank and pump station will be passive, as there will be no equipment installed on the reservoir tanks that create air emissions. The existing water tank will continue to function while the new reservoir tank is constructed. Currently, maintenance on the existing water tank occurs on a monthly and as-needed basis by City employees. No change would occur between the maintenance activities for the existing water tank and proposed reservoir tanks. As such, the operation of the Proposed Project would not create any additional air emissions, beyond which is currently being created. Therefore, the operation of the Proposed Project would result in a less than significant exposure of sensitive receptors to substantial pollutant concentrations.

- d) *Would the project result in other emissions, such as those leading to odors adversely affecting a substantial number of people?*

**Less Than Significant Impact.** The Proposed Project would not create objectionable odors affecting a substantial number of people. Individual responses to odors are highly variable and can result in a variety of effects. Generally, the impact of an odor results from a variety of factors such as frequency, duration, offensiveness, location, and sensory perception. The frequency is a measure of how often an individual is exposed to an odor in an ambient environment. The intensity refers to an individual's or group's perception of the odor strength or concentration. The duration of an odor refers to the elapsed time over which an odor is experienced. The offensiveness of the odor is the subjective rating of the pleasantness or unpleasantness of an odor. The location accounts for the type of area in which a potentially affected person lives, works, or visits; the type of activity in which he or she is engaged; and the sensitivity of the impacted receptor.

Sensory perception has four major components: detectability, intensity, character, and hedonic tone. The detection (or threshold) of an odor is based on a panel of responses to the odor. There are two types of thresholds: the odor detection threshold and the recognition threshold. The detection threshold is the lowest concentration of an odor that will elicit a response in a percentage of the people who live and work in the immediate vicinity of the Project site and is typically presented as the mean (or 50 percent of the population). The recognition threshold is the minimum concentration that is recognized as having a characteristic odor quality and is typically represented by recognition by 50 percent of the population. The intensity refers to the perceived strength of the odor. The odor character is what the substance smells like. The hedonic tone is a judgment of the pleasantness or unpleasantness of the odor. The hedonic tone varies in subjective experience, frequency, odor character, odor intensity, and duration. Potential odor impacts have been analyzed separately for construction and operations below.

#### **Construction-Related Odor Impacts**

Potential sources that may emit odors during construction activities include the application of coatings such as asphalt pavement, paints, solvents, and emissions from diesel equipment. Standard construction requirements that limit the time of day when construction may occur as well as SCAQMD Rule 1108, which limits volatile organic compounds (VOC) content in asphalt, and Rule 1113, which limits the VOC content in paints and solvents, would minimize odor impacts from construction. As such, the objectionable odors that may be produced during the construction process would be temporary and would not likely be noticeable for extended periods of time beyond the Project site's

boundaries. Through compliance with the applicable regulations that reduce odors and due to the transitory nature of construction odors, a less than significant odor impact would occur, and no mitigation would be required.

**Operations-Related Odor Impacts**

The Proposed Project would consist of the development of an enclosed water reservoir tank and pump station. Enclosed reservoir tanks are not a known source of odors. Therefore, a less than significant odor impact would occur from operation of the Proposed Project.

**4.4 BIOLOGICAL RESOURCES**

4.	BIOLOGICAL RESOURCES. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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 Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(e)	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**4.4.1 Impact Analysis**

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

**Less than Significant Impact.** The Project site is located on vacant, disturbed land. Historical aerial images from Google Earth Pro show signs of disturbance on the Project site: trucks and machinery

present, tire marks, grey-colored ground, and a possibly graded, flat surface. There is minimal vegetation on the Project site. The Project site is currently used as a worksite for a water treatment facility.

Based on a review of the California Natural Diversity Data Base (CNDDDB), there have been no special-status species recorded within the Project site. However, approximately 7 special-status species have been recorded within a 1-mile radius of the Project site – all within the Santa Ana River located 0.20 miles north (refer to Figure 3). These species include California glossy snake (*Arizona elegans occidentalis*), burrowing owl (*Athene cunicularia*), coastal California gnatcatcher (*Polioptila californica californica*), northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), San Bernardino kangaroo rat (*Dipodomys merriami parvus*), Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), and western mastiff bat (*Eumops perotis californicus*).

According to the City of Redlands General Plan 2035, the Riversidean Alluvial Fan Sage Scrub habitat, located between the Santa Ana River and the Project site, is designated as a special status habitat due to its limited occurrence or vulnerability (City 2017). Special status species commonly present in this habitat include Slender-horned spineflower (*Dodecahema leptoceras*), Sanctorum Santa Ana River woollystar (*Eriastrum densifolium ssp*), and California gnatcatcher (*Polioptila californica*).

However, the Project site is not directly located on the Riversidean Alluvial Fan Sage Scrub Habitat. Development of a buffer zone will be unnecessary because there is an existing water reservoir development between the Project Site and the special status habitat. The existing vegetation on the Project site is minimal and, due to existing development on the WWTP site, the area is disturbed and unsuitable for supporting special-status species. This is consistent with the CNDDDB review that shows no special status species have been recorded on the Project site.

The Proposed Project will not have substantial adverse effects, 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 (CDFW) or U.S. Fish and Wildlife Service (USFWS). Impacts will be less than significant.

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

**Less than Significant Impact.** The Project site is adjacent to an annual grassland, the Riversidean Alluvial Fan Sage Scrub, and Riparian Habitat to the north and agriculture to the west (City 2017). As previously discussed above, the Project site is not located directly on special status Riversidean Alluvial Fan Sage Scrub. The existing Project Site is heavily disturbed, has minimal vegetation, does not contain suitable habitat, and there is existing development between the Project Site and sensitive habitat. Therefore, the Proposed Project will have no substantial adverse effect on any riparian habitat or other sensitive natural communities; impacts will be less than significant.

- c) *Would the project 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 Impact.** The Project site is located on an existing disturbed vacant lot. There are no state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal,

etc.) within the Project site. Therefore, no direct removal, filling, or alteration of wetland habitat would occur.

The Santa Ana River, located approximately 0.20 miles north from the Project site, was established as a state-protected wetland in 2014 by Senate Bill (SB) 1390 (California 2014). Given the 0.20-mile distance and existing WWTP infrastructure between the Santa Ana River and the Project site, the Proposed Project will not result in direct encroachment, modification, or disturbance to this protected wetland area.

The declining slope between the Project site and the Santa Ana River is 2.82 percent. The Project site sits at a slightly higher elevation, so while drainage patterns may connect to the river, the Project does not involve activities that would alter its hydrology, such as redirecting water flow, increasing runoff, or introducing contaminants.

Per the City's Municipal Code Section 13.54.180, any new construction activity shall use best management practices (BMPs) to prevent the discharge of pollutants to the municipal separate storm water system (MS4) to the maximum extent practicable. Responsible parties must also ensure the proper removal and disposal of potential pollutants (e.g. fuels, waste fuels, and chemicals) from areas exposed to stormwater.

The Proposed Project will comply with all applicable stormwater management regulations, including BMPs to prevent erosion, sediment transport, and water quality degradation. These measures ensure that construction and operation activities will not affect nearby wetland areas. Therefore, impacts will be less than significant.

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

**Less than Significant Impact.** According to the County of San Bernardino (County) General Plan Open Space Element map, the Project Site is near the Santa Ana River wildlife corridor (County 2007a). The City's Critical Habitat and Principal Waters figure in the City's General Plan shows that the Project site is not located within any listed critical habitats (City 2017).

The Project site is a previously disturbed, vacant parcel with minimal vegetation and limited ecological function. Existing WWTP infrastructure lies between the Project site and the Santa Ana River wildlife corridor. As such, the Project site does not serve as a native wildlife nursery site or an active migratory corridor. Furthermore, the Proposed Project involves passive infrastructure – a water storage tank - which will not introduce significant noise, light, or ongoing human activity that could disrupt wildlife movement in the nearby Santa Ana River.

The San Bernardino County Airport, located directly north of the Santa Ana River, produces noise levels that would exceed those occurring during the construction of the Proposed Project. Given the existing noise environment, there will be minimal noise impacts the Proposed Project would have on native wildlife species or migratory wildlife corridors within the Santa Ana River area. There will be no increase in staff for the Proposed Project that would create long-term noise impacts. Operation of the water tanks would be passive and would not create significant noise. Thus, impacts towards native resident species, migratory fish, wildlife species, wildlife corridors, or native wildlife nursery sites would be less than significant.

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

**Less than Significant Impact.** The City’s General Plan and Municipal Code outlines various preservation policies and ordinances to protect the City’s biological resources. Policies 6-P.7 through 6-P.10 and 6-A.11 through 6-A.16 in the General Plan provide guiding principles and actions for the City’s protection of biological resources, including habitat preservation, buffer zone requirements, and managing activities within the Santa Ana River Wash and Upper Santa Ana River Land Management Habitat Conservation Plan (City 2017).

Chapter 12.52 of the City’s Municipal Code establishes tree protection policies within the City, including preservation of mature and healthy public trees, designation of native and specimen trees, and tree maintenance.

The Project site is a previously disturbed, vacant parcel, with minimal vegetation and limited ecological function. The existing water tank between the Proposed Project and the Santa Ana River would effectively serve as a buffer between Project activities and biological resources contained in the Santa Ana River. All trees on the Project site will be protected in place, and there is no proposed tree removal for the Project. Additionally, the Project boundaries do not encroach onto the adjacent Citrus Groves. Therefore, the Proposed Project will not conflict with any local policies or ordinances protecting biological resources; impacts would be less than significant.

- f) *Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservancy Conservation Plan, or other approved local, regional, or state habitat conservation plan?*

**Less than Significant Impact.** The City’s General Plan policy 6-A.21 ensures that future activities in the Santa Ana River Wash are consistent with the habitat conservation policies of the Upper Santa Ana River Land Management Habitat Conservation Plan (Wash Plan) (City 2017). The Project site is located approximately 0.45 miles south of the Wash Plan’s boundary (USFW 2019). The Project site is located outside of the established Wash Plan boundary, with existing WWTP development in between, and is located on a disturbed vacant lot; therefore, impacts will be less than significant.

#### 4.5 CULTURAL RESOURCES

5.	CULTURAL RESOURCES. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b)	Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c)	Disturb any human remains, including those interred outside of formal cemeteries?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### 4.5.1 Impact Analysis

- a) *Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?*

**Less than Significant Impact.** The City of Redlands is renowned for its well-preserved historical character, reflecting its development during the late 19th and early 20th centuries. Founded in the 1880s and incorporated in 1888, Redlands became known for its mature street trees, citrus groves, and detailed historic buildings, many of which still exist today. The City features several designated historic districts and landmarks, including the Smiley Park Historic District, the Redlands Bowl, the A.K. Smiley Public Library, and various Mission Revival and Victorian-era homes. Redlands' commitment to historic preservation is reflected in its Historic and Scenic Preservation Element of the General Plan, and its local Historic and Scenic Preservation Commission oversees the identification and protection of historic resources. Numerous properties in the city are listed as a City of Redlands Historic Resource, on the National Register of Historic Places (NRHP), or are eligible for listing under California Register of Historic Resources (CRHR) due to their architectural style, historical associations, or contribution to the city's cultural heritage (City 2017).

To confirm the Project site does not contain historic resources, on February 12, 2025, Chamber's Group submitted a California Historical Resources Information System (CHRIS) Data Request for historic resources within a ½ mile radius of the Project site. On April 14, 2025, the search results were received from the South Central Coastal Information Center (SCCIC) and indicated the lack of historical resources on the Project site, as discussed below.

The CHRIS search results indicate that while there is potential for the WWTP to be listed under the NRHP and CRHR, there are several criteria the site does not meet for eligibility in the NRHP, CRHR, or a City of Redlands Historic Resource defined in City Municipal Code Section 2.24.020. To summarize, the following lists the reasons from the CHRIS search results on why the Project site is ineligible for listing as a historic resource:

- **Lack of Historical Significance:** The site is currently composed of historic-age and modern buildings, structures, and infrastructure that are not associated with any significant historical events or individuals (NRHP/CRHR Criteria A and B; City Criteria A–C).
- **No Distinctive Architecture or Engineering:** While the facility retains many of its original features from 1962 and 1972, it does not exhibit unique or innovative architectural or engineering qualities, nor is it the work of a master designer. The site has undergone several upgrades in 1987, 1989, 2003, 2006, and 2022 (NRHP/CRHR Criterion C; City Criteria D–F, H).
- **Not a Unique Example:** The WWTP design and function are typical of mid-20th century wastewater treatment facilities nationwide. Its features and construction techniques are common, industrial, and utilitarian (NRHP/CRHR Criterion C; City Criteria H, I).
- **Lacks Research Value:** The site and its few pre-existing features (like the orchard remnants and refuse deposit) do not offer significant information potential due to disturbance and lack of uniqueness (NRHP/CRHR Criterion D).
- **No Local Landmark Qualities:** The WWTP is obscured from public view and does not serve as a familiar or visually significant community feature (City Criterion G), nor does it enhance the city's historic or scenic character (City Criteria J, K).

The lack of historic resources on the Project site and its vicinity suggests that the Proposed Project would not result in a significant impact on a historical resource of architectural significance. Additionally, the existing water tank will not be affected by the Proposed Project. Impacts would be less than significant.

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

**Less than Significant Impact With Mitigation Incorporated.** The Redlands area has a rich cultural history, with evidence of long-term occupation by the Serrano and Gabrielino (Tongva) peoples. Paleontological resources, including fossils, have been found in the Redlands area, and there is potential for archaeological and paleontological finds to occur in remaining, unexcavated open space areas within the City. Areas near springs and streams (such as San Timoteo Canyon Creek, Yucaipa Creek in Live Oak Canyon), tributaries and their canyons, and adjacent to larger water bodies (such as the bluffs, terraces, and hillsides above the Santa Ana River and Mill Creek) are considered particularly sensitive for archaeological resources (City 2017).

The CHRIS Data Request search results that Chambers Group received from the SCCIC on April 14, 2025, indicate there is one potential archaeological resource within the Project site boundary. "Feature 38," from an Archaeological Site Record in the CHRIS data system, is the remnant of a concrete pad and steel base for a wind machine – likely used for agricultural activities in the mid-20<sup>th</sup> Century. This pad has been moved from its original location, which was on the terrace above the WWTP to the east. It is a square-shaped concrete pad, measuring 5 x 5 feet and 4 inches thick. It has a large steel base for a wind machine; it is assumed the pad was used in an orchard for a wind machine. Inscribed into the concrete are the words "Armstrong Ranch/circle 4/1958." The pad has been partially demolished. According to the Archaeological Site Record, Feature 38 is heavily disturbed, not unique for the time period, and cannot provide important information about the history of the area. This feature will also not be disturbed during the construction and operation of the Proposed Project.

Other than Feature 38, there are no other historic or prehistoric resources recorded within the Project boundary. The soils that compose the terrace above the river in the southern portion of the WWTP property (including the Project site) may have buried sites, but the property has had heavy disturbances from the construction and expansion of the WWTP over time, and intact subsurface archaeological deposits are not expected to exist; however, this does not preclude the possibility of undisturbed subsurface deposits. The City's General Plan identifies the bluffs, terraces, and hillsides above the Santa Ana River as archaeologically sensitive areas (City 2017). Extensive excavation and grading during construction could result in the unanticipated discovery of archaeological resources.

Furthermore, based on Tribal Consultation discussed in Section 4.18, in the event that the unanticipated discovery of archaeological resources, the Yuhaaviatam of San Manuel Nation Cultural Resources Department (YSMN) requested language to be incorporated into the Cultural Resources Mitigation Measures.

Therefore, the following mitigation measures shall be implemented to ensure that potential impacts to cultural and archaeological resources would result in less than significant impacts.

**MM CUL-1** The City shall retain the services of a Qualified Archaeologist, meeting the Secretary of the Interior Standards, or County requirements, whichever is the greater. The Qualified Archaeologist shall remain on-call throughout the Project.

Upon approval or request by the City, a cultural resources mitigation plan (CRMP) outlining procedures for cultural resources monitoring, mitigation, treatment, and data recovery of any unanticipated discovery shall be prepared for the Project and submitted to the City for review and approval. The development and implementation of the CRMP shall include consultations with the City, as well as a requirement that the curation of any significant cultural resources recovered under any scenario shall be through an appropriate repository agreed upon by the City. If the City accepts ownership, the curation location may be revised.

If significant pre-contact cultural resources, as defined by CEQA, are discovered and avoidance cannot be ensured, the drafts of the CRMP shall be provided to YSMN for review and comment. The archaeologist shall monitor the remainder of the Project and implement the CRMP accordingly.

**MM CUL-2**

In the event of the discovery of previously unidentified and/or potential cultural Resources during Project activities, the City, and/or its Contractor, shall immediately cease all work activities within an area of not less than 60 feet of the discovery. The City or its Contractor shall immediately contact the City and the City-retained on-call Qualified Archaeologist, who must meet the Secretary of the Interior Standards. Except in the case of cultural items that fall within the scope of the California Health and Safety Code 7050.5, CEQA Section 15064.5, or California PRC Section 5097.98, the discovery of any cultural resource within the Project site shall not be grounds for a project-wide “stop work” notice or otherwise interfere with the Project’s continuation except as outlined in this mitigation measure.

In the event of an unanticipated discovery of cultural resources during construction, the City-retained Qualified Archaeologist, who must meet the Secretary of the Interior standards, shall be contacted to evaluate the significance of the materials prior to resuming any construction-related activities in the vicinity of the find. If a CRMP is prepared for the Project, the protocols for the mitigation or treatment of cultural resources will be implemented. If the Qualified Archaeologist determines that the discovery constitutes a significant resource under CEQA and it cannot be avoided, the City shall implement an archaeological data recovery program.

Additionally, any consulting Native American Tribal groups that requested notification of any unanticipated discovery of cultural resources on the Project shall be notified and included in subsequent consultation appropriately. Specifically, the YSMN shall be contacted regarding any pre-contact finds and provided information after the archaeologist makes his/her initial assessment of the nature of the find, to provide Tribal input with regards to significance and treatment.

**MM-CUL-3**

If cultural resources are encountered during the Project, the Qualified Archaeologist shall prepare a report summarizing any and all prehistoric or historic archaeological finds as well as providing follow-up reports of any finds to the SCCIC, as required.

c) *Would the project disturb any human remains, including those interred outside of formal cemeteries?*

**Less than Significant Impact with Mitigation Incorporated.** The Project site is vacant and undeveloped. As previously discussed, no cultural resources were recorded within the Project site. The Project area is not otherwise known to be a previous cemetery or burial site. Given the potential for buried cultural resources based on the Project site’s proximity to the Santa Ana River, encountering human remains during Project construction is possible.

In the event that human remains are discovered during ground-disturbing activities, then the Proposed Project would be subject to California Health and Safety Code 7050.5, CEQA Section 15064.5, and California Public Resources Code Section 5097.98. If human remains are found during ground-disturbing activities, State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to PRC Section 5097.98. In the event of an unanticipated discovery of human remains, the County Coroner shall be notified immediately. If the human remains are determined to be prehistoric, the County Coroner shall notify the National American Heritage Commission (NAHC), which shall notify a most likely descendant (MLD). The MLD shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

Based on Tribal Consultation discussed in Section 4.18, in the event that the unanticipated discovery of human remains, the YSMN requested language to be incorporated into the Cultural Resources Mitigation Measures.

Therefore, the Proposed Project would result in less than significant impacts with mitigation incorporated.

**MM-CUL-4** If human remains or funerary objects are encountered during any activities associated with the project, work in the immediate vicinity (within a 100-foot buffer of the find) shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code §7050.5 and that code enforced for the duration of the project.

**4.6 ENERGY**

6.	ENERGY Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b)	Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

#### 4.6.1 Impact Analysis

- a) *Would the project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?*

**Less than Significant Impacts.** The analysis for the Proposed Project's energy usage for both construction and operations are provided below.

##### **Construction Impacts**

Construction activities would require energy for the manufacture and transportation of building materials, the preparation of the site (e.g., site clearing and grading), and the actual construction of the reservoir and pump station. Petroleum-based fuels such as diesel fuel and gasoline would be the primary sources of energy for these tasks.

The off-road construction equipment diesel fuel usage was calculated through the use of the off-road equipment assumptions provided in the CalEEMod output files and CARB's off-road equipment fuel use assumptions. The off-road equipment diesel fuel calculations are in the Air Report, which found that off-road equipment would consume 23,935 gallons of diesel fuel (Appendix A).

Fuel use associated with construction vehicle trips generated by the Proposed Project was also estimated. Such trips include construction worker trips, haul truck trips for material transport, and vendor trips for construction material deliveries. Fuel use from these vehicles traveling to the Project site was based on (1) the projected number of trips the Proposed Project would generate during construction (obtained from the CalEEMod output file attached to Appendix A, (2) average trip distances by trip type, and (3) average miles per gallon rates estimated in the ARB Emission Factors (EMFAC) mobile source emission model attached to Appendix A, which found on-road construction-related vehicle trips would consume 1,019 gallons of gasoline and 675 gallons of diesel fuel during construction of the Proposed Project.

Construction activities associated with the Project would be required to adhere to all State and SCAQMD regulations for off-road equipment and on-road trucks, which provide minimum fuel efficiency standards. As such, construction activities for the Proposed Project would not result in the wasteful, inefficient, and unnecessary consumption of energy resources. Impacts regarding transportation energy would be less than significant.

During construction, the Proposed Project would consume electricity to construct the new reservoir and pump station. Electricity would be supplied to the Project site by Southern California Edison and would be obtained from the existing electrical lines in the vicinity of the Project site. The use of electricity from existing power lines, rather than temporary diesel or gasoline powered generators, would minimize impacts on energy use. Electricity consumed during Project construction would vary throughout the construction period based on the construction activities being performed. Various construction activities include electricity associated with the conveyance of water that would be used during Project construction for dust control (supply and conveyance) and electricity to power any necessary lighting during construction, electronic equipment, or other construction activities necessitating electrical power. Such electricity demand would be temporary, nominal, and would cease upon the completion of construction. Overall, construction activities associated with the Proposed Project would require limited electricity consumption that would not be expected to have

an adverse impact on available electricity supplies and infrastructure. Therefore, the use of electricity during Project construction would not be wasteful, inefficient, or unnecessary.

**Operational Impacts**

The ongoing operation of the Proposed Project would require the use of electricity for running the pumps and control systems. Energy would also be consumed during operations related to water usage (for landscape irrigation), solid waste disposal, and landscape equipment. Since regular maintenance will be completed by existing City employees who currently work at the WWTP, no new trips would be generated for maintenance of the Project. As such, no natural gas will be consumed and no increase in petroleum fuel will occur from operation of the Proposed Project. Operational energy use will be limited to electricity consumption.

The CalEEMod model calculated that operation of the Proposed Project would consume 6,500 kilowatt-hours per year of electricity. This equates to 0.00004 percent of the electricity consumed annually in the County. As such, the operation-related electricity use would be nominal when compared to current electricity usage rates in the County.

It should be noted that the Proposed Project would incorporate photovoltaic (PV) solar panels to reduce electricity usage. Therefore, it is anticipated that the Proposed Project will be designed and built to minimize electricity use and that existing, planned electricity capacity and electricity supplies would be sufficient to support the Proposed Project’s electricity demand. Thus, the Project would not result in the wasteful or inefficient use of electricity, and no mitigation measures would be required.

b) *Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?*

**Less than Significant Impact.** The Proposed Project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency. The applicable energy plan for the Proposed Project is the City of Redlands General Plan 2035, adopted December 5, 2017, that includes Section 8.1 *Energy Efficiency and Conservation*. The Proposed Project consists of the development of a reservoir for recycled water and an associated pump station for conveyance of the recycled water, which will reduce the amount of water that will need to be imported to the City and promote conservation of water through reusing wastewater. Therefore, the Proposed Project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency. Impacts would be less than significant.

**4.7 GEOLOGY AND SOILS**

7.	GEOLOGY AND SOILS. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				

7.	GEOLOGY AND SOILS. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
	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.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b)	Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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 on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(d)	Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(f)	Directly or indirectly destroy a unique paleontological resource or site, or unique geologic feature?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### 4.7.1 Impact Analysis

a) *Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:*

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

**Less Than Significant Impact.** The Proposed Project site is in Southern California, which is a seismically active area. As such, many areas in Southern California could be subject to some seismic activity. Within the Project area, there are no currently known active surface faults that traverse or trend toward this site, and the Project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone, or a fault zone delineated by the County or City. The closest fault is the San Jacinto Fault, located approximately 3 miles west of the Project site. The Geotechnical Investigation Report confirms that the Proposed Project is not located within a currently mapped State of California Earthquake Fault Zone (Appendix B).

The Proposed Project will be designed and constructed to comply with the California Building Code's standards to protect life safety and prevent collapse, and will implement the appropriate

seismic design parameters as defined by the California Geological Survey. Because the Project site is not located within the Alquist-Priolo Earthquake Fault Zone and does not propose construction of buildings that would house residents, impacts would be less than significant.

- ii) *Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?*

**Less than Significant.** As previously discussed, the Southern California region is seismically active, and areas within this region will experience ground shaking. The Geotechnical Investigation Report confirms that the Project site is not located within a currently designated State of California Earthquake or San Bernardino County Fault Zone, thus potential for surface rupture resulting from the movement of a presently unrecognized fault beneath the site is not known with certainty but is considered very low (Appendix B). The Proposed Project will be developed according to the California Building Code, taking into account seismic load criteria. Conformance to building standards would result in less than significant impacts related to ground shaking.

- iii) *Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?*

**Less Than Significant Impact.** Liquefaction is the loss of soil strength due to a buildup of excess porewater pressure during strong and long-duration ground shaking. Liquefaction is associated primarily with loose (low density), saturated, relatively uniform fine-to medium-grained, clean cohesionless soils. As the shaking action of an earthquake progresses, soil granules are rearranged, and the soil densifies within a short period. This rapid densification of soil results in a buildup of pore-water pressure. When the pore-water pressure approaches the total overburden pressure, soil shear strength reduces abruptly and temporarily and behaves similar to a fluid.

According to the County's General Plan, the Project site is located within an area designated for high liquefaction potential (County 2020). However, based on site-specific analysis, which can be found in Appendix C of the Geotechnical Investigation Report, the potential for liquefaction of the Project site is expected to be negligible (Appendix B). Impacts would be less than significant.

- iv) *Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?*

**Less Than Significant Impact.** Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. According to the San Bernadino County General Plan Geologic Hazard Overlays Map EHFH C, the Proposed Project is not located in an area susceptible to landslides (County 2020). Furthermore, the Project site is relatively flat (Google 2025).

The Geotechnical Investigation Report notes that the Project site is not adjacent to any steep slopes. In the absence of significant ground slopes, the potential for seismically induced landslides to affect the proposed site is considered to be low (Appendix B). Landslides due to seismic shaking are unlikely to occur; therefore, impacts would be less than significant.

- b) *Would the project result in substantial soil erosion or the loss of topsoil?*

**Less than Significant Impact.** Topsoil is the top layer of soil that usually holds high concentrations of organic matter, which are typically found in fields and other vegetated areas. Loss of topsoil or any type of soil erosion occurs when dirt is left exposed to physical factors such as strong winds, rain, and

flowing water. The Project site is located on existing disturbed and vacant dirt parcel that is zoned for Public/Institutional uses. Any existing vegetation on the Project site is not used for agricultural uses that would benefit from topsoil. As discussed in Section 4.10, *Hydrology and Water Quality*, the Proposed Project shall implement a Storm Water Pollution Prevention Plan (SWPPP) along with appropriate erosion and sediment control plans, as well as construction and operational BMPs, to prevent substantial soil erosion. Therefore, the Proposed Project would result in less than significant impacts related to substantial erosion or the loss of topsoil.

- c) *Would the project 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 on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?*

**Less Than Significant Impact.** The Proposed Project site is not located within a liquefaction nor a landslide susceptibility area (County 2020). The Project site has an existing water reservoir, and the area has historically been sufficient to support such structures. As previously discussed, construction of the water reservoirs will be done in compliance with building standards and seismic retrofit requirements in addition to City requirements on preparing a conceptual grading plan. Construction activities associated with the Proposed Project would not cause ground disturbance or destabilization of the geologic unit. According to the California Department of Water Resources Water Data Library, the groundwater table is approximately 200 feet from the ground surface in this area, which is well below the depth that would typically contribute to soil instability, liquefaction, or subsidence concerns (DWR 2025).

Furthermore, a Geotechnical Investigation Report was completed for the Proposed Project. According to this report, no groundwater was encountered in the borings up to an explored depth of 61.5 feet below ground surface (bgs) (Appendix B). The report also notes that due to the absence of shallow groundwater and lack of liquefaction potential, the risk for lateral spreading to affect the site is considered low. The Proposed Project will be constructed on a flat surface. Potential for the Proposed Project to result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse is less than significant.

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

**Less than Significant Impact.** Expansive soils (shrink-swell) are fine-grained clay soils generally found in historical floodplains and lakes. Expansive soils are subject to swelling and shrinkage in relation to the amount of moisture present in the soil. The entire Project Site is located on Hanford sandy loam with 0-2 percent slopes (USDA 2023). This particular soil type consists of deep, well-drained soils, thus it is not considered an expansive soil. Furthermore, the Geotechnical Investigation Report confirmed that the soils underlying the proposed water reservoir have very low expansion potential (Appendix B). Impacts would be less than significant.

- e) *Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?*

**No Impact.** The Proposed Project would include the construction of a recycled water reservoir and pump station. No habitable structures that require the use of septic tanks or alternative wastewater disposal systems would be built as a result of the Proposed Project. No impact would occur.

- f) *Would the project directly or indirectly destroy a unique paleontological resource or site, or unique geologic feature?*

**Less than Significant Impact With Mitigation Incorporated.** The Redlands area has a rich cultural history, with evidence of long-term occupation by the Serrano and Gabrielino (Tongva) peoples. Paleontological resources, including fossils, have been found in the Redlands area, and there is potential for archaeological and paleontological finds to occur in remaining, unexcavated open space areas within the City. Areas near springs and streams (such as San Timoteo Canyon Creek, Yucaipa Creek in Live Oak Canyon), tributaries and their canyons, and adjacent to larger water bodies (such as the bluffs, terraces, and hillsides above the Santa Ana River and Mill Creek) are considered particularly sensitive for archaeological resources (City 2017).

On February 12, 2025, Chambers Group requested a Paleontology Record Search from the Western Science Center (WSC). On March 27, 2025, the results were received and indicated that there are no fossil localities within the Project area or a 1-mile radius. However, the report stated that the soils mapped within the Project site (Quaternary alluvial units) are considered to be fossiliferous and highly paleontologically sensitive. The City's General Plan requires that if the potential for fossil discovery is moderate to high, project applicants are required to provide a paleontological monitor during rough grading of the project. Thus, due to the potential sensitivity of the Project site for paleontological resources, the following mitigation measures shall be implemented to result in a less than significant impact on resources that may be uncovered.

**MM PAL-1:** Prior to issuance of a grading permit, the City shall be required to obtain the services of a Qualified Project Paleontologist to remain on call for the duration of the proposed ground disturbing construction activity. The paleontologist selected must be approved by the City. Upon approval or request by the City, a paleontological mitigation plan (PMP) outlining procedures for paleontological data recovery shall be prepared for the Project and submitted to the City for review and approval. The development and implementation of the PMP shall include consultations with the District's Engineering Geologist, as well as a requirement that the curation of all specimens recovered under any scenario shall be through an appropriate repository agreed upon by the City. If the District accepts ownership, the curation location may be revised. The PMP shall include developing a multilevel ranking system, or Potential Fossil Yield Classification (PFYC), as a tool to demonstrate the potential yield of fossils within a given stratigraphic unit. The PMP shall outline the monitoring and salvage protocols to address paleontological resources encountered during Project-related ground-disturbing activities, as well as the appropriate recording, collection, and processing protocols to appropriately address any resources discovered.

**MM PAL-2:** At the completion of all ground-disturbing activities, the Project Paleontologist shall prepare a final paleontological mitigation report summarizing all monitoring efforts and observations, as performed in line with the PMP, and all paleontological resources encountered, if any, as well as providing follow-up reports of any specific discovery, if necessary.

#### 4.8 GREENHOUSE GAS EMISSIONS

8.	GREENHOUSE GAS EMISSIONS. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b)	Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

##### 4.8.1 Impact Analysis

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

**Less Than Significant Impact.** The Proposed Project would result in the construction and operation of a recycled water reservoir and pump station. The Proposed Project is anticipated to generate greenhouse gas (GHG) emissions from area sources, energy usage, waste disposal, water usage, refrigeration, and construction equipment. The Project’s GHG emissions have been calculated with the CalEEMod model and the results are shown below in Table 4-3.

**Table 4-3. Project-Related Greenhouse Gas Annual Emissions**

Category	Greenhouse Gas Emissions (Metric Tons per Year)			
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
Mobile Sources <sup>1</sup>	<0.01	<0.01	<0.01	<b>&lt;0.01</b>
Area Sources <sup>2</sup>	0.27	<0.01	<0.01	<b>0.28</b>
Energy Usage <sup>3</sup>	1.57	<0.01	<0.01	<b>1.57</b>
Water and Wastewater <sup>4</sup>	4.97	<0.01	<0.01	<b>0.22</b>
Solid Waste <sup>5</sup>	<0.01	<0.01	<0.01	<b>&lt;0.01</b>
Construction <sup>6</sup>	8.42	<0.01	<0.01	<b>8.45</b>
<b>Proposed Project Total GHG Emissions</b>	<b>10.48</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>10.52</b>
<b>SCAQMD Draft Threshold</b>				<b>3,000</b>
<b>Exceed Threshold?</b>				<b>No</b>

Category	Greenhouse Gas Emissions (Metric Tons per Year)			
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e

Source: CalEEMod Version 2022.1.

**Notes:**

- <sup>1</sup> Mobile sources consist of GHG emissions from vehicles. As detailed above, operation of the project would not generate any new trips.
- <sup>2</sup> Area sources consist of GHG emissions from consumer products, architectural coatings, and landscaping equipment.
- <sup>3</sup> Energy usage consists of GHG emissions from electricity and natural gas usage
- <sup>4</sup> Water includes GHG emissions from electricity used for transport of water and processing of wastewater for landscaping.
- <sup>5</sup> Solid Waste includes the CO<sub>2</sub> and CH<sub>4</sub> emissions created from the solid waste placed in landfills
- <sup>6</sup> Construction emissions amortized over 30 years as recommended in the SCAQMD GHG Working Group on November 19, 2009.

The data provided in Table 4-3 above shows that the Proposed Project would create 10.52 metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e) per year. According to the SCAQMD’s threshold of significance, a cumulative global climate change impact would occur if the GHG emissions created from the ongoing operations would exceed 3,000 MTCO<sub>2</sub>e per year. The Proposed Project GHG emissions are well below this threshold. Therefore, a less than significant generation of greenhouse gas emissions would occur from the development of the Proposed Project.

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

**Less than Significant Impact.** The City of Redlands Climate Action Plan (Redlands CAP) was adopted on December 5, 2017. The Redlands CAP was prepared pursuant to Section 15183.5(b) of the CEQA Guidelines to be utilized as a tiering document for the General Plan as well as future projects within the City that are consistent with the General Plan. The Redlands CAP incorporates the guidelines established in CARB’s 2017 Scoping Plan. The 2017 Scoping Plan was prepared to meet the GHG emissions reduction targets set in Executive Order S-3-15 and SB 32 that recommends local governments to develop plans to reduce GHG emissions to 6 MTCO<sub>2</sub>e per capita per year by the year 2030 and 2 MTCO<sub>2</sub>e per capita per year by the year 2050. Since the Redlands CAP was prepared in coordination with the General Plan that has a horizon year of 2035, the Redlands CAP provides a year 2035 target of 5 MTCO<sub>2</sub>e per capita per year, which was determined through interpolation of the 2030 and 2035 GHG emissions targets, which also aligns with the reduction targets provided in the 2022 Scoping Plan. Since a per capita threshold does not apply to the Proposed Project, the SCAQMD thresholds have been utilized instead.

In order to identify significance criteria under CEQA for development projects, SCAQMD initiated a Working Group, which provided a detailed methodology for evaluating significance under CEQA. At the September 28, 2010, Working Group meeting, the SCAQMD released its most current version of the draft GHG emissions thresholds, which recommends a tiered approach that provides a quantitative annual threshold of 3,000 MTCO<sub>2</sub>e for all land use projects.

**Greenhouse Gas Plan Consistency**

The Proposed Project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing GHG emissions. The applicable plan for the Proposed Project is the Redlands CAP that was prepared pursuant to Section 15183.5(b) of the CEQA Guidelines to be

utilized as a tiering document for the General Plan as well as future projects within the City that are consistent with the General Plan. Since the Proposed Project is consistent with the General Plan, the Proposed Project meets the criteria allowed for use of the Redlands CAP for analysis of the Proposed Project.

In addition, as detailed above, the Proposed Project is anticipated to create 10.52 MTCO<sub>2</sub>e per year, which is well below the SCAQMD threshold of significance of 3,000 MTCO<sub>2</sub>e per year. The SCAQMD developed this threshold in order to meet the State GHG emissions reduction regulations that were based on substantial evidence supporting the use of the recommended thresholds. Therefore, the Proposed Project would not conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases. Impacts would be less than significant.

#### 4.9 HAZARDS AND HAZARDOUS MATERIALS

9.	HAZARDS AND HAZARDOUS MATERIALS. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(c)	Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(e)	For a project located within an airport land use plan or, where such a plan had not been adopted, within 2 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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(f)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(g)	Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

#### 4.9.1 Impact Analysis

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

**Less than Significant Impact.** The Proposed Project does not involve routine transport of large quantities of hazardous materials. As noted by the Department of Toxic Substances Control (DTSC) and Code of Federal Regulations, generators producing hazardous waste exceeding 220 pounds would be considered to be significant quantities (DTSC 2025a). Small quantities of potentially hazardous substances (e.g. petroleum and other chemicals used to operate and maintain equipment) may be utilized and stored on-site. However, none of these materials will be stored at the Project facilities in quantities considered to be a significant hazard.

Construction of the Proposed Project would result in the generation, transport, and use of various waste materials that would require recycling and/or disposal. Some of the waste generated could be classified as hazardous waste/hazardous materials. Hazardous materials typically consist of chemicals that may be toxic, corrosive, flammable, reactive, an irritant, or a strong sensitizer. During construction, the Proposed Project will use potentially hazardous materials from petroleum-based fuels, lubricants, cleaning products, and other similar materials. The quantities of the used chemicals that will be present at the Project site would be limited and temporary.

During ongoing operations of the water tank, potentially hazardous materials such as grease, oils, cleaning products, fuel, and other similar materials will involve routine use, handling, and disposal. However, the listed materials above will not create a significant hazard to the public or the environment because the handling, storage, and disposal of these materials during construction and operations shall be done in compliance with the manufacturer's standards for storage and spill procedures, and existing regulations such as the California Health and Safety Code, Hazardous Materials Transportation Act, and Resource Conservation and Recovery Act.

The Project also proposes the installation of pump stations for the existing chlorine contact tanks and for the new water reservoir. The pump station serves to regulate water flow between storage tanks, thus will not introduce or generate hazardous materials. While routine maintenance may involve minimal amounts of lubricants or cleaning materials, these are managed in compliance with best practices to prevent environmental or hazardous exposure.

Therefore, impacts would be less than significant.

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

**Less than Significant Impact.** According to the DTSC databases, the Project site is not located within a hazardous cleanup site in the Geotracker (SWRCB 2025) and Envirostor database (DTSC 2025b).

As discussed in part a), the Proposed Project will utilize potentially hazardous chemicals during construction and operations. While hazardous materials will be present on-site, the quantities will be limited, and the materials will be handled and stored according to the manufacturer's guidelines and be disposed of according to local, state, and federal guidelines. Any potential spills will be addressed through implementing construction BMPs to minimize the risk of release of polluted runoff. Impacts would be less than significant.

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

**No Impact.** There are no schools within 0.25 miles of the Project site. The nearest school is Packinghouse Christian Academy, located as near as 4,100 feet (0.78 miles) south of the Project site. The distance between the school and the Project site indicates that no impacts would occur.

- d) *Would the project 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?*

**Less than Significant Impact.** Review of the EnviroStor and the GeoTracker database shows that the Project site is not listed in government databases as a hazardous material site (SWRCB 2025; DTSC 2025b). According to the EnviroStor database, the nearest hazardous material site is the California Street Landfill, which is west of the WWTP, across Nevada Street. The groundwater beneath the landfill is impacted by perchlorate, tetrachloroethene (PCE), trichloroethene (TCE), and 1,2-dibromo-3-chloropropane (DBCP). In 2004, the City submitted a report that demonstrated that all groundwater contamination originated from sources other than the landfill. No further action is required. Other EnviroStor sites are located farther (more than 0.5 mile) from the site and would not pose environmental concerns at the site.

Review of the GeoTracker database shows there are no Leaking Underground Storage Tanks (LUST) Cleanup Sites, Permitted Underground Storage Tanks (USTs), DTSC Hazardous Waste Sites, Waste Discharge Requirement (WDR) sites, Cleanup Program Sites, or Military Cleanup Sites within 0.5 mile of the WWTP.

Review of information on underlying groundwater resources identified the presence of contaminant plumes in the Upper Santa Ana River watershed. The Crafton-Redlands plume is located south of the site, and the Norton plume is located west of the site; neither plume underlies the site (SBVWCD 2020). The Project would confine the proposed reservoir and pump stations to the WWTP site and would not require excavation activities that would impact the underlying groundwater. The WWTP would also continue to be operated and maintained in accordance with pertinent hazardous material regulations. Thus, the Project would not create a significant hazard to the public or the environment. Impacts would be considered less than significant.

- e) *For a project located within an airport land use plan or, where such a plan had not been adopted, within 2 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?*

**Less than Significant Impact.** The Project Site is located approximately 0.60 miles from the San Bernadino International Airport southeastern boundary and 2.6 miles to the west from the Redlands Airport. The Project site is not within the boundaries of the designated Area of Special Compatibility Concern for the Redlands Airport but is within the airport influence area for the San Bernardino International Airport; however, no airport land use compatibility plan has been adopted for the San Bernardino International Airport. At the same time, the Proposed Project does not change the land use of the site. The proposed water reservoir would be 15 feet, which is at the same or lower heights as the existing facilities at the WWTP; therefore, the proposed structures would not result in obstructions to navigable air space, as defined in Federal Aviation Regulation (FAR) 77. Impacts would be less than significant.

f) *Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?*

**Less than Significant Impact.** The Proposed Project would be confined to the WWTP site and would not affect emergency response and evacuation at adjacent streets or the surrounding areas. There are no road closures planned for the duration of construction. Ingress and egress to the Project site would be from Nevada Street on Waste Water Road. The proposed construction work would not block the main gate on the WWTP. Therefore, impacts on emergency response or evacuation plans would be less than significant.

g) *Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?*

**Less than Significant Impact.** The California Department of Forestry and Fire Resources (CALFIRE) has prepared Fire Hazard Severity Zone Maps for the State, and the Project site is not in a Very High Fire Hazard Severity Zone (CALFIRE 2023). The nearest Very High Fire Hazard Severity Zone is located approximately 3 miles south from the Project site in an open space area adjacent to the San Timoteo Wash (CALFIRE 2023). While the Project site is not located within a fire hazard zone, the open spaces could create an environment where wildland fires could occur, especially during dry and high wind seasons. The Proposed Project will conform to City guidelines and regulations for new development to minimize fire hazard as outlined in the General Plan (Fire Hazards Policies). These requirements include but are not limited to using appropriate building material and design features, siting and designing development to avoid hazardous locations, incorporate fuel modification and brush clearances, and coordination with the Redlands Fire Department and other fire prevention agencies to review all applications for development. Conformance with these guidelines would result in less than significant impacts.

#### 4.10 HYDROLOGY AND WATER QUALITY

10.	HYDROLOGY AND WATER QUALITY. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b)	Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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;	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flood on- or off-site;	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

10.	HYDROLOGY AND WATER QUALITY. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
	iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	iv) Impede or redirect flood flows?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(d)	In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(e)	Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

#### 4.10.1 Impact Analysis

- a) *Would the project violate any water quality standards or waste discharge requirements, or otherwise substantially degrade surface or ground water quality?*

**Less Than Significant Impact.** Impacts related to water quality would be categorized under short-term construction related impacts and long-term operational impacts. Construction-related activities have the potential to degrade surface and groundwater quality by exposing soils to surface runoff from debris and other materials, including runoff from various construction equipment. Pollutants of concern during typical construction activities include sediments, dry and wet solid wastes, petroleum products, solvents, cleaning agents and other similar chemicals. During ground-disturbing activities, excavated soil would be exposed, thereby creating potential for soil erosion. During a storm event or water spill, these pollutants and soil could be spilled, leaked, or transported as runoff into drainages or downstream waters, and potentially into receiving waters such as the Santa Ana River.

The Proposed Project will construct a new water reservoir tank, and a pump station located on City property to treat and store more water to meet public demands. Construction and operation of the reservoir tanks will result in ground disturbances and introduce impervious surfaces to the Project site. However, only a portion of the City-owned parcel will be paved and the rest will remain undisturbed. There will be approximately 20,000 square feet of ground coverage from the proposed extended driveway and water reservoir. This proposed paved and covered area comprises of 5.9% percent of the Project site. Thus, there is a relatively small area of impervious surface being added to the WWTP that would not pose a significant impact to existing drainage in the area.

The Geotechnical Investigation Report noted that although the Santa Ana River is located approximately 1,000 feet from the Project site, the Project site is situated on top of a river terrace approximately 44 feet higher than the Santa Ana River bottom. Therefore, groundwater is not anticipated to be a factor during the excavation or construction of the 2.75 MG tank (Appendix B).

The purpose of the City of Redlands Storm Water Program is to implement the requirements of the National Pollutant Discharge Elimination System (NPDES) Program, which is federally mandated by the Environmental Protection Agency (EPA) to address water pollution. Since the disturbance area will exceed one acre of soil, the Proposed Project must comply with the requirements of the State Water Resources Control Board (SWRCB) NPDES Permit and Waste Discharge Requirements (Order No. R8-2010-0036) for the San Bernardino County Flood Control District, the County, and its incorporated

cities within the Santa Ana Region. As a result, the Project must implement a SWPPP along with appropriate erosion and sediment control plans, as well as construction and operational BMPs, to prevent runoff from becoming a nuisance to downstream properties and stream channels. Examples of BMPs include, but are not limited to, the use of drip pans, stabilizers, dust control measures, temporary drains, and fences (RWQCB 2010).

The Proposed Project would not violate any water quality standards or waste discharge requirements, nor would it affect surface or groundwater quality. The Proposed Project will implement the requirements of the NPDES program with construction and operational BMPs to minimize polluted runoff. Impacts would be less than significant.

- b) *Would the project 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 Impact.** EPA's Sole Source Aquifer (SSA) Program was established under Section 1424(e) of the Safe Drinking Water Act (SDWA), 44 Federal Register (FR) 52751, as published on September 10, 1979. Since 1977, this program has been used by communities to help prevent contamination of groundwater from federally funded projects. The SSA program allows for EPA environmental review of any project that is financially assisted by federal grants or federal loan guarantees. These projects are evaluated to determine whether they have the potential to contaminate a sole source aquifer. The Project site is not within the area designated by EPA as an SSA. No impact on an SSA would occur with the project.

The Project site is underlain by the Bunker Hill groundwater subbasin of the Upper Santa Ana Valley groundwater basin. This subbasin is part of the San Bernardino Basin Area. According to the most recent Engineering Investigation of the Bunker Hill Basin, the Project site's depth to the groundwater table is between 200-250 ft (SBVWCD 2025).

Construction and operation of the reservoir tanks will result in ground disturbances and introduce impervious surfaces to the Project site. However, only a portion of the City-owned parcel will be paved and the rest will remain undisturbed. There will be approximately 20,000 square feet of ground coverage from the proposed extended driveway and water reservoir. This proposed paved and covered area comprises 5.9 percent of the Project site. Thus, there is a relatively small area of impervious surface being added to the WWTP that would not pose a significant impact to existing drainage in the area.

The Geotechnical Investigation Report noted that although the Santa Ana River is located approximately 1,000 feet from the Project site, The Project site is situated on top of a river terrace approximately 44 feet higher than the Santa Ana River bottom. Therefore, groundwater is not anticipated to be a factor during the excavation or construction of the 2.75 MG tank (Appendix B).

While the Proposed Project's new water reservoir will be partially underground, the Project does not propose groundwater wells or excavation that would extend into the underlying groundwater. The installation of the water tank and extended driveway will introduce impervious surfaces to the area, which would introduce runoff. However, the majority of the City property will allow for continued percolation. Impacts therefore would be less than significant.

c) *Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:*

i) *Result in substantial erosion or siltation on- or off-site;*

**Less than Significant Impact.** The Project site is on an alluvial terrace on the south side of the Santa Ana River and is generally flat. No work within the Santa Ana River is proposed by the Project. Earthen berms along the boundaries of the main facility prevent erosion or siltation into the Santa Ana River. The proposed water reservoir and extended driveway would increase impervious areas on the site and reduce potential erosion. Existing landscaping at the central section of the WWTP prevents slope erosion. Erosion may occur during construction when ground-disturbance and excavation and trenching activities are ongoing, but this would be temporary. Erosion control measures, including a SWPPP and BMPs, would be implemented during construction to minimize the potential for sediment to be picked up and transported offsite or by runoff. Impacts would be less than significant.

ii) *Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?*

**Less than Significant Impact.** The proposed water reservoir and extended driveway would increase impervious areas on the site but would not substantially increase surface runoff rates as surrounding unpaved areas will remain unchanged. The Proposed Project activities will not alter the path of any stream or rivers through the site and the majority of the existing drainage patterns will remain. Construction and operation of the reservoir tanks will result in ground disturbances and introduce impervious surfaces to the Project site. However, only a portion of the City-owned parcel will be paved and the rest will remain undisturbed. There will be approximately 20,000 square feet of ground coverage from the proposed extended driveway and water reservoir. This proposed paved and covered area comprises 5.9 percent of the Project site. Thus, there is a relatively small area of impervious surface being added to the WWTP that would not pose a significant impact to existing drainage in the area.

The Proposed Project shall require compliance with the NPDES Program and implement BMPs involving site design source control, and other appropriate methods to minimize runoff. These include but are not limited to silt fencing and straw waddles. Conformance with these requirements would result in a less than significant impact.

iii) *Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources or polluted runoff?*

**Less Than Significant Impact.** The Proposed Project will install a new water tank, an extended driveway, and a pump station within City property to increase water storage in the City to meet the existing and planned water demand. The Proposed Project would generate stormwater runoff with the introduction of impervious surfaces where the water tank and extended driveway will be constructed. The remaining undeveloped areas on the Project site will allow for water to percolate into the soil. Additionally, the Proposed Project does not introduce construction of new residences or businesses, or activities that would create a significant increase in water use that would create additional runoff. Therefore, the Proposed Project would not result in a significant contribution to runoff that would exceed the drainage systems.

iv) *Impede or redirect flood flows?*

**Less than Significant Impact.** Flood flows result from off-site flows of water during rainy periods or when a stream or river overflows due to debris. According to the Federal Emergency Management Agency (FEMA) National Flood Hazard map, the Project site is not located within a designated flood hazard zone (FEMA 2024). The Proposed Project is not within a 100-year flood zone or a 500-year flood zone. While the northern half of the WWTP is located in an area with a 0.2 percent annual chance of flooding, the elevation difference between this area and the southern portion of the WWTP, where the Project site is located, indicates that flooding is not a hazard for the Proposed Project.

Construction and operation of the reservoir tanks will result in ground disturbances and introduce impervious surfaces to the Project site. However, only a portion of the City-owned parcel will be paved and the rest will remain undisturbed. There will be approximately 20,000 square feet of ground coverage from the proposed extended driveway and water reservoir. This is proposed paved and covered area comprises 5.9 percent of the Project site. Thus, there is a relatively small area of impervious surface being added to the WWTP that would not pose a significant impact to existing flood flows in the area.

Proper site grading and drainage improvements will ensure that runoff continues to follow existing flow patterns without obstruction. The project will also comply with NPDES permit requirements and local stormwater regulations, implementing BMPs to prevent unintended hydrological impacts. Impacts would be less than significant.

d) *Would the project in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?*

**Less than Significant Impact.** The Project site is not located near the coast; therefore, it is not subject to the Coastal Barriers Resources Act and Coastal Zone Management Act. The Proposed Project would not be exposed to flood hazards associated with a tsunami (sea waves). The Project site is also outside of the 100-year floodplain and the 500-year floodplain.

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. Review of the area indicates that the Project site is within close proximity to the Santa Ana River Channel. Additionally, there are onsite water reservoirs. According to the Geotechnical Report, the reservoir site is located within a State of California or San Bernardino County designated dam inundation area and the potential for flooding of the site due to earthquake-caused dam failure is considered extremely high. Due to these reasons, seiching is considered to be a risk during significant seismic events. Seiching within the new reservoir may result in flooding within the site after construction and filling of the reservoir is complete (Appendix B).

However, the reservoir will adhere to the latest California Building Code (CBC) and seismic safety regulations, ensuring structural integrity. Any overflow will be managed within the site through drainage infrastructure designed to contain excess water and prevent off-site impacts. Also, within the Project area, there are no currently known active surface faults that traverse or trend toward this site, and the Project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone, or a fault zone delineated by the County or City. The closest fault is the San Jacinto Fault, located approximately 3 miles west from the Project site. The Geotechnical Investigation Report confirms that the Proposed Project is not located within a currently mapped State of California Earthquake Fault

Zone (Appendix B). Compliance with seismic building regulations and the lack of faults in the Project area makes impacts less than significant.

- e) *Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?*

**No impact.** The Project site is located south of the Santa Ana River, and the water quality control plan (Basin Plan) for the Santa Ana River identifies the beneficial uses of surface and groundwater resources within this watershed (CWB 2008). The site is within Reach 5 of the Upper Santa Ana River, which has beneficial uses for Municipal and Domestic Supply, Agricultural Supply, Groundwater Recharge, Water-contact Recreation, Non-contact Water Recreation, Warm Freshwater Habitat, Wildlife Habitat, and Rare, Threatened and Endangered Species. Water quality objectives are also provided in the Basin Plan for the protection of water quality and to prevent antidegradation.

The Proposed Project does not propose any improvements in the Santa Ana River and would not result in any discharges into the river. The Project site overlies the Bunker Hill groundwater subbasin, which has beneficial uses for Municipal and Domestic Supply, Agricultural Supply, Industrial Service Supply, and Industrial Process Supply. The Proposed Project would not extend into the underlying groundwater, and no increases in water use would occur; therefore, no conflict with the beneficial uses and water quality objectives in the Basin Plan would occur with the Proposed Project.

As indicated above, the Project site overlies groundwater resources in the San Bernardino Basin Area, which is adjudicated by the Western-San Bernardino Watermaster to regulate the amount of groundwater that is extracted. No direct impacts to groundwater resources would occur with the Proposed Project, therefore, the Project would not impede sustainable groundwater management of the underlying groundwater basin.

Impacts on the Basin Plan for the Santa Ana River and the groundwater management plan for the San Bernardino Basin Area would not occur.

#### 4.11 LAND USE AND PLANNING

11.	LAND USE/PLANNING Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

##### 4.11.1 Impact Analysis

- a) *Would the project physically divide an established community?*

**No Impact.** The Proposed Project includes the construction of a water reservoir and pump station for the purpose of storing water. The Proposed Project Site is located on disturbed land as a result of the existing reservoir infrastructure and adjacent industrial land uses. The Project site is zoned as EV/PI and does not have any adjacent residential neighborhoods. The closest residential community is separated from the Project vicinity by the Interstate 210 Highway to the east. Thus, Proposed Project activities would not prevent resident access to the nearby roadways, transit facilities, or any other

public service and utility, either during construction or operation of the facilities. No impact would occur.

- b) *Would the project 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.** The Proposed Project is located within an EV/PI zone, which allows for public infrastructure projects such as water reservoirs. The Project is consistent with the existing land use designation and aligns with applicable land use plans and policies. Additionally, the site is on City-owned property and adjacent to an existing City-operated water reservoir, reinforcing its compatibility with surrounding land uses. Since the Project does not conflict with any land use plan, policy, or regulation adopted to avoid or mitigate environmental effects, there would be no impact related to land use conflicts.

#### 4.12 MINERAL RESOURCES

12.	MINERAL RESOURCES Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

##### 4.12.1 Impact Analysis

- a) *Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?*

**Less than Significant Impact.** The California Department of Oil, Gas, and Geothermal Resources' (DOGGR) Well Finder shows there are no oil, geothermal, or gas wells (either active, inactive, plugged, or abandoned) on or near (within 1.0 mile) the site (CalGEM 2025).

Redlands is required by the Surface Mining and Reclamation Act of 1975 (SMARA) to adopt policies recognizing the importance of the identified mineral resources, clarifying the intent that this information is to be used when making land use decisions in areas designated to be of statewide or regional significance, and emphasizing the conservation and development of identified mineral deposits. Based on the Mineral Land Classification of the Greater Los Angeles Area prepared by the California Department of Conservation, the Project site is in the San Bernardino Production Consumption region, an area containing regionally significant mineral resources (e.g., sand and gravel resources). The Project area and surrounding areas are designated as Mineral Resource Zone (MRZ) - 2, an area where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists, primarily due to the location of the Santa Ana River just north of the site (DOC 1995). While the Project site may be underlain by sand and gravel resources, the Project site area is on a disturbed vacant lot within the existing WWTP boundaries. Thus, it is unlikely that the site be subject to mining operations in the future. At the same time, the Project would not obstruct ongoing or future mining operations in the Santa Ana River and

adjacent areas. Thus, the impact of the Project on the availability of known regionally significant mineral resources is less than significant.

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

**Less than Significant Impact.** As previously discussed above in section a), the Project area and surrounding areas are designated as MRZ-2, an area where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists, primarily due to the location of the Santa Ana River north of the site (DOC 1995). The City of Redlands is required by SMARA to adopt policies recognizing the importance of the identified mineral resources, clarifying the intent that this information is to be used when making land use decisions in areas designated to be of statewide or regional significance, and emphasizing the conservation and development of identified mineral deposits (City 2017).

While the Proposed Project would be on an area with locally important mineral resources (e.g., sand and gravel), the Project would occur within a site that is now disturbed with adjacent, existing wastewater treatment facilities. Because there are no mining operations adjacent to the site, the Proposed Project would also not interfere with existing mining operations in the area. Therefore, impacts on local mineral resources are less than significant.

#### 4.13 NOISE

13.	NOISE Would the project result in:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b)	Generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

##### 4.13.1 Impact Analysis

- a) *Would the project result in 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 Impact.** Noise levels are based on equivalent noise levels (Leq) and are decibels, or dBA. Leq describes sounds levels that vary over time and is a single decibel that takes the total sound energy over a period of time. A community noise level (CNEL) is the weighted average of a noise level over time, typically a 24-hour average. The Ldn is the day to night average sound level and is approximately numerically equal to the CNEL for most environmental settings (County 2007b). The

decibel levels of common outdoor and indoor noises according to the Federal Highway Administration (FHWA) are provided in the table below.

**Table 4-4. Common Outdoor and Indoor Noises**

Sound Pressure Level (dB)	Activity
100-110	Rock Band at 5 meters/Jet Flyover at 300 meters
90-100	Inside New York Subway Train/ Gas Lawn Mower at 1 meter
80-90	Diesel Truck at 15 meters/Food blender 1 meter
70-80	Noise Urban Daytime / Garbage Disposal at 1 meter / Shouting at 1 meter
60-70	Gas Lawn Mower at 30 meters/Commercial area/ Vacuum Cleaner at 3 meters / Normal Speech at 1 meter
50-60	Large Business Office
40-50	Dishwasher next room / Quiet Urban Daytime
30-40	Quiet urban/ Suburban Nighttime / Small theater / Large Conference Room (Background) / Library
20-30	Bedroom at night / Concert Hall (Background) / Quiet Rural Nighttime
10-20	Broadcast and Recording Studio
0-10	Threshold of hearing

Source: Federal Highway Administration; Public Roads; 2003  
<https://www.fhwa.dot.gov/publications/publicroads/03jul/06.cfm>

According to the U.S. Department of Transportation FHWA Construction Noise Handbook, typical sound levels produced by typical construction equipment at a 50 foot distance are described as follows: compactors (82 dBA), loaders (85 dBA), backhoes (80 dBA), scrapers (89 dBA), graders (85 dBA), drill rigs (85 dBA), and pumps (76 dBA) (FHWA 2006). Noise levels reduce (or drops off) with distance from a project location. Noise drops off approximately 3 dB per doubling of distance for line sources (such as a roadway) and 6 dB per doubling of distance for point sources over an open terrain (FTA 2018).

The Project site is in an industrial area where industrial sources of noise such as outdoor activities by trucks, machinery, and pumps characterize the noise environment. Adjacent land uses include the Santa Ana River to the north, the California Street Landfill to the west, SR-210 to the east, and warehouses, agricultural fields, and vacant land to the south. Farther south and southwest of the site are various industrial uses and warehouses. The nearest noise-sensitive uses, single-family residences, are located approximately 0.7 miles to the southeast. The Proposed Project would involve the use of noise generating construction equipment that would increase ambient noise levels in the immediate surroundings.

### **Construction-Related Noise**

The Redlands General Plan includes a Healthy Community chapter that addresses noise. This chapter includes principles to reduce noise from mobile sources; eliminate noise problems; make new development compatible with the noise environment; guide the location of noise sources; and regulate development around the Redlands Airport. Industrial uses are considered “Clearly Compatible” in areas with noise levels up to 75 dB CNEL and “Normally Compatible” in areas with noise levels 80 dB CNEL and above. There is no exterior noise standard and a 60-dB CNEL interior noise standard for manufacturing, warehousing, wholesale, and utilities land uses.

Chapter 8.06, Community Noise Control, of the Redlands Municipal Code prohibits “loud, unnecessary or unusual noise which disturbs the peace and quiet of any neighborhood or which causes discomfort or annoyance to a reasonable person of normal sensitivity in the area”. The ordinance sets exterior noise limits of 75 A-weighted dBA in industrial areas, which cannot be exceeded for more than 30 minutes in any hour; with the limit plus 20 dB not permitted for any period of time. The ordinance also sets interior noise limits of 60 dBA in industrial areas. Lower exterior noise limits are set for residential and commercial uses, but there are no residential and commercial uses near the site. Construction and/or demolition activities are only allowed between 7:00 a.m. and 6:00 p.m. on weekdays and Saturdays but not on Sundays or holidays, except for emergency work.

However, under the City’s Noise Ordinance, permitted construction activities between 7:00 a.m. and 6:00 p.m. are exempt from community noise standards. Construction of the proposed improvements would occur during the daytime hours on weekdays and Saturdays, in compliance with the City’s Noise Ordinance.

Construction noise impacts would be temporary and would not adversely affect adjacent land uses, including the Santa Ana River, warehouses, vacant land/agricultural land, and the California Street Landfill. The noise intensity and duration of construction equipment operations, the lack of noise-sensitive receptors near the Project site, and the distances between the site and nearby land uses would prevent violation of the City’s noise regulations. Impacts are less than significant.

### **Operations-Related Noise**

In general, the operation of the new reservoir tank will be passive as there will be no equipment installed on the reservoir tanks that creates noise. The Proposed Project would include installation of a new water pump station pad to fill the reservoir tanks, and a chlorine contact tank pump station to control water flows into the chlorine contact tank. The pumps would be located either in underground vaults or inside a pump house to protect pumps from outdoor elements. This would also result in insulating the noise from the pumps so that the pumps would not be audible at nearby properties.

The existing water tank will continue to function while the new reservoir tank and pump stations are constructed. Currently, maintenance on the existing water tank occurs on a monthly and as-needed basis by City employees. No change would occur between the maintenance activities for the existing water tank and proposed reservoir tank. As such, operation of the Proposed Project would not create any additional sources of noise, over which is currently being created, and no operational noise modeling was performed. As such, less than significant noise impacts would occur from operation of the Proposed Project.

- b) *Would the project result in generation of excessive groundborne vibration or groundborne noise levels?*

**Less than Significant Impact.** Analysis for construction and operational impacts relating to groundborne vibration and groundbourne noise is detailed below.

#### **Construction-Related Vibration Impacts**

The Proposed Project involves construction of a new water reservoir tank, an extended driveway to access the new tank, a pump station pad, and a chlorine contact tank pump station. Vibration impacts from construction activities associated with the Proposed Project would typically be created from the operation of heavy off-road equipment. Groundborne vibration is measured using the Federal Transit Authority (FTA) annoyance threshold of 72 VdB (vibrational velocity level) (FTA 2018). Due to the distance of the nearest residences (0.7 mile), intermittent and short-term vibration from construction activities at the Project site are not expected to affect residents in the area. Impacts from excessive groundborne vibration or groundborne noise would be less than significant.

#### **Operational-Related Vibration Impacts.**

In general, the operation of the new reservoir tank will be passive as there will be no equipment installed on the reservoir tanks that creates noise. The Proposed Project would include installation of a new water pump station pad to fill the reservoir tanks and a chlorine contact tank pump station to control water flows into the chlorine contact tank. The pumps would be located either in underground vaults or inside a pump house to protect pumps from the elements. This would also result in insulating the noise from the pumps so that the pumps would not be audible at nearby properties

No new long-term noise-generating activities above existing ambient noise levels in this industrial zone would occur from the Proposed Project. The ongoing operation of the Proposed Project would not include the operation of any equipment that creates vibration and would not include any other known vibration sources. Therefore, a less than significant vibration impact is anticipated from the operation of the Proposed Project.

- 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 Impact.** The Project Site is located approximately 0.60 miles from the San Bernadino International Airport southeastern boundary and 2.6 miles to the west from the Redlands airport. The Project site is not within the boundaries of the designated Area of Special Compatibility Concern for the Redlands Airport but is within the airport influence area for the San Bernardino International Airport; however, no airport land use compatibility plan has been adopted for the San Bernardino International Airport.

While the Project site is within the airport influence area for San Bernardino International Airport, it is not within a designated high-noise contour as identified by Federal Aviation Administration (FAA) guidelines or local airport studies (Vista 2023). The existing staff will maintain the new water reservoir along with the existing water reservoir at the WWTP. Thus, the Proposed Project would not expose people working in the Project area to excessive noise levels. The Proposed Project does not involve the construction of noise-sensitive uses such as residential, educational, or healthcare facilities.

Additionally, the nature of the Project - limited to water infrastructure installments - does not introduce new long-term noise-sensitive receptors. Impacts are less than significant.

**4.14 POPULATION AND HOUSING**

14.	POPULATION AND HOUSING. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(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)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(b)	Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**4.14.1 Impact Analysis**

a) *Would the project 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 Proposed Project does not provide permanent housing or include operations that could result in unplanned growth such as extension of roadways or expansion of existing infrastructure. The additional water storage facility would address the water supply for the existing population and planned future growth. During operations, there will be no change in the number of personnel of the WWTP. No impact would occur

b) *Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?*

**No Impact.** There are no residential units on the Project site or in the surrounding areas. The Project would not displace any housing units, households, or residents. In addition, no businesses or employees would be displaced by the Project. Therefore, the Project would not result in any impacts to people or housing nor require replacement housing. No impacts would occur.

**4.15 PUBLIC SERVICES**

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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	ii) Police Protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	iii) Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	iv) Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	v) Other public facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**4.15.1 Impact Analysis**

a) i) *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 fire protection?*

**Less Than Significant Impact.** The Proposed Project would not affect the service standards related to fire protection. The Proposed Project site is located approximately 1.6 miles northwest of Redlands Fire Station 263 (Google 2025). The Proposed Project will safeguard public health by expanding the capacities of the reservoirs to meet public drinking water demands which is critical as the City continues to be impacted by multi-decade drought. Development of the Proposed Project would not necessitate the expansion of services as it would not result in permanent population growth. While there may be temporary travel delays during construction with the presence of construction vehicles and equipment traveling along the roadways, this would occur during construction and is not expected to create long-term and significant delay for fire protection in the area. Impacts would be less than significant.

ii) *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 police protection?*

**Less than Significant Impact.** The Proposed Project would not affect the service standards related to police protection. The Redlands Police Department provides law enforcement and police protection services in the City, including the Project site. The Proposed Project site is located approximately 2.25 miles northwest of the Redlands Police Station (Google 2025). The WWTP site would remain fenced, and personnel would also be stationed at the WWTP 24 hours per day, 7

days per week. The Proposed Project would not attract crime to the area, nor will it result in population growth in the area requiring the expansion of existing services or the creation of new services. The Project area that is currently being serviced by the Redlands Police Station would continue to receive the same services as nearby land uses. While there may be temporary travel delays during construction, these would occur during construction and is not expected to create a long-term and significant delay for police protection in the area. Thus, the Project would not result in the need for new police stations in the area or otherwise adversely impact existing police services. Demand for police protection services at the site is expected to remain unchanged. Therefore, impacts are less than significant.

- iii) *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 schools?*

**Less than Significant Impact.** The nearest school is the Packinghouse Christian Academy, located 4,100 feet (0.78 miles) south of the Project site. Despite its proximity, the development of the Proposed Project would not induce population growth requiring the creation of new services. Additionally, The Proposed Project would not increase the demand for schools in the City. Impacts would be less than significant.

- iv) *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 parks?*

**Less than Significant Impact.** The Proposed Project would not induce population growth requiring the extension of existing or creation of new park services. The Proposed Project site is located 1 mile west of a future park, 1.81 miles west of Israel Beal Park, 3.80 miles north from Hulda Crooks Park, 2.6 miles north from Heritage Park, and 2.30 miles north from Citrus Trails Community Park. While there may be temporary travel delays during construction with the presence of construction vehicles and equipment traveling along the roadway, this would occur during construction and is not expected to create long term and significant delay in access to these parks. Additionally, the Proposed Project will not induce unplanned population growth that would create demand for additional park and recreation facilities. Impacts would be less than significant.

- vi) *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 other public facilities?*

**No Impact.** The Proposed Project would not induce growth requiring the extension of existing or creation of new services. Construction of the water tank and pump station would not result in the demand for expansion or the addition of new service areas. The Proposed Project would not increase the demand for other public facilities. In fact, the intent of the Proposed Project is to increase water storage to meet existing demands in times of drought. No new or additional personnel would be needed to operate the additional water reservoir and pump station. No impact would occur.

**4.16 RECREATION**

16.	RECREATION. Would the project:	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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**4.16.1 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 site is located 1 mile west of a future park, 1.81 miles west of Israel Beal Park, 3.80 miles north from Hulda Crooks mark, 2.6 miles north from Heritage Park, and 2.30 miles north from Citrus Trails Community Park. The Proposed Project does not include features or activities that would contribute to the increased use of the surrounding neighborhoods, regional parks, other recreational facilities and would not cause substantial deterioration of existing public facilities. The Proposed Project would not induce population growth as it does not include permanent or temporary housing. 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.** The Proposed Project site is located 1 mile west of a future park, 1.81 miles west of Israel Beal Park, 3.80 miles north from Hulda Crooks Park, 2.6 miles north from Heritage Park, and 2.30 miles north from Citrus Trails Community Park. The Proposed Project does not include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment. The Proposed Project does not include introducing new job opportunities that would increase populations beyond what has been analyzed nor increase demands on recreational resources. No impacts will occur.

**4.17 TRANSPORTATION**

17.	TRANSPORTATION. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadways, bicycle and pedestrian facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b)	Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

17.	TRANSPORTATION. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(c)	Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(d)	Result in inadequate emergency access?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

#### 4.17.1 Impact Analysis

- a) *Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadways, bicycle and pedestrian facilities?*

**Less than Significant Impact.** The Proposed Project would introduce a 14-foot-wide road, off of Waste Water Road, that would provide access to the new water reservoir. The Proposed Project will be located within City property, adjacent to an existing water tank that is being maintained and operated by the City.

The City's General Plan emphasizes maintaining a safe and efficient circulation system that accommodates various modes of transportation, including vehicles, bicycles, and pedestrians. The proposed 14-foot-wide extended driveway is designed primarily for maintenance vehicles accessing the reservoir and pump station. Given its specific utility purpose and location within the WWTP premises, it is not intended for general public use or as a thoroughfare for regular traffic. Site plans for the extended driveway will also be subject to review by the City's Engineering Department.

While the Project site may experience delays during construction, this will be temporary in nature. Operation of the new reservoir tanks will not increase the presence of employees on the site that would create interference with the existing circulation. Therefore, it does not interfere with existing circulation systems, including transit, public roadways, bicycle paths, or pedestrian facilities. Impacts would be less than significant.

- b) *Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?*

**No Impact.** The Proposed Project would introduce a 14' wide road, off of Waste Water Road, that would provide access to the new water reservoir. Implementation of the Proposed Project, which includes a new recycled water reservoir and pump station, would not result in the addition of new personnel. The existing faculty would manage the operations of the Proposed Project. Because the Project would not increase the number of employees at the WWTP nor increase vehicle miles traveled, it would not be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)(1). There would be no impact related to increased travel with the Project.

- c) *Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?*

**Less than Significant Impact.** The Proposed Project would introduce a 14' wide road, off of Waste Water Road, that would provide access to the new water reservoir. The Proposed Project does not propose any hazardous design features such as sharp curves or dangerous intersections. Furthermore, the Proposed Project will be on City property, will be accessible only to City employees, and is not open to the general public. Any additional roadways or entrances that may be included in the Project

area will be done in conformance with City engineering guidelines and with the approval of the City Engineer. Impacts would be less than significant.

d) *Would the project result in inadequate emergency access?*

**Less than Significant Impact.** Project site access would be along Nevada Street via Waste Water Road. The Proposed Project would introduce a 14' wide extended driveway, off of Waste Water Road, that would provide access to the new water reservoir. This proposed driveway will be subject to review by the Redlands Fire Department for compliance with applicable California Fire and Building Codes. Compliance with fire safety regulations would make impacts relating to emergency access less than significant.

**4.18 TRIBAL CULTURAL RESOURCES**

18.	<b>TRIBAL CULTURAL RESOURCES.</b> <b>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:</b>	<b>Potentially Significant Impact</b>	<b>Less than Significant With Mitigation Incorporated</b>	<b>Less Than Significant Impact</b>	<b>No Impact</b>
(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), or	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**4.18.1 Impact Analysis**

a) *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 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.** As discussed in Section 4.5.1, the WWTP is not eligible for listing in the NRHP or the CRHR. Although the WWTP was built in 1962, sequential updates and surrounding modern development has resulted in the site losing any potential historic character. The CHRIS Data Request results that Chambers Group received from the SCCIC on April 12, 2025, indicated that there are no previously recorded historical resources recorded within the Project site. No tribal cultural resources that are listed or eligible for listing in the NRHP, the CRHR, or local designation as a Historic Resource would be affected by the Proposed Project. No impacts would occur.

- b) *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 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?*

**Less than Significant With Mitigation Incorporated.** On February 12, 2025, Chambers Group sent a Sacred Lands File and Native American Contracts List Request to the NAHC. On February 13, 2025, Chambers Group received an email response from the NAHC, stating that the results were positive, indicating that sacred or culturally significant Native American lands are known to exist in or near the Project area.

Assembly Bill 52 requires public agencies to consult with tribes that may have a traditional affiliation to a project area to gather information on a site's sensitivity and identify if any mitigation measures would be required to preserve discovered or undiscovered tribal cultural resources. The City of Redlands Development Services Planning Division has a list of Native American tribes that have standing notification requests per AB 52. This list contains ten contacts representing six different tribes. On April 11, 2025 the City sent notification letters to all six of these tribes: the Agua Caliente Band of Cahuilla Indians, the Gabrieleño Band of Mission Indians – Kizh Nation, the Morongo Band of Mission Indians, the Soboba Band of Luiseño Indians, the Torres Martinez Desert Cahuilla Indians, and the Yuhaaviatam of San Manuel Nation.

After review of the Project information, the Agua Caliente Band of Cahuilla Indians and the Yuhaaviatam of San Manuel Nation requested consultation. The Agua Caliente Band of Cahuilla Indians responded and indicated that, although the Project is within the Tribe's Traditional Use Area, they will defer the Project to the Yuhaaviatam of San Manuel Nation. The Yuhaaviatam of San Manuel provided their mitigation measures (MM TCR-1 and MM TCR-2) to be incorporated into the Proposed Project.

In addition, the Morongo Band of Mission Indians requested consultation and provided their mitigation measures to be incorporated into the Proposed Project (MM TCR-3 through MM TCR-8).

Based on consultation with the tribes, the Project area has the potential for discovery of buried cultural resources. Therefore, the following mitigation measure provided by the tribe(s) shall be implemented, thus the Project would have less than significant impacts with mitigations incorporated.

**MM TCR-1** The Yuhaaviatam of San Manuel Nation Cultural Resources Management Department (YSMN) shall be contacted, as detailed in CUL-1, of any pre-contact cultural resources discovered during project implementation, and be provided information regarding the nature of the find, so as to provide Tribal input with regards to significance and treatment. Should the find be deemed significant, as defined by CEQA (as amended, 2015), a Cultural Resources Monitoring and Treatment Plan shall be created by the archaeologist, in coordination with YSMN, and all subsequent finds shall be subject to this Plan. This Plan shall allow for a monitor to be present that represents YSMN for the remainder of the project, should YSMN elect to place a monitor on-site.

- MM TCR-2** Any and all archaeological/cultural documents created as a part of the Project (isolate records, site records, survey reports, testing reports, etc.) shall be supplied to the applicant and Lead Agency for dissemination to YSMN. The Lead Agency and/or applicant shall, in good faith, consult with YSMN throughout the life of the Project.
- MM TCR-3** **Native American Treatment Agreement.** Prior to the issuance of grading permits, the applicant shall enter into a Tribal Monitoring Agreement with the Morongo Band of Mission Indians for the Project. The Tribal Monitor(s) shall be on-site during all ground-disturbing activities (including, but not limited to, clearing, grubbing, tree and bush removal, grading, trenching, fence post placement and removal, construction excavation, excavation for all utility and irrigation lines, and landscaping phases of any kind). The Tribal Monitor(s) shall have the authority to temporarily divert, redirect, or halt the ground-disturbing activities to allow identification, evaluation, and potential recovery of cultural resources and/or tribal cultural resources.
- MM TCR-4** **Cultural Resource Management Plan.** Prior to any ground-disturbing activities the project archaeologist shall develop a Cultural Resource Management Plan (CRMP) and/or Archaeological Monitoring and Treatment Plan (AMTP) to address the details, timing, and responsibilities of all archaeological and cultural resource activities that occur on the project site. This Plan shall be written in consultation with the Consulting Tribe[s] and at minimum, shall include the following: (1) the approved Mitigation Measures (MM)/Conditions of Approval (COA), (2) procedures for each MM/COA, (3) the contact information for all pertinent parties, (4) parties' responsibilities, and (5) an overview of the project schedule.
- MM TCR-5** **Pre-Grade Meeting.** The retained qualified archeologist and Consulting Tribe[s] representative shall attend the pre-grade meeting with the grading contractors to explain and coordinate the requirements of the monitoring plan.
- MM TCR-6** **Inadvertent Discovery of Cultural Resources.** In the event that previously unidentified cultural resources are discovered /unearthed during construction, the qualified archaeologist and the Tribal Monitor(s) shall have the authority to temporarily divert and/or temporarily halt ground-disturbance activities in the area of discovery to allow for the evaluation of potentially significant cultural resources. Isolates and clearly non-significant deposits shall be minimally documented in the field and collected so the monitored ground-disturbing activity can proceed.

If a potentially significant cultural resource(s) is discovered, work shall stop within a 60-foot perimeter of the discovery and an Environmentally Sensitive Area (ESA) physical demarcation/barrier constructed. All work shall be diverted away from the vicinity of the find(s), so that it/they can be evaluated by the qualified archaeologist and Tribal Monitor[s]. The archaeologist shall notify the Lead Agency and Consulting Tribe[s] of said discovery. The qualified archaeologist, in consultation with the Lead Agency, the Consulting Tribe[s], and the Tribal monitor, shall determine the significance of the discovered resource. A

recommendation for the treatment and disposition of the Tribal Cultural Resource shall be made by the qualified archaeologist in consultation with the Tribe[s] and the Tribal monitor[s] and be submitted to the Lead Agency for review and approval.

Below are the possible treatments and dispositions of significant cultural resources in order of CEQA preference:

A. Full avoidance.

B. If avoidance is not feasible, Preservation in place.

If Preservation in place is not feasible, all items shall be reburied in an area away from any future impacts and reside in a permanent conservation easement or Deed Restriction.

C. If all other options are proven to be infeasible, data recovery through excavation and then curation in a Curation Facility that meets the Federal Curation Standards (36 CFR 79).

Unless otherwise agreed upon by all parties, all removed items from the Project shall be temporarily curated on-site in a secure and locked location (i.e., Conex box, a lockable office or drawer with restricted access to it, etc.). A periodic inventory must be maintained and provided to Consulting Tribe[s].

#### MM TCR-7

**Inadvertent Discovery of Human Remains.** The Morongo Band of Mission Indians requests the following specific conditions to be imposed in order to protect Native American human remains and/or cremations. No photographs are to be taken except by the coroner, with written approval by the Consulting Tribe[s].

A. Should human remains and/or cremations be encountered on the surface or during any and all ground-disturbing activities (i.e., clearing, grubbing, tree and bush removal, grading, trenching, fence post placement and removal, construction excavation, excavation for all water supply, electrical, and irrigation lines, and landscaping phases of any kind), work in the immediate vicinity of the discovery shall immediately stop within a 100-foot perimeter of the discovery. The area shall be protected by the establishment of an ESA with a marked boundary. Project personnel/observers will be restricted from entry into the ESA. The County Coroner is to be contacted within 24 hours of discovery. The County Coroner has 48 hours to make his/her determination pursuant to State and Safety Code §7050.5. and Public Resources Code (PRC) § 5097.98.

B. In the event that the human remains and/or cremations are identified as Native American, the Coroner shall notify the Native American Heritage Commission (NAHC) within 24 hours of determination pursuant to subdivision (c) of HSC §7050.5.

C. The NAHC shall immediately notify the person or persons it believes to be the Most Likely Descendant (MLD). The MLD has 48 hours, upon being granted access

to the Project site, to inspect the site of discovery and make his/her recommendation for final treatment and disposition, with appropriate dignity, of the remains and all associated grave goods pursuant to PRC §5097.98

D. If the Morongo Band of Mission Indians has been named the MLD or Co-MLD, the Tribe may wish to rebury the human remains and/or cremation and sacred items in their place of discovery with no further disturbance where they will reside in perpetuity. The place(s) of reburial will not be disclosed by any party and is exempt from the California Public Records Act (California Government Code § 6254[r]). Reburial location of human remains and/or cremations will be determined by the Tribe’s MLD, the landowner, and the City Planning Department.

**MM TCR-8**

**FINAL REPORT:** The final report[s] created as a part of the project (CRMP/AMTP, isolate records, site records, survey reports, testing reports, etc.) shall be submitted to the Lead Agency and Consulting Tribe[s] for review and comment. After approval of all parties, the final reports are to be submitted to the appropriate Information Center (IC), and the Consulting Tribe[s].

**4.19 UTILITIES AND SERVICE SYSTEMS**

19.	UTILITIES/SERVICE SYSTEMS. Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(b)	Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(e)	Comply with federal, state, and local management and reduction statutes and regulations related to solid wastes?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

#### 4.19.1 Impact Analysis

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

**Less Than Significant Impact.** There are existing utility infrastructures within the Project area for telecommunications, electric, natural gas, and wastewater treatment. The Proposed Project will connect to existing utility services during operations. No off-site expansions are proposed.

The Proposed Project will install a new water tank on City property to increase water storage in the City. The intent of the Proposed Project is to meet the critical public drinking water demands as the City continues to be impacted by a multi-decade drought. The City's Municipal Utilities Department operates and maintains a water distribution system with an approximately 54.5-million-gallon maximum storage capacity (City 2025a). The Proposed Project would increase the existing capacity by 2.75 MG and will utilize existing infrastructure for water distribution.

The Proposed Project would result in an increase of impervious surfaces to the area causing additional runoff. As previously discussed, the Proposed Project will comply with the NDPES Program by implementing SWPPP BMPs to address additional runoff. Impacts would be less than significant.

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

**Less than Significant Impact.** The Proposed Project would not result in requiring a significant increase in water supplies as there is no increase in personnel expected at the Project site. There is existing landscaping on the Project site that already requires irrigation. Any additional landscaping for the Proposed Project would involve a minimal increase in water usage for irrigation. In fact, the Proposed Project would install an additional water tank to increase the City's water storage. No additional expansions or new entitlements are required for the Proposed Project. Impacts would be less than significant.

- c) *Would the project 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 Impact.** The City's existing WWTP will have adequate capacity to serve the Proposed Project because the proposed activities are not introducing additional water demand in the area. The Proposed Project intends to increase the City's water storage to address existing demands of the public. As previously discussed, there are no proposed personnel increases or need for irrigation that would increase the need for wastewater treatment facilities. Impacts would be less than significant.

- 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 Impact.** The City's Sustainable Community Element identifies waste reduction and recycling goals within the City. Waste reduction goals include the reduction of generation of solid waste. These would meet the State's policy goal that not less than 75 percent of solid waste generated be source-reduced, recycled, or composted.

The Proposed Project will be operating a new water tank to be serviced by the existing employees maintaining the existing water tank adjacent to the Project site. The Project site would not result in a significant increase in employees that would create an increase of solid wastes generated.

Construction of the Proposed Project would result in generation of construction wastes. The construction activities will comply with the City’s requirements for Construction and Demolition Recycling Requirements (Section 13.66.040 of the Municipal Code) which outlines the requirements for loading and collection areas, targeted materials for recycling, separation of materials, and compliance with the General Plan. There is no increase in long-term waste generation given that the Project site is not introducing new populations and will be serviced by existing employees of the City. Therefore, the Proposed Project would not result in the generation of solid wastes in excess of state or local standards and would not result in impairing solid waste reduction goals. Impacts, therefore, would be less than significant.

e) *Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?*

**Less than Significant Impact.** As discussed above, the generation of solid waste would be limited during construction and will comply with the Federal, State, and local requirements, including the City’s Construction and Demolition Requirements for managing solid waste, CalGreen Code, and the Chapter 13.64 Integrated Solid Waste Management ordinance. Impacts would be less than significant.

#### 4.20 WILDFIRE

20.	WILDFIRE. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a)	Substantially impair an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(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?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

##### 4.20.1 Impact Analysis

a) *Would the project impair an adopted emergency response plan or emergency evacuation plan?*

**Less than Significant Impact.** The Proposed Project would not interfere with an evacuation or emergency plan as discussed in Section 4.9 Hazards and Hazardous Materials. In addition, CALFIRE has prepared Fire Hazard Severity Zone Maps for the State, and the Project site is in a Non-Very High Fire

Hazard Severity Zone (CALFIRE 2023). The nearest Very High Fire Hazard Severity Zone is located approximately 3 miles south from the Project site in an open space area adjacent to the San Timoteo Wash (CALFIRE 2023). While the Project site is not located within a fire hazard zone, the open spaces to the north of the Project site could create an environment where wildland fires could occur especially during dry and high wind seasons. The Proposed Project will conform to City guidelines and regulations for new development to minimize fire hazard as outlined in the General Plan (Fire Hazards Policies) (City 2017). These requirements include but are not limited to, using appropriate building material and design features, siting and designing development to avoid hazardous locations, incorporate fuel modification and brush clearances, and coordination with the Redlands Fire Department and other fire prevention agencies to review all applications for development. Conformance with these guidelines would result in less than significant impacts.

- b) *Would the project, 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 Impact.** As discussed above, the Proposed Project site is not located within, nor adjacent to, a Very High Fire Hazard Severity Zone of state or local responsibility (CALFIRE 2023). In addition, the Project site is in a flat, developed area with no slopes that would exacerbate fire risks.

While the Project site is not located within a fire hazard zone, the open spaces to the north of the Project Site could create an environment where wildland fires could occur especially during dry and high wind seasons. The Proposed Project will conform to City guidelines and regulations for new development to minimize fire hazard as outlined in the General Plan (Fire Hazards Principles and Actions). These requirements include, but are not limited to, using appropriate building material and design features, siting and designing development to avoid hazardous locations, incorporating fuel modification and brush clearances, and coordination with the Redlands Fire Department and other fire prevention agencies to review all applications for development. Conformance with these guidelines would result in less than significant impacts.

- c) *Would the project 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.** As noted in Section a) and b), the Proposed Project is not located in an area deemed at a risk of wildfire. However, open spaces could create an environment where wildland fires could occur. The existing and proposed water tanks at the WWTP would serve as emergency water sources, thus installation of additional infrastructure that would exacerbate fire risks would not be necessary under the Proposed Project. No impact would occur.

- d) *Would the project 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?*

**Less than Significant Impact.** The Proposed Project site is not in an area prone to wildfire or near any water bodies that could cause slope instability or drainage changes. However, as discussed in Section a) and b), the open space north of the Project site could create an environment where wildfires could occur especially during dry and high wind seasons. The Proposed Project shall comply with City guidelines and regulations for new developments to minimize fire hazards (General Plan, Fire Hazards Principles and Actions). Conformance with these guidelines would result in a less than significant impact.

**4.21 MANDATORY FINDINGS OF SIGNIFICANCE**

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?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(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?)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(c)	Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**4.21.1 Impact Analysis**

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 discussed in Section 4.4, the Proposed Project does not have the potential to substantially degrade the quality of the environment or adversely impact sensitive biological resources. The Project site is a disturbed, vacant lot with minimal vegetation, and no suitable habitat is present. It has been previously used as a worksite for the WWTP, with aerial imagery confirming signs of disturbance such as tire marks, grading, and a flat surface.

While the Riversidean Alluvial Fan Sage Scrub habitat - which supports special-status species like Slender-horned spineflower, Santa Ana River woollystar, and California gnatcatcher - is located between the Santa Ana River and the Project site, the Project itself does not directly impact this habitat. Additionally, an existing water reservoir provides a buffer between the Project site and the sensitive habitat, eliminating the need for additional protective measures.

The Project will not impact riparian habitat, wetlands, or wildlife corridors. It is located 0.20 miles from the Santa Ana River, a state-protected wetland, but no direct encroachment, hydrological alteration, or pollutant discharge is anticipated. BMPs will be implemented during construction to prevent sediment transport and water quality degradation, ensuring compliance with local and state water quality regulations.

The Project site is outside of any designated critical habitats and does not conflict with any local, regional, or state conservation plans. Additionally, no tree removal is required, and the Project aligns with the City's General Plan policies on habitat conservation and biological resource protection.

As discussed in Section 4.7, the Project site contains soils that are considered highly paleontologically sensitive. Regarding historical resources, as discussed in Section 4.5, the CHRIS data system search results indicated the Project site does not contain important examples of major periods in California's history, thus no mitigation measures for this issue are necessary. Regarding archeological resources, the analysis in Section 4.5 determined that the Project site is in an archeologically sensitive area, thus there is a likelihood of discovery of an archeological resource during grading and excavation of the Project site.

Based on Tribal Consultation discussed in Section 4.18, mitigation measures have been incorporated to address potential impacts to tribal cultural resources.

Thus, implementation of mitigation measures MM PAL-1, MM PAL-2, CUL-1, CUL-2, CUL-3, CUL-4, and TCR-1 through TCR-8 would reduce impacts to less than significant.

- 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 Impacts.** Impacts associated with the Proposed Project would generally be associated with short-term construction activities as operations of the new water reservoir would be passive and not require an increase in staff. According to the City's Planning Division Major Project List 2025, updated in September 2023, the only listed project near the Proposed Project is the Marriott Springhill Suites located on Lugonia Ave. between Nevada St. and Alabama St (City 2025b). However, this project has already been completed, thus there will be no cumulatively considerable impacts associated with construction.

Besides the Marriot Springhill Suites project, there are no listed projects that are occurring on or adjacent to the Project site on Nevada Street, Palmetto Avenue, Pioneer Avenue, San Bernardino Avenue, Alabama Street, or California Street. Cumulative impacts would be considered less than significant.

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

**Less than Significant Impact.** Substantial adverse effects on human beings directly or indirectly are primarily resulting from impacts on air quality, geology and soils, greenhouse gas emissions, hazardous materials, land use, noise, and wildfire. Out of these impact categories, there is one impact associated with geology and soils that would be less than significant with mitigation incorporated (MM PAL-1 and MM PAL-2), due to the Project site's high paleontological sensitivity (see Section 4.7). In addition, impacts regarding paleontological resources do not result in substantial adverse effects on human beings. As analyzed in this document, all other impacts relating to substantial adverse effects on human beings have been determined to be less than significant as the Proposed Project's construction and operations will comply with the City's General Plan policies and Municipal Code. Impacts will be less than significant with mitigation incorporated.

## SECTION 5.0 – REFERENCES

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- 2025 Well Finder. Available at: <https://maps.conservation.ca.gov/doggr/wellfinder/>

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### City of Redlands (City)

- 2017 General Plan 2035. <https://www.cityofredlands.org/post/planning-division-general-plan>
- 2022 Zoning Map. Available at: <https://www.cityofredlands.org/sites/main/files/file-attachments/zoning.pdf?1670528707>
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2024 FEMA's National Flood Hazard Layer Viewer. Available at: <https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd>

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Vista Environmental

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**APPENDIX A – AIR QUALITY, GREENHOUSE GAS EMISSIONS, AND ENERGY  
TECHNICAL MEMORANDUM**





March 19, 2025

Eunice Bagwan  
Chambers Group, Inc.  
3151 Airway Avenue, Suite F208  
Costa Mesa, CA 92626

**Subject: City of Redlands – Recycled Water Reservoir and Pump Station Project Air Quality, Greenhouse Gas Emissions and Energy Technical Memorandum.**

Dear Ms. Bagwan:

Vista Environmental has conducted an analysis to evaluate whether the proposed recycled water reservoir and pump station (proposed project) would cause significant air quality, greenhouse gas (GHG) emissions and energy consumption impacts. This assessment was conducted within the context of the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000, et seq.). The methodology follows the South Coast Air Quality Management District (SCAQMD) recommendations for quantification of emissions and evaluation of potential air quality and GHG emissions impacts.

### ***Project Location***

The project site is located at the existing Redlands Wastewater Treatment Plant at 1950 Nevada Street in the City of Redlands (City). Specifically, the proposed reservoir and pump station would be located on the empty lot west of the existing sludge drying beds and would be bounded by Waste Water Road to the north, sludge drying beds to the east, a vacated road easement and vacant land to the south, and Nevada Street and vacant land to the west.

### ***Project Description***

The City of Redlands Municipal Utilities and Engineering Department proposes the construction of a 2.75 Million Gallon (MG) recycled water reservoir and pump station on an approximately 2 acre area. The reservoir would be constructed as an above ground, 126 foot diameter steel tank and the pump station would be located in an approximately 800 square foot structure located on the east side of the reservoir. There would also be an approximately 290 square foot structure for electrical equipment that would include solar PV panels and a chain link fence around the perimeter of the electrical equipment area.

In addition, an approximately 16,000 square foot contractor staging area located on the north side of Waste Water Road. A new 14 foot wide paved access road will be constructed to the proposed reservoir and would encircle the reservoir, that would total approximately 8,700 square feet of new paved area.

The project is expected to break ground in 2026 and be completed by 2027. Construction activities will take place between 06:00 a.m. to 04:00 p.m. Monday through Friday. No construction work will occur on weekends or City observed holidays per the City's Community Noise Control section, Chapter 8.06 of the Municipal Code (City 2023).

Operations at the treatment plant will continue to function while the new reservoir and pump station will be constructed. Maintenance will occur on a monthly and as-needed basis by City employees. The Project

site will include installation of ornamental landscaping. Type of landscaping will be selected as recommended by the City and will be maintained by City staff.

**Thresholds of Significance**

**Regional Air Quality**

To estimate if the proposed parking lot may adversely affect the air quality in the region, the SCAQMD has prepared the CEQA Air Quality Handbook (SCAQMD 1993) to provide guidance to those who analyze the air quality impacts of proposed projects. The SCAQMD CEQA Air Quality Handbook states that any project in the Air Basin with daily emissions that exceed any of the identified significance thresholds should be considered as having an individually and cumulatively significant air quality impact. For the purposes of this air quality impact analysis, a regional air quality impact would be considered significant if emissions exceed the SCAQMD significance thresholds identified in Table A.

**Table A – SCAQMD Regional Criteria Pollutant Emission Thresholds of Significance**

	Pollutant Emissions (pounds/day)					
	VOC	NOx	CO	SOx	PM10	PM2.5
Construction	75	100	550	150	150	55
Operation	55	55	550	150	150	55

Source: <http://www.aqmd.gov/ceqa/handbook/signthres.pdf>

**Local Air Quality**

Project-related construction and operational air emissions may have the potential to exceed the State and Federal air quality standards in the project vicinity, even though these pollutant emissions may not be significant enough to create a regional impact to the Air Basin. In order to assess local air quality impacts the SCAQMD has developed Localized Significant Thresholds (LSTs) to assess the project-related air emissions in the project vicinity. SCAQMD has also provided Final Localized Significance Threshold Methodology (LST Methodology), July 2008, which details the methodology to analyze local air emission impacts. The LST Methodology found that the primary emissions of concern are NO<sub>2</sub>, CO, PM10, and PM2.5.

The LST Methodology provides Look-Up Tables with different thresholds based on the location and size of the project site and distance to the nearest sensitive receptors. As detailed above in Section 6.3, the project site is located in Air Monitoring Area 34, Central San Bernardino Valley. The Look-Up Tables provided in the LST Methodology include project site acreage sizes of 1-acre, 2-acres and 5-acres. Since the proposed project would disturb up to 2.4 acres, the 2-acre thresholds were utilized, since the 2-acre thresholds provide more conservative thresholds than the 5-acre thresholds.

The nearest sensitive receptor to the project site is Packinghouse Christian Academy that is located as near as 4,100 feet (1,250 meters) south of the project site. As such, the 500 meter (1,640 foot) threshold was utilized, since that is the largest distance threshold available in the Look-up Tables. Table B below shows the LSTs for NO<sub>2</sub>, PM10 and PM2.5 for both construction and operational activities.

**Table B – SCAQMD Local Air Quality Thresholds of Significance**

Activity	Allowable Emissions (pounds/day) <sup>1</sup>			
	NOx	CO	PM10	PM2.5
Construction	684	23,304	205	104
Operation	684	23,304	50	25

Notes:

<sup>1</sup> The nearest offsite sensitive receptor is the Packinghouse Christian Academy, located as near as 4,100 feet (1,250 meters) south of the project site. As such, the 500 meter threshold (largest threshold available) was utilized.

Source: Calculated from SCAQMD’s Mass Rate Look-up Tables for two acres in Air Monitoring Area 34, San Bernardino Valley.

### Greenhouse Gas Emissions

The *City of Redlands Climate Action Plan* (Redlands CAP), was adopted on December 5, 2017. The Redlands CAP was prepared pursuant to Section 15183.5(b) of the CEQA Guidelines to be utilized as a tiering document for the General Plan as well as future projects within the City that are consistent with the General Plan. The Redlands CAP incorporates the guidelines established in CARB’s 2017 Scoping Plan. The 2017 Scoping Plan was prepared to meet the GHG emissions reduction targets set in Executive Order S-3-15 and SB 32 that recommends local governments to develop plans to reduce GHG emissions to 6 MTCO<sub>2</sub>e per capita per year by the year 2030 and 2 MTCO<sub>2</sub>e per capita per year by the year 2050. Since the Redlands CAP was prepared in coordination with the General Plan that has a horizon year of 2035, the Redlands CAP provides a year 2035 target of 5 MTCO<sub>2</sub>e per capita per year, which was determined through interpolation of the 2030 and 2035 GHG emissions targets, which also aligns with the reduction targets provided in the 2022 Scoping Plan. Since a per capita threshold does not apply to the proposed project, the SCAQMD thresholds has been utilized, instead.

In order to identify significance criteria under CEQA for development projects, SCAQMD initiated a Working Group, which provided detailed methodology for evaluating significance under CEQA. At the September 28, 2010 Working Group meeting, the SCAQMD released its most current version of the draft GHG emissions thresholds, which recommends a tiered approach that provides a quantitative annual threshold of 3,000 MTCO<sub>2</sub>e for all land use projects.

### CalEEMod Model Input Parameters

The criteria pollutants and GHG emissions impacts created by the proposed project have been analyzed through use of the California Emissions Estimator Model (CalEEMod) Version 2022.1.1.29 CalEEMod is a computer model published by the California Air Pollution Control Officers Association (CAPCOA) for estimating air pollutant and GHG emissions. The CalEEMod program uses the EMFAC2021 computer program to calculate the emission rates specific for the South Coast Air Basin portion of San Bernardino County for employee, vendor and haul truck vehicle trips and the OFFROAD2011 computer program to calculate emission rates for heavy equipment operations. EMFAC2021 and OFFROAD2011 are computer programs generated by CARB that calculates composite emission rates for vehicles. Emission rates are reported by the program in grams per trip and grams per mile or grams per running hour.

The project characteristics in the CalEEMod model were set to a project location of the South Coast Air Basin portion of San Bernardino County, utility companies of Southern California Edison and Southern California Gas and a project opening year of 2025.

### Land Use Parameters

The proposed project’s land use parameters that were entered into the CalEEMod model are shown in Table C.

**Table C – CalEEMod Land Use Parameters**

Proposed Land Use	Land Use Subtype in CalEEMod	Land Use Size <sup>1</sup>	Lot Acreage <sup>2</sup>	Building <sup>3</sup> (sq ft)	Landscaped Area <sup>4</sup> (sq ft)
Reservoir & Pump Station	User Defined Industrial	13.6 TSF	2.20	13,559	9,587
Paved Area	Other Asphalt Surfaces	8.68 TSF	0.20	--	868

Notes:

<sup>1</sup> TSF = Thousand square feet.

<sup>2</sup> Lot acreage calculated based on the total disturbed area of 2.4 acres.

<sup>3</sup> Building square feet represent area where architectural coatings will be applied

<sup>4</sup> Landscaped area based on 10 percent of disturbed area landscaped.

### Construction Parameters

Construction of the proposed project is anticipated to start in Fall 2025 and the CalEEMod default construction phasing and timing was utilized, which found that construction would be completed in approximately 13 months. The construction-related GHG emissions were based on a 30-year amortization rate as recommended in the SCAQMD GHG Working Group meeting on November 19, 2009.

The worker trips and truck trips utilized for each phase of construction was based on the CalEEMod default values. For the construction equipment, the only change to the default values were the Tractors/Loaders/Backhoes equipment in the Site Preparation and Grading Phases were changed to Crawler Tractors, which has higher horsepower and load factor, in order to provide for a worst-case analysis. The demolition quantity of 8,385 tons of debris that was modeled in CalEEMod was based on demolition of the 118,192 square foot office building and 2.72 acres of paved area.

CalEEMod provides the selection of reduction measures to account for project conditions that would result in less emissions than a project without these conditions. This includes the required to adherence to SCAQMD Rule 403, which requires that the Best Available Control Measures be utilized to reduce fugitive dust emissions and was modeled in CalEEMod by selection of water all exposed areas three times per day, water unpaved roads twice daily, reduce vehicle speeds on dirt roads and sweep paved roads once per month.

### Operational Parameters

In general, operation of the new reservoir tank will be passive as there will be no equipment installed on the reservoir tank that creates air emissions. However, the proposed pump station will use electricity to convey the stored water. The electricity utilized by the electric water pumps was based on the reservoir being drawn to empty two times per year, which would require the pumping of 5.5 MG. *A Survey of Energy Use in Water Companies*, prepared by Rachel Young, June 2015 found that, the average energy usage for water pumps to convey water require 1,100 kilowatt-hours (kWh) per million gallons.<sup>1</sup> As such, 6,050 kWh per year was entered into the CalEEMod model.

Since regular maintenance will be completed by existing City employees that currently work at the Wastewater Treatment Plant, the project vehicle trip rate was set to zero in CalEEMod, since no new trips

1 Obtained from: <https://www.aceee.org/sites/default/files/water-company-energy-use.pdf>

would be generated for maintenance of the project. No other changes were made to the default operational parameters in CalEEMod.

### Project Impacts

#### Construction-Related Air Quality Impacts

The construction activities for the proposed project are anticipated to include site preparation and grading of up to 2.4 acres, building construction of the proposed reservoir and pump station, paving of the access road, and application of architectural coatings. The CalEEMod model has been utilized to calculate the construction-related emissions from the proposed project and the input parameters utilized in this analysis have been detailed in Section 7.1. The maximum daily construction-related criteria pollutant emissions from the proposed project are shown below in Table D.

**Table D – Construction-Related Criteria Pollutant Emissions**

Season and Year of Construction	Maximum Daily Pollutant Emissions (pounds/day)					
	VOC	NOx	CO	SO <sub>2</sub>	PM10	PM2.5
Winter 2026	1.47	12.9	14.6	0.03	2.55	1.45
Summer 2026	1.20	10.2	12.2	0.02	0.45	0.36
Winter 2027	12.9	5.80	8.96	0.01	0.43	0.26
<b>Maximum Daily Construction Emissions</b>	<b>12.9</b>	<b>12.9</b>	<b>14.6</b>	<b>0.03</b>	<b>2.55</b>	<b>1.45</b>
SCQAMD Regional Thresholds	<b>75</b>	<b>100</b>	<b>550</b>	<b>150</b>	<b>150</b>	<b>55</b>
SCAQMD Local Thresholds <sup>1</sup>	--	<b>684</b>	<b>23,304</b>	--	<b>205</b>	<b>104</b>
Exceeds Thresholds?	No	No	No	No	No	No

Notes:

<sup>1</sup> The nearest sensitive receptor is Packinghouse Christian Academy, located as near as 4,100 feet (1,250 meters) south of the project site. As such, the 500-meter threshold (largest threshold available) was utilized. Calculated from SCAQMD’s Mass Rate Look-up Tables for two acres in Air Monitoring Area 34, San Bernardino Valley.

Source: CalEEMod Version 2022.1.

Table D shows that none of the analyzed criteria pollutants would exceed either the regional or local emissions thresholds during construction of the proposed project. Therefore, a less than significant regional or local air quality impact would occur from construction of the proposed project.

#### Toxic Air Contaminant Impacts

The greatest potential for toxic air contaminant emissions would be related to diesel particulate matter (DPM) emissions associated with heavy equipment operations during construction of the proposed project. According to SCAQMD methodology, health effects from carcinogenic air toxics are usually described in terms of “individual cancer risk”. “Individual Cancer Risk” is the likelihood that a person exposed to concentrations of toxic air contaminants over a 70-year lifetime will contract cancer, based on the use of standard risk-assessment methodology. It should be noted that the most current cancer risk assessment methodology recommends analyzing a 30 year exposure period for the nearby sensitive receptors (OEHA, 2015).

Given the relatively limited number of heavy-duty construction equipment, the varying distances that construction equipment would operate to the nearby sensitive receptors, and the short-term construction schedule, the proposed project would not result in a long-term (i.e., 30 or 70 years) substantial source of toxic air contaminant emissions and corresponding individual cancer risk. In addition, California Code of

Regulations Title 13, Article 4.8, Chapter 9, Section 2449 regulates emissions from off-road diesel equipment in California. This regulation limits idling of equipment to no more than five minutes, requires equipment operators to label each piece of equipment and provide annual reports to CARB of their fleet’s usage and emissions. This regulation also requires systematic upgrading of the emission Tier level of each fleet, and currently no commercial operator is allowed to purchase Tier 0, Tier 1 or Tier 2 equipment. In addition to the purchase restrictions, equipment operators need to meet fleet average emissions targets that become more stringent each year between years 2014 and 2023. By January, 2026, 75 percent or more of all contractors’ equipment fleets must be Tier 2 or higher and by January, 2029 100 percent of all equipment fleets must be Tier 2 or higher. Therefore, no significant short-term DPM impacts would occur during construction of the proposed project.

### Long-Term Operational Air Quality Impacts

The proposed project would consist of operation of the proposed recycled water reservoir and pump station. The proposed project would generate air emissions from area sources, and energy usage. The operations-related criteria air quality impacts created by the proposed project have been analyzed through use of the CalEEMod model. The worst-case summer or winter VOC, NOx, CO, SO<sub>2</sub>, PM10, and PM2.5 daily emissions created from the proposed project’s long-term operations are summarized below in Table E and the CalEEMod emissions printouts are attached to this Memo.

**Table E – Operations-Related Criteria Pollutant Emissions**

Emissions Source	Pollutant Emissions (pounds/day)					
	ROG	NOx	CO	SO <sub>2</sub>	PM10	PM2.5
Mobile Sources <sup>1</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Area Sources <sup>2</sup>	0.42	<0.01	<0.01	<0.01	<0.01	<0.01
Energy Usage <sup>3</sup>	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Total Operational Emissions</b>	<b>0.42</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>
SCAQMD Regional Thresholds	<b>55</b>	<b>55</b>	<b>550</b>	<b>150</b>	<b>150</b>	<b>55</b>
SCAQMD Local Thresholds <sup>4</sup>	--	<b>684</b>	<b>23,304</b>	--	<b>205</b>	<b>104</b>
Exceeds Thresholds?	No	No	No	No	No	No

Notes:

<sup>1</sup> Mobile sources consist of emissions from vehicles and road dust. As detailed above, operation of the project would not generate any new trips.

<sup>2</sup> Area sources consist of emissions from consumer products, architectural coatings, and landscaping equipment.

<sup>3</sup> Energy usage consists of emissions from natural gas usage. The project would not include any appliances that use natural gas.

<sup>4</sup> The nearest sensitive receptor is Packinghouse Christian Academy, located as near as 4,100 feet (1,250 meters) south of the project site. As such, the 500-meter threshold (largest threshold available) was utilized. Calculated from SCAQMD’s Mass Rate Look-up Tables for two acres in Air Monitoring Area 34, San Bernardino Valley.

Source: CalEEMod Version 2022.1

The data provided in Table E above shows that none of the analyzed criteria pollutants would exceed either the regional or local emissions thresholds during operation of the proposed project. Therefore, a less than significant regional or local air quality impacts would occur from operation of the proposed project.

### Generation of Greenhouse Gas Emissions

The proposed project would result in the construction and operation of a recycled water reservoir and pump station. The proposed project is anticipated to generate GHG emissions from area sources, energy

usage, waste disposal, water usage, refrigeration, and construction equipment. The project’s GHG emissions have been calculated with the CalEEMod model and the results is shown below in Table F.

**Table F – Project Related Greenhouse Gas Annual Emissions**

Category	Greenhouse Gas Emissions (Metric Tons per Year)			
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
Mobile Sources <sup>1</sup>	<0.01	<0.01	<0.01	<0.01
Area Sources <sup>2</sup>	0.27	<0.01	<0.01	0.28
Energy Usage <sup>3</sup>	1.57	<0.01	<0.01	1.57
Water and Wastewater <sup>4</sup>	0.22	<0.01	<0.01	0.22
Solid Waste <sup>5</sup>	<0.01	<0.01	<0.01	<0.01
Construction <sup>6</sup>	8.42	<0.01	<0.01	8.45
<b>Proposed Project Total GHG Emissions</b>	<b>10.48</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>10.52</b>
<b>SCAQMD Draft Threshold</b>				<b>3,000</b>
Exceed Threshold?				No

Notes:

<sup>1</sup> Mobile sources consist of GHG emissions from vehicles. As detailed above, operation of the project would not generate any new trips.

<sup>2</sup> Area sources consist of GHG emissions from consumer products, architectural coatings, and landscaping equipment.

<sup>3</sup> Energy usage consists of GHG emissions from electricity and natural gas usage.

<sup>4</sup> Water includes GHG emissions from electricity used for transport of water and processing of wastewater for landscaping.

<sup>5</sup> Solid Waste includes the CO<sub>2</sub> and CH<sub>4</sub> emissions created from the solid waste placed in landfills.

<sup>6</sup> Construction emissions amortized over 30 years as recommended in the SCAQMD GHG Working Group on November 19, 2009.

Source: CalEEMod Version 2022.1.

The data provided in Table F above shows that the proposed project would create 10.52 MTCO<sub>2</sub>e per year. According to the SCAQMD’s threshold of significance, a cumulative global climate change impact would occur if the GHG emissions created from the on-going operations would exceed 3,000 MTCO<sub>2</sub>e per year. Therefore, a less than significant generation of greenhouse gas emissions would occur from development of the proposed project. Impacts would be less than significant.

### Greenhouse Gas Plan Consistency

The proposed project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing GHG emissions. The applicable plan for the proposed project is the Redlands CAP that was prepared pursuant to Section 15183.5(b) of the CEQA Guidelines to be utilized as a tiering document for the General Plan as well as future projects within the City that are consistent with the General Plan. Since the proposed project is consistent with the General Plan, the proposed project meets the criteria allowed for use of the Redlands CAP for analysis of the proposed project.

In addition, as detailed above, the proposed project is anticipated to create 10.52 MTCO<sub>2</sub>e per year, which is well below the SCAQMD threshold of significance of 3,000 MTCO<sub>2</sub>e per year. The SCAQMD developed this threshold in order to meet the State GHG emissions reduction regulations that was based on substantial evidence supporting the use of the recommended thresholds. Therefore, the proposed project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

## Energy Consumption

### Setting

Energy use, especially through fossil fuel consumption and combustion, relates directly to environmental quality since it can adversely affect air quality and generate GHG emissions that contribute to climate change. Electrical power is generated through a variety of sources, including fossil fuel combustion, hydropower, wind, solar, biofuels, and others. Natural gas is widely used to heat buildings, prepare food in restaurants and residences, and fuel vehicles, among other uses. Fuel use for transportation is related to the fuel efficiency of cars, trucks, and public transportation; choice of different travel modes such as auto, carpool, and public transit; and miles traveled by these modes and is generally based on petroleum-based fuels such as diesel and gasoline. Electric vehicles (EVs) may not have any direct emissions but do have indirect emissions via the source of electricity generated to power the vehicle. Construction and routine operation and maintenance of transportation infrastructure also consume energy.

In 2022, San Bernardino County consumed 16,630 Gigawatt-hours per year of electricity<sup>2</sup>. The proposed project would not include any appliances that would use natural gas. Therefore, the proposed project would not consume any natural gas.

Petroleum-based fuels currently account for a majority of the California's transportation energy sources and primarily consist of diesel and gasoline types of fuels. However, the state has been working on developing strategies to reduce petroleum use. Over the last decade California has implemented several policies, rules, and regulations to improve vehicle efficiency, increase the development and use of alternative fuels, reduce air pollutants and GHG emissions from the transportation sector, and reduce vehicle miles traveled (VMT). Accordingly, petroleum-based fuel consumption in California has declined. In 2023 897 million gallons of gasoline and 267 million gallons of diesel was sold in San Bernardino County<sup>3</sup>.

### Construction Impacts

Construction activities would require energy for the manufacture and transportation of building materials, preparation of the site (e.g., site clearing, and grading), and the actual construction of the reservoir and pump station. Petroleum-based fuels such as diesel fuel and gasoline would be the primary sources of energy for these tasks.

The off-road construction equipment diesel fuel usage was calculated through use of the off-road equipment assumptions provided in the CalEEMod output files and CARB's off-road equipment fuel use assumptions. The off-road equipment diesel fuel calculations are attached to this Memo, which found that off-road equipment would consume 23,935 gallons of diesel fuel.

Fuel use associated with construction vehicle trips generated by the proposed project was also estimated; trips include construction worker trips, haul truck trips for material transport, and vendor trips for construction material deliveries. Fuel use from these vehicles traveling to the project site was based on (1) the projected number of trips the proposed project would generate during construction (obtained from the CalEEMod output file attached to this Memo), (2) average trip distances by trip type, and (3) average miles per gallon rates estimated in the ARB Emission Factors (EMFAC) mobile source emission

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<sup>2</sup> Obtained from: <http://www.ecdms.energy.ca.gov/elecbycounty.aspx>

<sup>3</sup> Obtained from: <https://www.energy.ca.gov/media/3874>

model attached to this Memo, which found on-road construction-related vehicle trips would consume 1,019 gallons of gasoline and 675 gallons of diesel fuel during construction of the proposed project.

Construction activities associated with the Project would be required to adhere to all State and SCAQMD regulations for off-road equipment and on-road trucks, which provide minimum fuel efficiency standards. As such, construction activities for the proposed project would not result in the wasteful, inefficient, and unnecessary consumption of energy resources. Impacts regarding transportation energy would be less than significant.

During construction the proposed project would consume electricity to construct the new reservoir and pump station. Electricity would be supplied to the project site by Southern California Edison and would be obtained from the existing electrical lines in the vicinity of the project site. The use of electricity from existing power lines rather than temporary diesel or gasoline powered generators would minimize impacts on energy use. Electricity consumed during project construction would vary throughout the construction period based on the construction activities being performed. Various construction activities include electricity associated with the conveyance of water that would be used during project construction for dust control (supply and conveyance) and electricity to power any necessary lighting during construction, electronic equipment, or other construction activities necessitating electrical power. Such electricity demand would be temporary, nominal, and would cease upon the completion of construction. Overall, construction activities associated with the proposed project would require limited electricity consumption that would not be expected to have an adverse impact on available electricity supplies and infrastructure. Therefore, the use of electricity during project construction would not be wasteful, inefficient, or unnecessary.

### Operational Impacts

The on-going operation of the proposed project would require the use of electricity for running the pumps and control systems. Energy would also be consumed during operations related to water usage (for landscape irrigation), solid waste disposal, and landscape equipment. Since regular maintenance will be completed by existing City employees that currently work at the Wastewater Treatment Plant, no new trips would be generated for maintenance of the project. As such, no natural gas will be consumed and no increase in petroleum fuel will occur from operation of the proposed project and operational energy use will be limited to electricity consumption.

The CalEEMod model calculated that operation of the proposed project would consume 6,500 kilowatt-hours per year of electricity. This equates to 0.00004 percent of the electricity consumed annually in San Bernardino County. As such, the operations-related electricity use would be nominal, when compared to current electricity usage rates in the County.

It should be noted that, the proposed project would incorporate PV solar panels to reduce electricity usage. Therefore, it is anticipated the proposed project will be designed and built to minimize electricity use and that existing and planned electricity capacity and electricity supplies would be sufficient to support the proposed project's electricity demand. Thus, the project would not result in the wasteful or inefficient use of electricity and no mitigation measures would be required.

### **Energy Plan Consistency**

The proposed project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency. The applicable energy plan for the proposed project is the *City of Redlands General*



*Plan 2035*, adopted December 5, 2017, that includes Section 8.1 Energy Efficiency and Conservation. The proposed project consists of development of a reservoir for recycled water and associated pump station for conveyance of the recycled water, which will reduce the amount of water that will need to be imported to the City and promotes conservation of water, through re-using waste water. Therefore, the proposed project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency. Impacts would be less than significant.

Please let me know if you have any questions or need additional information with regard to the above analysis. I can be reached at (949) 510-5355, or email me at [greg@vistalb.com](mailto:greg@vistalb.com).

Sincerely,

A handwritten signature in black ink that reads "Greg Tonkovich".

Greg Tonkovich, AICP

Senior Analyst

Vista Environmental

949 510 5355

Encl.: CalEEMod Model Printouts  
Petroleum Fuel Consumption Calculations

# Recycled Water Reservoir & Pump Station Detailed Report

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# 1. Basic Project Information

## 1.1. Basic Project Information

Data Field	Value
Project Name	Recycled Water Reservoir & Pump Station
Construction Start Date	1/1/2026
Operational Year	2027
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.50
Precipitation (days)	11.2
Location	34.089315123985656, -117.21706682087867
County	San Bernardino-South Coast
City	Redlands
Air District	South Coast AQMD
Air Basin	South Coast
TAZ	5393
EDFZ	10
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas
App Version	2022.1.1.29

## 1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
User Defined Industrial	13.6	User Defined Unit	2.20	13,559	9,587	—	—	—

Other Asphalt Surfaces	8.68	1000sqft	0.20	0.00	868	—	—	—
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### 1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

## 2. Emissions Summary

### 2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.20	10.2	12.2	0.02	0.45	0.36	2,347	0.10	0.03	0.45	2,359
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	12.9	12.9	14.6	0.03	2.55	1.45	2,811	0.11	0.03	0.02	2,821
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.78	6.60	7.87	0.02	0.33	0.25	1,513	0.06	0.02	0.13	1,521
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.14	1.20	1.44	< 0.005	0.06	0.05	251	0.01	< 0.005	0.02	252
Exceeds (Daily Max)	—	—	—	—	—	—	—	—	—	—	—
Threshold	75.0	100	550	150	150	55.0	—	—	—	—	—
Unmit.	No	No	No	No	No	No	—	—	—	—	—
Exceeds (Average Daily)	—	—	—	—	—	—	—	—	—	—	—
Threshold	75.0	100	550	150	150	55.0	—	—	—	—	—
Unmit.	No	No	No	No	No	No	—	—	—	—	—

### 2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
2026	1.20	10.2	12.2	0.02	0.45	0.36	2,347	0.10	0.03	0.45	2,359
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
2026	1.47	12.9	14.6	0.03	2.55	1.45	2,811	0.11	0.03	0.02	2,821
2027	12.9	5.80	8.96	0.01	0.43	0.26	1,430	0.05	0.02	0.02	1,436
Average Daily	—	—	—	—	—	—	—	—	—	—	—
2026	0.78	6.60	7.87	0.02	0.33	0.25	1,513	0.06	0.02	0.13	1,521
2027	0.36	0.05	0.07	< 0.005	< 0.005	< 0.005	9.66	< 0.005	< 0.005	< 0.005	9.70
Annual	—	—	—	—	—	—	—	—	—	—	—
2026	0.14	1.20	1.44	< 0.005	0.06	0.05	251	0.01	< 0.005	0.02	252
2027	0.07	0.01	0.01	< 0.005	< 0.005	< 0.005	1.60	< 0.005	< 0.005	< 0.005	1.61

### 2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.42	< 0.005	0.59	< 0.005	< 0.005	< 0.005	13.2	< 0.005	< 0.005	0.00	13.2
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.33	0.00	0.00	0.00	0.00	0.00	10.8	< 0.005	< 0.005	0.00	10.8
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.39	< 0.005	0.40	< 0.005	< 0.005	< 0.005	12.4	< 0.005	< 0.005	0.00	12.5







Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	< 0.005	0.13	< 0.005	< 0.005	< 0.005	< 0.005	0.13	0.13
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

### 3.3. Grading (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.42	12.9	14.0	0.02	0.58	0.53	2,455	0.10	0.02	—	2,463
Dust From Material Movement	—	—	—	—	1.84	0.89	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.21	0.23	< 0.005	0.01	0.01	40.4	< 0.005	< 0.005	—	40.5
Dust From Material Movement	—	—	—	—	0.03	0.01	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	0.04	< 0.005	< 0.005	< 0.005	6.68	< 0.005	< 0.005	—	6.70





### 3.7. Paving (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	5.88	8.19	0.01	0.25	0.23	1,244	0.05	0.01	—	1,248
Paving	0.05	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.15	0.21	< 0.005	0.01	0.01	31.6	< 0.005	< 0.005	—	31.7
Paving	< 0.005	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.04	< 0.005	< 0.005	< 0.005	5.24	< 0.005	< 0.005	—	5.26
Paving	< 0.005	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.07	0.82	0.00	0.20	0.05	190	< 0.005	0.01	0.02	192
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	< 0.005	< 0.005	< 0.005	4.90	< 0.005	< 0.005	< 0.005	0.01	4.96		
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—		
Worker	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	< 0.005	0.81	< 0.005	< 0.005	< 0.005	< 0.005	0.82		
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

### 3.9. Paving (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.65	5.74	8.20	0.01	0.23	0.21	1,244	0.05	0.01	—	1,248
Paving	0.05	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.03	< 0.005	< 0.005	< 0.005	4.87	< 0.005	< 0.005	—	4.89
Paving	< 0.005	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.81	< 0.005	< 0.005	—	0.81

Paving	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.76	0.00	0.20	0.05	186	< 0.005	0.01	0.02	188	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.75
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.74	< 0.005	< 0.005	< 0.005	0.12	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.12	< 0.005	< 0.005	< 0.005	0.12	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

### 3.11. Architectural Coating (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)																			
Location	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e								
Onsite	—	—	—	—	—	—	—	—	—	—	—								
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—								
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—								
Off-Road Equipment	0.11	0.83	1.13	< 0.005	0.02	0.02	134	0.01	< 0.005	—	134								



## 4. Operations Emissions Details

### 4.1. Mobile Emissions by Land Use

#### 4.1.1. Unmitigated

Mobile source emissions results are presented in Sections 2.6. No further detailed breakdown of emissions is available.

### 4.2. Energy

#### 4.2.1. Electricity Emissions By Land Use - Unmitigated

##### Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	9.47	< 0.005	< 0.005	—	9.51
Other Asphalt Surfaces	—	—	—	—	—	—	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	9.47	< 0.005	< 0.005	—	9.51
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	9.47	< 0.005	< 0.005	—	9.51
Other Asphalt Surfaces	—	—	—	—	—	—	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	9.47	< 0.005	< 0.005	—	9.51
Annual	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	1.57	< 0.005	< 0.005	—	1.57
Other Asphalt Surfaces	—	—	—	—	—	—	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	1.57	< 0.005	< 0.005	—	1.57

### 4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00

### 4.3. Area Emissions by Source

#### 4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Consumer Products	0.29	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.10	< 0.005	0.59	< 0.005	< 0.005	< 0.005	2.42	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.43
Total	0.42	< 0.005	0.59	< 0.005	< 0.005	< 0.005	2.42	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.43
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.29	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.05	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.01	< 0.005	0.07	< 0.005	< 0.005	< 0.005	0.27	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.28
Total	0.07	< 0.005	0.07	< 0.005	< 0.005	< 0.005	0.27	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.28

#### 4.4. Water Emissions by Land Use

##### 4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
User Defined Industrial	—	—	—	—	—	—	1.19	< 0.005	< 0.005	—	1.20





Equipment Type	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

#### 4.8. Stationary Emissions By Equipment Type

##### 4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

#### 4.9. User Defined Emissions By Equipment Type

##### 4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

#### 4.10. Soil Carbon Accumulation By Vegetation Type

##### 4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—

##### 4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10T	PM2.5T	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—

Avoided	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—

## 5. Activity Data

### 5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Site Preparation	1/30/2026	2/3/2026	5.00	3.00	—
Grading	Grading	2/4/2026	2/12/2026	5.00	6.00	—
Building Construction	Building Construction	2/13/2026	12/18/2026	5.00	220	—
Paving	Paving	12/19/2026	1/2/2027	5.00	10.0	—
Architectural Coating	Architectural Coating	1/3/2027	1/17/2027	5.00	10.0	—

### 5.2. Off-Road Equipment

#### 5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Graders	Diesel	Average	1.00	8.00	148	0.41
Site Preparation	Scrapers	Diesel	Average	1.00	8.00	423	0.48
Site Preparation	Tractors/Loaders/Back hoes	Diesel	Average	1.00	7.00	84.0	0.37
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40

Grading	Tractors/Loaders/Back	Diesel	Average	2.00	7.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	8.00	367	0.29
Building Construction	Forklifts	Diesel	Average	2.00	7.00	82.0	0.20
Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Back hoes	Diesel	Average	1.00	6.00	84.0	0.37
Building Construction	Welders	Diesel	Average	3.00	8.00	46.0	0.45
Paving	Cement and Mortar Mixers	Diesel	Average	1.00	8.00	10.0	0.56
Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38
Paving	Tractors/Loaders/Back hoes	Diesel	Average	1.00	8.00	84.0	0.37
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

### 5.3. Construction Vehicles

#### 5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Preparation	—	—	—	—
Site Preparation	Worker	7.50	18.5	LDA,LDT1,LDT2
Site Preparation	Vendor	—	10.2	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	10.0	18.5	LDA,LDT1,LDT2
Grading	Vendor	—	10.2	HHDT,MHDT
Grading	Hauling	0.00	20.0	HHDT

Grading	Onsite truck	—	—	—	HHDT
Building Construction	—	—	—	—	—
Building Construction	Worker	5.69	18.5	LDA,LDT1,LDT2	
Building Construction	Vendor	2.22	10.2	HHDT,MHDT	
Building Construction	Hauling	0.00	20.0	HHDT	
Building Construction	Onsite truck	—	—	HHDT	
Paving	—	—	—	—	
Paving	Worker	15.0	18.5	LDA,LDT1,LDT2	
Paving	Vendor	—	10.2	HHDT,MHDT	
Paving	Hauling	0.00	20.0	HHDT	
Paving	Onsite truck	—	—	HHDT	
Architectural Coating	—	—	—	—	
Architectural Coating	Worker	1.14	18.5	LDA,LDT1,LDT2	
Architectural Coating	Vendor	—	10.2	HHDT,MHDT	
Architectural Coating	Hauling	0.00	20.0	HHDT	
Architectural Coating	Onsite truck	—	—	HHDT	

## 5.4. Vehicles

### 5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

## 5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	0.00	0.00	20,339	6,780	521

## 5.6. Dust Mitigation

### 5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Preparation	—	—	4.50	0.00	—
Grading	—	—	6.00	0.00	—
Paving	0.00	0.00	0.00	0.00	0.20

### 5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	3	74%	74%

### 5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
User Defined Industrial	0.00	0%
Other Asphalt Surfaces	0.20	100%

### 5.8. Construction Electricity Consumption and Emissions Factors

#### kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2026	0.00	532	0.03	< 0.005
2027	0.00	532	0.03	< 0.005

### 5.9. Operational Mobile Sources

#### 5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Total all Land Uses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

## 5.10. Operational Area Sources

### 5.10.1. Hearths

#### 5.10.1.1. Unmitigated

### 5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	20,339	6,780	521

### 5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	250

## 5.11. Operational Energy Consumption

### 5.11.1. Unmitigated

Land Use	Electricity (kWh/yr)			CO2		CH4		N2O		Natural Gas (kBTU/yr)	
	CO2	CH4	N2O	CO2	CH4	CO2	CH4	CO2	CH4	CO2	CH4
User Defined Industrial	6,500	532	0.0330	532	0.0330	0.0040	0.0040	0.0040	0.0040	0.00	0.00
Other Asphalt Surfaces	0.00	532	0.0330	532	0.0330	0.0040	0.0040	0.0040	0.0040	0.00	0.00

## 5.12. Operational Water and Wastewater Consumption

### 5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
User Defined Industrial	0.00	153,959

Other Asphalt Surfaces	0.00	13,939
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### 5.13. Operational Waste Generation

#### 5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
User Defined Industrial	0.00	—
Other Asphalt Surfaces	0.00	—

### 5.14. Operational Refrigeration and Air Conditioning Equipment

#### 5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
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### 5.15. Operational Off-Road Equipment

#### 5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
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### 5.16. Stationary Sources

#### 5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor
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#### 5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)
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## 5.17. User Defined

Equipment Type	Fuel Type
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## 5.18. Vegetation

### 5.18.1. Land Use Change

#### 5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres
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### 5.18.1. Biomass Cover Type

#### 5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres
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### 5.18.2. Sequestration

#### 5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)
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## 6. Climate Risk Detailed Report

### 6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	26.6	annual days of extreme heat
Extreme Precipitation	4.20	annual days with precipitation above 20 mm

Sea Level Rise	—	meters of inundation depth
Wildfire	6.46	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi. Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi. Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

### 6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	3	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure. The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

### 6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	3	1	1	3

35 / 40

Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

## 6.4. Climate Risk Reduction Measures

# 7. Health and Equity Details

## 7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	100
AQ-PM	57.4
AQ-DPM	82.8
Drinking Water	96.3
Lead Risk Housing	29.2
Pesticides	74.7
Toxic Releases	44.2
Traffic	81.0
Effect Indicators	—

CleanUp Sites	81.9
Groundwater	47.6
Haz Waste Facilities/Generators	96.8
Impaired Water Bodies	12.5
Solid Waste	0.00
Sensitive Population	—
Asthma	34.7
Cardio-vascular	45.1
Low Birth Weights	75.6
Socioeconomic Factor Indicators	—
Education	39.2
Housing	89.1
Linguistic	17.3
Poverty	55.9
Unemployment	14.4

## 7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	37.76466059
Employed	27.51186963
Median HI	26.53663544
Education	—
Bachelor's or higher	60.5800077
High school enrollment	100
Preschool enrollment	11.52316181
Transportation	—

Auto Access	62.47914795
Active commuting	28.56409598
Social	—
2-parent households	37.02040293
Voting	39.83061722
Neighborhood	—
Alcohol availability	30.07827538
Park access	50.53252919
Retail density	65.94379571
Supermarket access	72.28281791
Tree canopy	43.62889773
Housing	—
Homeownership	9.303220839
Housing habitability	37.12305916
Low-inc homeowner severe housing cost burden	73.38637239
Low-inc renter severe housing cost burden	66.31592455
Uncrowded housing	31.19466188
Health Outcomes	—
Insured adults	48.58206082
Arthritis	92.2
Asthma ER Admissions	65.8
High Blood Pressure	95.2
Cancer (excluding skin)	82.6
Asthma	30.0
Coronary Heart Disease	94.7
Chronic Obstructive Pulmonary Disease	71.2
Diagnosed Diabetes	92.6
Life Expectancy at Birth	79.7

Cognitively Disabled	52.2
Physically Disabled	60.6
Heart Attack ER Admissions	32.7
Mental Health Not Good	41.5
Chronic Kidney Disease	95.6
Obesity	56.2
Pedestrian Injuries	53.3
Physical Health Not Good	67.2
Stroke	91.3
Health Risk Behaviors	—
Binge Drinking	13.6
Current Smoker	36.3
No Leisure Time for Physical Activity	67.1
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	7.3
Elderly	81.9
English Speaking	84.0
Foreign-born	37.0
Outdoor Workers	85.1
Climate Change Adaptive Capacity	—
Impervious Surface Cover	69.4
Traffic Density	74.6
Traffic Access	23.0
Other Indices	—
Hardship	54.2
Other Decision Support	—

58.0

2016 Voting

### 7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	72.0
Healthy Places Index Score for Project Location (b)	32.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.  
 b: The maximum Healthy Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

### 7.4. Health & Equity Measures

No Health & Equity Measures selected.

### 7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

### 7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

### 8. User Changes to Default Data

Screen	Justification
Land Use	Total area disturbed 2.4 acres. 10% of area landscaped.
Construction: Construction Phases	No demolition required
Operations: Energy Use	Electric water pumps would utilize an average of 1,100 kWh/MG. Based on drain reservoir twice per year would use 6,500 kWh per year

## Petroleum Fuel Usage Calculations

### Construction-Related Petroleum Fuels

The off-road construction equipment fuel usage was calculated through use of the off-road equipment assumptions utilized in the CalEEMod model run provided in Appendix A and the fuel usage calculations provided in the 2017 Off-road Diesel Emission Factors spreadsheet, prepared by CARB. The Spreadsheet provides the following formula to calculate fuel usage from off-road equipment:

Fuel Used = Load Factor x Horsepower x Total Operational Hours x BSFC / Unit Conversion

Where:

Load Factor - Obtained from CalEEMod default values

Horsepower – Obtained from CalEEMod default values

Total Operational Hours – Calculated by multiplying CalEEMod default daily hours by the estimated number of working days for each phase of construction

BSFC – Brake Specific Fuel Consumption (pounds per horsepower-hour) – If less than 100 Horsepower = 0.408, if greater than 100 Horsepower = 0.367

Unit Conversion – Converts pounds to gallons = 7.109

The Following Table shows the off-road construction equipment fuel calculations based on the above formula, which shows that the off-road equipment utilized during construction of the proposed project would consume 23,935 gallons of diesel fuel.

### Off-Road Construction Equipment Modeled in CalEEMod and Fuel Used

Equipment Type	Equipment Quantity	Horse-Power	Load Factor	Operating Hours Per Day	Total Operational Hours <sup>1</sup>	Fuel Used (gallons)
<b>Site Preparation</b>						
Grader	1	148	0.41	8	24	75
Scraper	1	423	0.48	8	24	252
Tractors/Loaders/Backhoes	1	84	0.37	8	24	43
<b>Grading</b>						
Grader	1	148	0.41	8	48	150
Rubber Tired Dozer	1	367	0.4	8	48	364
Tractors/Loaders/Backhoes	2	84	0.37	7	84	150
<b>Building Construction</b>						
Crane	1	367	0.29	8	1,760	9,670
Forklifts	2	82	0.2	7	3,080	2,889
Generator Set	1	14	0.74	8	1,760	1,046
Tractors/Loaders/Backhoes	1	84	0.37	6	1,320	2,355
Welders	3	46	0.45	8	5,280	6,273
<b>Paving</b>						
Cement and Mortar Mixers	1	10	0.56	8	80	26
Paver	1	81	0.42	8	80	156
Paving Equipment	1	89	0.36	8	80	147
Rollers	2	36	0.38	8	160	126
Tractors/Loaders/Backhoes	1	84	0.37	8	80	143
<b>Architectural Coatings</b>						
Air Compressor	1	37	0.48	6	60	61
<b>Total Off-Road Equipment Diesel Fuel used during Construction (gallons)</b>						<b>23,935</b>

Notes:

<sup>1</sup> Based on: 3 days for Site Preparation, 6 days for Grading, 220 days for Building Construction, 10 days for Paving, and 10 days for Architectural Coatings.

Source: CalEEMod Version 2022.1, CARB, 2017.

The on-road construction-related vehicle trips fuel usage was calculated through use of the default construction vehicle trip assumptions from the CalEEMod model run. The calculated total construction miles were then divided by the fleet average for the South Coast Air Basin portion of San Bernardino County miles per gallon rates for the year 2026 that were calculated through use of the EMFAC2021 model and the EMFAC2021 model printouts are attached. The worker trips were based on the combined fleet average miles per gallon rates for gasoline powered automobiles, SUVs and pickup trucks and the vendor and haul truck trips were based on the combined T4, T5, T6 and T7 diesel trucks fleet average miles per gallon rate. The following Table shows the on-road construction vehicle trips modeled in CalEEMod and the fuel usage calculations, which shows that the on-road construction-related vehicle trips would consume

1,019 gallons of gasoline and 675 gallons of diesel fuel during construction of the proposed project.

**On-Road Construction Vehicle Trips Modeled in CalEEMod and Fuel Used**

<b>Vehicle Trip Types / Fuel Type</b>	<b>Daily Trips</b>	<b>Trip Length (miles)</b>	<b>Total per Day (miles)</b>	<b>Total per Phase (miles)</b>	<b>Fleet Average Miles per Gallon</b>	<b>Fuel Used (gallons)</b>
<b>Site Preparation</b>						
Worker (Gasoline)	7.5	18.5	139	416	27.2	15
<b>Grading</b>						
Worker (Gasoline)	10	18.5	185	1,110	27.2	41
<b>Building Construction</b>						
Worker (Gasoline)	5.69	18.5	105	23,158	27.2	853
Vendor (Diesel)	2.22	10.2	23	4,982	7.4	675
<b>Paving</b>						
Worker (Gasoline)	15	18.5	278	2,775	27.2	102
<b>Architectural Coatings</b>						
Worker (Gasoline)	1.14	18.5	21	211	27.2	8
<b>Total Gasoline Fuel Used from On-Road Construction Trips (gallons)</b>						<b>1,019</b>
<b>Total Diesel Fuel Used from On-Road Construction Trips (gallons)</b>						<b>675</b>

Notes:

<sup>1</sup> Based on 3 days for Site Preparation, 6 days for Grading , 220 days for Building Construction, 10 days for Paving, and 10 days for Architectural Coatings.

Source: CalEEMod Version 2022.1, CARB, 2017.

**Source: EMFAC2021 (v1.0.2) Emissions Inventory**

Region Type: Sub-Area

Region: San Bernardino (SC)

Calendar Year: 2026

Season: Annual

Vehicle Classification: EMFAC202x Categories

Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	Calendar Y	Vehicle Category	Model Year	Speed	Fuel	Population	Total VMT	Trips	Fuel Consumption
San Bernardino (SC)	2026	LDA	Aggregate	Aggregate	Gasoline	456255	19874166	2117601	641.5
San Bernardino (SC)	2026	LDT1	Aggregate	Aggregate	Gasoline	39064	1360018	169062	53.4
San Bernardino (SC)	2026	LDT2	Aggregate	Aggregate	Gasoline	202613	8343535	949149	327.3
San Bernardino (SC)	2026	MCY	Aggregate	Aggregate	Gasoline	20884	122976	41769	2.9
San Bernardino (SC)	2026	MDV	Aggregate	Aggregate	Gasoline	147189	5833278	673333	282.9
San Bernardino (SC)	2026	T6 Instate Deliver	Aggregate	Aggregate	Diesel	650	21918	9271	2.5
San Bernardino (SC)	2026	T6 Instate Deliver	Aggregate	Aggregate	Diesel	785	26665	11205	3.0
San Bernardino (SC)	2026	T6 Instate Deliver	Aggregate	Aggregate	Diesel	3132	105877	44697	11.9
San Bernardino (SC)	2026	T6 Instate Deliver	Aggregate	Aggregate	Diesel	571	30842	8143	3.4
San Bernardino (SC)	2026	T6 Instate Other	Aggregate	Aggregate	Diesel	1202	49842	13893	5.6
San Bernardino (SC)	2026	T6 Instate Other	Aggregate	Aggregate	Diesel	3114	133523	36000	15.0
San Bernardino (SC)	2026	T6 Instate Other	Aggregate	Aggregate	Diesel	2699	114244	31199	12.8
San Bernardino (SC)	2026	T6 Instate Other	Aggregate	Aggregate	Diesel	1591	73936	18391	8.1
San Bernardino (SC)	2026	T6 Instate Tractor	Aggregate	Aggregate	Diesel	25	1292	290	0.1
San Bernardino (SC)	2026	T6 Instate Tractor	Aggregate	Aggregate	Diesel	888	51794	10263	5.4
San Bernardino (SC)	2026	T7 Single Concret	Aggregate	Aggregate	Diesel	387	26532	3643	4.3
San Bernardino (SC)	2026	T7 Single Dump	Aggregate	Aggregate	Diesel	739	40939	6965	6.9
San Bernardino (SC)	2026	T7 SWCV Class 8	Aggregate	Aggregate	Diesel	380	24667	1748	9.0
San Bernardino (SC)	2026	T7 Tractor Class 8	Aggregate	Aggregate	Diesel	4051	296087	58863	47.3

Worker (Autos) vehicle miles per day 35,533,973 1,308 1,000 gall per day  
 Workers (Autos) Avg Miles per gallon 27.2 1,308,072 gallons per day

Diesel Truck vehicle miles per day 998,157 135 1,000 gall per day  
 Diesel Truck Fleet Avg Miles per gallon 7.4 135,180 gallons per day

## **APPENDIX B – GEOTECHNICAL INVESTIGATION REPORT**





**Converse Consultants**

Geotechnical Engineering  
Environmental & Groundwater Science  
Inspection & Testing Services

# GEOTECHNICAL INVESTIGATION REPORT

## NEW 2.75 MG TANK AND PUMP STATION AT THE REDLANDS WASTEWATER TREATMENT PLANT

1950 Nevada Street  
City of Redlands, San Bernardino County, California

CONVERSE PROJECT No. 21-81-276-01



*Prepared For:*

**CAROLLO ENGINEERS, INC.**

707 Wilshire Blvd., Ste. 3920  
Los Angeles, CA 90017

*Presented By:*

**CONVERSE CONSULTANTS**

2021 Rancho Drive, Suite 1  
Redlands, CA 92373  
909-796-0544

August 23, 2023



# Converse Consultants

Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

August 23, 2023

Mr. Miko Aivazian, PE  
Principal infrastructure Engineer  
Vice President  
Carollo Engineers, Inc.  
707 Wilshire Boulevard, Suite 3920  
Los Angeles, CA 90017

Subject: **GEOTECHNICAL INVESTIGATION REPORT**  
**New 2.75 MG Tank and Pump Station at the Redlands Wastewater Treatment Plant (WWTP)**  
1950 Nevada Street  
City of Redlands, San Bernardino County, California  
Converse Project No. 21-81-276-01

Dear Mr. Aivazian:

Converse Consultants (Converse) has prepared this Geotechnical Investigation Report to assist with the design and construction of the proposed new 2.75 MG Tank and Pump Station at the Redlands Wastewater Treatment Plant (WWTP) located 1950 Nevada Street, City of Redlands, San Bernardino County, California. This report was prepared in accordance with our second revised proposal dated November 29, 2022, and your Agreement for Professional Services dated November 30, 2022.

Based upon our field investigation, laboratory data, and analyses, the project site is considered feasible from a geotechnical standpoint, provided the recommendations presented in this report are incorporated into the design and development of the project.

We appreciate the opportunity to be of service to Carollo Engineers, Inc. and the City of Redlands. If you have any questions, please do not hesitate to contact us at 909-474-2847.

## CONVERSE CONSULTANTS

Hashmi S. E. Quazi, PhD, PE, GE  
Principal Engineer

Dist.: 1/Addressee (email)  
SR/SM/RLG/HSQ/kvg

### PROFESSIONAL CERTIFICATION

This report has been prepared by the individuals whose seals and signatures appear hereon.

The findings, recommendations, specifications or professional opinions contained in this report were prepared in accordance with generally accepted professional engineering and engineering geologic principles and practice in this area of Southern California. There is no warranty, either expressed or implied.



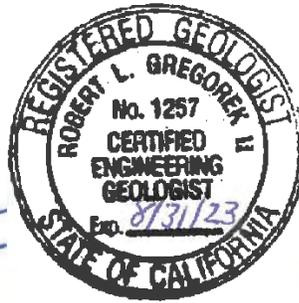
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Senior Geologist



Hashmi S. E. Quazi, PhD, PE, GE  
Principal Engineer



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## 1.0 INTRODUCTION

This report presents the results of our geotechnical investigation performed for the proposed new 2.75 MG Prestressed Concrete Tank and Pump Station at the Redlands Wastewater Treatment Plant (WWTP) located 1950 Nevada Street City of Redlands, San Bernardino County, California. The approximate location of the project is shown on Figure No. 1, *Approximate Project Location Map*.

The purpose of this report is to provide seismic and geotechnical recommendations for design and construction of proposed recycled water reservoir, pump station and other improvements.

This report is prepared for the project described herein and is intended for use solely by Carollo Engineers, Inc., City of Redlands, and its authorized agents for site evaluation purposes. It should not be used as a bidding document but may be made available to the potential contractors for information on factual data only. For bidding purposes, the contractors should be responsible for making their own interpretation of the data contained in this report.

## 2.0 PROJECT DESCRIPTION

The proposed 2.75 MG reservoir and pump station will be located at the southeast corner of Mills Street and Nevada Street within the City's Wastewater Treatment Facility.

The prestressed concrete reservoir information is presented below.

- The reservoir diameter is 125.0 feet and water depth is 30.0 feet.
- The reservoir will have a domed roof.
- The reservoir pad will be partially buried below grade.
- The reservoir will be partially buried about 15 feet below the existing ground surface.
- The reservoir bottom will be a reinforced concrete pad and the roof (dome) will be supported by the reservoir wall. The reservoir wall will have continuous footings.

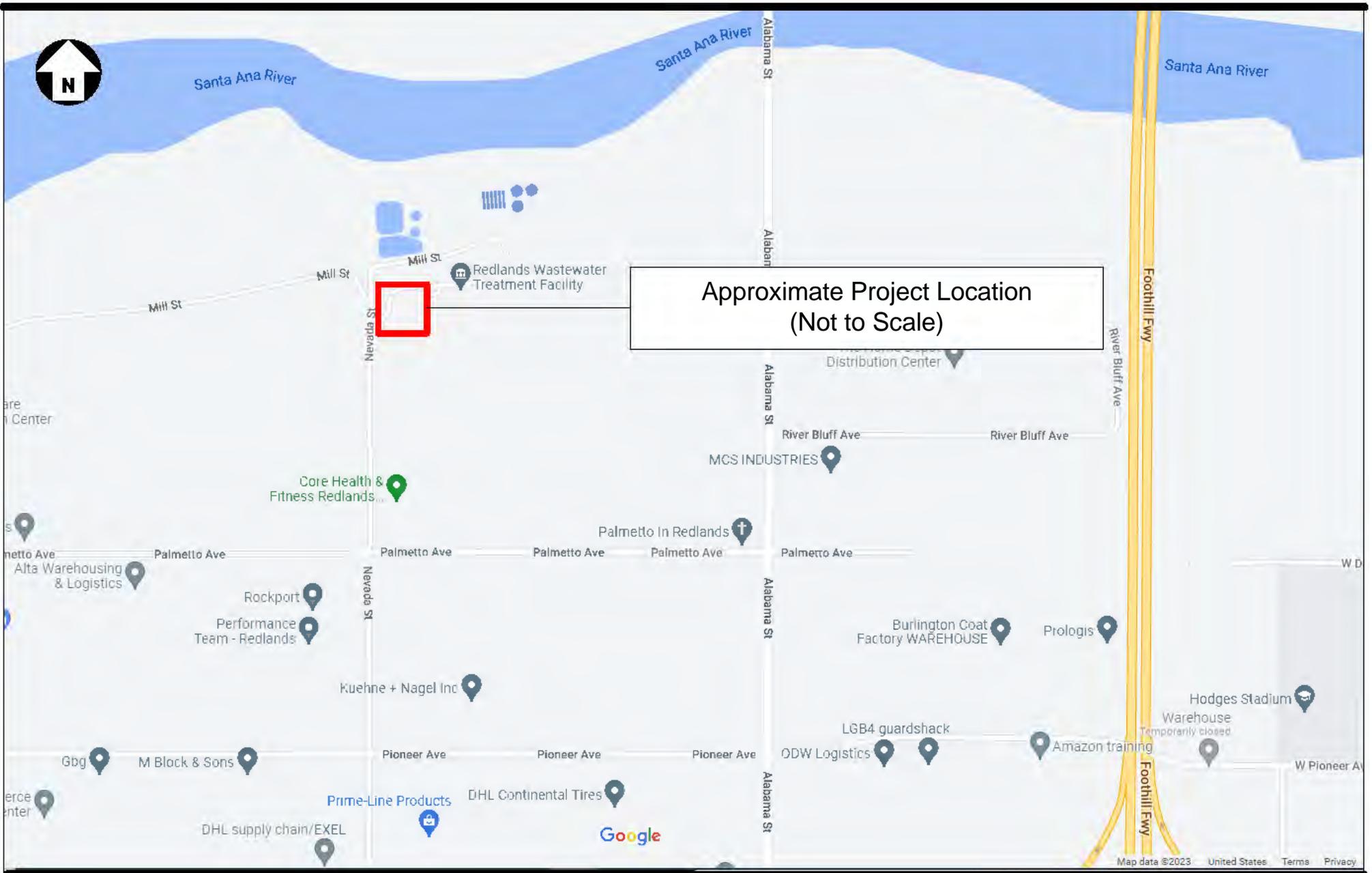
The pump station will be situated east of the reservoir. The size of the pump station is not known at this time. We anticipate it will be on a 40' x 20' concrete pad.

## 3.0 SITE DESCRIPTION

The project site is located approximately 1.6 miles north of the Interstate 10 (I-10) Freeway at 1950 Nevada Street, Redlands, California. The site is developed with different types of facilities and structures associated with the existing treatment plant.

After reviewing historical aerial photos (*Framefinder - UCSB Library*), the site is located atop an approximately 20 feet high river terrace that overlooks the main wastewater





Project: New 2.75 MG Tank and Pump Station at the Redlands Wastewater Treatment Plant  
 Location: 1950 Nevada Street  
 City of Redlands, San Bernardino County, California

## Approximate Project Location Map

Project No.  
 21-81-276-01

For: Carollo Engineers, Inc.

treatment plant that is situated to the north of the proposed 2.75 MG Tank. The site was formerly used for agriculture.

The approximately 1.0-acre site for the 2.75 MG Prestressed Concrete Tank is located approximately 200 feet southeast of the main gate of the Redlands Wastewater Treatment Facility. The Tank site is bounded to the east by sludge beds, to the south by a vacant lot, to the west by Nevada Street, and to the north by Wastewater Road. Photographs Nos. 1 & 2 presents the general site conditions.



*Photograph No. 1: Present site condition view to north looking over BH-03 (stake in foreground).*



*Photograph No. 2: Present site condition view to southwest from BH-05.*

#### **4.0 SCOPE OF WORK**

The scope of this investigation includes the following tasks presented below.



#### 4.1 Document Review

We reviewed the following available documents.

- Regional and local geology literature and maps.
- Flood hazards maps.
- Aerial photos.
- Faulting and seismicity, and any other documents that pertain to the site or the vicinity.
- Groundwater data.

#### 4.2 Project Set-up

The project set-up consisted of the following tasks.

- Received a boring location exhibit via email on January 3, 2023, from Miko Aivazian, PE, Principal Infrastructure Engineer for Carollo Engineers, Inc.
- Conducted site reconnaissance and marked the borings at locations designated by Miko Aivazian with Carollo Engineers, Inc.
- Notified Underground Service Alert (USA) at least 48 hours prior to drilling to clear the boring locations of any conflict with existing underground utilities.
- Engaged a California-licensed driller to drill exploratory borings.

#### 4.3 Subsurface Exploration

Five exploratory borings (BH-01 through BH-05) were drilled on January 20, 2023, within the footprint of the proposed improvements to investigate the subsurface conditions. The borings were drilled using a truck-mounted drill rig equipped with 8-inch diameter hollow-stem augers. The boring details are presented in the following table.

**Table No. 1, Summary of the Borings**

Boring No.	Boring Depth (ft, bgs)		Groundwater Depth (ft, bgs)	Date Completed
	Proposed	Completed		
BH-01	30.0	31.5	N/E	1/20/2023
BH-02	30.0	31.5	N/E	1/20/2023
BH-03	30.0	31.5	N/E	1/20/2023
BH-04	30.0	31.5	N/E	1/20/2023
BH-05	60.0	61.5	N/E	1/20/2023

The approximate boring locations are shown on Figure Nos. 2, *Approximate Boring Locations Map*. A detailed discussion of the subsurface exploration is presented in Appendix A, *Field Exploration*.



**Legend**

**BH-05/61.5'**



Number/Depth and Approximate Location of Exploratory Boring



Project: New 2.75 MG Tank and Pump Station at the Redlands Wastewater Treatment Plant  
Location: 1950 Nevada Street  
City of Redlands, San Bernardino County, California

For: Carollo Engineers, Inc.

## Approximate Boring Locations Map

Project No.  
21-81-276-01



**Converse Consultants**

Figure No.  
2

#### **4.4 Laboratory Testing**

Representative soil samples obtained from the soil borings were tested in our laboratory to evaluate their physical characteristics and engineering properties. Laboratory testing included the following.

- In-situ moisture content and dry unit weight (ASTM Standard D2216)
- Expansion index (ASTM Standard D4829)
- R-value (California Test 301)
- Soil corrosivity tests (California Test 643, 422, 417, and 532)
- Collapse potential (ASTM Standard D4546)
- Grain size analysis (ASTM Standard C136)
- Maximum dry density and optimum moisture content (ASTM Standard D1557)
- Direct shear (ASTM D3080)
- Consolidation (ASTM D2435)

For a description of the laboratory test methods and test results, see Appendix B, *Laboratory Testing Program*.

#### **4.5 Analysis and Report Preparation**

Data obtained from the field exploration and laboratory testing program was assembled and evaluated. Geotechnical analyses of the compiled data were performed, followed by the preparation of this report to present our findings, conclusions, and recommendations for the proposed project.

### **5.0 SUBSURFACE CONDITIONS**

A general description of the subsurface conditions, various materials and groundwater conditions encountered at the site during our field exploration is discussed below.

#### **5.1 Subsurface Profile**

Based on the exploratory borings and laboratory test results, the subsurface materials primarily consist generally of a mixture of sand, silt, and clay. Scattered gravel up to about 1 inch in the largest dimension was encountered in boring BH-05 at 42.0 feet bgs.

Discernible fill soils were not identified in our subsurface exploration. For a detailed description of the subsurface materials encountered in the exploratory borings, see Drawings No. A-2 through A-6, *Logs of Borings*, in Appendix A-1, *Field Exploration*.

#### **5.2 Groundwater**

No Groundwater was encountered in the borings up to an explored depth of 61.5 feet bgs.



For comparison, regional groundwater data from the GeoTracker database (SWRCB, 2023) was reviewed to evaluate the current and historical groundwater levels. No site with groundwater data were identified within a 1.0-mile radius of the project site.

The National Water Information System (USGS, 2023) was reviewed for current and historical groundwater data from sites within an approximately 1.0-mile radius of the proposed development and the results of that search are included below.

**Table No. 2, Summary of USGS Groundwater Depth Data**

Site No.	Location	Groundwater Depth Range (ft. bgs)	Date Range
340519117130301	Approx. 15 feet NW of intersection of Nevada St. and Pine Ave.	167-209	2003-2009
340527117130601	Approx. 600 feet NW of Nevada St.	168	2003
340506117122901	Approx. 50 feet NW of intersection of Palmetto Ave. and Alabama St.	49-205	1931-2005

The California Department of Water Resources database (DWR, 2023) was reviewed for historical groundwater data from sites within a 1.0-mile radius of the project site. One site was identified within a 1.0-mile radius of the project site that contained groundwater elevation data. Details of that record are listed below.

- Well No. 01S03W17C005S (Station 340886N1172175W001), located approximately 600 feet southwest of the project site, reported groundwater at a depth ranging from 167.53 to 208.7 feet bgs between 2005 and 2008.
- Well No. 01S03W09E002S (Station 341014N1172084W001), located approximately 5,200 feet northeast of the project site, reported groundwater at a depth ranging from 51.9 to 231.2 feet bgs between 1955 and 2008.
- Well No. 01S03W17H001S (Station 340850N1172098W001), located approximately 600 feet southwest of the project site, reported groundwater at a depth ranging from 49.3 to 204.5.7 feet bgs between 1931 and 2005.

Based on available data, the historical high groundwater level reported at wells within approximately one mile of the site was approximately 49 feet bgs. Current groundwater is expected to be deeper than approximately 61.5 feet bgs. Groundwater is not expected to be encountered during excavation or construction. Please note that although the Santa Ana River is located approximately 1,000 feet from the project site, The project site is situated on top of a river terrace approximately 44 feet higher than the Santa Ana River bottom. Therefore, groundwater is not anticipated to be a factor during the excavation or construction of the 2.75 MG tank. It should be noted that the groundwater level could vary depending upon the seasonal precipitation and possible groundwater pumping activity in the site vicinity. Shallow perched groundwater may be present locally, particularly following precipitation.



### 5.3 Expansive Soils

Expansive soils are characterized by their ability to undergo significant volume changes (shrink or swell) due to variations in moisture content. Changes in soil moisture content can result from precipitation, landscape irrigation, utility leakage, roof drainage, perched groundwater, drought, or other factors and may result in unacceptable settlement or heave of structures or concrete slabs supported on grade. Depending on the extent and location below finish subgrade, expansive soils can have a detrimental effect on structures.

Based on the laboratory test results, the expansion indices (EI) of the upper 20 feet of site soils ranged between 0 to 7, corresponding to very low expansion potentials.

### 5.4 Collapse Potential

Soil deposits subjected to collapse/hydro-consolidation generally exist in regions of moisture deficiency. Collapsible soils are generally defined as soils that have potential to suddenly decrease in volume upon an increase in moisture content even without an increase in external loads. Moreover, some soils may have a different degree of collapse/hydro-consolidation based on the amount of proposed fill or structure loads. Soils susceptible to collapse/hydro-consolidation include wind-blown silt, weakly cemented sand, and silt where the cementing agent is soluble (e.g., soluble gypsum, halite), alluvial or colluvial deposits within semi-arid to arid climate, and certain weathered bedrock above the groundwater table.

Granular soils may have a potential to collapse upon wetting in arid climate regions. Collapse/hydro-consolidation may occur when the soluble cements (carbonates) in the soil matrix dissolve, causing the soil to densify from its loose/low density configuration from deposition.

The degree of collapse of a soil can be defined by the collapse potential value, which is expressed as a percent of collapse of the total sample using the Collapse Potential Test (ASTM D4546). According to the ASTM guideline, the severity of collapse potential is commonly evaluated by the following Table No. 3, *Collapse Potential Values*.

**Table No. 3, Collapse Potential Values**

Collapse Potential Value (%)	Severity of Problem
0	None
0.1 to 2	Slight
2.1 to 6.0	Moderate
6.0 to 10.0	Moderately Severe
>10	Severe



Based on the results of the laboratory test performed on undisturbed ring samples (collapse potential of 0 to 0.6 percent), none to slight collapse potential is anticipated at the site. Collapse potential distress is typically considered a concern when collapse potential is over 2% (LA County, 2013).

### **5.5 Excavatability**

The subsurface materials of the project are expected to be excavatable by conventional heavy-duty earth moving equipment.

The phrase “conventional heavy-duty excavation equipment” is intended to include commonly used equipment such as excavators, scrapers, and trenching machines. It does not include hydraulic hammers (“breakers”), jackhammers, blasting, or other specialized equipment and techniques used to excavate hard earth materials. Selection of an appropriate excavation equipment models should be done by an experienced earthwork contractor.

### **5.6 Subsurface Variations**

Based on results of the subsurface exploration and our experience, some variations in the continuity and nature of subsurface soil conditions within the project site should be anticipated. Because of the uncertainties involved in the nature and depositional characteristics of the earth material, care should be exercised in interpolating or extrapolating subsurface conditions between or beyond the boring locations.

## **6.0 GEOLOGIC SETTING**

### **6.1 Regional Geology**

The project site is located within the San Bernardino Valley, in the northern portion of the Peninsular Ranges Geomorphic Province of Southern California, near the boundary with the adjacent Transverse Ranges Geomorphic Province. The Peninsular Ranges Geomorphic Province consists of a series of northwest-trending mountain ranges and valleys bounded on the north by the San Bernardino and San Gabriel Mountains, on the west by the Los Angeles Basin, and on the southwest by the Pacific Ocean.

The province is a seismically active region characterized by a series of northwest-trending strike-slip faults. The most prominent of the nearby fault zones include the San Jacinto, Cucamonga, and San Andreas Fault Zones, all of which have been known to be active during Quaternary time.

Topography within the province is generally characterized by broad alluvial valleys separated by linear mountain ranges. This northwest-trending linear fabric is created by the regional faulting within the granitic basement rock of the Southern California Batholith. Broad, linear, alluvial valleys have been formed by erosion of these principally granitic mountain ranges.



## 6.2 Local Geology

The project site is underlain by early to late Holocene-aged alluvial deposits of valley areas and stream channels. The alluvial deposits primarily consist of sand, gravel and clay deposits derived from adjacent mountains and stream channels (Dibblee and Minch, 2008). The project site is located approximately 200 feet south of the Santa Ana River channel. Where encountered during our investigation, the alluvium consisted primarily of silt, sand, gravel and cobbles.

## 6.3 Flooding

Review of National Flood Insurance Rate Maps indicates that the project site is within a Flood Hazard Zone "X". The Zone "X" is designated as an area of minimal flood hazard and as an area with 0.2 percent annual chance of flood hazard (FEMA 2008). According to FEMA 2008, flood plain elevation of the site is approximately 1158.37 feet.

## 7.0 FAULTING AND SEISMICITY

The approximate distance and seismic characteristics of nearby faults as well as seismic design coefficients are presented in the following subsections.

### 7.1 Faulting

The proposed site is situated in a seismically active region. As is the case for most areas of Southern California, ground-shaking resulting from earthquakes associated with nearby and more distant faults may occur at the project site. During the life of the project, seismic activity associated with active faults can be expected to generate moderate to strong ground shaking at the site. Review of recent seismological and geophysical publications indicates that the seismic hazard for the project is high.

The project site is not located within a currently mapped State of California Earthquake Fault Zone for surface fault rupture (CGS, 2007). Table No. 4, *Summary of Regional Faults*, summarizes selected data of known faults capable of seismic activity within 31 miles (100 kilometers) of the site. The data presented below was calculated using the National Seismic Hazard Maps Database (USGS, 2008) and other published geologic data.

**Table No. 4, Summary of Regional Faults**

Fault Name and Section	Closest Distance (km)	Slip Sense	Length (km)	Slip Rate (mm/year)	Maximum Magnitude
S. San Andreas	5.98	strike slip	548	n/a	8.18
San Jacinto	6.69	strike slip	241	n/a	7.88
Cleghorn	20.96	strike slip	25	3.0	6.80
Cucamonga	23.16	thrust	28	5.0	6.70
North Frontal (West)	25.79	reverse	50	1.0	7.20



Fault Name and Section	Closest Distance (km)	Slip Sense	Length (km)	Slip Rate (mm/year)	Maximum Magnitude
Elsinore	43.33	strike slip	241	n/a	7.85
Chino, alt 2	43.64	strike slip	29	1.0	6.80
San Jose	43.85	strike slip	20	0.5	6.70
Chino, alt 1	43.94	strike slip	24	1.0	6.70
Helendale-So Lockhart	45.28	strike slip	114	0.6	7.40
Pinto Mtn	45.89	strike slip	74	2.5	7.30
North Frontal (East)	47.2	thrust	27	0.5	7.00
Sierra Madre Connected	48.52	reverse	76	2.0	7.30
Sierra Madre	48.52	reverse	57	2.0	7.20
Lenwood-Lockhart-Old Woman Springs	60.21	strike slip	145	0.9	7.50
Clamshell-Sawpit	60.46	reverse	16	0.5	6.70
Puente Hills (Coyote Hills)	63.82	thrust	17	0.7	6.90
Johnson Valley (No)	68.41	strike slip	35	0.6	6.90
San Joaquin Hills	68.68	thrust	27	0.5	7.10
Raymond	71.89	strike slip	22	1.5	6.80
Landers	72.82	strike slip	95	0.6	7.40
Burnt Mtn	74.2	strike slip	21	0.6	6.80
Eureka Peak	75.87	strike slip	19	0.6	6.70
Puente Hills (Santa Fe Springs)	76.12	thrust	11	0.7	6.70
So Emerson-Copper Mtn	79.02	strike slip	54	0.6	7.10
Elysian Park (Upper)	81.62	reverse	20	1.3	6.70
Newport Inglewood Connected alt 1	84.04	strike slip	208	1.3	7.50
Newport-Inglewood (Offshore)	84.04	strike slip	66	1.5	7.00
Newport Inglewood Connected alt 2	84.04	strike slip	208	1.3	7.50
Newport-Inglewood, alt 1	84.88	strike slip	65	1.0	7.20
Puente Hills (LA)	85.1	thrust	22	0.7	7.00
Verdugo	86.65	reverse	29	0.5	6.90
Calico-Hidalgo	88.82	strike slip	117	1.8	7.40
Gravel Hills-Harper Lk	91.12	strike slip	65	0.7	7.10
Hollywood	93.65	strike slip	17	1.0	6.70
Pisgah-Bullion Mtn-Mesquite Lk	96.71	strike slip	88	0.8	7.30
Santa Monica Connected alt 2	98.6	strike slip	93	2.4	7.40

(Source: [https://earthquake.usgs.gov/cfusion/hazfaults\\_2008\\_search/](https://earthquake.usgs.gov/cfusion/hazfaults_2008_search/))



## 7.2 Seismic Hazard Analysis

Seismic hazard analysis is presented in the following sections.

### 7.2.1 Mapped Seismic Design Parameters

Seismic parameters based on the 2022 California Building Code (CBC, 2022) and ASCE 7-16 are provided in the following table. These parameters were determined using the generalized coordinates (34.0888N, 117.2167W) and the Seismic Design Maps ATC online tool.

**Table No. 5, 2022 CBC Seismic Design Parameters**

Seismic Parameters	
Site Coordinates	34.0888N, 117.2167W
Site Class	D*
Risk Category	III
Mapped Short period (0.2-sec) Spectral Response Acceleration, $S_S$	2.028g
Mapped 1-second Spectral Response Acceleration, $S_1$	0.773g
Site Coefficient (site class D), $F_a$	1.0
Site Coefficient (site class D), $F_v$	2.5
MCE 0.2-sec period Spectral Response Acceleration, $S_{MS}$	2.028g
MCE 1-second period Spectral Response Acceleration, $S_{M1}$	1.933g
Design Spectral Response Acceleration for short period $S_{DS}$	1.352g
Design Spectral Response Acceleration for 1-second period, $S_{D1}$	1.288g
Site Modified Maximum Peak Ground Acceleration, $PGA_M$	0.787g
Long-period transition period (s), $T_L$	8

\*D, Stiff Soil

Site Class D was selected based on the estimated average shear wave velocity of the site in the upper 30 meters (100 feet),  $V_{s30}$  of 267 meters/second.  $V_{s30}$  was calculated using the SPTPROP software (InfraGEO, 2020) based on the correlation with SPT blow counts by Brandenberg, Bellana and Shantz (2010). Extrapolation of estimated shear wave velocities from 50-ft depth to 100-ft depth was performed using the method proposed by Boore (2004). SPTPROP analysis results are attached in Appendix D, *Plate No. D-1*.

### 7.2.2 Site-Specific Seismic Design Parameters

To develop site-specific seismic design parameters, ground motion study was performed in accordance with the 2022 CBC and ASCE 7-16 design guidelines. The methodology and results of this study are presented in Appendix D, *Site-Specific Seismic Analysis*.



Based on the results of this study, site-specific seismic acceleration parameters were developed and summarized in the table below.

**Table No. 6, Recommended Site-Specific Seismic Acceleration Parameters**

Seismic Parameters	Values
MCE 0.2-sec period Spectral Response Acceleration, $S_{Ms}$	2.459g
MCE 1-second period Spectral Response Acceleration, $S_{M1}$	1.983g
Design Spectral Response Acceleration for short period, $S_{Ds}$	1.639g
Design Spectral Response Acceleration for 1-second period, $S_{D1}$	1.322g
Site-Specific Maximum Peak Ground Acceleration, $MCE_G$ $PGA_M$	0.834g

### 7.3 Secondary Effects of Seismic Activity

In addition to ground shaking, effects of seismic activity on a project site may include surface fault rupture, soil liquefaction, landslides, lateral spreading, seismic settlement, tsunamis, seiches and earthquake-induced flooding. Results of a site-specific evaluation of each of the above secondary effects are explained below:

**Surface Fault Rupture:** The project site is not located within a currently designated State of California Earthquake or San Bernardino county Fault Zone (CGS, 2007, SBC, 2010b). Based on review of existing geologic information, no major surface fault crosses through or extends toward the site. The potential for surface rupture resulting from the movement of a presently unrecognized fault beneath the site is not known with certainty but is considered very low.

**Liquefaction:** Liquefaction is defined as the phenomenon in a soil mass, because of the development of excess pore pressures, soil mass suffers a substantial reduction in its shear strength. During earthquakes, excess pore pressures in saturated soil deposits may develop as a result of induced cyclic shear stresses, resulting in liquefaction. Soil liquefaction occurs in submerged granular soils during or after strong ground shaking. There are several requirements for liquefaction to occur. They are as follows.

- Soils must be submerged.
- Soils must be primarily granular.
- Soils must be contractive, that is, loose to medium-dense.
- Ground motion must be intense.
- Duration of shaking must be sufficient for the soils to lose shear resistance.

The site is located within an area designated for high liquefaction potential (San Bernardino County, 2010b). Based on a site-specific liquefaction analysis presented in Appendix C, *Liquefaction and Settlement Analyses*, the potential for liquefaction of the site is expected to be negligible.



**Seismic Settlement:** Dynamic dry settlement may occur in loose, granular, unsaturated soils during a large seismic event. Based on a site-specific liquefaction analysis presented in Appendix C, *Liquefaction and Settlement Analyses*, the potential for dry seismic settlement of the site is expected to be up to 0.15 inches.

**Landslides:** Seismically induced landslides and other slope failures are common occurrences during or after earthquakes in areas of significant relief. The project site is not adjacent to any steep slopes. In the absence of significant ground slopes, the potential for seismically induced landslides to affect the proposed site is considered to be low.

**Lateral Spreading:** Seismically induced lateral spreading involves primarily lateral movement of earth materials due to ground shaking. It differs from the slope failure in that complete ground failure involving large movement does not occur due to the relatively smaller gradient of the initial ground surface. Lateral spreading is demonstrated by near-vertical cracks with predominantly horizontal movement of the soil mass involved. Due to the absence of shallow groundwater and lack of liquefaction potential, the risk for lateral spreading to affect the site is considered low.

**Tsunamis:** Tsunamis are tidal waves generated in large bodies of water by fault displacement or major ground movement. Based on the location of the site, tsunamis do not pose a hazard to this site.

**Seiches:** Seiches are large waves generated in enclosed bodies of water in response to ground shaking. Review of the area indicates that the project site is within close proximity to the Santa Ana River Channel. Additionally, there are onsite water reservoirs. Due to these reasons, seiching is considered to be a risk during significant seismic events. Seiching within the new reservoir may result in flooding within the site after construction and filling of the reservoir is complete.

**Earthquake-Induced Flooding:** This type of flooding is caused by failure of dams or other water-retaining structures as a result of earthquakes. Dams or other water-retaining structures may fail as a result of large earthquakes, resulting in flooding. The reservoir site is located within a State of California or San Bernardino County designated dam inundation area (DSOD, 2021 and SBC, 2021a). The potential for flooding of the site due to dam failure is considered extremely high.

## 8.0 LABORATORY TEST RESULTS

Results of the various laboratory tests are presented in Appendix B, *Laboratory Testing Program* and in the following sections.

### 8.1 Physical Testing

Physical testing of selected soil samples to determine the engineering properties of the onsite soils was performed in Converse's laboratory. The testing and results are summarized below.



- In-situ Moisture and Dry Density - In-situ dry density within the upper 20 feet of soil ranged between 93 and 107 pounds per cubic foot (pcf) with the moisture content ranging between 4 and 21 percent, respectively. The presence of high moisture in some depths of the soil could be attributed to a possible higher concentration of fine clay particles holding the moisture.
- Expansion Index – Five representative samples were tested to evaluate the expansion potential in accordance with ASTM Standard D4829. The expansion indices were 0 to 7, which corresponds to “Very Low” expansion potential.
- R-value – One R-value test was performed on a representative bulk soil sample in accordance ASTM Standard D2844. Based on the test result, the R-value of the sample was 22.
- Collapse Potential – The collapse potentials of three relatively undisturbed samples collected in the 15 to 21 feet of soil range, the depth of the proposed reservoir, were tested under a vertical stress of 2.0 kips per square foot (ksf) in accordance with the ASTM Standard D4546 test method. These samples indicated collapse potentials ranging from 0.0 and 0.6 percent, indicating none to slight collapse potential. Collapse potentials from consolidation tests were between 0.3 to 0.5, indicating slight collapse potential.
- Grain Size Analysis – Five representative samples were tested to determine the relative grain size distribution in accordance with ASTM Standard D6913. The test results are graphically presented in Drawings No. B-1, *Grain Size Distribution Results*.
- Maximum Dry Density and Optimum Moisture Content – Typical moisture-density relationship tests were performed on three representative samples in accordance with ASTM D1557. The results are presented in Drawing No. B-2, *Moisture-Density Relationship Results*, in Appendix B, *Laboratory Testing Program*. The laboratory maximum dry densities were 125.0, 126.0 and 127.0 pcf and the optimum moisture contents of 10.5, 9.5, and 9.0 percent respectively.
- Direct Shear – Four direct shear tests were performed on representative samples under saturated moisture condition in accordance with ASTM Standard D3080. The direct shear tests indicated that the samples had moderate shear strengths. The results are presented in Drawing Nos. B-3 through B-6, *Direct Shear Test Results* in Appendix B, *Laboratory Testing Program*.
- Consolidation Test – Two consolidation tests were conducted in accordance with ASTM Standard D2435 method. For test results, including sample density and moisture content, see Drawing Nos. B-7 and B-8, *Consolidation Test Results* in Appendix B, *Laboratory Testing Program*.

## 8.2 Chemical Testing - Corrosivity Evaluation

Three selected soil samples were tested by AP Engineering and Testing, Inc. (Pomona, CA) for corrosivity evaluation with respect to common construction materials such as concrete and steel. Tests were performed for pH, sulfate and chloride content, and saturated minimum electrical resistivity in accordance with California Test Methods 643, 422 and 417. The test results are summarized below and are presented in Appendix B, *Laboratory Testing Program*.



- The pH measurements of the samples ranged between 7.8 and 8.2.
- The sulfate contents of the samples tested ranged between 22 and 45 ppm.
- The chloride concentrations of the samples tested ranged between 17 and 21 ppm.
- The minimum electrical resistivities when saturated ranged between 3,960 and 10,595 ohm-cm.

## 9.0 EARTHWORK/SITE GRADING RECOMMENDATIONS

### 9.1 General

Prior to the start of construction, all existing underground utilities and appurtenances should be located within the project area. Such utilities should either be protected in-place or removed and replaced during construction as required by the project specifications. Any existing utilities and pipelines will likely require careful research and marking. All excavations should be conducted in such a manner as not to cause loss of bearing and/or lateral support of existing utilities.

All debris, surface vegetation (if any), deleterious material, surficial soils containing roots and perishable materials should be stripped and removed from the site. The site should be stripped to the bottom of the roots of vegetation. The actual stripping depth required depends on site usage prior to construction and should be established in the field at the time of construction. Deleterious material, including organics, concrete, and debris generated during excavation, should not be placed as fill.

### 9.2 Remedial Grading

The following remedial grading recommendations are provided. Reservoir Pad/Footing, Pump Station footing, Slab-on-grade and Pavements should be uniformly supported by compacted fill. To provide uniform support, structural areas should be over excavated, scarified, and recompacted as follows.

**Table No. 6, Overexcavation Depths**

Structure/Pavement	Minimum Excavation Depth
Reservoir Pad/Footing	12 inches below footings or 4 feet below ground surface, whichever is deeper
Pump Station footing	12 inches below footings or 4 feet below ground surface, whichever is deeper
Slab-on-grade	18 inches below finished grade
Pavement	18 inches below finished grade

The change in depth of the over excavation below the footings and slabs-on-grade should be transitioned by a gradual slope. Generally, the over excavation should extend to at least 1 foot beyond the footprint of the reservoir foundation, 2 feet beyond the pump station and slab and at least 1 foot beyond the edge of the pavement. The over excavation bottom should be scarified and compacted as described in Section 9.3.2 *Fill Compaction*.



If isolated pockets of very soft, loose, eroded, or pumping soil are encountered, the unstable soil should be excavated as needed to expose undisturbed, firm, and unyielding soils. Any existing fill (if encountered) should be over excavated.

The contractor should determine the best manner to conduct the excavations, such that there are no losses of bearing and/or lateral support to the existing structures or utilities. Consideration should be given to using slot cuts or other excavation methods which preserve lateral support during excavation operations near the existing structures.

### **9.3 Structural Fills**

Recommendations regarding fill materials and compaction of structural fills are provided in the following sections.

#### **9.3.1 Fill Materials**

Fill materials should meet the following criteria.

- No particles larger than 3 inches in largest dimension.
- At least 15 percent, but no more than 40 percent, passing the No. 200 sieve.
- No more than 30 percent retained on the ¾-inch sieve.
- Free of all organic matter, debris, or other deleterious material.
- Have an expansion index of 30 or less.
- Liquid limit less than 35 and plastic index of 15 or less.
- Corrosivity equal or less than the onsite soils.

The native soils encountered within the project site, free of debris or organic matter, are generally expected to be suitable for use as structural fill. Processing may involve cleaning roots and debris, mixing, and moisture conditioning before placing as compacted fill.

#### **9.3.2 Fill Compaction**

All surfaces to receive compacted fill should be observed and approved by the project geotechnical consultant prior to fill placement. The approved bottoms of excavations should be scarified to a depth of 12 inches, moisture conditioned to within  $\pm 3$  percent of optimum moisture content for coarse grained soil and +2% above the optimum moisture content for fine grained soil, and recompacted to at least 90 percent of the laboratory maximum dry density per ASTM Standard D1557 prior to placement of compacted fills.

Excavated site materials are suitable for re-use as compacted fill when cleared of deleterious materials. Fill materials should be placed on the scarified and recompacted bottom in loose lifts not exceeding 8 inches in thickness. Fill lifts should be uniform in thickness and material type.



All fills should be moisture conditioned to within  $\pm 3$  percent of optimum moisture content for coarse grained soil and +2% above the optimum moisture content for fine grained soil and compacted to at least 90 percent of the laboratory maximum dry density per ASTM Standard D1557, unless a higher compaction is recommended below or elsewhere in this report.

The upper 12 inches of fill beneath pavement areas should be compacted to at least 95 percent of the laboratory maximum dry density. All bases and subbases for pavements should be compacted to a relative compaction of at least 95 percent of the laboratory maximum dry density.

Backfill behind any structural wall should be compacted using lightweight construction equipment to avoid overstressing the wall. The fill material should be moisture conditioned to within  $\pm 3$  percent of optimum moisture content for coarse grained soil and +2% above the optimum moisture content for fine grained soil and compacted to at least 90 percent of the laboratory maximum dry density. Compaction of backfill adjacent to structural walls can produce excessive lateral pressures. Improper types and locations of compaction equipment and/or compaction techniques may damage the walls. The use of heavy compaction equipment should not be permitted within a horizontal distance of five feet from the wall. Only handheld compactors should be permitted to perform compaction within the recommended 5-foot zone. Loose soil, form work, and debris should be removed prior to backfilling.

#### **9.4 Shrinkage and Subsidence**

The volume of excavated and recompacted soils will decrease as a result of grading. The shrinkage would depend on, among other factors, the depth of cut and/or fill, and the grading method and equipment utilized. Based on our exploration as well as previous experience in the other projects in close vicinity of this site, for the preliminary estimation, shrinkage factors for various units of earth material at the site may be taken as presented below.

- The shrinkage factor (defined as a percentage of soil volume reduction when moisture conditioned and compacted to the average of 92 percent relative compaction) for the upper 10 feet of soils an average value of 15 percent may be used for preliminary earthwork planning.
- Subsidence (defined as the settlement of native materials from the equipment load applied during grading and proposed fill loads) would depend on the construction methods including type of equipment utilized. Ground subsidence is estimated to be approximately 0.20 foot to 0.25 foot.

Although these values are only approximate, they represent our best estimates of the factors to be used to calculate lost volume that may occur during grading. If more accurate shrinkage and subsidence factors are needed, it is recommended that field-testing using the actual equipment and grading techniques be conducted.



## **10.0 UTILITY TRENCH BACKFILL**

The following sections present earthwork recommendations for utility trench backfill, including subgrade preparation and trench zone backfill.

Open cuts adjacent to existing roadways or structures are not recommended within a 1:1 (horizontal: vertical) plane extending down and away from the roadway or structure perimeter (if any).

Soils from the trench excavation should not be stockpiled more than 6 feet in height or within a horizontal distance from the trench edge equal to the depth of the trench. Soils should not be stockpiled behind the shoring, if any, within a horizontal distance equal to the depth of the trench, unless the shoring has been designed for such loads.

### **10.1 Pipe Sub-grade Preparation**

The final subgrade surface should be level, firm, uniform, and free of loose materials and properly graded to provide uniform bearing and support to the entire section of the pipe placed on bedding material. Protruding oversize particles larger than 2 inches in dimension, if any, should be removed from the trench bottom and replaced with compacted on-sites materials.

Any loose, soft and/or unsuitable materials encountered at the pipe subgrade should be removed and replaced with an adequate bedding material. During the digging of depressions for proper sealing of the pipe joints, the pipe should rest on a prepared bottom for as near its full length as is practicable.

### **10.2 Pipe Bedding**

Bedding is defined as the material supporting and surrounding the pipe to 1 foot above the pipe. Pipe bedding should follow San Bernardino County guidelines. Additional recommendations for pipe bedding are provided below.

To provide uniform and firm support for the pipe, compacted granular materials such as clean sand, gravel or ¾-inch crushed aggregate, or crushed rock may be used as pipe bedding material. Typically, soils with sand equivalent value of 30 or more are used as pipe bedding material. The pipe designer should determine if the soils are suitable as pipe bedding material.

The type and thickness of the granular bedding placed underneath and around the pipe, if any, should be selected by the pipe designer. The load on the rigid pipes and deflection of flexible pipes and, hence, the pipe design, depends on the type and the amount of bedding placed underneath and around the pipe.

Bedding materials should be vibrated in-place to achieve compaction. Care should be taken to densify the bedding material below the springline of the pipe. Prior to placing the pipe bedding material, the pipe subgrade should be uniform and properly graded to



provide uniform bearing and support to the entire section of the pipe placed on bedding material.

Migration of fines from the surrounding native and/or fill soils must be considered in selecting the gradation of any imported bedding material. We recommend that the pipe bedding material should satisfy the following criteria to protect migration of fine materials.

- i.  $\frac{D_{15}(F)}{D_{85}(B)} \leq 5$
- ii.  $\frac{D_{50}(F)}{D_{50}(B)} < 25$
- iii. Bedding Materials must have less than 5 percent passing No. 200 sieve (0.0074 mm) to avoid internal movement of fines.

Where,

F	=	Bedding Material
B	=	Surrounding Native and/or Fill Soils
D <sub>15</sub> (F)	=	Particle size through which 15% of bedding material will pass
D <sub>85</sub> (B)	=	Particle size through which 85% of surrounding soil will pass
D <sub>50</sub> (F)	=	Particle size through which 50% of bedding material will pass
D <sub>50</sub> (B)	=	Particle size through which 50% of surrounding soil will pass

If the above criteria do not satisfy, commercially available geofabric used for filtration purposes (such as Mirafi 140N or equivalent) may be wrapped around the bedding material encasing the pipe to separate the bedding material from the surrounding native or fill soils.

### **10.3 Trench Zone Backfill**

The trench zone is defined as the portion of the trench above the pipe bedding extending up to the final grade level of the trench surface. Excavated sites soil free of oversize particles and deleterious matter may be used to backfill the trench zone. Detailed trench backfill recommendations are provided below.

- Trench excavations to receive backfill should be free of trash, debris or other unsatisfactory materials at the time of backfill placement.
- Trench zone backfill should be compacted to at least 90 percent of the laboratory maximum dry density as per ASTM D1557 test method. At least the upper 1 foot of trench backfill underlying pavement should be compacted to at least 95 percent of the laboratory maximum dry density as per ASTM D1557 test method.
- Particles larger than 1 inch should not be placed within 12 inches of the pavement subgrade. No more than 30 percent of the backfill volume should be larger than ¾-inch in the largest dimension. Gravel should be well mixed with finer soil. Rocks



larger than 3 inches in the largest dimension should not be placed as trench backfill.

- Trench backfill should be compacted by mechanical methods, such as sheepsfoot, vibrating or pneumatic rollers or mechanical tampers to achieve the density specified herein. The backfill materials should be brought to within  $\pm 3$  percent of optimum moisture content for coarse-grained soil, and between optimum and 2 percent above optimum for fine-grained soil, then placed in horizontal layers. The thickness of uncompacted layers should not exceed 8 inches. Each layer should be evenly spread, moistened or dried as necessary, and then tamped or rolled until the specified density has been achieved.
- The contractor should select the equipment and processes to be used to achieve the specified density without damage to adjacent ground, structures, utilities and completed work.
- The field density of the compacted soil should be measured by the ASTM D1556 (Sand Cone) or ASTM D6938 (Nuclear Gauge) or equivalent.
- Observations and field tests should be performed by the project soils consultant to confirm that the required degree of compaction has been obtained. Where compaction is less than that specified, additional compactive effort should be made with adjustment of the moisture content as necessary, until the specified compaction is obtained.
- It should be the responsibility of the contractor to maintain safe working conditions during all phases of construction.
- Trench backfill should not be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations should not resume until field tests by the project's geotechnical consultant indicate that the moisture content and density of the fill are in compliance with project specifications.

## **11.0 DESIGN AND CONSTRUCTION RECOMMENDATIONS**

### **11.1 General Evaluation**

The various design recommendations provided in this section are based on the assumption that in preparing the site, the above earthwork and grading recommendations will be implemented.

### **11.2 Foundation Type and Bearing Pressures**

The water reservoir can be founded on a ring footing and its roof (dome) will be supported by the wall having continuous footings. Continuous and isolated spread footings should be at least 18 inches wide and embedded at least 18 inches below the lowest adjacent soil grade. Actual footing widths and reinforcement should be based on structural design. Footings placed on recompacted soil at a depth of 18 inches below lowest adjacent grade may be designed based on an allowable net bearing capacity of 2,500 pounds per square foot (psf).



The allowable net bearing capacity is defined as the maximum allowable net bearing pressure on the ground. It is obtained by dividing the net ultimate bearing capacity by a safety factor. The ultimate bearing capacity is the bearing stress at which ground fails by shear or experiences a limiting amount of settlement at the foundation. The net ultimate bearing capacity is obtained by subtracting the total overburden pressure on a horizontal plane at the foundation level from the ultimate bearing capacity.

The actual footing dimensions and reinforcement should be based on structural design. The allowable bearing capacity can be increased by 500 pounds per square foot (psf) with each foot of additional embedment and 100 psf with each foot of additional width up to a maximum of 3,500 psf.

The net allowable bearing values indicated above are for the dead loads and frequently applied live loads and are obtained by applying a factor of safety of 3.0 to the net ultimate bearing capacity. If normal code requirements are applied for design, the above vertical bearing value may be increased by 33 percent for short duration loadings, which will include loadings induced by wind or seismic forces.

### **11.3 Lateral Earth Pressures and Resistance to Lateral Loads**

In the following subsections, the lateral earth pressures and resistance to lateral loads are estimated by using on-site native soils compacted to the average of 92 percent of laboratory maximum dry density.

#### **11.3.1 Active Earth Pressures**

The active earth pressure behind wall of water reservoir depends primarily on the allowable wall movement, type of backfill materials, backfill slopes, wall inclination, surcharges, and any hydrostatic pressures. The estimated lateral earth pressures are presented in the following table.

**Table No. 7, Equivalent Fluid Pressure**

Equivalent Fluid Pressure, pcf	
Active earth condition (Free to deflect, level backfill)	46
At-rest (wall is restrained)	68
Seismic pressure on unrestrained (yielding)/retaining walls (at the top of reverse triangle where H is the height of the wall)	30 H

#### **11.3.2 Passive Earth Pressure**

Resistance to lateral loads can be assumed to be provided by friction acting at the base of foundations and by passive earth pressure. An ultimate coefficient of friction of 0.35 between concrete and native soils may be used with the dead load forces. An allowable passive earth pressure of 235 psf per foot of depth may be used for the sides of footings poured against recompacted native soils from upper depths. A factor of safety of 1.5 was applied in



calculating passive earth pressure. The maximum value of the passive earth pressure should be limited to 2,500 psf for recompacted soil.

Vertical and lateral bearing values indicated above are for the total dead loads and frequently applied live loads. If normal code requirements are applied for design, the above vertical bearing and lateral resistance values may be increased by 33 percent for short duration loading, which will include the effect of wind or seismic forces.

Due to the low overburden stress of the soil at shallow depth, the upper one foot of passive resistance should be neglected unless the soil is confined by pavement or slab.

#### **11.4 Settlement**

The settlement due to static loading of the foundations, designed as recommended above, from structural loads and short-term settlement of properly compacted fill is anticipated to be 1 inch or less. The differential settlement resulting from static loads is anticipated to be 0.5 inches or less over a horizontal distance of 40 feet.

Our analysis of the potential dynamic settlement is presented in Appendix C, *Liquefaction and Settlement Analysis*. Based on our analysis, we anticipate the reservoir site has the potential for up to 0.15 inches of seismically induced settlement. The differential settlement resulting from dynamic loads is anticipated to be half of the total dynamic settlement or less over a horizontal distance of 40 feet. Structural engineer should consider this in the design.

Generally, static and dynamic settlement does not occur at the same time. For design purposes, the structural engineer should decide whether static and dynamic settlement will be combined or not.

#### **11.5 Temporary Sloped Excavations**

Based on the materials encountered in the exploratory borings, temporary excavations may be supported by shoring or constructed according to the slope ratios presented in the following table. Temporary cuts encountering soft and wet fine-grained soils, dry loose, cohesionless soils, or loose fill from trench backfill may have to be constructed at a flatter gradient than presented below.



**Table No. 8 Slope Ratios for Temporary Excavations**

Soil Type	OSHA Soil Type	Depth of Cut (feet)	Recommended Maximum Slope (Horizontal:Vertical) <sup>1</sup>
Silty Sand (SM), Sandy Silt (ML), Sand with Silt (SP-SM), Sand (SP), Sandy Clay (CL)	C	0-10	1:1
		10-20	1.5:1

<sup>1</sup> Slope ratio assumed to be uniform from top to toe of slope.

For shallow excavations up to 4 feet bgs, wall slope can be vertical. For steeper temporary construction slopes or deeper excavations, or unstable soil encountered during the excavation, shoring or trench shields should be provided by the contractor as necessary to protect the workers in the excavation.

Surfaces exposed in sloped excavations should be kept moist but not saturated to retard raveling and sloughing during construction. Adequate provisions should be made to protect the slopes from erosion during periods of rainfall. Surcharge loads, including construction materials, should not be placed within 5 feet of the unsupported slope edge. Stockpiled soils with a height higher than 6 feet will require greater distance from trench edges.

All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act and current amendments, and the Construction Safety Act should be met. The soil exposed in cuts should be observed during excavation by a competent person employed by the contractor. If potentially unstable soil conditions are encountered, modifications of slope ratios for temporary cuts may be required.

### **11.6 Shoring Design**

Temporary shoring will be required where open sloped excavations will not be feasible due to unstable soils or due to nearby existing structures or facilities. Temporary shoring may consist of conventional soldier piles and lagging or sheet piles or any piles selected by contractor. The shoring for the pipe excavations may be laterally supported by walers and cross bracing or may be cantilevered. Drilled excavations for soldier piles will require the use of drilling fluids to prevent caving and to maintain an opened hole for pile installation.

The active earth pressure behind any shoring depends primarily on the allowable movement, type of backfill materials, backfill slopes, wall inclination, surcharges, and any hydrostatic pressures.

The lateral earth pressures to be used in the design of shoring is presented in the following table.



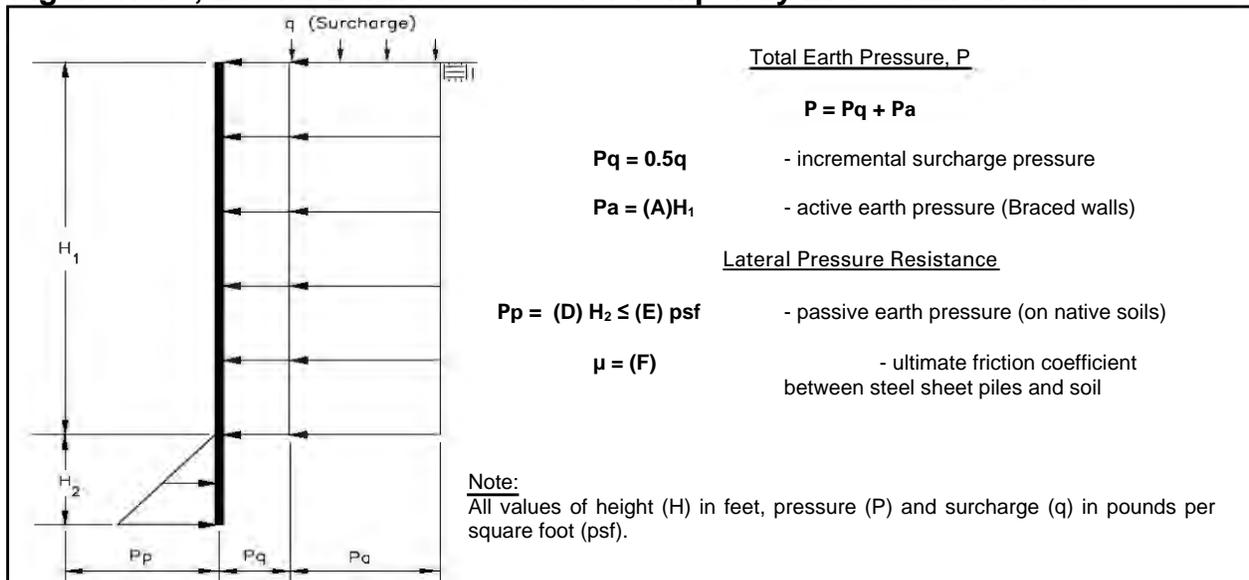
**Table No. 9, Lateral Earth Pressures for Temporary Shoring**

Lateral Resistance Soil Parameters*	Value
Active Earth Pressure (Braced Shoring) (psf) (A)	31
Active Earth Pressure (Cantilever Shoring) (psf) (B)	48
At-Rest Earth Pressure (Cantilever Shoring) (psf) (C)	68
Passive earth pressure (psf per foot of depth) (D)	235
Maximum allowable bearing pressure against native soils (psf) (E)	2,500
Coefficient of friction between sheet pile and native soils, fs (F)	0.25

\* Parameters A through F are used in Figures No. 4 and 5 on the next page.

Restrained (braced) shoring systems should be designed based on Figure No. 3, *Lateral Earth Pressures for Temporary Braced Excavation* to support a uniform rectangular lateral earth pressure.

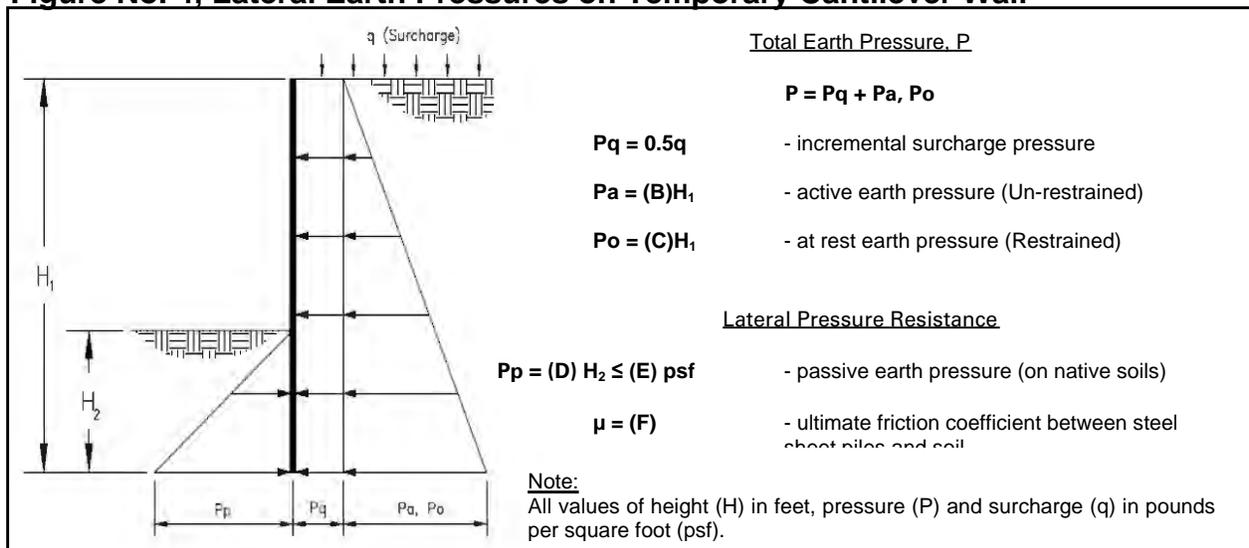
**Figure No. 3, Lateral Earth Pressures for Temporary Braced Excavation**



Unrestrained (cantilever) design of cantilever shoring consisting of soldier piles spaced at least two diameters on-center or sheet piles, can be based on Figure No. 4, *Lateral Earth Pressures on Temporary Cantilever Wall*.



**Figure No. 4, Lateral Earth Pressures on Temporary Cantilever Wall**



The provided pressures assume no hydrostatic pressures. If hydrostatic pressures are allowed to build up, the incremental earth pressures below the ground-water level should be reduced by 50 percent and added to hydrostatic pressure for total lateral pressure.

Passive resistance includes a safety factor of 1.5. The upper 1 foot for passive resistance should be ignored unless the surface is confined by a pavement or slab.

In addition to the lateral earth pressure, surcharge pressures due to miscellaneous loads, such as soil stockpiles, vehicular traffic or construction equipment located adjacent to the shoring, should be included in the design of the shoring. A uniform lateral pressure of 100 psf should be included in the upper 10 feet of the shoring to account for normal vehicular and construction traffic within 10 feet of the trench excavation. As previously mentioned, all shoring should be designed and installed in accordance with state and federal safety regulations.

The contractor should have provisions for soldier pile and sheet pile removal. All voids resulting from removal of shoring should be filled. The method for filling voids should be selected by the contractor, depending on construction conditions, void dimensions and available materials. The acceptable materials, in general, should be non-deleterious, and able to flow into the voids created by shoring removal (e.g., concrete slurry, “pea” gravel, etc.).

Excavations for the proposed pipeline should not extend below a 1:1 horizontal:vertical (H:V) plane extending from the bottom of any existing structures, utility lines or streets. Any proposed excavation should not cause loss of bearing and/or lateral supports of the existing utilities or streets.

If the excavation extends below a 1:1 (H:V) plane extending from the bottom of the existing structures, utility lines or streets, a maximum of 10 feet of slope face parallel to



the existing improvement should be exposed at a time to reduce the potential for instability. Backfill should be accomplished in the shortest period of time and in alternating sections.

### 11.7 Soil Corrosivity

The results of chemical testing of three representative samples of site soils were evaluated for corrosivity evaluation with respect to common construction materials such as concrete and steel. The test results are presented in Appendix B, *Laboratory Testing Program*, Summary of Corrosivity Test Results, and are discussed below.

The sulfate contents of the soils tested correspond to American Concrete Institute (ACI) exposure category S0 for these sulfate concentration (ACI 318-14, Table 19.3.1.1) ACI recommends a minimum compressive strength of 2,500 psi for exposure category S0 in ACI 318-14, Table 19.3.2.1.

We anticipate that concrete structures such as footings, slabs, pavement and flatwork will be exposed to moisture from precipitation and irrigation. Based on the project location and the results of chloride testing of the site soils, we do not anticipate that concrete structures will be exposed to external sources of chlorides, such as deicing chemicals, salt, brackish water, or seawater. ACI specifies exposure category C1 where concrete is exposed to moisture, but not to external sources of chlorides (ACI 318-14, Table 19.3.1.1). ACI provides concrete design recommendations in ACI 318-14, Table 19.3.2.1, including a minimum compressive strength of 2,500 psi, and a maximum chloride content of 0.3 percent.

According to Romanoff, 1957, the following table provides general guidelines of soil corrosion based on electrical resistivity.

**Table No. 10, Correlation Between Resistivity and Corrosion**

Soil Resistivity (ohm-cm) per Caltrans CT 643	Corrosivity Category
Over 10,000	Mildly corrosive
2,000 – 10,000	Moderately corrosive
1,000 – 2,000	corrosive
Less than 1,000	Severe corrosive

The measured values of the minimum electrical resistivities when saturated were between 3,682 and 10,595 Ohm-cm. This indicates that the soils tested are mild to moderately corrosive for ferrous metals in contact with the soils. Converse does not practice in the area of corrosion consulting. If needed, a qualified corrosion consultant should provide appropriate corrosion mitigation measures for ferrous metals in contact with the site soil.



### 11.8 Pavement Design and Construction

Pavement has been designed based on R-value of 22. The site soils may be substantially mixed during construction and the R-value of the final sub-grade soils is likely to be different. The R-value of the sub-grade soils should be determined and the pavement structural sections should be reevaluated during construction.

Asphalt concrete pavement structural sections corresponding to Traffic Indices (TI) 5.0, 6.0, 7.0, and 8.0 are summarized in the following table.

**Table No. 11, Preliminary Pavement Sections**

Traffic Index	Preliminary Pavement Section		
	Asphalt Concrete (inches)	Aggregate Base (inches)	Full Depth Asphalt (inches)
5.0	4.5	4.0	6.0
6.0	6.0	5.0	7.5
7.0	7.5	6.0	8.5
8.0	9.0	7.0	10.0

Pavement sub-grade should be prepared in accordance with Section 301 of the Standard Specifications for Public Works Construction (SSPWC, Public Works Standard, 2021). The upper 12 inches of sub-grade should be compacted to at least 95 percent of the laboratory maximum dry density as per ASTM Standard D1557 test method.

Base materials should conform to Section 200-2.2, "Crushed Aggregate Base," of the current SSPWC and should be placed in accordance with Section 301.2 of the SSPWC. Asphaltic concrete materials should conform to Section 203 of the SSPWC and should be placed in accordance with Section 302.5 of the SSPWC.

### 12.0 GEOTECHNICAL SERVICES DURING CONSTRUCTION

This report has been prepared to aid in the evaluation of the site, to prepare site grading recommendations, and to assist the structural engineer with the design of the proposed structures. Recommendations presented herein are based upon the assumption that earthwork monitoring will be provided by a qualified geotechnical consultant.

All excavation bottoms should be observed by a geotechnical representative prior to fill placement. Structural fill and backfill should be placed and compacted during continuous observation and testing. It is recommended that the footing excavations should be observed by a geotechnical consultant representative prior to placement of steel and concrete, to ensure that foundations are founded on satisfactory materials and excavations are free of loose and disturbed materials.



## 13.0 CLOSURE

This report is prepared for the project described herein and is intended for use solely by Carollo Engineers, Inc., the City of Redlands, and their authorized agents, to assist in the design and construction of the proposed project. Our findings and recommendations were obtained in accordance with generally accepted professional principles practiced in geotechnical engineering. We make no other warranty, either expressed or implied.

Converse Consultants is not responsible or liable for any claims or damages associated with interpretation of available information provided to others. Site exploration identifies actual soil conditions only at those points where samples are taken, when they are taken. Data derived through sampling and laboratory testing is extrapolated by Converse employees who render an opinion about the overall soil conditions. Actual conditions in areas not sampled may differ. In the event that changes to the project occur, or additional, relevant information about the project is brought to our attention, the recommendations contained in this report may not be valid unless these changes and additional relevant information is reviewed, and the recommendations of this report are modified or verified in writing. In addition, the recommendations can only be finalized by observing actual subsurface conditions revealed during construction. Converse cannot be held responsible for misinterpretation or changes to our recommendations made by others during construction.

As the project evolves, continued consultation and construction monitoring by a qualified geotechnical consultant should be considered an extension of geotechnical investigation services performed to date. The geotechnical consultant should review plans and specifications to verify that the recommendations presented herein have been appropriately interpreted, and that the design assumptions used in this report are valid. Where significant design changes occur, Converse may be required to augment or modify the recommendations presented herein. Subsurface conditions may differ in some locations from those encountered in the explorations, and may require additional analyses and, possibly, modified recommendations.

Design recommendations given in this report are based on the assumption that the recommendations contained in this report are implemented. Additional consultation may be prudent to interpret Converse's findings for contractors, or to possibly refine these recommendations based upon the review of the actual site conditions encountered during construction. If the scope of the project changes, if project completion is to be delayed, or if the report is to be used for another purpose, this office should be consulted.



## 14.0 REFERENCES

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# Appendix A

Field Exploration



## APPENDIX A

### FIELD EXPLORATION

Our field investigation included a site reconnaissance and a subsurface exploration program consisting of drilling soil borings. During the site reconnaissance, the surface conditions were noted, and the borings were marked at locations approved by Mr. Miko Aivazian with Carollo Engineers, Inc. The boring locations were established in the field using approximate distances from local streets as well as existing features as a guide and should be considered accurate only to the degree implied by the method used to locate them.

Five exploratory borings (BH-01 through BH-05) were drilled on January 20, 2023, to investigate the subsurface conditions. The planned and actual depth of the borings are presented in the following table.

**Table No. A-1, Summary of the Borings**

Boring No.	Boring Depth (ft, bgs)		Groundwater Depth (ft, bgs)	Date Completed
	Proposed	Completed		
BH-01	30.0	31.5	N/E	1/20/2023
BH-02	30.0	31.5	N/E	1/20/2023
BH-03	30.0	31.5	N/E	1/20/2023
BH-04	30.0	31.5	N/E	1/20/2023
BH-05	60.0	61.5	N/E	1/20/2023

The borings were advanced using a truck-mounted drill rig equipped with 8-inch diameter hollow-stem augers for soils sampling. Encountered materials were continuously logged by a Converse Geologist and classified in the field by visual classification in accordance with the Unified Soil Classification System. Where appropriate, the field descriptions and classifications have been modified to reflect laboratory test results.

Relatively undisturbed samples were obtained using California Modified Samplers (2.4 inches inside diameter and 3.0 inches outside diameter) lined with thin sample rings. The steel ring sampler was driven into the bottom of the borehole with successive drops of a 140-pound driving weight falling 30 inches. Blow counts at each sample interval are presented on the boring logs. Samples were retained in brass rings (2.4 inches inside diameter and 1.0 inch in height) and carefully sealed in waterproof plastic containers for shipment to the Converse laboratory. Bulk samples of typical soil types were also obtained in plastic bags.

Standard Penetration Testing (SPT) was also performed in accordance with the ASTM Standard D1586 test using 1.4 inches inside diameter and 2.0 inches outside diameter



split-barrel sampler. The mechanically driven hammer for the SPT sampler was 140 pounds, falling 30 inches for each blow. The recorded blow counts for every 6 inches for a total of 1.5 feet of sampler penetration are shown on the Logs of Borings.

The exact depths at which material changes occur cannot always be established accurately. Unless a more precise depth can be established by other means, changes in material conditions that occur between drive samples are indicated on the logs at the top of the next drive sample.

Following the completion of logging and sampling, the borings were backfilled with soil cuttings and compacted by pushing down with an auger using the drill rig weight. If construction is delayed, the surface of the borings may settle over time. We recommend the owner monitor the boring locations and backfill any depressions that might occur or provide protection around the boring locations to prevent trip and fall injuries from occurring near the area of any potential settlement.

For a key to soil symbols and terminology used in the boring logs, refer to Drawing Nos. A-1a and A-1b, *Unified Soil Classification and Key to Boring Log Symbols*. For logs of borings, see Drawing Nos. A-2 through A-6, *Logs of Borings*. All elevations are based on Google Earth.



# SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		<b>GW</b>	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		<b>GP</b>	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		<b>GM</b>	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		<b>GC</b>	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		<b>SW</b>	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		<b>SP</b>	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
FINE GRAINED SOILS	SILTS AND CLAYS	Liquid Limit Less Than 50		<b>ML</b>	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
		Liquid Limit Greater Than 50		<b>CL</b>	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	SILTS AND CLAYS	Liquid Limit Greater Than 50		<b>MH</b>	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
		Liquid Limit Greater Than 50		<b>CH</b>	INORGANIC CLAYS OF HIGH PLASTICITY
HIGHLY ORGANIC SOILS				<b>OH</b>	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				<b>PT</b>	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

FIELD AND LABORATORY TESTS	
<b>C</b>	Consolidation (ASTM D 2435)
<b>CL</b>	Collapse Potential (ASTM D 4546)
<b>CP</b>	Compaction Curve (ASTM D 1557)
<b>CR</b>	Corrosion, Sulfates, Chlorides (CTM 643-99; 417; 422)
<b>CU</b>	Consolidated Undrained Triaxial (ASTM D 4767)
<b>DS</b>	Direct Shear (ASTM D 3080)
<b>EI</b>	Expansion Index (ASTM D 4829)
<b>M</b>	Moisture Content (ASTM D 2216)
<b>OC</b>	Organic Content (ASTM D 2974)
<b>P</b>	Permeability (ASTM D 2434)
<b>PA</b>	Particle Size Analysis (ASTM D 6913 [2002])
<b>PI</b>	Liquid Limit, Plastic Limit, Plasticity Index (ASTM D 4318)
<b>PL</b>	Point Load Index (ASTM D 5731)
<b>PM</b>	Pressure Meter
<b>PP</b>	Pocket Penetrometer
<b>R</b>	R-Value (CTM 301)
<b>SE</b>	Sand Equivalent (ASTM D 2419)
<b>SG</b>	Specific Gravity (ASTM D 854)
<b>SW</b>	Swell Potential (ASTM D 4546)
<b>TV</b>	Pocket Torvane
<b>UC</b>	Unconfined Compression - Soil (ASTM D 2166)
	Unconfined Compression - Rock (ASTM D 7012)
<b>UU</b>	Unconsolidated Undrained Triaxial (ASTM D 2850)
<b>UW</b>	Unit Weight (ASTM D 2937)
<b>WA</b>	Passing No. 200 Sieve

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

## BORING LOG SYMBOLS

DRILLING METHOD SYMBOLS			
	Auger Drilling		Mud Rotary Drilling
	Dynamic Cone or Hand Driven		Diamond Core

## SAMPLE TYPE

- STANDARD PENETRATION TEST  
Split barrel sampler in accordance with ASTM D-1586-84 Standard Test Method
- DRIVE SAMPLE 2.42" I.D. sampler (CMS).
- DRIVE SAMPLE No recovery
- BULK SAMPLE
- GROUNDWATER WHILE DRILLING
- GROUNDWATER AFTER DRILLING

## UNIFIED SOIL CLASSIFICATION AND KEY TO BORING LOG SYMBOLS



Converse Consultants

New 2.5 MG DN Tank and Pump Station at the Redlands Wastewater Treatment Plant  
1950 Nevada Street  
City of Redlands, San Bernardino County, California  
For: Carollo Engineers, Inc.

Project No. Drawing No.  
21-81-276-01 A-1a

### CONSISTENCY OF COHESIVE SOILS

Descriptor	Unconfined Compressive Strength (tsf)	SPT Blow Counts	Pocket Penetrometer (tsf)	CA Sampler	Torvane (tsf)	Field Approximation
Very Soft	<0.25	< 2	<0.25	<3	<0.12	Easily penetrated several inches by fist
Soft	0.25 - 0.50	2 - 4	0.25 - 0.50	3 - 6	0.12 - 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 - 1.0	5 - 8	0.50 - 1.0	7 - 12	0.25 - 0.50	Can be penetrated several inches by thumb with moderate effort
Stiff	1.0 - 2.0	9 - 15	1.0 - 2.0	13 - 25	0.50 - 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2.0 - 4.0	16 - 30	2.0 - 4.0	26 - 50	1.0 - 2.0	Readily indented by thumbnail
Hard	>4.0	>30	>4.0	>50	>2.0	Indented by thumbnail with difficulty

### APPARENT DENSITY OF COHESIONLESS SOILS

Descriptor	SPT N <sub>60</sub> Value (blows / foot)	CA Sampler
Very Loose	<4	<5
Loose	4 - 10	5 - 12
Medium Dense	11 - 30	13 - 35
Dense	31 - 50	36 - 60
Very Dense	>50	>60

### MOISTURE

Descriptor	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

### PERCENT OF PROPORTION OF SOILS

Descriptor	Criteria
Trace (fine)/ Scattered (coarse)	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

### SOIL PARTICLE SIZE

Descriptor	Size	
Boulder	> 12 inches	
Cobble	3 to 12 inches	
Gravel	Coarse	3/4 inch to 3 inches
	Fine	No. 4 Sieve to 3/4 inch
Sand	Coarse	No. 10 Sieve to No. 4 Sieve
	Medium	No. 40 Sieve to No. 10 Sieve
	Fine	No. 200 Sieve to No. 40 Sieve
Silt and Clay	Passing No. 200 Sieve	

### PLASTICITY OF FINE-GRAINED SOILS

Descriptor	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

### CEMENTATION/ Induration

Descriptor	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

**NOTE:** This legend sheet provides descriptions and associated criteria for required soil description components only. Refer to Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), Section 2, for tables of additional soil description components and discussion of soil description and identification.

## UNIFIED SOIL CLASSIFICATION AND KEY TO BORING LOG SYMBOLS



**Converse Consultants**

New 2.5 MG DN Tank and Pump Station at the  
Redlands Wastewater Treatment Plant  
1950 Nevada Street  
City of Redlands, San Bernardino County, California  
For: Carollo Engineers, Inc.

Project No. Drawing No.  
21-81-276-01 A-1b

# Log of Boring No. BH-01

Date Drilled: 1/20/2023      Logged by: Stephen McPherson      Checked By: Hashmi Quazi

Equipment: 8" DIAMETER HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 1185      Depth to Water (ft, bgs): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS <small>This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the Boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.</small>	SAMPLES		BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
	12" ASPHALT CONCRETE/ NO BASE							
	ALLUVIUM <b>SILTY SAND (SM):</b> fine to medium-grained, trace clay, loose, moist, dark brown.							
5					1/3/4	12	106	
					3/4/6	12	106	CR
					3/4/5	4	105	DS
10					3/5/6	8	101	
15		-@15.0': medium dense.			5/8/9	12	102	C
20			X		3/6/7	11		EI, PA
25		-@25': dense.			10/16/22	9	96	
30		<b>SAND WITH SILT (SP-SM):</b> fine to coarse-grained, dense, moist, gray.	X		10/15/17	3		PA
		End of boring at 31.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings and compacted by pushing down with an auger using drill rig weight on						



**Converse Consultants**

New 2.75 MG Tank and Pump Station at the  
Redlands Wastewater Treatment Plant  
1950 Nevada Street  
City of Redlands, San Bernardino County, California  
For: Carollo Engineers, Inc.

Project No. **21-81-276-01**      Drawing No. **A-2**

# Log of Boring No. BH-02

Date Drilled: 1/20/2023      Logged by: Stephen McPherson      Checked By: Hashmi Quazi

Equipment: 8" DIAMETER HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 1183      Depth to Water (ft, bgs): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS <small>This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the Boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.</small>	SAMPLES		BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
		<b>6" ASPHALT CONCRETE/ NO BASE</b>						
		<b>ALLUVIUM SANDY SILT / SILTY SAND (ML/SM):</b> fine to medium-grained sand, trace clay, loose, moist, dark brown.						EI, R, PA
5					3/3/4	10	104	
					2/3/4	10	99	
					3/5/6	5	100	
10					3/4/6	8	98	
15		<b>SANDY SILT (ML):</b> fine-grained sand, stiff, moist, dark brown.			4/6/8	21	97	CL, DS
20		-@20.0': very stiff.			6/7/9	13		
25		-@21': hard.			11/20/33	6	110	
30		<b>SAND (SP):</b> fine to coarse-grained, scattered gravel up to 1 inch maximum dimension, moist, dense, gray. End of boring at 31.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings and compacted by pushing down with an auger using drill rig weight on			10/16/26	2		



**Converse Consultants**

New 2.75 MG Tank and Pump Station at the  
Redlands Wastewater Treatment Plant  
1950 Nevada Street  
City of Redlands, San Bernardino County, California  
For: Carollo Engineers, Inc.

Project No. **21-81-276-01**      Drawing No. **A-3**

# Log of Boring No. BH-03

Date Drilled: 1/20/2023      Logged by: Stephen McPherson      Checked By: Hashmi Quazi

Equipment: 8" DIAMETER HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 1186      Depth to Water (ft, bgs): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the Boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES		BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
		<b>9" ASPHALT CONCRETE/ NO BASE</b>						
		<b>ALLUVIUM</b>						
		<b>SANDY SILT (ML):</b> fine to medium-grained, trace clay, stiff, moist, dark brown. -@3.5': loose.			9/9/9	19	102	
5					3/3/4	10	101	EI, CP
					3/3/4	8	103	
10					3/4/6	8	95	
15		medium stiff, moist, dark brown	X		3/4/4	18		PA
20		-@19.0': stiff.			6/10/15	14	105	CL
25		-@24.0': very stiff	X		7/9/12	14		
30		<b>SAND (SP):</b> fine to coarse-grained, trace clay, dense, moist, grayish brown.			12/19/31	6	111	
		End of boring at 31.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings and compacted by pushing down with an auger using drill rig weight on						



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For: Carollo Engineers, Inc.

Project No. **21-81-276-01**      Drawing No. **A-4**

# Log of Boring No. BH-04

Date Drilled: 1/20/2023      Logged by: Stephen McPherson      Checked By: Hashmi Quazi

Equipment: 8" DIAMETER HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 1186      Depth to Water (ft, bgs): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the Boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES		BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
		<b>13" ASPHALT CONCRETE/ NO BASE</b>						
		<b>ALLUVIUM</b> <b>SILTY SAND (SM):</b> fine to medium-grained sand, loose, moist, dark brown.						CR, CP
5					4/4/5	11	102	
					4/4/5	7	98	
		-@8.5': medium dense.			4/6/7	4	95	
10					4/5/7	11	93	
15								
		<b>SANDY SILT (ML):</b> fine-grained sand, medium stiff, moist, dark brown.			6/10/11	14	107	DS, CL
20			X		6/7/7	7		EI
25								
		<b>SAND (SP):</b> fine to coarse-grained, very dense, moist, grayish brown.			18/37/41	3	104	
30			X		11/24/25	4		
		End of boring at 31.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings and compacted by pushing down with an auger using drill rig weight on						



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Project No. **21-81-276-01**      Drawing No. **A-5**

# Log of Boring No. BH-05

Date Drilled: 1/20/2023      Logged by: Stephen McPherson      Checked By: Hashmi Quazi

Equipment: 8" DIAMETER HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 1185      Depth to Water (ft, bgs): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the Boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES		BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
		<b>9.5" ASPHALT CONCRETE/ NO BASE</b>						
		<b>ALLUVIUM</b> <b>SILTY SAND (SM):</b> fine to medium-grained, trace clay, loose, moist, dark brown.			3/4/3	12	99	
5					3/3/4	11	104	EI, CP
		<b>SAND WITH SILT (SP-SM):</b> fine to coarse-grained, loose, moist, grayish brown.			3/4/6	4	100	
10		<b>SILTY SAND (SM):</b> fine to medium-grained, trace clay, loose, moist, dark brown.  -@12.0': medium dense.			4/5/6	10	95	
					4/7/8	7	101	
15		<b>SANDY SILT (ML):</b> medium stiff, moist, dark brown.  -@17.0"; medium dense.			4/7/9	17	97	DS
					3/3/4	14		CR
20		-@19.5': very dense.			6/12/20	9	113	C
					5/6/7	8		
25								
		<b>SAND (SP):</b> fine to coarse-grained, dense, moist, grayish brown.			10/24/35	3	103	
30								
					11/18/19	3		



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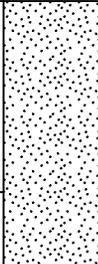
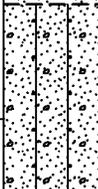
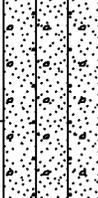
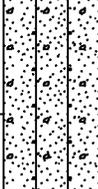
Project No. **21-81-276-01**      Drawing No. **A-6a**

# Log of Boring No. BH-05

Date Drilled: 1/20/2023      Logged by: Stephen McPherson      Checked By: Hashmi Quazi

Equipment: 8" DIAMETER HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 1185      Depth to Water (ft, bgs): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS  This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the Boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES		BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
40		<b>ALLUVIUM SAND (SP):</b> fine to coarse-grained, dense, moist, grayish brown. -@37.0': very dense.			23/50-5.5"	3	108	
45		<b>SILTY SAND (SM):</b> fine to medium-grained, trace clay, scattered gravel up to 1 inch maximum dimension, medium dense, moist, dark brown.  -@47.0': more sand content, very dense.	X		13/9/14	11		
50		-@52.0': dense.			46/50-6"	1	118	PA
55		-@57.0': very dense.	X		18/24/25	8		
60		<b>SAND (SP):</b> fine to coarse-grained, very dense, moist, grayish brown.	X		26/50-3.5"	10	116	
		End of boring at 61.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings and compacted by pushing down with an auger using drill rig weight on 01/20/2023.			25/44/44	3		



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Project No. **21-81-276-01**      Drawing No. **A-6b**

# Appendix B

Laboratory Testing Program



## APPENDIX B

### LABORATORY TESTING PROGRAM

Tests were conducted in our laboratory on representative soil samples for the purpose of classification and evaluation of their physical properties and engineering characteristics. The amount and selection of tests were based on the geotechnical parameters required for this project. Test results are presented herein and on the Logs of Borings, in Appendix A, *Field Exploration*. The following is a summary of the various laboratory tests conducted for this project.

#### **In-Situ Moisture Content and Dry Density**

In-situ dry density and moisture content tests were performed on relatively undisturbed ring samples, in accordance with ASTM Standard D2216 & D2937 to aid soils classification and to provide qualitative information on strength and compressibility characteristics of the site soils. For test results, see the Logs of Borings in Appendix A, *Field Exploration*.

#### **Expansion Index (EI)**

Five samples were tested to evaluate the expansion potential in accordance with ASTM Standard D4829. The test results are presented in the following table.

**Table No. B-1, Expansion Index Test Result**

Boring No.	Depth (feet)	Soil Description	Expansion Index	Expansion Potential
BH-01	20.0-21.5	Silty Sand (SM)	0	Very Low
BH-02	0.0-5.0	Sandy Silt (ML)/Silty Sand (SM)	0	Very Low
BH-03	3.0-8.0	Sandy Silt (ML)	0	Very Low
BH-04	21.0-22.5	Silty Sand (SM)	0	Very Low
BH-05	5.0-10.0	Silty Sand (SM)/Sand with Silt (SP-SM)	7	Very Low

#### **R-value**

One representative bulk soil sample was tested in accordance with California Test Method CT301 for resistance value (R-value). The test provides a relative measure of soil strength for use in pavement design. The test result is presented in the following table.

**Table No. B-2, R-Value Test Result**

Boring No.	Depth (feet)	Soil Classification	Measured R-value
BH-02	0-5	Sandy Silt (ML)	22



**Soil Corrosivity Test (CR)**

Three representative soil samples were tested to determine minimum electrical resistivity (wet condition), pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of these tests was to determine the corrosion potential of site soils when placed in contact with common construction materials. The tests were performed by AP Engineering and Testing, Inc. (Pomona, CA) in accordance with Caltrans Tests 643, 422 and 417. Test results are presented in the following table.

**Table No. B-3, Summary of Soil Corrosivity Test Results**

Boring No.	Depth (feet)	pH	Soluble Sulfates (CA 417) (ppm)	Soluble Chlorides (CA 422) (ppm)	Min. Resistivity (CA 643) (Ohm-cm)
BH-01	5.0-10.0	8.2	22	17	10,595
BH-04	1.0-5.0	7.8	27	20	6,862
BH-05	17.0-18.5	8.1	45	21	3,960

**Collapse**

To evaluate the moisture sensitivity (collapse/swell potential) of the encountered soils, three collapse tests were performed in accordance with the ASTM Standard D4546 laboratory procedure. The samples were loaded to approximately 2 kips per square foot (ksf), allowed to stabilize under load, and then submerged. The tests results are presented in the following table.

**Table No. B-4, Collapse Test Results**

Boring No.	Depth (ft)	Soil Classification	Percent Swell (+) Percent Collapse (-)	Collapse Potential
BH-02	15.0-16.5	Sandy Silt (ML)	-0.6	Slight
BH-03	19.0-20.5	Sandy Silt (ML)	-0.3	Slight
BH-04	21.0-22.5	Sandy Silty (ML)	0.0	None

**Grain-Size Analyses**

To assist in classification of soils, mechanical grain-size analyses were performed on five select samples in accordance with the ASTM Standard ASTM D6913 test method. Grain-size curves are shown in Drawing No. B-1, *Grain Size Distribution Results*.



**Table No. B-5, Grain Size Distribution Test Results**

Boring No.	Depth (ft)	Soil Classification	% Gravel	% Sand	%Silt	%Clay
BH-01	20.0-21.5	Silty Sand (SM)	0.0	76.7	23.3	
BH-01	30.0-31.5	Sand with Silt (SP-SM)	0.0	92.9	7.1	
BH-02	0.5-5.0	Sandy Silt (ML)/ Silty Sand (SM)	0.0	49.8	50.2	
BH-03	10.0-15.0	Sandy Silt (CL)	0.0	38.3	61.7	
BH-05	47.0-52.0	Silty Sand (SM)	0.0	71.9	28.1	

**Maximum Density and Optimum Moisture Content**

Laboratory maximum dry density-optimum moisture content relationship tests were performed on three representative bulk soil samples. The tests were conducted in accordance with the ASTM Standard D1557 test method. The test results are presented in Drawing No. B-2, *Moisture-Density Relationship Results*, and are summarized in the following table.

**Table No. B-6, Summary of Moisture-Density Relationship Results**

Boring No.	Depth (feet)	Soil Description	Optimum Moisture (%)	Maximum Density (lb/cft)
BH-03	3.0-8.0	Sandy Silt (ML), Dark Brown	9.0	127.0
BH-04	1.0-5.0	Silty Sand (SM), Dark Brown	9.5	126.0
BH-05	5.0-10.0	Silty Sand (SM)/ Sand with Silt (SP-SM), Dark to Grayish Brown	10.0	125.0

**Direct Shear**

Four direct shear tests were performed on relatively undisturbed samples under soaked moisture condition in accordance with ASTM D3080. For the test, three samples contained in brass sampler rings were placed, one at a time, directly into the test apparatus and subjected to a range of normal loads appropriate for the anticipated conditions. The samples were then sheared at a constant strain rate of 0.02 inch/minute. Shear deformation was recorded until a maximum of about 0.25-inch shear displacement was achieved. Ultimate strength was selected from the shear-stress deformation data and plotted to determine the shear strength parameters. For test data, including sample density and moisture content, see Drawing No. B-3 through B-6, *Direct Shear Test Results*, and the following table.



**Table No. B-7, Summary of Direct Shear Test Results**

Boring No.	Depth (feet)	Soil Description	Peak Strength Parameters	
			Friction Angle (degrees)	Cohesion (psf)
BH-01	8.0-9.5	Silty Sand (SM)	31	140
BH-02	15.0-16.5	Sandy Silt (ML)	29	90
BH-04	16.0-17.5	Sandy Silt (ML)	28	150
BH-05	14.5-16.0	Sandy Silt (ML)	29	190

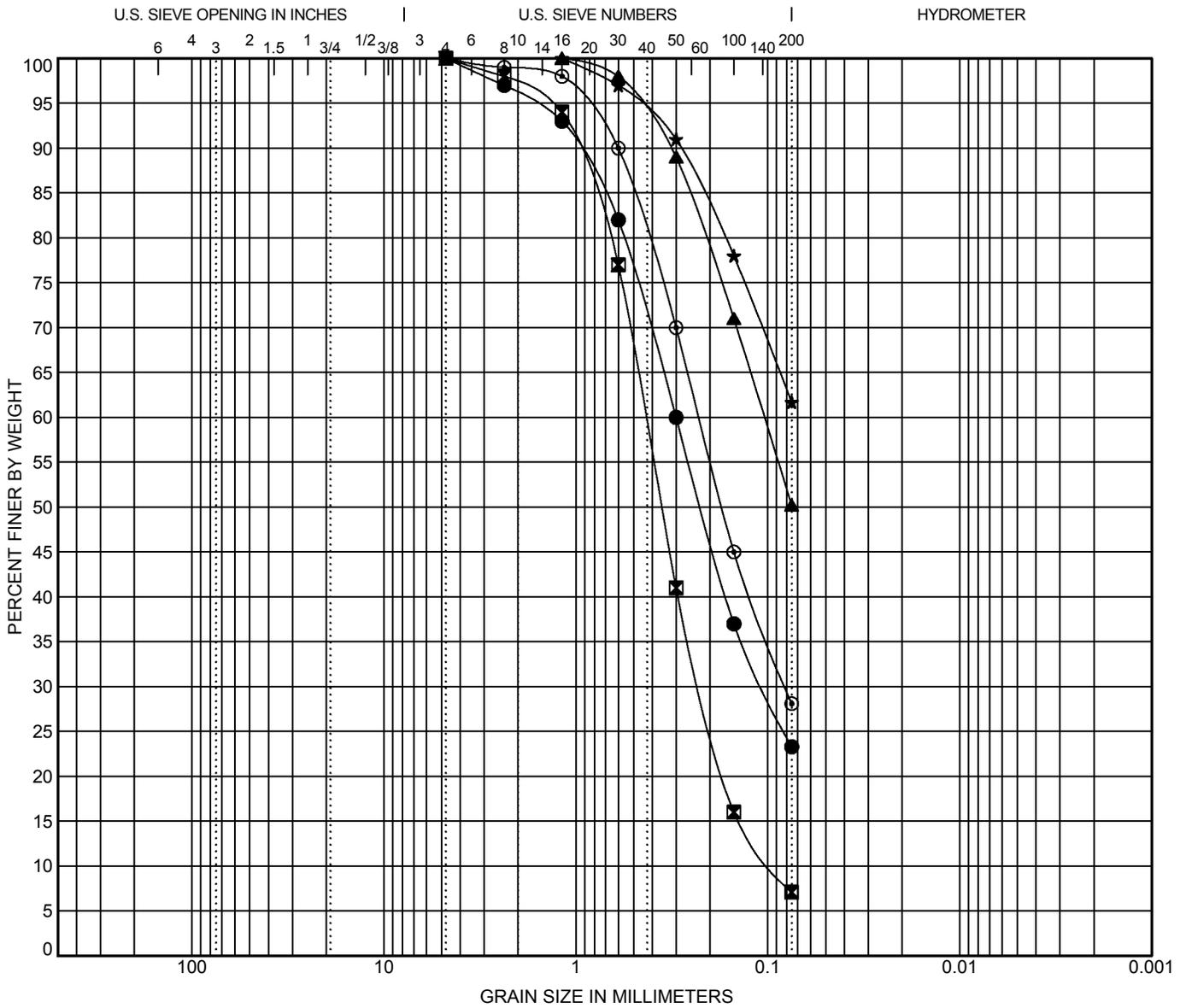
**Consolidation Test**

Two consolidation tests were conducted in accordance with ASTM Standard D2435 method. Data obtained from these tests performed on relatively undisturbed ring samples were used to evaluate the settlement characteristics of the on-site soils under load. Preparation for these tests involved trimming the sample, placing it in a 1-inch-high brass ring, and loading it into the test apparatus, which contained porous stones to accommodate drainage during testing. Normal axial loads were applied to one end of the sample through the porous stones, and the resulting deflections were recorded at various time periods. The load was increased after the sample reached a reasonable state of equilibrium. Normal loads were applied at a constant load-increment ratio, successive loads being generally twice the preceding load. For test results, including sample density and moisture content, see Drawing Nos. B-7 and B-8, *Consolidation Test Results*.

**Sample Storage**

Soil samples presently stored in our laboratory will be discarded 30 days after the date of this report, unless this office receives a specific request to retain the samples for a longer period.





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu		
● BH-01	20.0-21.5	SILTY SAND (SM)							
☒ BH-01	30.0-31.5	SAND WITH SILT (SP-SM)				1.20	4.60		
▲ BH-02	0.5-5.0	SANDY SILT (ML)/SILTY SAND (SM)							
★ BH-03	14.0-15.5	SANDY SILT (ML)							
⊙ BH-05	47.0-52.0	SILTY SAND (SM)							
Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BH-01	20.0-21.5	4.75	0.3	0.105		0.0	76.7	23.3	
☒ BH-01	30.0-31.5	4.75	0.433	0.221	0.094	0.0	92.9	7.1	
▲ BH-02	0.5-5.0	1.18	0.104			0.0	49.8	50.2	
★ BH-03	14.0-15.5	1.18				0.0	38.3	61.7	
⊙ BH-05	47.0-52.0	4.75	0.227	0.081		0.0	71.9	28.1	

## GRAIN SIZE DISTRIBUTION RESULTS

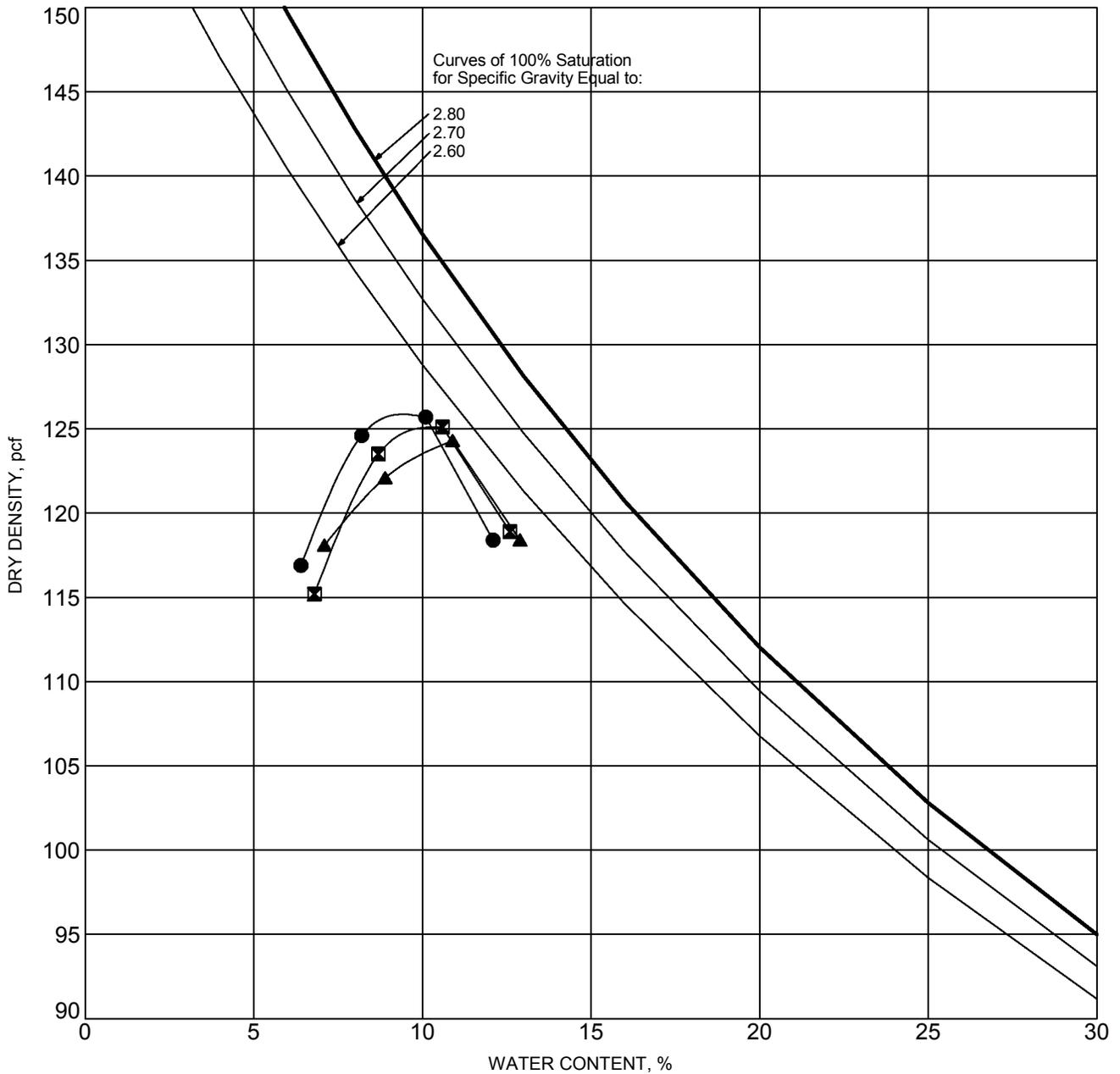


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Drawing No.  
B-1



SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	BH-03	3.0-8.0	SANDY SILT (ML), DARK BROWN	D1557 A	9.0	127
☒	BH-04	1.0-5.0	SILTY SAND (SM) DARK BROWN	D1557 A	9.5	126
▲	BH-05	5.0-10.0	SILTY SAND (SM) / SAND WITH SILT (SP-SM)	D1557 A	10.5	125
			DARK to GRAYISH BROWN			

## MOISTURE-DENSITY RELATIONSHIP RESULTS

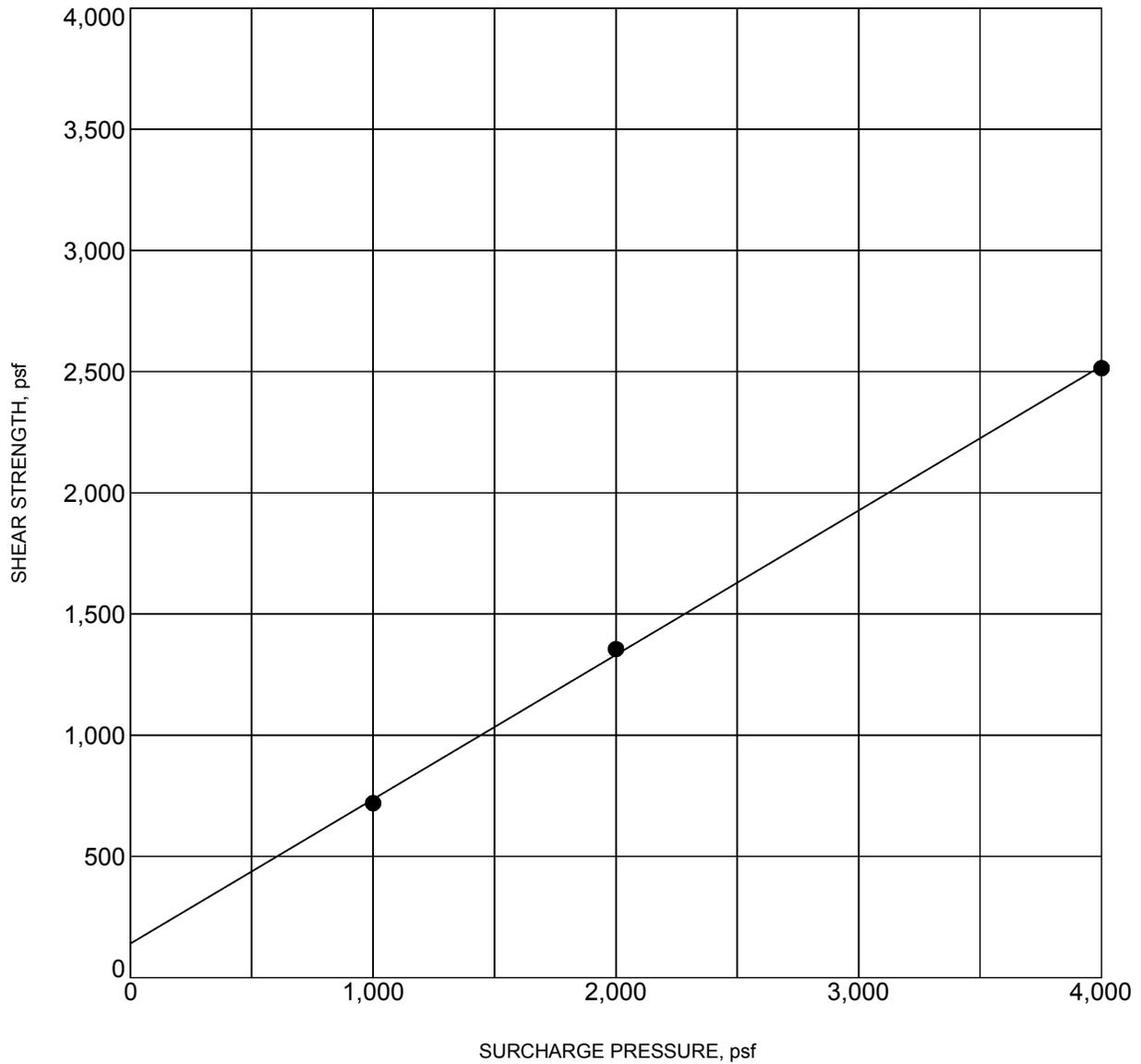


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Drawing No.  
**B-2**



BORING NO.	: BH-01	DEPTH (ft)	: 8.0-9.5
DESCRIPTION	: SILTY SAND (SM)		
COHESION (psf)	: 140	FRICTION ANGLE (degrees):	31
MOISTURE CONTENT (%)	: 4.0	DRY DENSITY (pcf)	: 105.0

NOTE: Ultimate Strength.

## DIRECT SHEAR TEST RESULTS

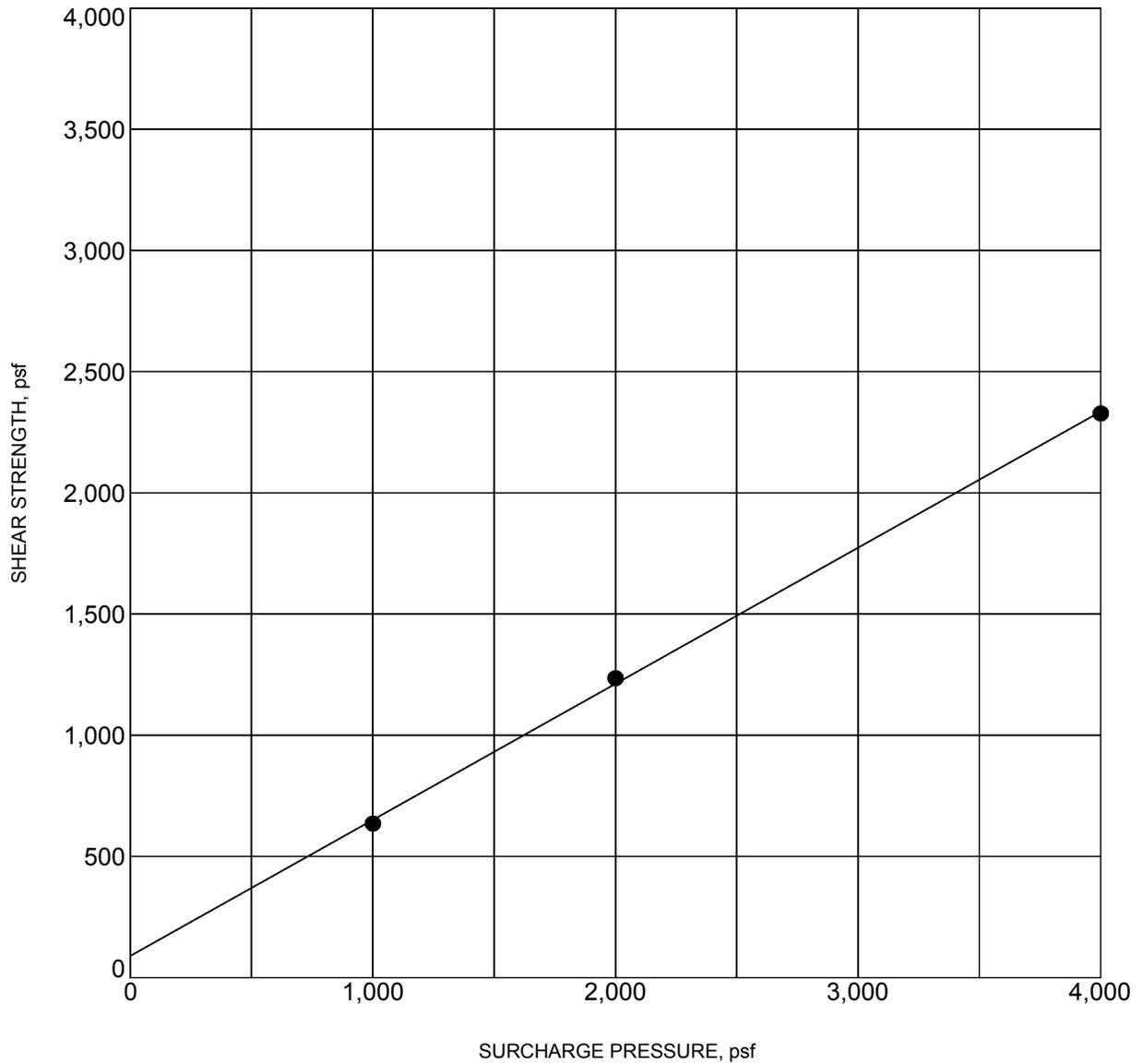


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Drawing No.  
**B-3**



BORING NO. :	<b>BH-02</b>	DEPTH (ft) :	<b>15.0-16.5</b>
DESCRIPTION :	<b>SANDY SILT (ML)</b>		
COHESION (psf) :	<b>90</b>	FRICTION ANGLE (degrees):	<b>29</b>
MOISTURE CONTENT (%) :	<b>21.0</b>	DRY DENSITY (pcf) :	<b>97.0</b>

NOTE: Ultimate Strength.

## DIRECT SHEAR TEST RESULTS

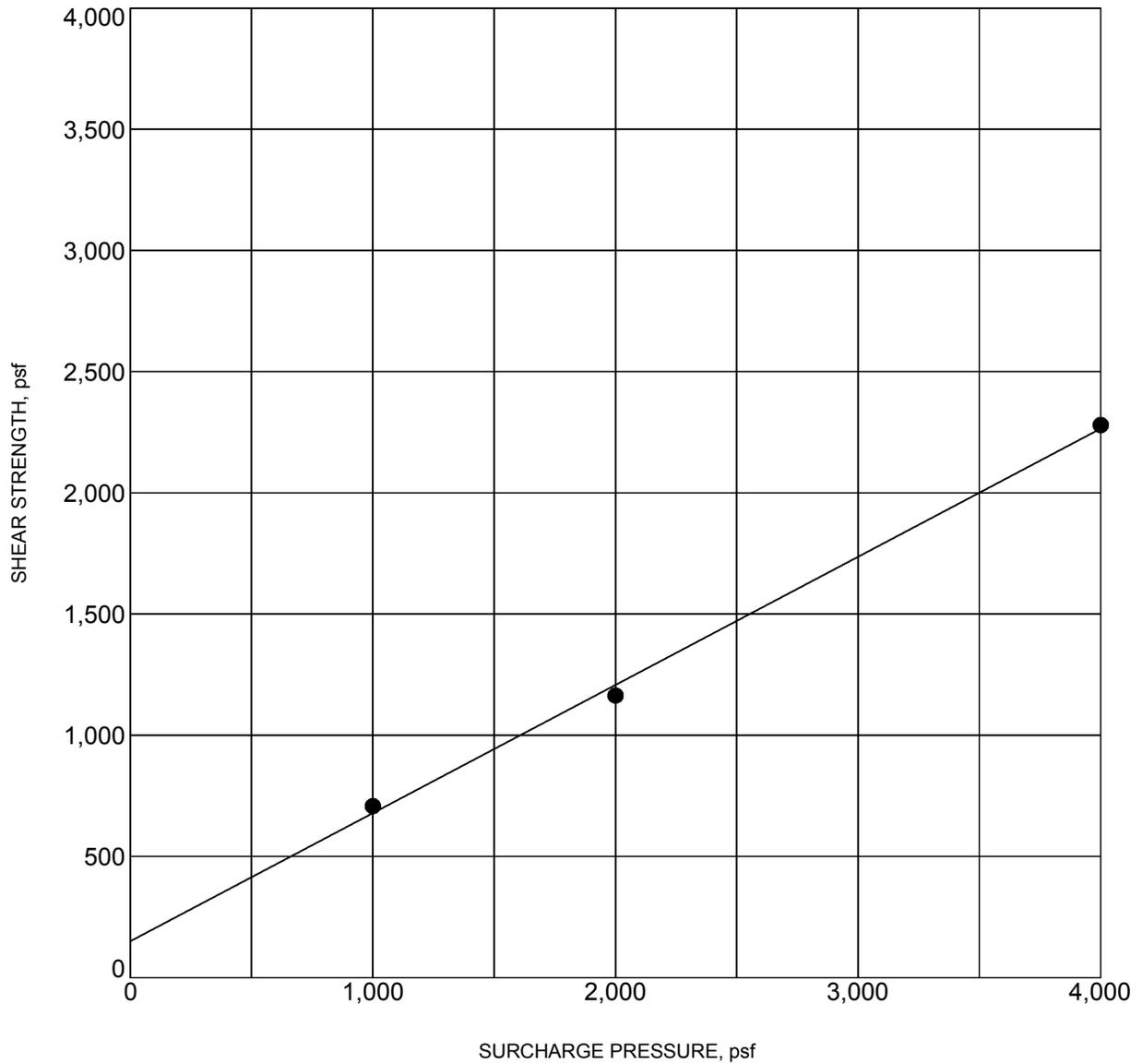


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Drawing No.  
**B-4**



BORING NO. :	<b>BH-04</b>	DEPTH (ft) :	<b>16.0-17.5</b>
DESCRIPTION :	<b>SANDY SILT (ML)</b>		
COHESION (psf) :	<b>150</b>	FRICTION ANGLE (degrees):	<b>28</b>
MOISTURE CONTENT (%) :	<b>14.0</b>	DRY DENSITY (pcf) :	<b>107.0</b>

NOTE: Ultimate Strength.

## DIRECT SHEAR TEST RESULTS

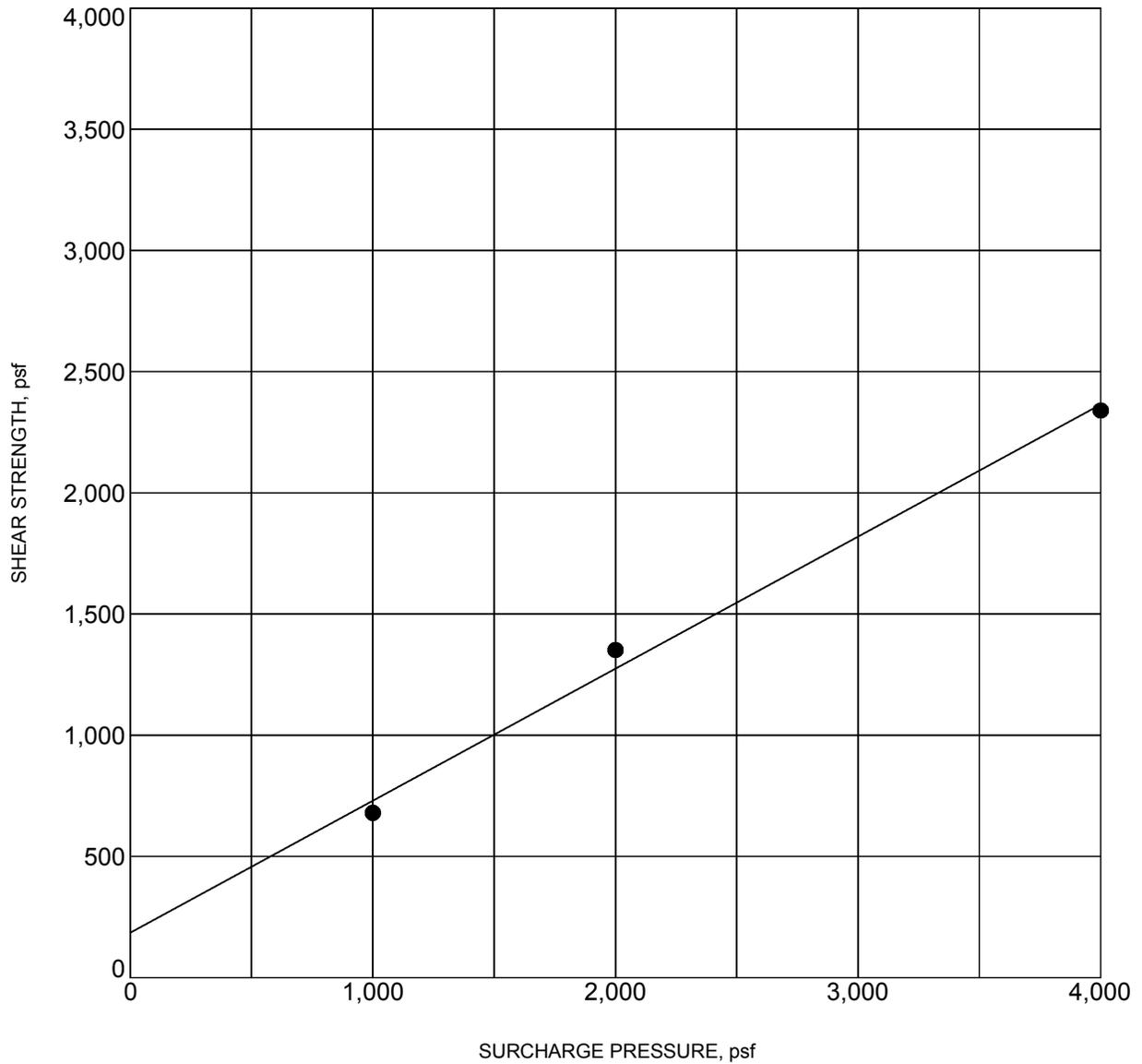


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Drawing No.  
**B-5**



BORING NO. :	<b>BH-05</b>	DEPTH (ft) :	<b>14.5-16.0</b>
DESCRIPTION :	<b>SANDY SILT (ML)</b>		
COHESION (psf) :	<b>190</b>	FRICTION ANGLE (degrees):	<b>29</b>
MOISTURE CONTENT (%) :	<b>17.0</b>	DRY DENSITY (pcf) :	<b>97.0</b>

NOTE: Ultimate Strength.

## DIRECT SHEAR TEST RESULTS

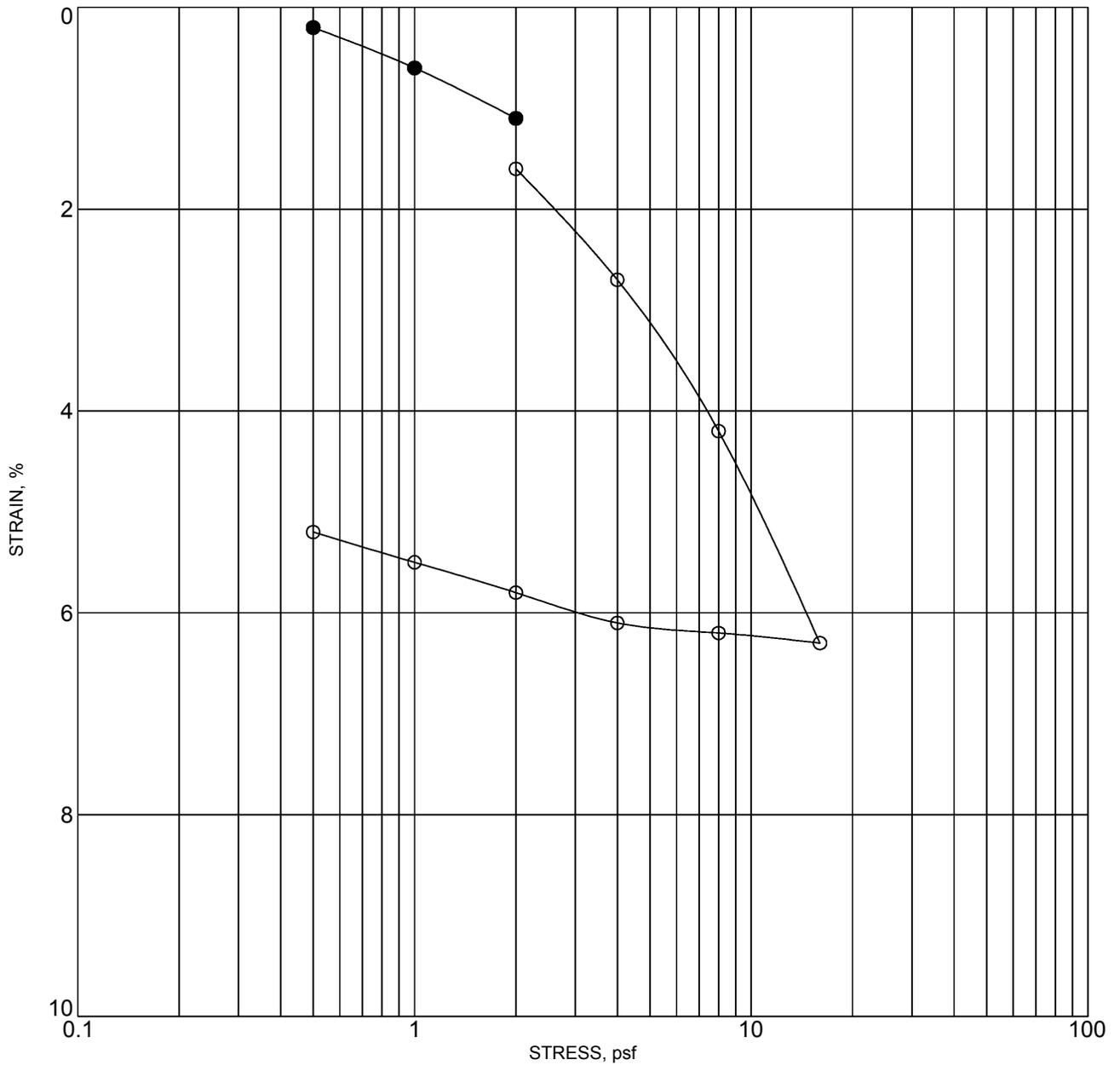


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Drawing No.  
**B-6**



BORING NO. :		<b>BH-01</b>		DEPTH (ft) :		<b>15.0-16.5</b>	
DESCRIPTION :		<b>SILTY SAND (SM)</b>					
MOISTURE CONTENT (%)		DRY DENSITY (pcf)		PERCENT SATURATION		VOID RATIO	
INITIAL	<b>12</b>	<b>102.0</b>		<b>51</b>		<b>0.620</b>	
FINAL							

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

## CONSOLIDATION TEST RESULTS

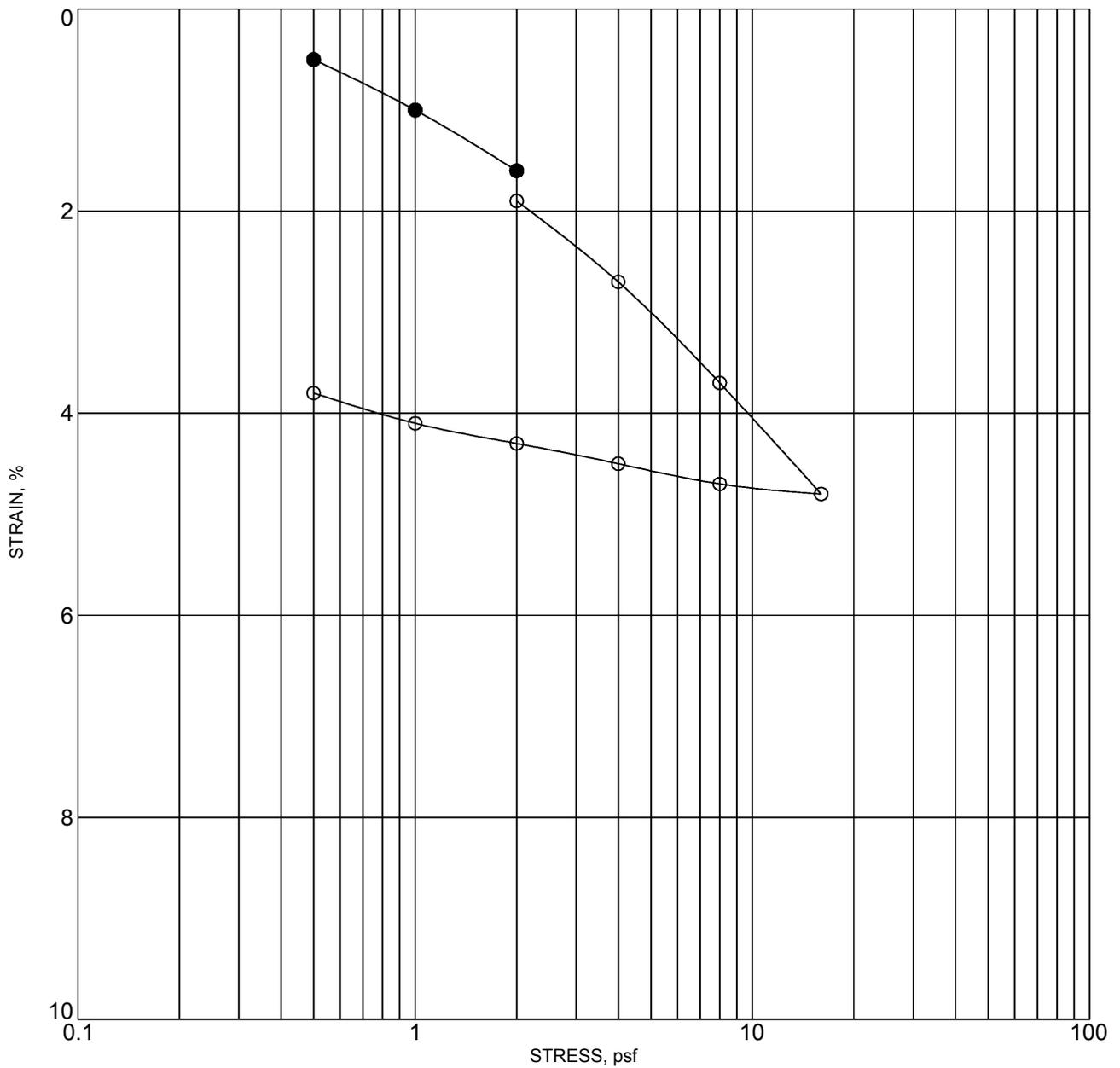


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Drawing No.  
**B-7**



BORING NO. :		<b>BH-05</b>		DEPTH (ft) :		<b>19.5-21.0</b>	
DESCRIPTION :		<b>SANDY SILT (ML)</b>					
MOISTURE CONTENT (%)		DRY DENSITY (pcf)		PERCENT SATURATION		VOID RATIO	
INITIAL	<b>9</b>	<b>113.0</b>	<b>51</b>	<b>0.610</b>			
FINAL							

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

## CONSOLIDATION TEST RESULTS



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Project No.  
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Drawing No.  
**B-8**

# Appendix C

## Liquefaction and Settlement Analysis



## APPENDIX C

### LIQUEFACTION AND SETTLEMENT ANALYSIS

The subsurface data obtained from the borings were used to evaluate the liquefaction potential and associated dry seismic settlement when subjected to ground shaking during earthquakes.

A simplified liquefaction hazard analysis was performed using the program SPTLIQ (InfraGEO Software, 2021) using the liquefaction triggering analysis method by Boulanger and Idriss (2014). A modal earthquake magnitude of M 7.1 was selected for the site based on the results of seismic disaggregation analysis using the USGS interactive online tool (<https://earthquake.usgs.gov/hazards/interactive/>).

A peak ground acceleration ( $PGA_M$ ) of 0.787g for the MCE design event, where g is the acceleration due to gravity, were selected for this analysis. The PGA was based on the 2022 CBC seismic design parameters presented in Section 7.2, *Seismic Hazard Analysis*.

The results of our analyses are presented on Plate Appendix C-1 through C-3 and summarized in the following table.

**Table No. C-1, Estimated Dynamic Settlements**

Location	Groundwater Current Depth (feet bgs)	Groundwater Historical Depth (feet bgs)	Dry Seismic Settlement (inches)	Liquefaction Induced Settlement (inches)
BH-05	> 61.5	>49.0	0.15	negligible

Based on our analysis, we anticipate the site has the potential for up to 1.02 inches of seismically induced settlement and negligible potential for liquefaction induced settlement. The differential settlement resulting from dynamic loads is anticipated to be half (0.51 inches) of the total seismically induced settlement or less over a horizontal distance of 40 feet. The structural engineer should consider this in the design.





**SIMPLIFIED LIQUEFACTION HAZARDS ASSESSMENT USING STANDARD PENETRATION TEST (SPT) DATA**

(Copyright © 2015, 2021, SPTLIQ, All Rights Reserved; By: InfraGEO Software)

PROJECT INFORMATION	
Project Name	New 2.75 MG Tank and Pump Station at the Redlands Wastewater Treatment Plant
Project No.	21-81-276-01
Project Location	1950 Nevada Street, City of Redlands, San Bernardino County, California
Analyzed By	Sk Syfur Rahman
Reviewed By	Hashmi S. Quazi

SEISMIC DESIGN PARAMETERS	
Earthquake Moment Magnitude, $M_e$	7.10
Peak Ground Acceleration, $A_{max}$	0.79 g
Factor of Safety Against Liquefaction, FS	1.20

BORING DATA AND SITE CONDITIONS	
Boring No.	BH-05
Ground Surface Elevation	1,185.00 feet
Proposed Grade Elevation	1,185.00 feet
GWL Depth Measured During Test	61.50 feet
GWL Depth Used in Design	49.00 feet
Borehole Diameter	8.00 inches
Hammer Weight	140.00 pounds
Hammer Drop	30.00 inches
Hammer Energy Efficiency Ratio, ER	80.00 %
Hammer Distance to Ground Surface	5.00 feet
Topographic Site Condition:	TSC3 (Level Ground with Nearby Free Face)
- Ground Slope, S	N/A
- Free Face (L/H) Ratio	5.00 H = 15 feet

SUMMARY OF RESULTS				
<b>Severity of Liquefaction:</b>				
Total Thickness of Liquefiable Soils:	0.00 feet (cumulative total thickness in the upper 65 feet)			
Liquefaction Potential Index (LPI):	0.00 *** (Very low risk, with no surface manifestation of liquefaction)			
<b>Seismic Ground Settlements:</b>				
Seismic Compression Settlement:	Pradel (1998)	0.06 inches	0.15 inches	0.15 inches (Dry/Unsaturated Soils)
Liquefaction-Induced Settlement:	Ishihara and Yoshimine (1992)	0.00 inches	0.00 inches	0.00 inches (Saturated Soils)
Total Seismic Settlement:		0.06 inches	0.15 inches	0.15 inches
<b>Seismic Lateral Displacements:</b>				
Cyclic Lateral Displacement:	Tokimatsu and Asaka (1998)	0.07 inches	0.14 inches	0.14 inches (During Ground Shaking)
Lateral Spreading Displacement:	Zhang et al. (2004)	0.00 inches	0.00 inches	0.00 inches (After Ground Shaking)

**NOTES AND REFERENCES**

+ This method of analysis is based on observed seismic performance of level ground sites using correlation with normalized and fines-corrected SPT blow count,  $(N_{60cs} = f(N_1)_{60}, FC)$  where  $(N_1)_{60} = N_{60} C_N C_E C_B C_R C_S$

++ Liquefaction susceptibility screening is performed to identify soil layers assessed to be non-liquefiable based on laboratory test results using the criteria proposed by Cetin and Seed (2003), Bray and Sancio (2006), or Idriss and Boulanger (2008).

\*  $FS_{liq}$  = Factor of Safety against liquefaction =  $(CRR/CSR)$ , where  $CRR = CR_{7.5} MSF K_{\sigma} K_{\alpha}$ ,  $MSF$  = Magnitude Scaling Factor,  $K_{\sigma} = f((N_1)_{60}, \sigma'_{vo})$ ,  $K_{\alpha} = 1.0$ , (level ground),  $CSR = \text{Cyclic Stress Ratio} = 0.65 A_{max} (\sigma'_m / \sigma'_{vo}) r_d$ , and  $CR_{7.5}$  = Cyclic Resistance Ratio is a function of  $(N_1)_{60cs}$  and corrected for an earthquake magnitude  $M_e$  of 7.5.

\*\* Residual strength values of liquefied soils are based on correlation with post-earthquake, normalized and fines-corrected SPT blow count derived by Idriss and Boulanger (2008).

\*\*\* Based on Iwasaki et al. (1978) and Toprak and Holzer (2003)

+ Reference: Boulanger, R.W. and Idriss, I.M. (2014), "CPT and SPT Based Liquefaction Triggering Procedures," University of California Davis, Center for Geotechnical Modeling Report No. UCDCGM-14/01, 1-134.

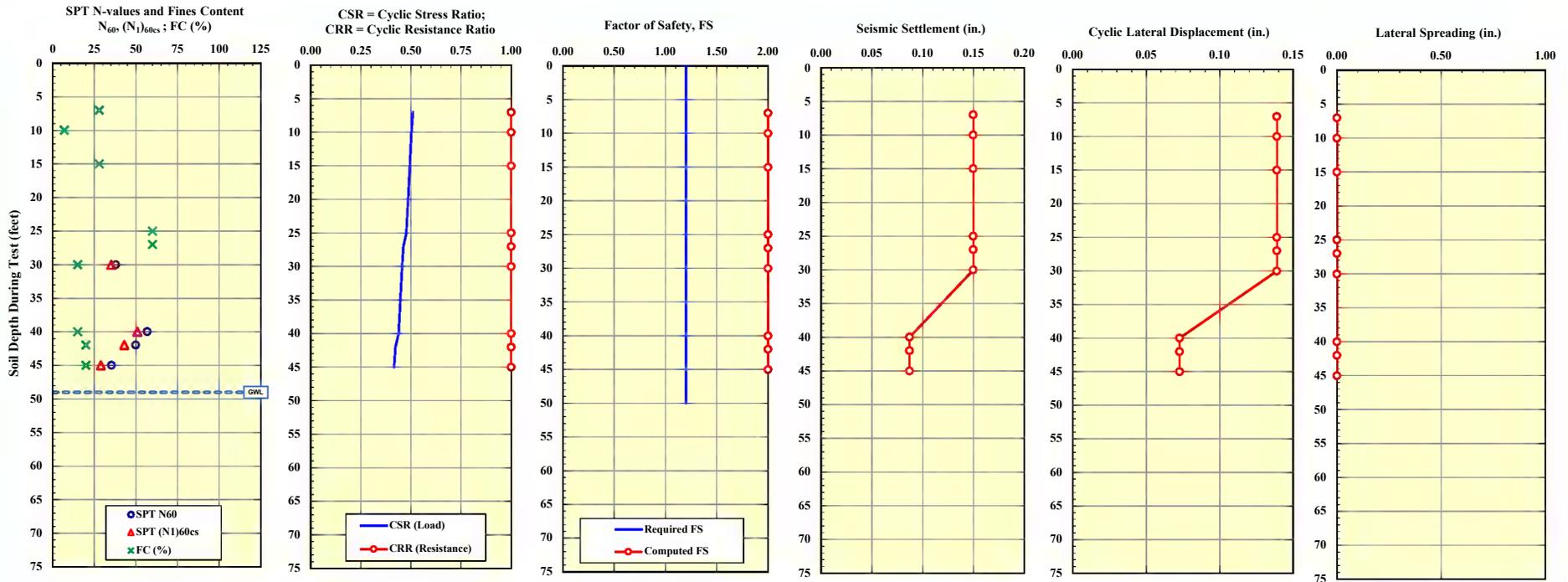
INPUT SOIL PROFILE DATA							
Depth to Top of Soil Layer (feet)	Depth to Bottom of Soil Layer (feet)	Material Type USCS Group Symbol (ASTM D2487)	Liquefaction Susceptibility Screening ++ Susceptible Soil? (Y/N)	Total Soil Unit Weight $\gamma_t$ (pcf)	Type of Soil Sampler	Field SPT Blow Count $N_{field}$ (blows/ft)	Fines Content FC (%)
0.00	7.00	SM	N	118.00	MCal	7.00	28.00
7.00	10.00	SP-SM	N	104.00	MCal	10.00	7.00
10.00	15.00	SM	N	109.00	MCal	13.00	28.00
15.00	25.00	CL	N	118.00	SPT1	13.00	60.00
25.00	27.00	CL	N	118.00	SPT1	13.00	60.00
27.00	30.00	SP	Y	109.00	MCal	38.00	15.00
30.00	40.00	SP	Y	109.00	SPT1	37.00	15.00
40.00	42.00	SP	Y	109.00	MCal	50.00	20.00
42.00	45.00	SM	Y	123.50	SPT1	23.00	20.00
45.00	50.00	SM	Y	123.50	MCal	50.00	20.00

LIQUEFACTION TRIGGERING ANALYSIS BASED ON R.W. BOULANGER AND I.M. IDRIS (2014) METHOD +																	Residual Shear Strength **	Seismic Porewater Pressure Ratio	Cumulative Seismic Settlement	Cumulative Cyclic Lateral Displacement	Cumulative Lateral Spreading Displacement
Total Vert. Stress (Design)	Effective Vert. Stress (Design)	SPT Corr. for Vert. Stress $C_N$	SPT Corr. for Hammer Energy $C_E$	SPT Corr. for Borehole Size $C_B$	SPT Corr. for Rod Length $C_R$	SPT Corr. for Sampling Method $C_S$	Corrected SPT Blow Count $N_{60}$	Normalized SPT Blow Count $(N_1)_{60}$	Fines Corrected SPT Blow Count $(N_1)_{60cs}$	Shear Stress Reduction Coefficient $r_d$	Correction for High Overburden Stress $K_{\sigma}$	Cyclic Stress Ratio $CSR$	Cyclic Resistance Ratio $CRR$	Factor of Safety * $FS_{liq}$	Liquefaction Analysis Results	$S_r$ (psf)	$r_u$ (%)	(inches)	(inches)	(inches)	
413.00	413.00									0.997		0.510						0.15	0.14	0.00	
982.00	982.00									0.981		0.502						0.15	0.14	0.00	
1,410.50	1,410.50									0.966		0.494						0.15	0.14	0.00	
2,273.00	2,273.00									0.933		0.477						0.15	0.14	0.00	
2,981.00	2,981.00									0.904		0.463						0.15	0.14	0.00	
3,262.50	3,262.50	0.843	1.333	1.150	1.000	0.650	37.9	31.9	35.2	0.892	0.891	0.456					0.15	0.14	0.00		
3,971.00	3,971.00	0.840	1.333	1.150	1.000	1.000	56.7	47.7	50.9	0.858	0.794	0.439					0.09	0.07	0.00		
4,625.00	4,625.00	0.773	1.333	1.150	1.000	0.650	49.8	38.5	43.0	0.825	0.749	0.422					0.09	0.07	0.00		
4,919.25	4,919.25	0.695	1.333	1.150	1.000	1.000	35.3	24.5	29.0	0.812	0.857	0.415					0.09	0.07	0.00		
5,413.25	5,382.05	0.726	1.333	1.150	1.000	0.650	49.8	36.2	40.6	0.790	0.701	0.407					0.00	0.00	0.00		

# SIMPLIFIED LIQUEFACTION HAZARDS ASSESSMENT USING STANDARD PENETRATION TEST (SPT) DATA

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PROJECT INFORMATION	
Project Name	New 2.75 MG Tank and Pump Station at the Redlands Wastewater Treatment Plant (WWTP)
Project No.	21-81-276-01
Project Location	1950 Nevada Street, City of Redlands, San Bernardino County, California
Analyzed By	Sk Syfur Rahman
Reviewed By	Hashmi S. Quazi



**Analysis Methods Used ==>>>**

<b>Liquefaction Triggering:</b>	<b>Seismic Settlements:</b>	<b>Cyclic Lateral Displacements:</b>	<b>Lateral Spreading:</b>
Boulanger-Idriss (2014)	Above GWL: Pradel (1998) Below GWL: Ishihara and Yoshimine (1992)	Pradel (1998) Tokimatsu and Asaka (1998)	Zhang et al. (2004)

**REFERENCES:**

1. Boulanger, R.W. and Idriss, I.M. (2014), "CPT and SPT Based Liquefaction Triggering Procedures," University of California Davis, Center for Geotechnical Modeling Report No. UCDC/CGM-14/01, 1-134.
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14. Zhang, G, Robertson, P.K. and Brachman, R.W.I. (2004), "Estimating liquefaction-induced lateral displacement using the standard penetration test or cone penetration test," Journal of Geotech. and Geoenv. Engineering, ASCE 130 (8), 861-871.

# Appendix D

## Site-Specific Seismic Analysis



## APPENDIX D

### SITE-SPECIFIC SEISMIC ANALYSIS

A site-specific response spectrum was developed for the project for a Maximum Considered Earthquake (MCE), defined as a horizontal peak ground acceleration that has a 2 percent probability of being exceeded in 50 years (return period of approximately 2,475 years).

In accordance with ASCE 7-16, Section 21.2, the site-specific response spectra can be taken as the lesser of the probabilistic maximum rotated component of MCE ground motion and the 84<sup>th</sup> percentile of deterministic maximum rotated component of MCE ground motion response spectra. The design response spectra can be taken as 2/3 of site-specific MCE response spectra but should not be lower than 80 percent of CBC general response spectra. The risk coefficient  $C_R$  has been incorporated at each spectral response period for which the acceleration was computed in accordance with ASCE 7-16, Section 21.2.1.1.

The 2022 CBC mapped acceleration parameters are provided in the following table. These parameters were determined using the *ATC hazard by location Seismic Design Maps* website application, and in accordance with ASCE 7-16 Sections 11.4, 11.6, 11.8 and 21.2.

**Table No. D-1, 2022 CBC Mapped Acceleration Parameters**

Site Class	D	Risk Category	III
$S_s$	2.028	$C_{RS}$	0.917
$S_1$	0.773	$C_{R1}$	0.891
$F_a$	1	$T_0$	0.191
$F_v$	2.5	$T_s$	0.953
$S_{MS}$	2.028	$T_L$	8
$S_{M1}$	1.933		
$S_{DS}$	1.352		
$S_{D1}$	1.288		

A site-specific response analysis, using faults within 200 kilometers of the site, was developed using the computer program EZ-FRISK Version 8.07 (Fugro, 2021).

The weighted mean maximum-rotated horizontal spectral acceleration values were computed by multiplying the weighted mean geometric spectral values derived from four next-generation attenuation (NGA) West 2 ground motion attenuation models by Abrahamson et al. (2014), Boore et al. (2014), Campbell and Bozorgnia (2014), and Chiou and Youngs (2014) with the scale factors provided in ASCE 7-16 Section 21.2. An average shear wave velocity at upper 30 meters of soil profile ( $V_{s30}$ ) of 267 meters per second was determined (Plate No. D-1), and a shear wave velocity 1,000 meters per



second at 200 meters below grade, and a shear wave velocity is 2,500 meters per second at 550 meters below grade were selected for EZ-Frisk Analysis.

The probabilistic response spectrum results and peak ground acceleration for each attenuation relationship are presented in the following table.

**Table No. D-2, Probabilistic Response Spectrum Data**

Attenuation Relationship	Probabilistic Mean	Abrahams on et al. (2014)	Boore et al. (2014)	Campbell-Bozorgnia (2014)	Chiou-Youngs (2014)
Peak Ground Acceleration (g)	1.047	1.012	1.187	0.794	1.050
Spectral Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g)				
0.05	1.191	0.995	1.485	1.000	1.155
0.10	1.689	1.265	2.259	1.383	1.551
0.20	2.218	2.198	2.573	1.467	2.258
0.30	2.495	2.637	2.588	1.768	2.709
0.40	2.598	2.794	2.522	2.085	2.859
0.50	2.563	2.554	2.560	2.164	2.883
0.75	2.191	1.976	2.163	2.036	2.517
1.00	1.831	1.552	1.788	1.793	2.098
2.00	1.045	0.917	1.033	1.188	1.004
3.00	0.728	0.614	0.746	0.898	0.593
4.00	0.532	0.473	0.583	0.638	0.383
5.00	0.370	0.335	0.426	0.443	0.222

Applicable response spectra data are presented in the table below and on Plate No. D-2, *Site-Specific Design Response Spectrum*. These curves correspond to response values obtained from above attenuation relations for horizontal elastic single-degree-of-freedom systems with equivalent viscous damping of 5 percent of critical damping.

**Table No. D-3, Probabilistic MCE<sub>R</sub> Spectral Acceleration (g)**

Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g) Geometric Mean	Risk Coefficient C <sub>R</sub>	Scale Factors for MCE <sub>R</sub>	Probabilistic MCE <sub>R</sub> Spectral Acceleration (g)
0.05	1.191	0.917	1.100	1.056
0.10	1.689	0.917	1.100	1.201
0.20	2.218	0.917	1.100	1.704
0.30	2.495	0.917	1.125	2.237
0.40	2.598	0.914	1.150	2.565
0.50	2.563	0.911	1.175	2.720
0.75	2.191	0.907	1.238	2.732
1.00	1.831	0.899	1.300	2.438



Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g) Geometric Mean	Risk Coefficient $C_R$	Scale Factors for $MCE_R$	Probabilistic $MCE_R$ Spectral Acceleration (g)
2.00	1.045	0.891	1.350	1.257
3.00	0.728	0.891	1.400	0.908
4.00	0.532	0.891	1.450	0.687
5.00	0.370	0.891	1.500	0.465

Deterministic response spectra parameters were determined using PEER spread sheet and presented in Table No. D-4. The following fault parameters were used to calculate the spectrum.

- S. San Andreas Fault, Mw=8.18, RRUP=5.98 km, RJB=5.98 km, Rx=5.98 km and dip angle are 90 degrees. The San Jacinto Fault is an approximately 241-km long fault generally trending in a southeast to northwest direction from the Santa Rosa Mountains to the San Gabriel Mountains. The branch of the S. San Andreas Fault that is located in the vicinity of this project site traverses across the Inland Santa Ana Basin. The fault trends northwest and has a vertical dip. The nearest mapped trace of the S. San Andreas is located approximately 3.72 miles (5.98 kilometers) west of the project site.

**Table No. D-4, Site-Specific Response Spectrum Data**

Period (sec)	84th Percentile Deterministic Response Spectrum, (g) Geometric Mean	Scale Factors for $MCE_R$	84th Percentile Deterministic MCE Response Spectrum, (g)	Site-Specific $MCE_R$ Spectral Acceleration (g)	80% CBC Design Response Spectrum	Site-Specific Design Spectral Acceleration (g)
0.05	0.973	1.100	1.070	1.070	0.603	0.71
0.10	1.422	1.100	1.564	1.564	0.773	1.04
0.20	1.986	1.100	2.185	2.185	1.082	1.46
0.30	2.336	1.125	2.628	2.565	1.082	1.71
0.40	2.482	1.150	2.854	2.720	1.082	1.81
0.50	2.406	1.175	2.828	2.732	1.082	1.82
0.75	1.917	1.238	2.372	2.372	1.082	1.58
1.00	1.526	1.300	1.983	1.983	1.031	1.32
2.00	0.699	1.350	0.944	0.944	0.515	0.63
3.00	0.403	1.400	0.564	0.564	0.344	0.38
4.00	0.258	1.425	0.374	0.374	0.258	0.26
5.0	0.180	1.500	0.270	0.270	0.206	0.21

The site-specific design response parameters are provided in the following table. These parameters were determined from Design Response Spectra presented in table above and following guidelines of ASCE Section 21.4.

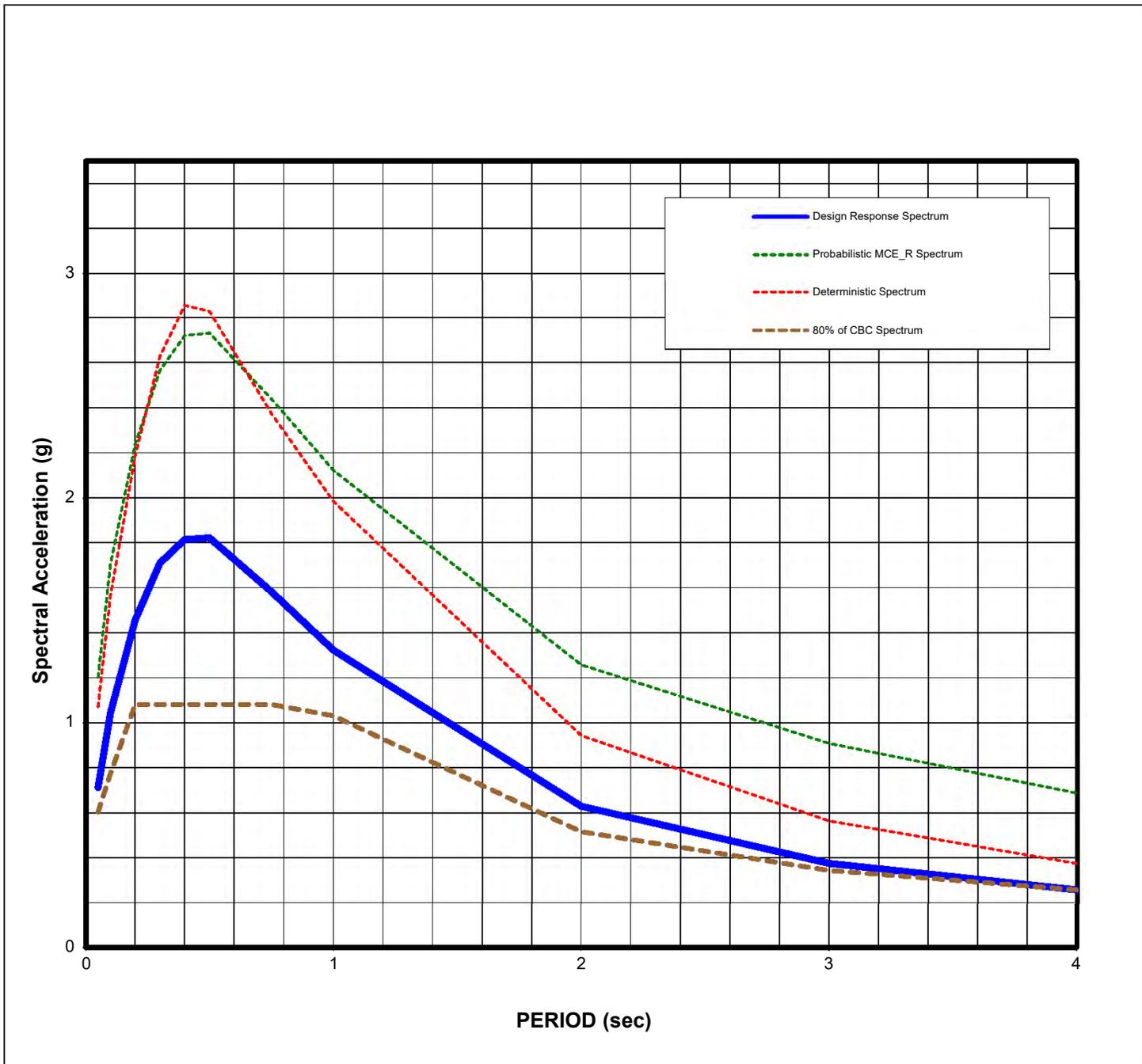


**Table No. D-5, Site-Specific Seismic Design Parameters**

Parameter	Value (5% Damping)	Lower Limit, 80% of CBC Design Spectra
Site-Specific 0.2-second period Spectral Response Acceleration, $S_{MS}$	2.459	1.622
Site-Specific 1-second period Spectral Response Acceleration, $S_{M1}$	1.983	1.546
Site-Specific Design Spectral Response Acceleration for short period $S_{DS}$	1.639	1.082
Site-Specific Design Spectral Response Acceleration for 1-second period, $S_{D1}$	1.322	1.031







Note: Calculated using EZFRISK program Risk Engineering, version 8.07

**SITE SPECIFIC DESIGN RESPONSE SPECTRUM**

New 2.75 MG Tank and Pump Station at the Redlands Wastewater Treatment Plant (WWTP)

Project Number:

1950 Nevada Street, City of Redlands, San Bernardino County, California

21-81-276-01

For : Carollo Engineers, Inc.



**Converse Consultants**

Plate No.

D-2

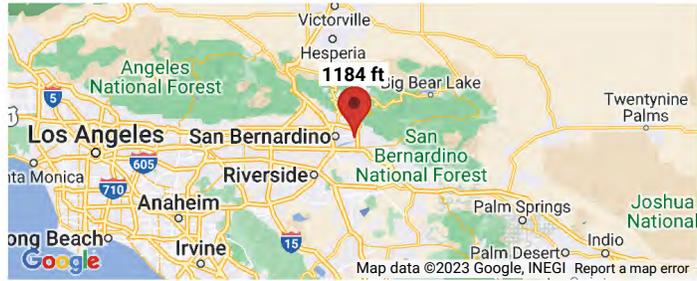
⚠ This is a beta release of the new ATC Hazards by Location website. Please [contact us](#) with feedback.

ℹ The ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

**ATC** Hazards by Location

**Search Information**

**Coordinates:** 34.0888, -117.2167  
**Elevation:** 1184 ft  
**Timestamp:** 2023-03-08T19:21:02.174Z  
**Hazard Type:** Seismic  
**Reference Document:** ASCE7-16  
**Risk Category:** III  
**Site Class:** D



**Basic Parameters**

Name	Value	Description
S <sub>S</sub>	2.028	MCE <sub>R</sub> ground motion (period=0.2s)
S <sub>1</sub>	0.773	MCE <sub>R</sub> ground motion (period=1.0s)
S <sub>MS</sub>	2.028	Site-modified spectral acceleration value
S <sub>M1</sub>	* null	Site-modified spectral acceleration value
S <sub>DS</sub>	1.352	Numeric seismic design value at 0.2s SA
S <sub>D1</sub>	* null	Numeric seismic design value at 1.0s SA

\* See Section 11.4.8

**Additional Information**

Name	Value	Description
SDC	* null	Seismic design category
F <sub>a</sub>	1	Site amplification factor at 0.2s
F <sub>v</sub>	* null	Site amplification factor at 1.0s
CR <sub>S</sub>	0.917	Coefficient of risk (0.2s)
CR <sub>1</sub>	0.891	Coefficient of risk (1.0s)
PGA	0.836	MCE <sub>G</sub> peak ground acceleration
F <sub>PGA</sub>	1.1	Site amplification factor at PGA
PGA <sub>M</sub>	0.919	Site modified peak ground acceleration
T <sub>L</sub>	8	Long-period transition period (s)
SsRT	2.68	Probabilistic risk-targeted ground motion (0.2s)
SsUH	2.923	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.028	Factored deterministic acceleration value (0.2s)
S1RT	1.061	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.191	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.773	Factored deterministic acceleration value (1.0s)
PGAd	0.836	Factored deterministic acceleration value (PGA)

\* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

# Site-Specific $MCE_R$ & Design Response Spectral Accelerations

New 2.5 MG DN Tank and a Pump Station at the Redlands Wastewater Treatment Plant (WWTP) (generated 03/08/2023)



Summary (/ugms-mcerGM-tool\_v18.4/report/144) Detailed Download All (/ugms-mcerGM-tool\_v18.4/report/144/download)

## Input Parameters

Coordinates 34.0888, -117.2167

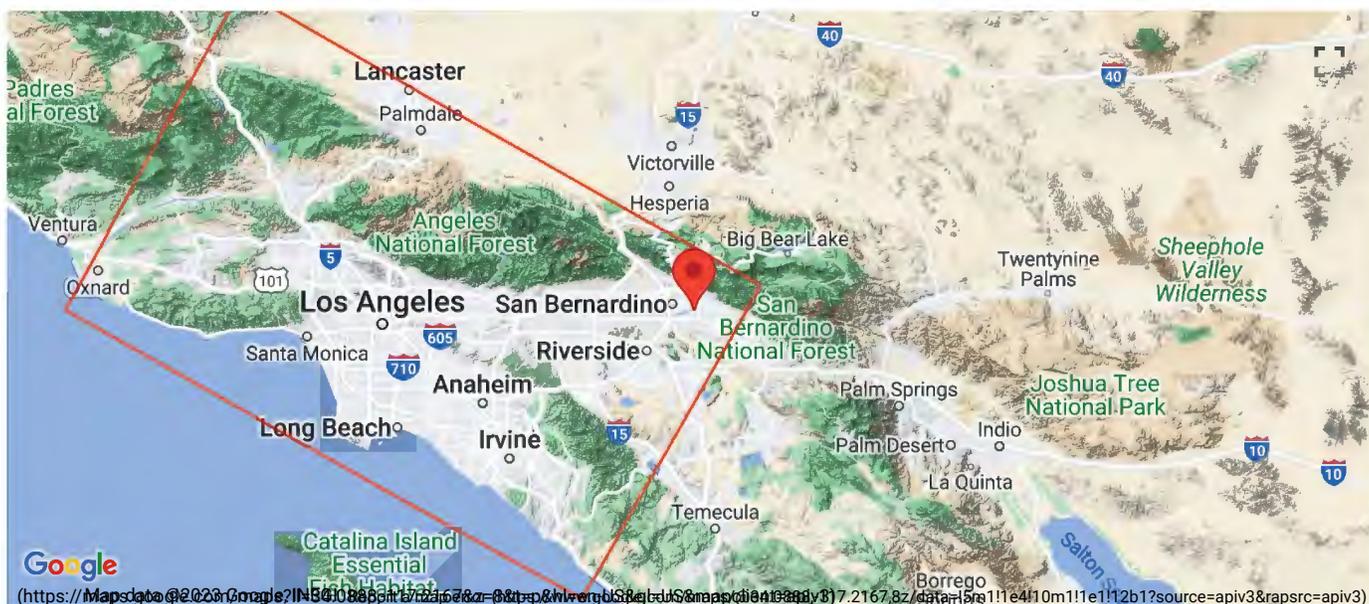
Vs30 267 m/s

## Values used in Computation

Vs30 267 m/s

Z1.0 200 m

Z2.5 550 m



Reset Map View

## Computed Results

### Site-Specific Design Parameters (Sect. 21.4)

$S_{DS} = 1.454$        $S_{MS} = 2.182$

$S_{D1} = 1.372$        $S_{M1} = 2.058$

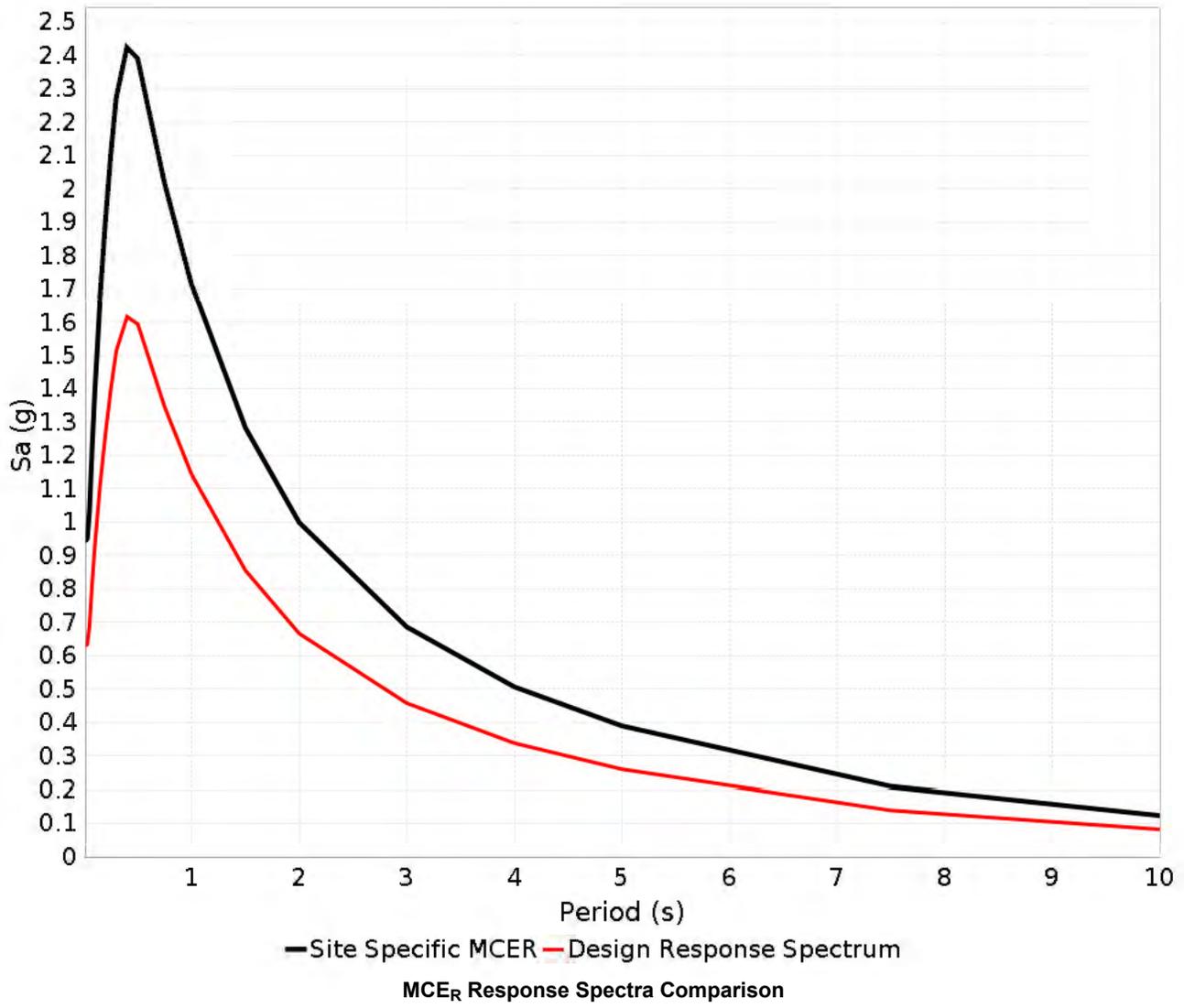
### $MCE_G$ Peak Ground Acceleration (Sect. 21.5)

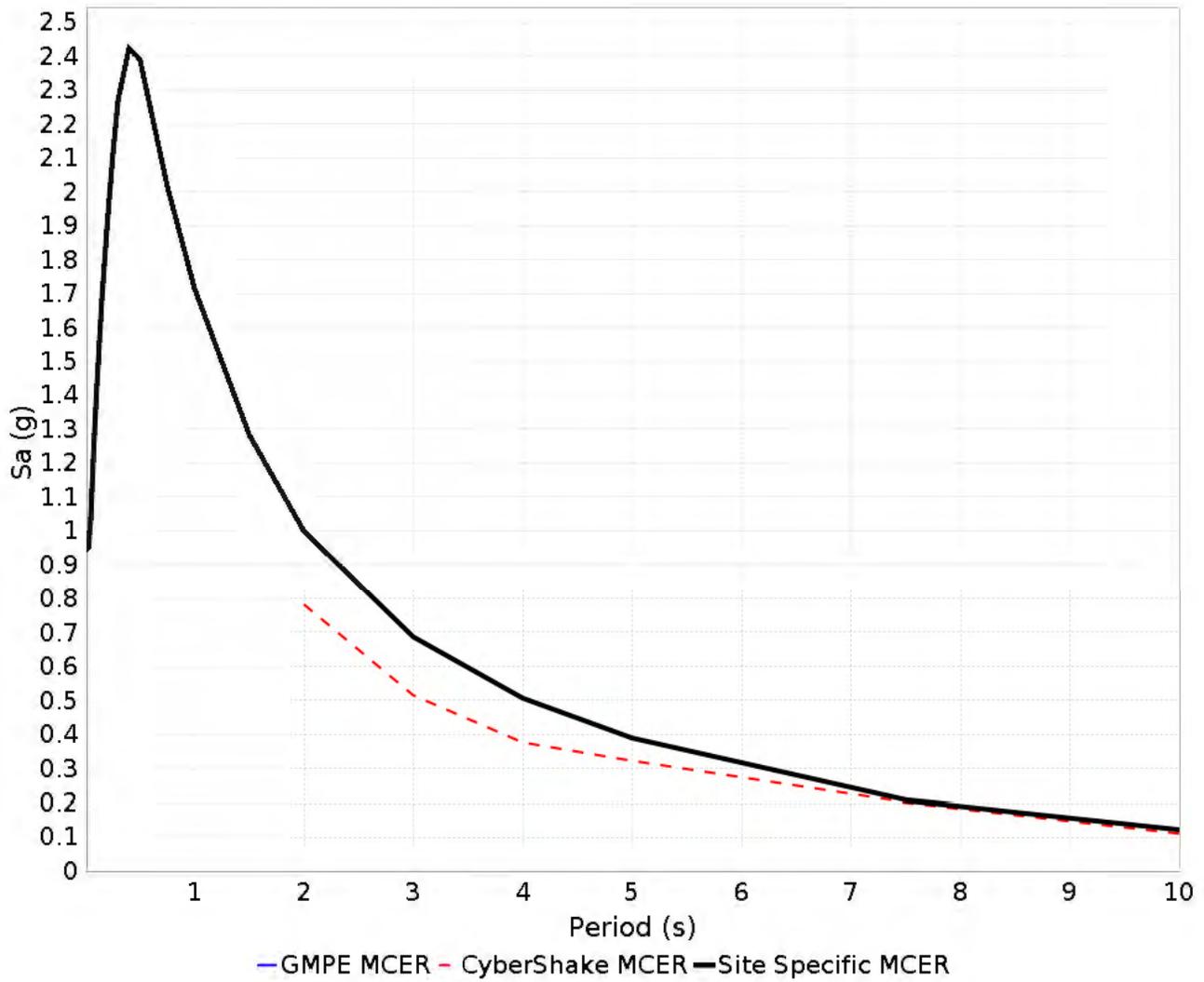
$PGA_M = 0.787$  g

## $MCE_R$ Response Spectrum

**NOTE:** The  $MCE_R$  response spectrum must be checked against the minimum ASCE 7-16 requirement on the ASCE 7 Hazard Tool (<https://asce7hazardtool.online/>) website; see the User Guide (/ugms-mcerGM-tool\_v18.4/guide) for details.

### $MCE_R$ Response Spectra





**SA (g)**

Period (s)	GMPE Sa (g)	CyberShake Sa (g)	Site-Specific MCE <sub>R</sub> Sa* (g)
0.01	0.945		0.945
0.02	0.947		0.947
0.03	0.951		0.951
0.05	1.034		1.034
0.075	1.223		1.223
0.1	1.392		1.392
0.15	1.673		1.673
0.2	1.901		1.901
0.25	2.102		2.102
0.3	2.271		2.271
0.4	2.424		2.424
0.5	2.391		2.391

0.75	2.017		2.017
1.0	1.714		1.714
1.5	1.283		1.283
2.0	0.999	0.781	0.999
3.0	0.686	0.515	0.686
4.0	0.506	0.376	0.506
5.0	0.389	0.322	0.389
7.5	0.209	0.202	0.209
10.0	0.124	0.112	0.124

\* Site-Specific  $MCE_R$  response spectrum obtained using weighted geometric averaging procedure. See User Guide ([/ugms-mcerGM-tool\\_v18.4/guide](/ugms-mcerGM-tool_v18.4/guide)).

