DOCKETED	
Docket Number:	21-AFC-02
Project Title:	Willow Rock Energy Storage Center
TN #:	254805
Document Title:	Willow Rock Energy Storage Center SAFC, Volume 1, Part B
Description:	N/A
Filer:	Amanda Cooey
Organization:	Ellison Schneider Harris & Donlan LLP
Submitter Role:	Applicant Representative
Submission Date:	3/1/2024 4:57:55 PM
Docketed Date:	3/1/2024

5.6 Land Use

5.6.1 Introduction

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California (Assessor's Parcel Number (APN) 431-022-13). The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's (SCE's) Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way (ROW) associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH.

This section discusses the environmental and regulatory setting and includes an analysis of potential impacts associated with the A-CAES in unincorporated Kern County, California. Herein, references to the A-CAES facility equate to the location of the proposed WRESC. The WRESC will be located approximately 9 miles northeast of the community of Willow Springs and about 3.5 miles north of Rosamond, California. **Figure 5.6-1A** in Appendix 5.6A presents the location and vicinity of the WRESC Site.

In addition to the main site located on APN 431-022-13, the Applicant has acquired or is in the process of completing acquisition of site control of additional properties to support construction laydown, parking, and an optional architectural berm on the west and north side of the facility. **Table 5.6-1** presents a list of parcels that may be used in support of WRESC's construction or long-term operations, their location in reference to the main site, and their intended temporary and long-term use.

Table 5.6-1: Additional Supporting Parcels

Assessor's Parcel Number (APN)	Size (acres)	Distance from WRESC Site (miles)	Location in Relationship to Main Site	Temporary Use During Construction	Potential Long-Term Use
431-122-18	*20.3*	*Adjoining*	*West*	*Laydown/Parking* [a]	*Architectural Berm*
431-122-08	*5.1*	*Adjoining*	*West*	*Not Required*	*Architectural Berm*
431-122-14	*1.3*	*0.1*	*West*	*Not Required*	*Architectural Berm*
431-122-15	*1.3*	*0.06*	*West*	*Not Required*	*Architectural Berm*
431-122-16	*1.3*	*Adjoining*	*West*	*Not Required*	*Architectural Berm*
431-122-17	*1.2*	*Adjoining*	*West*	*Not Required*	*Architectural Berm*
431-122-03	*17*	*0.07*	*Northwest*	*Not Required*	*Architectural Berm*
431-122-07	*5*	*Adjoining*	*Northwest*	*Not Required*	*Architectural Berm*
431-022-12	*17.2*	*Adjoining*	*North*	*Laydown/Parking* [a]	*Architectural Berm*
431-022-11	*18.7*	*0.05*	*North*	*Laydown/Parking* [a]	*Architectural Berm*
431-122-02	*5.1*	*0.1*	*Northwest*	*Not Required*	*Architectural Berm*
431-122-01	*0.9*	*0.3*	*Northwest*	*Not Required*	*Architectural Berm*
431-122-04	*2.5*	*0.1*	*Northwest*	*Not Required*	*Architectural Berm*
431-022-08	*79.4*	*1*	*West*	*Laydown/Parking*	*No Long-Term Use*
431-111-30	*20.6*	*0.1*	*North/Northwest*	*Laydown*	*No Long-Term Use*
431-112-24	*5.1*	*0.1*	*North*	*Laydown*	*No Long-Term Use*
431-112-25	*5.1*	*0.1*	*North*	*Laydown*	*No Long-Term Use*
431-112-26	*5.1*	*0.1*	*North*	*Laydown*	*No Long-Term Use*
431-112-27	*5.1*	*0.1*	*North*	*Laydown*	*No Long-Term Use*
471-061-05	*2.5*	*0.05*	*Southwest*	*Laydown/Parking*	*No Long-Term Use*
471-061-06	*2.4*	*Adjoining*	*Southwest*	*Laydown/Parking*	*No Long-Term Use*
471-061-07	*2.5*	*0.06*	*Southwest*	*Laydown/Parking*	*No Long-Term Use*
471-061-08	*2.6*	*0.09*	*Southwest*	*Laydown/Parking*	*No Long-Term Use*
431-122-01	*0.9*	*0.3*	*Northwest*	*Laydown/Parking*	*No Long-Term Use*
431-122-02	*2.5*	*0.1*	*Northwest*	*Laydown/Parking*	*No Long-Term Use*
431-122-04	*2.4*	*0.1*	*Northwest*	*Laydown/Parking*	*No Long-Term Use*

[a] *Parcel would only be used for laydown and additional parking if the architectural berm is not constructed*

Gen-Tie Line

The WRESC will provide electricity to the existing SCE Whirlwind Substation via an estimated 19.1-mile interconnection gen-tie line from the 500 MW A-CAES system. In addition to the Preferred Gen-Tie Route, there are six possible route options that deviate slightly from the Preferred Gen-Tie Route between the WRESC and the Whirlwind Substation. These route options have been included in this analysis and are described in **Table 5.6-2. Figure 5.6A-2** in Appendix 5.6A illustrates the location and vicinity of the gen-tie line route options. Adjacent land uses to the gen-tie routes are shown in **Figure 5.6A-3** in Appendix 5.6A. The gen-tie routes used in the alternatives analysis presented in **Chapter 6.0** are not included in this evaluation of land use.

The Preferred Gen-Tie Route

The Preferred Gen-Tie Route leaves the east corner of the WRESC Site and continues north for approximately 650 feet. It then transitions 90 degrees east and crosses SR 14 and continues west for approximately 1 mile parallel and north of Dawn Road. Just before reaching a property designated as State Lands (APN 431-022-06) the line transitions 90 degrees south to Dawn Road (0.4 miles), and then follows Dawn Road west to Mojave-Tropico Road (2.2 miles). From Dawn Road, the route follows Mojave-Tropico Road south to Felsite Avenue (2.8 miles), west along Felsite Avenue to 65th Street W. (1.0 mile), and south along 65th Street W. to Rosamond Boulevard (0.5 miles). The route then continues along Rosamond Boulevard west to Whirlwind Substation for approximately 10.8 miles. Before reaching 170th Street W., east of Whirlwind Substation, the line runs northwest to cross an existing SCE transmission line and then runs southwest back to the Rosamond Boulevard alignment west of 170th Street W. The total length of the Preferred Gen-Tie Route primary alignment is approximately 19.1 miles. The Preferred Gen-Tie Route includes five named road segments and two segments that do not follow existing roads, which are located at the SR 14 crossing and Whirlwind Substation interconnection area. Approximately 17.8 miles would be aboveground and approximately 1.2 miles would be underground, including three utility crossing locations along Rosamond Avenue.

Table 5.6-2: Gen-Tie Line Option Routes

Route Option	Distance from Preferred Gen-Tie Line	Location	Additional Information
1	*1.3 miles in total or 1.0 mile from the southwest corner of the WRESC Site*	*Dawn Road approximately 1 mile west of the WRESC Site following the existing SR 14 overpass.*	*Route changed to the northern SR 14 crossing based on recommendations by Caltrans to avoid a more complex review process that would be involved if the gen-tie line crossed SR 14 adjacent to the overpass.*
2a	*0.5 miles*	*A continuation of the SR 14 northern crossing route 0.5 miles farther west to 30th Street W*	*Passes through a State Lands parcel (APN 431-022-06), which may not be feasible.*
2b	*1.1 miles*	*This option avoids the State Lands parcel by following the northern boundary and remaining outside of the property and ends at the same location as Option 2b at 30th Street W.*	*This option avoids the State Lands parcel by following the northern boundary by remaining outside of the State-owned property*
3a	*0.5 miles*	*This option follows 30th Street W to Dawn Road.*	*Not Applicable*
3b	*1.2 miles*	*This option continues west past 30th Street W in the same east-to-west alignment as Option 2a. When it reaches Werner Street, the line would then transition 90 degrees south and follow Werner Street to Dawn Road.*	*Not Applicable*
4	*0.3 miles*	*An alternate segment of Dawn Road approximately 0.3 miles east of the Mojave-Tropico Road.*	*The primary route identified for the Preferred Gen-Tie Route at the western end of Dawn Road follows the County's road easement instead of the existing road that motorists use, which is visible in aerial imagery.*
5	*1.5 miles*	*Mojave-Tropico Road between Felsite Avenue and Rosamond Avenue, and Rosamond Avenue between Mojave-Tropico Road and 65th Street W. Approximately 0.4 mile of this option would be underground in the vicinity of the school.*	*This segment was the original Preferred Gen-Tie Route but was later changed to Felsite Avenue and 65th Street W to avoid the gen-tie line passing in front of Tropico Middle School.*
6	*0.2 miles*	*This option follows Rosamond Boulevard east of 170th Street W. in a generally parallel directly before continuing to Whirlwind Substation*	*Provides another option for crossing the existing SCE transmission line northeast of the substation.*

In accordance with Title 20 of the California Code of Regulations (CCR), this section defines the Study Area, also referred to as the affected environment, as those areas within 1 mile of the WRESC, as well as areas within 0.25 miles of potential gen-tie line routes. References to the WRESC Study Area are inclusive of the approximately 88.6-acre A-CAES facility site, as well as potential gen-tie line routes. This evaluation of land use within the Study Area includes the following elements:

- Section 5.6.1 includes a discussion regarding the environment that the Project may affect.
- Section 5.6.2 presents an environmental analysis of Project development.
- Section 5.6.3 discusses potential cumulative effects.
- Section 5.6.4 presents possible mitigation measures.
- Section 5.6.5 presents a description of the laws, ordinances, regulations, and standards (LORS) applicable to land use and the Project.
- Section 5.6.6 provides a list of agencies and agency contacts for land use issues applicable to the Project.
- Section 5.6.7 includes a description of the necessary land use permits required to construct and operate the WRESC and its appurtenances.
- Section 5.6.8 provides a list of references used in the preparation of this land use evaluation.

5.6.2 Affected Environment

The WRESC is in the Ansel area of unincorporated Kern County just north of Rosamond, CA. The WRESC Site is within the boundaries of the Kern County General Plan. The WRESC Site is not located within the boundaries of any specific land use plan. Portions of the Preferred Gen-Tie Route and route options intersect the boundaries of the Rosamond Specific Plan and Willow Springs Specific Plan.

Rosamond

Rosamond is in the unincorporated, southwest Kern County portion of Antelope Valley. The Rosamond Specific Plan covers an area that is approximately 17,280 acres. The area covered under the Rosamond Specific Plan is 75 miles southeast of Bakersfield, California, in the Mojave Desert and is bounded on the south by Avenue “A,” on the east by Edwards Air Force Base (EAFB), and on the north by Dawn Road. The westerly boundary is 50th Street West. The Rosamond Specific Plan is part of the efforts of the Kern County General Plan to promote a balanced and functional mix of land uses consistent with the values of the community (Kern County 2008b).

Rosamond is in the Mojave Desert and is a large arid inland plain located at an elevation between 2,000 and 3,000 feet. The high desert environment of Rosamond is dry, with annual precipitation measuring from 2 to 7 inches per year. A range of rocky hills rises to 300 feet above the surrounding plain. Air temperatures within Rosamond rise above 100 degrees Fahrenheit (°F) 36 days per year and often fall under 32 degrees °F in the winter. The prevailing wind direction in the Rosamond area is from the west and southwest during midsummer and from the northwest during the rest of the year (Kern County 2008b).

Land uses in Rosamond range from agriculture, mineral extraction, and open space to various urban uses. Lands zoned for agricultural use have had problems that make farming or ranching either impractical or uneconomical. Some of these problems include severe sheet flooding and erosion, contiguity to residential areas, steep slopes, unworkable lot sizes, unfavorable soils, and high prices for irrigation water. The Rosamond Specific Plan assumes that agricultural uses within the plan area will continue to decline. The range of rocky hills rising to 300 feet above the surrounding plain is the most prominent feature and forms a partial drainage divide along the northern boundary of the planning area, which slopes gently to the south and east at the rate of 5 to 15 feet per mile. Present structural development consists of a central business area which has commercial structures and apartment complexes. Other developments include the Rosamond Skypark. Housing tracts have been developed south of the Skypark, as well as a neighborhood park, apartments, a restaurant, and an expansion of the airpark facility itself (Kern County 2008b).

There are more than 3,117 parcels within the Rosamond Specific Plan area. The area is largely undeveloped, with the majority being undeveloped rural residential lots, 918 of which are 2.5 acres to 5 acres in size. (Kern County 2008b). As noted above, the WRESC Site is not within the Rosamond Specific Plan area, but portions of the gen-tie line are within the plan area.

Willow Springs

Willow Springs is in the unincorporated, southwest Kern County portion of Antelope Valley. The Willow Springs Specific Plan covers an area that is approximately 50,560 acres. The area covered under that Willow Springs Specific Plan is 6 miles west of Rosamond, California, and is bounded on the south by Avenue "A" (Los Angeles/Kern County Line), on the east by the alignment of 50th Street West, and on the north by a township line which is the projection of Dawn Road. The westerly boundary is a section line (190th Street West) and a northeast trending desert trail (State Road 5381 that roughly parallels the Los Angeles Aqueduct). The Willow Springs Specific Plan is part of the Land Use, Open Space, and Conservation Element of the 2008 Kern County General Plan (Kern County 2008a).

The Tehachapi Mountains lie to the northwest of Willow Springs and, because of the relatively level terrain, these mountains are visible from most all locations. The high desert environment of Willow Springs is dry, with annual precipitation measuring from 2 to 7 inches per year. Air temperatures within Willow Springs range from a high of 110 °F to 115 °F to a low of 5°F. The prevailing wind direction in the Willow Springs area is from the west (Kern County 2008a).

Willow Springs is an open, undeveloped land consisting of desert flora and agriculture. Commercial agriculture within Willow Springs consists of onions, sugar beets, carrots, and alfalfa farming. A 700-foot-high butte is the most prominent feature of the landscape, but the overall topography slopes less than 5 percent from 3,000 feet down to 2,400 feet above mean sea level. Present structural development consists of approximately 214 residences scattered throughout the area, along with a social saloon/grocery store and numerous renewable energy projects. Other land uses within the Willow Springs Specific Plan area include an automotive racetrack (Willow Springs International Raceway), poultry farms, private airstrips, illegal solid waste dumps, and ore mining (Kern County 2008a).

As noted above, the WRESC Site is not within the Willow Springs Specific Plan area, but portions of the gen-tie line are within the plan area. There are more than 5,000 parcels within the Willow Springs Specific Plan area. The area is largely undeveloped, with absentee owners holding 85 to 90 percent of the land divisions, which range in size from 1 to 20 acres and larger throughout the Willow Springs community (Kern County 2008a).

5.6.2.1 Existing Land Uses within the Study Area

The WRESC is located immediately north of Dawn Road and immediately west of Sierra Highway. The associated mailing address for the parcel that comprises the WRESC is Dawn Road, Rosamond, California. The parcel is currently vacant. The Kern County Assessor-Recorder's APN for the parcel associated with the WRESC main facility is 431-022-13.

Figure 5.6A-4 provided in Appendix 5.6A presents the parcel and Kern County Assessor-Recorder's parcel number for the properties located within and adjacent to the 1-mile Project Area and 0.25-mile buffer surrounding the gen-tie line options. The WRESC Site is within Section 33 Township 10 Range 12 of Kern County, California. Parcel 431--022-13 is 112.19 acres (deeded), and the corresponding Kern County Assessor-Recorder's land use code is "5000 Undeveloped Land." **Table 5.6-3** presents current land uses for the parcels located adjacent to the main WRESC Site.

Table 5.6-3: Parcel Numbers and Zoning Codes Adjacent to WRESC Site

Adjacent Parcel ID	Zoning Code	Zoned Land Use	Current Status
431-010-08	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-022-12	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-062-25	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-062-04	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-062-03	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-062-02	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-062-01	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-18	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-08	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-16	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-17	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-07	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-061-06	*C-2*	*Commercial Development Precise Development Combining*	*Undeveloped / Vacant*
471-010-01	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*

Source: Kern County 2024. *Interactive County Map (GIS Tool)* https://www.kerncounty.com/government/gis-menu/interactive-county-map-gis-tool *(as accessed January 21, 2024)*

Table 5.6-4 presents the current land uses for the parcels located adjacent to those that may be used for temporary construction purposes or support the WRESC's operations.

Table 5.6-4: Parcel Numbers and Zoning Descriptions Adjacent to WRESC Support Parcels

Adjacent Parcel ID	Land Use Code	Land Use Code Description and Zoned Land Use	Current Status
Associated with Additional Laydown and Parking			
431-112-30	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-112-27	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-112-26	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-112-25	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-112-24	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-112-15	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-111-23	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-111-22	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-111-21	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-111-20	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-111-29	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-05	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-02	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-04	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-06	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-09	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-13	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-19	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-122-20	*C-2*	*General Commercial, Precise Development Combining*	*Undeveloped / Vacant*
471-061-04	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-061-11	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-061-12	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-061-14	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-062-06	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-062-05	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
471-062-01	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-022-06	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*

Adjacent Parcel ID	Land Use Code	Land Use Code Description and Zoned Land Use	Current Status
431-100-09	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-100-07	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-022-09	*A-1*	*Limited Agriculture*	*Undeveloped / Vacant*
431-022-10	*C-2*	*General Commercial, Precise Development Combining*	*Undeveloped / Vacant*
471-210-03	*R-1*	*Low Density Residential*	*Undeveloped / Vacant*
471-210-04	*C-2*	*General Commercial, Precise Development Combining*	*Undeveloped / Vacant*

Source: Kern County 2024. Interactive County Map (GIS Tool) https://www.kerncounty.com/government/gis-menu/interactive-county-map-gis-tool (as accessed January 21, 2024)

As noted, the WRESC's appurtenances include a gen-tie line that will connect the energy storage facility with SCE's Whirlwind Substation. The existing Whirlwind Substation is located approximately 19 miles to southwest of the WRESC.

The Applicant is proposing a Preferred Gen-Tie Route with six gen-tie route options that will either be within existing County-designated roadway easements (under a future Kern County franchise agreement) or cross existing roadways and traverse over privately held undeveloped or vacant lands where access agreements have or will be executed.

Some portions of the gen-tie corridor are shared with existing transmission lines. Where necessary, the proposed gen-tie line will cross to the opposite side of the roadway to avoid space conflicts. Potential routes for the gen-tie line occur within the following Sections, Townships and Ranges (Kern County Assessor-Recorder 2023):

- Section 1 Township 9N Range 13W, Section 2 Township 9N Range 13W; Section 3 Township 9N Range 12W, Section 4 Township 9N Range 12W, Section 5 Township 9N Range 12W, Section 6 Township 9N Range 12W
- Section 11 Township 9N Range 13 W, Section 12 Township 9N Range 13W, Section 14 Township 9N Range 13W, Section 13 Township 9N Range 14W, Section 13 Township 9N Range 15W, Section 14 Township 9N Range 14W, Section 14 Township 9N Range 15W, Section 15 Township 9N Range 13W, Section 15 Township 9N Range 14W, Section 16 Township 9N Range 13W, Section 16 Township 9N Range 14W, Section 17 Township 9N Range 14W; Section 17 Township 9N Range 13W, Section 18 Township 9N Range 13W; Section 18 Township 9N Range 14W, Section 19 Township 9N Range 14W, Section 19 Township 9N Range 13W
- Section 20 Township 9N Range 13W, Section 20 Township 9N Range 14W, Section 21 Township 9N Range 13W, Section 21 Township 9N Range 14W, Section 22 Township 9N Range 14W, Section 22 Township 9N Range 13W, Section 23 Township 9N Range 13W, Section 23 Township 9N Range 15W, Section 23 Township 9N Range 14W, Section 24 Township 9N Range 15W, Section 24 Township 9N1 Range 14W
- Section 31 Township 10N Range 12W, Section 32 Township 10N Range 12W; Section 33 Township 10N Range 12W, Section 34 Township 10N Range 12W, Section 35 Township 10N Range 13W, Section 36 Township 10N 13W Range 13W

Figure 5.6A-5 in Appendix 5.6A illustrates the various elements of the local and regional roadway transportation system, as well as the Project's location and potential gen-tie line routes (Preferred Gen-Tie Route and Gen-Tie Option Routes). The main transportation corridors that connect the WRESC to the region include the following:

- Aerospace Highway (northern portion of SR 14), located west and south of the WRESC, connects the community of Rosamond, California, with the cities of Palmdale and Lancaster, California

- Sierra Highway located east of the WRESC, connects the community of Rosamond, California, with the city of Mojave, California
- SR 58, located to the north of the WRESC, connects the city of Bakersfield, California, to the city of Mojave, California.
- Antelope Valley Freeway (southern portion of SR 14), located to the south of the WRESC, connects the cities of Lancaster and Palmdale with Interstate Highway 5 north of the greater Los Angeles, California, area.

Local improved roadways within the WRESC Study Area include Dawn Road and Backus Road (the next SR 14 exit to the north of Dawn Road exit near the WRESC Site), and Rosamond Boulevard. The following describes how the local roadway system connects to the regional network:

- Dawn Road intersects SR 14 approximately 0.25 miles west of the WRESC Site.
- Backus Road intersects SR 14 approximately 1 mile north of Dawn Road.
- Sierra Highway intersects Dawn Road adjacent to the southeast corner of the WRESC Site.
- Rosamond Boulevard intersects State Highway 14 approximately 4 miles south of WRESC Site in the community of Rosamond, California.

In addition to improved roadways, various unimproved roadways exist throughout the Study Area and the community of Willow Springs and Rosamond.

5.6.2.2 Specific Land Uses within the Willow Rock Study Area

This section provides a description of land uses located near the WRESC, as well as potential gen-tie line routes. The specific land use review extended 1 mile from the location of the WRESC and 0.25 mile from potential siting routes for an interconnection gen-tie line between the WRESC and SCE's Whirlwind Substation.

As shown on **Figure 5.6-1**Error! Reference source not found., the WRESC is in a sparsely populated portion of Kern County. The parcels proposed for the siting of the WRESC are currently vacant. As noted in **Table 5.6-2 and Table 5.6-3**, Kern County Assessor classifies the parcels surrounding the WRESC as undeveloped. Parcels with A-1, C-2, and R-1 designations surround each of the potential gen-tie line routes. Several solar and wind farms parallel potential gen-tie line ROWs within the Study Area.

5.6.2.2.1 Commercial/General Office

There are currently no commercial or general offices within the WRESC Study Area. There are four commercial offices within the Study Area for the gen-tie line. These commercial offices include the following businesses:

- **Parcel 252-172-16:** American Performance Engineering is located at 7347 Rosamond, Blvd, Rosamond, CA.
- **Parcel 374-031-15:** RC's Affordable Limousine Service is located at 2845 80th St. West, Rosamond, CA.
- **Parcel 252-352-33:** Tabitha's Grooming Parlor is located 9009 Rosamond, Blvd., Rosamond, CA.
- **Parcel 359-011-05:** Solar Star is located at 11936 Rosamond, Blvd., Rosamond, CA.

5.6.2.2.2 Residential

Figure 5.6-1 illustrates the sparsely populated Study Area. There are no single-family residences adjacent to the WRESC and only a few single-family residences adjacent to the Preferred Gen-Tie Route and gen-tie route options. The following describes the proximity of homes closest to the WRESC:

- **Parcel 431-02-123:** This residence[1] is located approximately 0.8 miles northwest of WRESC Site and is the nearest residence.
- **Parcel 471-081-11:** This residence is located approximately 1.6 miles to the west of WRESC Site
- **Parcel 471-081-10:** This residence is located approximately 1.6 miles to the west of WRESC Site

[1] Cameron Ranch - Riding Lessons & Horse Training

- **Parcel 471-081-12:** This residence is located approximately 1.6 miles to the west of WRESC Site
- **Parcel 471-081-15:** This residence is located approximately 1.7 miles to the southwest of WRESC Site (Kern County Assessor-Recorder 2023)

The Study Area for the preferred and optional gen-tie line routes consists of a few single-family residences along the existing roadways and communities. The largest concentration of residential housing occurs near the Tropico Middle School which is located on Mojave-Tropico Rd. just north of its intersection with Rosamond Blvd. A complete list of residences that occur within the gen-tie line Study Area are presented in Appendix 5.6B.

5.6.2.2.3 Agricultural Use

The California Department of Conservation (CDOC), Farmland Mapping and Monitoring Program (FMMP) developed categorical definitions of important farmlands for land inventory purposes. Important farmlands provide the best opportunity for agricultural production. **Figure 5.6A-6** presented in Appendix 5.6A illustrates the CDOC farmland designations for the Project vicinity. According to the 2020 Kern County Important Farmland Map, the CDOC has designated the Study Area largely as Nonagricultural and Natural Vegetation (CDOC 2022). The FMMP Rural Land Mapping Project defines Nonagricultural and Natural Vegetation as:

> *Heavily wooded, rocky/barren areas, riparian and wetland areas, grassland areas which do not qualify as Grazing Land due to their size or land management restrictions, small water bodies and recreational water ski lakes. Constructed wetlands are also included in this category* (CDOC 2020).

According to Kern County Important Farmland map, there are no parcels within the Study Area designated as farmland of state importance (CDOC 2020). The FMMP defines Farmland of Statewide Importance as:

> *Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date* (CDOC 2021).

Beginning in 1965 with the California Land Conservation Act, local governments have been permitted to enter into contracts with private landowners for the purpose of retaining agricultural and open space uses. Resource managers refer to these contracts as Williamson Act contracts. The minimum term for a Williamson Act contract is 10 years. There are no active Williamson Act contracts within or adjacent to the Study Area (Kern County GIS 2023).

5.6.2.2.4 Recreation

There are no recreational facilities within the Study Area. The Willow Springs International Raceway is located outside the Study Area for the gen-tie line.

5.6.2.2.5 Community Airport

A small privately-owned, public use airport, Rosamond Skypark, is located at 400 Knox Avenue, approximately two miles west of Rosamond. The airport is owned and operated by the Rosamond Skypark Association, a homeowners association consisting of 60 residential lots and three commercial lots (Rosamond Skypark Association 2024). The WRESC Site is located approximately 3.75 miles northwest of the closest runway edge at Rosamond Skypark. With maximum facility component heights less than 100 feet, the facility is not expected to trigger Federal Aviation Administration (FAA) Form 7460-1 Notice of Construction (NOC) requirements.

A portion of the WRESC gen-tie line passes along Mojave-Tropico Road within approximately 0.9 miles west of the closest runway edge at Rosamond Skypark. A map showing the location of the airport and applicable land use planning boundaries is shown on **Figure 5.6A-7** in Appendix 5.6A. This segment of the gen-tie line is near the border and within Zone B2 of the Comprehensive Land Use Plan for Rosamond Skypark (Kern County 2012). Appendix D of the Kern County Airport Land Use Consistency Plan indicates that power lines located in Zone B2 are considered “potentially compatible with restrictions.”

Depending on the final placement of transmission poles in this area, there may be some transmission structures that would trigger the FAA NOC requirement. The Applicant will coordinate with the FAA and file the appropriate

NOCs, if required once final transmission structure locations have been determined. Copies of any FAA Form 7460-1 submittals that may be necessary will be provided to California Energy Commission (CEC) staff if they need to be submitted.

5.6.2.2.6 Military

The western boundary of EAFB extends to within approximately 0.5 miles east of the WRESC. However, the majority of EAFB facilities and runways are located approximately 14 miles east of the WRESC Site. EAFB is used as an aerospace testing facility. EAFB hosts the 412th Test Wing and is the headquarters of the Air Force Test Center (EAFB 2021). The base covers approximately 470 square miles and has a population of 11,457 (Military OneSource 2023). **Figure 5.6A-8** in Appendix 5.6A shows the proximity of the Project to EAFB.

State Requirement on Notification

California Government Code section 65352 requires cities and counties that are adopting or amending a general plan to present the proposed action to the U.S. Armed Forces when the project:

- Is within 1,000 feet of a military installation (the WRESC is within 1,000 feet of military special use airspace)
- Occurs within a special use airspace
- Is beneath a low-level flight path (CMLUCA 2023)

The Kern County Zoning Ordinance Section 19.08.160 requires military review for all wind turbines and communication towers over 80 feet and all other structures over 100 feet within the military flight area (Kern County 2022). The Applicant conducted an informal briefing with EAFB personnel to advise EAFB of the proposed WRESC. While WRESC will be located within the military flight area, all structures associated with the WRESC will be below 100 feet. The Applicant's notification to the Department of Defense in accordance with Public Resources Code Section 25519.5 is provided in Appendix 5.6C. Email communications between the Applicant and EAFB are presented in Appendix 5.6C.

5.6.2.2.7 Federal and State Lands

Federal Lands

An ROW grant is typically needed for the construction of a project on public land managed by the Bureau of Land Management (BLM). Some examples of land use which require a ROW grant include electric gen-tie lines, communication sites, roads, highways, trails, telephone/fiber optic lines, canals, flumes, pipelines, reservoirs, etc.

The preferred gen-tie line route crosses two parcels owned by the United States of America and managed by BLM, parcels APN 252-060-04 and APN 252-080-02. The corresponding Kern County zoning designation for the two parcels is RF (Recreational Forestry) and E(2 1/2) RS (Estate 2.5 Acres, Residential Suburban Combining), respectively Additionally, the WRESC's additional parking and laydown area may border BLM managed parcel APN 431-022-06. This parcel is located immediately to the west of APN 431-022-08.

Prior to construction, the Applicant will contact the applicable BLM office and notify them of its intent to submit an "Application for Transportation and Utility Systems and Facilities on Federal Lands". This application is also referred to as a SF-299 form. The Applicant will then set up a pre-application meeting with a BLM Realty Specialist or appropriate staff member to discuss the WRESC Project and gen-tie line routes across the above referenced parcels. Following the pre-application meeting, the Applicant will submit a SF-299 application for review and approval, if required. BLM recommends that SF-299 applications be submitted more than 60 days prior to construction.

State Lands/Special District

As the Preferred Gen-Tie Route parallels Mojave-Tropico Road, it intersects parcel APN 252-060-05 (Exempt Property Special Districts). Special districts are local governments created by the people of a community to deliver specialized services essential to their health, safety, economy, and well-being. A community forms a

special district, which are political subdivisions authorized through a state's statutes, to provide specialized services the local city or county do not provide.

Parcel APN 252-060-05 is owned and managed by the Rosamond Community Service District (RCSD). The RCSD was formed in 1966 under the Community Services District Law, Division 3, 61000 of Title 6 of the Government Code of the State of California. RCSD provides water and sewer service to residential and commercial customers for domestic, commercial, irrigation, and fire protection uses. Additionally, RCSD provides street lighting, and graffiti abatement services. Rosamond Department of Engineering and Planning is responsible for the Districts' Wells, water tanks, water and sewer lines, wastewater treatment plant, construction, and information technologies. The gen-tie line will be constructed within the County-owned ROW along Mojave-Tropico Road.

Parcel APN 252-060-05 is zoned Recreation-Forestry (RF). The purpose of the Recreation-Forestry (RF) District is to designate lands for the conservation and use of natural resources and for compatible recreational uses. Non-resource-related uses are limited to uses that will not adversely affect the primary resource use or uses to which the land is devoted. Under 19.42.020 permitted uses within the RF District include the following:

> ***D. UTILITY AND COMMUNICATIONS FACILITIES*** *—— Transmission lines and supporting towers, poles, and underground facilities for gas, water, electricity, telephone, or telegraph service owned and operated by a public utility company or other company under the jurisdiction of the California Public Utilities Commission pursuant to Section 19.08.090 of this title. Microwave towers are also permitted pursuant to this section provided that there is a minimum setback of three hundred (300) feet from a dwelling (Kern County 2022).*

Based on the permissible land uses under the zoning designation Recreation-Forestry (RF) District that include "*other company under the jurisdiction of the California Public Utilities Commission*," the installation of a gen-tie line on Parcel APN 252-060-05 will be consistent with Kern County's zoning ordinance.

Finally, to construct and operate a gen-tie line on Parcel APN 252-060-05, the Applicant may be required to obtain approval from RCSD as part of their agreement with Kern County for ROW access.

5.6.2.2.8 Open Space

Under Section 65560 of the State Government Code, open space is defined as any parcel or area of land or water that is essentially unimproved and devoted to an open-space use, and that is designated on a local, regional, or state open space plan as any of the following:

- Open space for the preservation of natural resources
- Open space used for the managed production of resources
- Open space for outdoor recreation
- Open space for public health and safety

The Willow Springs Specific Plan area consists of Antelope Valley Desert land with land uses ranging from agriculture, mineral extraction, and open space to various urban uses. According to the Willow Springs Specific Plan, the open space character of Willow Springs exists because rural residential development has not occurred. Most of Willow Springs' resource lands are presently zoned "Estate 2.5 acres" ("E 2½"). The "E 2½" designation is for larger-lot, single-family residential development with uses typical of and compatible with quiet residential neighborhoods (Kern County 2008a).

The Rosamond Specific Plan area consists of Antelope Valley Desert land with land uses ranging from agriculture, mineral extraction, and open space to various urban uses. The major built up area within the Rosamond Specific Plan is Census Tract 58. Rosamond Specific Land is primarily zoned agricultural, residential, open space, commercial, estate, and industrial (Kern County 2008b).

Other than the developed area along Rosamond Boulevard within the Rosamond Specific Plan and the sparsely populated single-family residences and parcels developed for solar and wind energy production in the Willow Rock Specific Plan, there is vacant land throughout the Study Area. Within the Study Area, parcels that meet the State of California's definition of open space are lands associated with agricultural production. A review of the

Kern County assessor's database indicates that most vacant lands within the Study Area maintain multiple land use designations that align with future development.

5.6.2.2.9 Scenic Areas

There are no designated scenic resources within the Study Area. The character of the WRESC Study Area is determined largely by existing land uses such as residential, commercial, agriculture, vacant lots, and renewable energy production. Kern County California has three candidate scenic highways and no designated scenic highways. The closest candidate scenic highway is the northern portion of SR 14 beginning near the intersection of SR 14 and SR 58 near the city of Mojave and the portion of SR 58 from Mojave to the city of Barstow; however, these scenic highways are more than 10 miles north of the WRESC Site and its appurtenances. The candidate scenic highways include the following:

- SR 14 north from near the city of Mojave and SR 58 from Mojave to the city of Barstow
- SR 14 near Little Lake to Route 89 near Coleville
- SR 46 as it traverses Kern County

None of the three candidates are within the Study Area (Caltrans 2021).

5.6.2.2.10 Natural Resource Protection

The WRESC Site is located within the West Mojave Plan (WMP) Habitat Conservation Plan (HCP) area. The WMP includes 3.6 million acres of public land and 2.8 million acres of private land in the West Mojave Desert of San Bernardino, Kern, Inyo, and Los Angeles Counties. All public lands of the WMP are within the California Desert Conservation Area managed by the BLM. The WMP consists of two components: a federal component that will amend the existing 1980 California Desert Conservation Area Plan, and an HCP that will cover development on private lands within the region.

The WMP is a proposed comprehensive strategy to conserve and protect listed or sensitive wildlife species and their habitats. Although the applicable state and federal agencies have not yet prepared the HCP, the intent of the plan will be to provide a program for complying with the federal Endangered Species Act on private lands within the WMP's boundaries (BLM 2005).

5.6.2.2.11 Educational/Child Care/Nursing Home

There are four educational facilities within the Study Area, all associated with the gen- tie line. The Study Area is within the Southern Kern Unified School District. Tropico Middle School is within the 0.25-mile buffer along gen-tie line routes running along Rosamond Boulevard. There is one registered childcare facility within the Study Area. **Figure 5.6A-9** in Appendix 5.6A shows the location of Tropico Middle School in relation to the Study Area. There are no nursing homes within the Study Area. The community of Rosamond, California, maintains two senior living communities, while the nearest nursing home is in the city of Lancaster, California. The city of Lancaster is more than 13 roadway miles from the Study Area.

5.6.2.2.12 Religious

There are no religious facilities within the Study Area. The nearest facility that holds religious ceremonies is the Rosamond Public Library located at 3611 W Rosamond Blvd, Rosamond, CA 93560. This location is used by the Grace Reformed Church. The Rosamond Public Library is approximately 1.6 miles from the gen-tie line Study Area.

5.6.2.2.13 Cultural and Historic

Section 5.3, Cultural Resources, provides a discussion of cultural and historic resources in the Study Area, including implementation of standard mitigation measures to address incidental discovery of resources during construction of the WRESC and interconnection gen-tie line. The Willow Springs Community and Historic Landmark are located approximately 0.75 miles outside the gen-tie line Study Area.

5.6.2.2.14 Unique Land Uses

There are no unique land uses within the Study Area. The Willow Springs International Raceway is located outside the Study Area for the gen-tie line.

5.6.2.3 General Plan Land Use Designations

The State of California requires that cities and counties adopt comprehensive, long-term general plans for physical development within their jurisdictions. The comprehensive plans include a Land Use Element that establishes a desired pattern of appropriate land use, as well as policies and guidelines for the development of those uses. Local governments and their resource managers use local zoning ordinances, specific plans, and maps to implement the general plan's Land Use Element. A specific plan is a planning document that implements the goals and policies of the general plan. Specific plans contain detailed standards for development and implementation measures to which future projects located within a specified geographic area must adhere.

Zoning ordinances include zoning maps and designations. The Revised November 2022 Kern County Zoning Ordinance presents the most recently approved zoning designations for the County. The Kern County Zoning Ordinance contains details about building controls, grading requirements, and regulations for the design and improvement of private and county lands within Kern County.

5.6.2.3.1 General Plan Land Use Designations within the Study Area

Land use provisions included in every California city and county general plan reflect the goals and policies that guide physical development of land within their jurisdiction (California State Planning Law, Government Code Section 65302 et seq.). This section describes the land use designations for properties located within the Study Area. **Figure 5.6A-3** in Appendix 5.6A shows the general plan land use designations within the Study Area, and **Table 5.6-5** describes these designations.

Table 5.6-5: General Land Use Designations within the Study Area

General Plan Land Use No.	General Plan Land Use Designation	Description	Minimum Parcel Size
1.1[(a)]	*State or Federal Land*	*Applied to all property under the ownership and control of the various State and federal agencies operating in Kern County (military, U.S. Forest Service, Bureau of Land Management, Department of Energy, etc.).*	*The General Plan lists no desired character and uses and does not provide for a development intensity.*
4.1[(b)]	*Accepted County Plan Areas*	*A designation of areas for which specific land use plans have already been prepared and approved. These plans are accepted and incorporated by this reference and the respective land use map associated with each such plan is hereby adopted as the General Plan diagram for each such area. Each plan area is indicated on the General Plan map.*	*The General Plan lists no desired character and uses and does not provide for a development intensity.*
6.3[(b)(c)]	*Highway Commercial*	*Uses that provide services, amenities, and accommodations at key locations along major roadways to visitors and through traffic. Uses shall include, but are not limited to, the following: Hotels, motels, restaurants, garages, service stations, recreational vehicle parks, fast-food restaurants, truck stops, and truck washes.*	*The General Plan lists no desired character and uses and does not provide for a development intensity.*
8.3	*Extensive Agriculture (Min. 20 Acre Parcel Size)*	*Agricultural uses involving large amounts of land with relatively low value-per-acre yields, such as livestock grazing, dry land farming, and woodlands. Uses shall include, but are not limited to, the following: Livestock grazing; dry land farming; ranching facilities; wildlife and botanical preserves; and timber harvesting; one single-family dwelling unit; irrigated croplands; water storage or groundwater recharge areas; mineral; aggregate; and petroleum exploration and extraction; and recreational activities, such as gun clubs and guest ranches; and land within development areas subject to significant physical constraints*	*Minimum parcel size is 20 acres gross, except lands subject to a Williamson Act Contract/ Farmland Security Zone Contract, in which case the minimum parcel size shall be 80 acres gross.*
8.4	*Mineral and Petroleum (Min. 5 Acre Parcel Size)*	*Areas which contain producing or potentially productive petroleum fields, natural gas, and geothermal resources, and mineral deposits of regional and Statewide significance. Uses are limited to activities directly associated with the resource extraction. Uses shall include, but are not limited to, the following: Mineral and petroleum exploration and extraction, including aggregate extraction; extensive and intensive agriculture; mineral and petroleum processing (excluding petroleum refining); natural gas and geothermal resources; pipelines; power transmission facilities; communication facilities; equipment storage yards; and borrow pits.*	*5 acres*

General Plan Land Use No.	General Plan Land Use Designation	Description	Minimum Parcel Size
8.5	*Resource Management*	*Primarily open space lands containing important resource values such as wildlife habitat, scenic values, or watershed recharge areas. These areas may be characterized by physical constraints or may constitute an important watershed recharge area or wildlife habitat or may have value as a buffer between resource areas and urban areas. Other lands with this resource attribute are undeveloped, non-urban areas that do not warrant additional planning within the foreseeable future because of current population (or anticipated increase), marginal physical development, or no subdivision activity. Uses shall include, but are not limited to, the following: Recreational activities; livestock grazing; dry land farming; ranching facilities; wildlife and botanical preserves; and timber harvesting; one single-family dwelling unit; irrigated croplands; water storage or groundwater recharge areas; mineral; aggregate; petroleum exploration and extraction; open space and recreational uses; one single-family dwelling on legal residentially zoned lots on effective date of this General Plan; land within development areas subject to significant physical constraints; State and federal lands which have been converted to private ownership.*	*The General Plan requires a minimum parcel size of 20 acres gross, except lands subject to a Williamson Act Contract/Farmland Security Zone Contract, in which case the minimum parcel size shall be 80 acres gross.*

Source: Kern County General 2009.
a Area adjacent to potential temporary parking and laydown area
b Area potentially used for temporary parking and laydown area
c Land use designation for a portion of APN 431-022-08.

5.6.2.3.2 General Plan Land Use Designations, WRESC

The 2009 Kern County General Plan designates the WRESC as 8.5 Resource Management. The General Plan describes the designation as follows:

> *Primarily open space lands containing important resource values, such as wildlife habitat, scenic values, or watershed recharge areas. These areas may be characterized by physical constraints or may constitute an important watershed recharge area or wildlife habitat or may have value as a buffer between resource areas and urban areas. Other lands with this resource attribute are undeveloped, non-urban areas that do not warrant additional planning within the foreseeable future because of current population (or anticipated increase), marginal physical development, or no subdivision activity*. (Kern County 2009)

Figure 5.6A-3 in Appendix 5.6A and **Table 5.6-6** describe the land use codes used by the Rosamond and Willow Springs Specific Plans.

Table 5.6-6: Specific Plan Land Use Codes

Plan Name	Map Code	Description	Acres (if Applicable)
2008 Willow Springs Specific Plan	*1.1*	*State or Federal Land*	*Not Applicable*
2008 Willow Springs Specific Plan	*3.2*	*Educational Facilities*	*Not Applicable*
2008 Willow Springs Specific Plan	*3.3*	*Other Facilities*	*Not Applicable*
2008 Willow Springs Specific Plan	*5.1*	*Residential*	*29 Dwelling Units (DU) per Net Acre Maximum*
2008 Willow Springs Specific Plan	*5.3*	*Residential*	*10 DU per Net Acre Maximum*
2008 Willow Springs Specific Plan	*5.3/5.4*	*Residential*	*10 DU per Net Acre Maximum /4 DU per Net Acre Maximum*
2008 Willow Springs Specific Plan	*5.4*	*Residential*	*4 DU per Net Acre Maximum*
2008 Willow Springs Specific Plan	*5.4/4.4*	*Residential/Comprehensive Planning Area*	*4 DU per Net Acre Maximum/40 acres*
2008 Willow Springs Specific Plan	*5.45*	*Residential*	*2 DU per Net Acre Maximum*
2008 Willow Springs Specific Plan	*5.5*	*Residential*	*1 DU per Net Acre Maximum*
2008 Willow Springs Specific Plan	*5.6*	*Residential*	*2.5 Gross Acres per DU*
2008 Willow Springs Specific Plan	*5.7*	*Residential*	*5 Gross Acres per DU*

Plan Name	Map Code	Description	Acres (if Applicable)
2008 Willow Springs Specific Plan	*5.75*	*Residential*	*Not Applicable*
2008 Willow Springs Specific Plan	*5.8*	*Residential*	*20 Gross Acres per DU*
2008 Willow Springs Specific Plan	*6.2*	*General Commercial*	*Not Applicable*
2008 Willow Springs Specific Plan	*6.3*	*Highway Commercial*	*Not Applicable*
2008 Willow Springs Specific Plan	*7.1*	*Light Industrial*	*Not Applicable*
2008 Willow Springs Specific Plan	*7.2*	*Service Industrial*	*Not Applicable*
2008 Willow Springs Specific Plan	*8.4*	*Mineral and Petroleum*	*Minimum 5 Acres*
2008 Willow Springs Specific Plan	*8.5*	*Resource Management*	*Minimum 20 Acres*
2008 Rosamond Specific Plan	*3.1*	*Parks and Recreation*	*Not Applicable*
2008 Rosamond Specific Plan	*3.2/3.1*	*Educational Facilities/ Parks and Recreation*	*Not Applicable*
2008 Rosamond Specific Plan	*5.6*	*Residential*	*2.5 Gross Acres per DU*
2008 Rosamond Specific Plan	*6.2*	*General Commercial*	*Not Applicable*
2008 Rosamond Specific Plan	*5.4*	*Residential*	*4 DUs per Net Acre Maximum*
2008 Rosamond Specific Plan	*5.45*	*Residential*	*2 DUs per Net Acre Maximum*
2008 Rosamond Specific Plan	*5.1*	*Residential*	*29 DUs per Net Acre Maximum*
2008 Rosamond Specific Plan	*6.1*	*Major Commercial*	*Not Applicable*

Source: Kern County 2008a, 2008b.

5.6.2.4 Study Area Zoning

Zoning codes provide specific requirements related to land use and the density and intensity of development. **Figure 5.6A-10** in Appendix 5.6A depicts the zoning districts in the Study Area. **Table 5.6-7** provides definitions and information about the zoning districts within the Study Area.

Table 5.6-7: Zoning Districts within the Study Area

Zone Title	Typical Uses	Minimum Parcel Size
Estate - 2 1/2 acres	*Larger-lot, single-family residential development; uses typical of and compatible with quiet residential neighborhoods*	*2 1/2 acres*
Estate - 0.25 acres	*Larger-lot, single-family residential development; uses typical of and compatible with quiet residential neighborhoods*	*¼ acres*
Estate - 1 acre	*Larger-lot, single-family residential development; uses typical of and compatible with quiet residential neighborhoods*	*1 acre*
Estate – 5 acres	*Larger-lot, single-family residential development; uses typical of and compatible with quiet residential neighborhoods*	*5 acres*
Estate – 10 acres	*Larger-lot, single-family residential development; uses typical of and compatible with quiet residential neighborhoods*	*10 acres*
Estate – 20 acres	*Larger-lot, single-family residential development; uses typical of and compatible with quiet residential neighborhoods*	*20 acres*
A - Exclusive Agriculture	*Primarily agricultural uses and other activities compatible with agricultural uses*	*20 acres*
A-1 - Limited Agriculture	*Larger-lot, single-family residential development; uses typical of and compatible with quiet residential neighborhoods Estate-type residential development, agricultural uses, and other compatible uses*	*2 1/2 acres*
R-1 - Low Density Residential	*Traditional smaller lot, single-family homes and compatible uses*	*6,000 square feet*
R-3 - High Density Residential	*Medium-density to high-density residential living environments, including apartments, townhouses, and condominiums*	*6,000 square feet*
C-2 - General Commercial	*Commercial activities, including regional shopping centers and heavy commercial uses*	*7,500 square feet*
M-1 - Light Industrial	*Wholesale commercial, storage, trucking, assembly-type manufacturing, and other similar industrial uses*	*None*
C-1 - Neighborhood Commercial	*Small retail, service-oriented commercial activities, including small shopping centers*	*7,500 square feet*
OS - Open Space	*Unimproved lands that should remain in open space use for the preservation of identified scenic values, habitat for endangered plants or animals, unique geologic features, natural resources, passive recreational values, or for the protection of public health and safety, or as an interim district*	*None*
PL - Platted Lands	*Residential uses and other activities compatible with the area to which the PL District is applied*	*No less than the area existing within the lot on April 15, 1982, excepting in the case of the conveyance to or from a governmental agency, public entity, public utility, community water company or mutual water company for public purposes, public utility purposes, or for ROWs or well sites*

Zone Title	Typical Uses	Minimum Parcel Size
RF - Recreation-Forestry	*Conservation and use of natural resources and for compatible recreational uses.*	*5 acres*
MP - Mobile Home Park	*Mobile home parks with spaces available for rent, mobile homes within a mobile home park available for rent, accessory uses, and recreational vehicle parks.*	*N/A*
NR – Natural Resource	*Resource exploration, production and transportation, and to compatible activities.*	*5 acres*

Source: Kern County 2022.

5.6.2.5 WRESC Site and Linear Zoning

The WRESC and Preferred Gen-Tie Route (and route options) are located on parcels with the following zoning designations:

WRESC Site, Option Architectural Berm and Construction Laydown & Parking

- Limited Agriculture
- General commercial, precise development combining

Preferred Gen-Tie Route and Options

- Estate 0.25 acres, mobile home combining
- Estate 0.25 acres, residential suburban combining, mobile home combining
- Estate 1-acre, residential suburban combining, mobile home combining
- Estate 1-acre, residential suburban combining, mobile home combining, floodplain secondary combining
- Estate 2.5 acres, residential suburban combining, Estate 2.5 acres, residential suburban combining, floodplain secondary combining
- Estate 2.5 acres, residential suburban combining, floodplain secondary combining, mobile home combining
- Estate 2.5 acres, residential suburban combining, mobile home combining
- Estate 5 acres, residential suburban combining, floodplain secondary combining
- Estate 10 acres, residential suburban combining, floodplain secondary combining
- Estate 20 acres, residential suburban combining, geologic hazard combining, floodplain secondary combining
- Exclusive agriculture
- Exclusive agriculture, floodplain secondary combining
- General commercial, precise development combining
- General commercial, floodplain secondary combining
- General commercial, precise development combining, floodplain secondary combining
- General commercial, precise development combining, airport approach height combining, floodplain secondary combining
- Light industrial
- Limited agriculture, mobile home combining
- Limited agriculture, airport approach height combining
- Neighborhood commercial, precise development combining, airport approach height combining, floodplain secondary combining
- Mobile home Park
- Low density residential

- Low density residential, airport approach height combining
- Open space
- Platted lands, residential suburban combining
- Recreation-forestry
- Natural Resource

Table 5.6-8 lists the purposes of zoning designations as stated in the Revised November 2022 Kern County Zoning Ordinance.

Table 5.6-8: Zoning Designation Purposes

Designation	Purpose
Estate (E)	*The purpose of the Estate (E) District is to designate areas suitable for larger lot residential living environments. Uses are limited to those typical of and compatible with quiet residential neighborhoods. The minimum lot size shall be one-quarter (1/4) acre (10,890 square feet) unless the E District is combined with the Lot Size Combining District (Chapter 19.54 of this title) where a larger minimum lot size is specified. The minimum lot size may be reduced when any E District is combined with the Cluster (CL) Combining District (Chapter 19.58 of this title). Agricultural uses permitted in the E District are accessory uses and shall not be established until a primary use is established.*
Exclusive Agriculture (A)	*The purpose of the Exclusive Agriculture (A) District is to designate areas suitable for agricultural uses and to prevent the encroachment of incompatible uses onto agricultural lands and the premature conversion of such lands to nonagricultural uses. Uses in the A District are limited primarily to agricultural uses and other activities compatible with agricultural uses.*
Limited Agriculture (A-1)	*The purpose of the Limited Agriculture (A-1) District is to designate areas suitable for a combination of estate-type residential development, agricultural uses, and other compatible uses. Final map residential subdivisions are not allowed in the A-1 District.*
General Commercial (C-2)	*The purpose of the General Commercial (C-2) District is to designate areas for the widest range of retail commercial activities, including regional shopping centers and heavy commercial uses. The C-2 District may also be combined with the Cluster (CL) Combining District to achieve innovative, creative office or commercial development. The C-2 District should be located on major highways.*
Light Industrial (M-1)	*The purpose of the Light Industrial (M-1) District is to designate areas for wholesale commercial, storage, trucking, assembly-type manufacturing, and other similar industrial uses. Processing or fabrication will be limited to activities conducted within a building that does not emit fumes, odor, dust, smoke, or gas beyond the confines of the building within which the activities occur or produce significant levels of noise or vibration."*
Highway Commercial (CH)	*The purpose of the Highway Commercial (CH) District is to designate areas for uses and services normally associated with the traveling public. The CH District shall be located adjacent to or in close proximity to major highways. The CH District may be combined with the Cluster (CL) Combining District to achieve innovative, creative commercial development. The CH District is intended to promote a unified grouping of travel-oriented uses, such as gas stations, restaurants, and motels. It is also intended to permit limited urban type uses in rural areas adjacent to highways with a minimum of encroachment on surrounding agricultural activities.*
Neighborhood Commercial (C-1)	*The purpose of the Neighborhood Commercial (C-1) District is to designate areas for low-intensity commercial activities oriented to serving nearby residential areas. The C-1 District may also be combined with the Cluster (CL) Combining District to achieve innovative, creative office or commercial developments. Uses in the C-1 District typically include small retail, service-oriented commercial activities, including small shopping centers. The C-1 District generally will be located on major or secondary highways.*

Designation	Purpose
Mobile home Park (MP)	*The sole purpose of the MP (Mobile Home Park) District is to designate areas for medium-density mobile home living areas that are, or will be, subject to the California Mobile Home Parks Act, as set forth in Section 18200 et seq., of the California Health and Safety Code, and associated administrative regulations as set forth in Title 25, California Code of Regulations.*
Low-Density Residential (R-1)	*The purpose of the Low-density Residential (R-1) District is to designate areas which will be suitable for traditional smaller lot, single-family homes and compatible uses. Maximum density is limited to ten (10) dwelling units per net acre. Typically, the R-1 District will be characterized by the typical single-family subdivision. However, innovative low-intensity projects are allowed in combination with the Cluster (CL) Combining District.*
Open Space (OS)	*The purpose of the Open Space (OS) District is to designate lands in public or private ownership that are essentially unimproved and should remain in open space use for the preservation of identified scenic values, habitat for endangered plants or animals, unique geologic features, natural resources, passive recreational values, or for the protection of public health and safety. The OS District may also be utilized as an Interim District in conjunction with County-initiated changes in zoning district classification for those properties designated as "Commercial" or "Industrial" by the Kern County General Plan or adopted Specific Plan, where the current zoning district classification for those properties is inconsistent with said "Commercial" or "Industrial" designations.*
Platted Lands (PL)	*The purpose of the Platted Lands (PL) District is to recognize legally existing lots within recorded subdivisions which had been rendered nonconforming with regard to minimum lot size requirements of the various Resource designations (8.1, 8.2, 8.3, 8.4, and 8.5) of the County General Plan. Uses in the PL District are limited primarily to residential uses and other activities compatible with the area to which the PL District is applied. Future land divisions within the PL District are prohibited.*
Recreation-Forestry (RF)	*The purpose of the Recreation-Forestry (RF) District is to designate lands for the conservation and use of natural resources and for compatible recreational uses. Non resource-related uses are limited to uses that will not adversely affect the primary resource use or uses to which the land is devoted.*
Natural Resource (NR)	*The purpose of the Natural Resource (NR) District is to designate lands that contain productive or potentially productive petroleum, mineral, or timber resources and to prevent the encroachment of incompatible uses onto such lands.*

Source: Kern County 2022

5.6.2.5.1 Permitted Land Uses and Land Uses that Will Require a Conditional Use Permit

Appendix 5.6D provides a list of land uses that are either permissible under the zoning designations Limited Agriculture (A-1), Exclusive Agriculture (A), General Commercial (C-2), and Highway Commercial (CH) or may be permissible with the issuance of a Conditional Use Permit (CUP).

5.6.2.6 Other Applicable Planning Documents

In addition to the general plan, specific plan, and zoning ordinances implemented by the jurisdiction, the County adopted an Airport Land Use Compatibility Plan (ALUCP) in 2012 that includes the Rosamond Skypark (Kern County 2012). Conformance with the ALUCP are discussed in Section 5.6.1.2.5. There are no other applicable planning documents that provide for land use or development guidance/restrictions that could affect the WRESC.

5.6.2.7 Recent Proposed Zone Changes and General Plan Amendments

There are no recent or proposed General Plan amendments or rezones within Kern County or the community of Rosamond that could affect the WRESC. Kern County revised their zoning ordinances in November 2022. In 2017, Kern County initiated the process of updating their General Plan for 2040. The 2040 process is made public through Kern County's public-facing website administered by the Kern County Planning and Natural Resources Department.

5.6.2.8 Recent Discretionary Review by Public Agencies

Kern County has not publicly identified any discretionary reviews related to the 2009 General Plan, 2008 Willow Springs Specific Plan, 2008 Rosamond Specific Plan, 2012 ALUCP or zoning ordinances that would affect the Study Area.

5.6.2.9 Population and Growth Trends

Land use and growth trends identified for the Study Area are based on population estimates, projections, and current land use plans. The California Department of Finance estimates that Kern County's 2022 population was 908,513. In 2010, the county's population was 842,069 according to the American Community Survey. The California Department of Finance estimates that Kern County's population in 2030 will be 940,275 (CDOF 2023). Based on Kern County population data for 2010 and 2020, population growth within the county was 7.5 percent. This equates to a net increase of 63,172 residents in the 10-year period from 2010 to 2020.

According to the U.S. Environmental Protection Agency's environmental justice screening tool, https://www.epa.gov/ejscreen, the 2018 population for the 10-mile area surrounding the WRESC was 24,376. This equates to a population density of 74 people per square mile (U.S. EPA 2021). The Willow Springs and Rosamond Specific Plans indicate that growth rates within the community are hard to predict, with projections ranging from stagnant to as high as 4 to 6 percent annually. The Rosamond and Willow Springs Specific Plans list the following as key elements affecting population growth within the area:

- Population and housing demand within Rosamond and Willow Springs is affected by the proximity of EAFB to Willow Springs and the ever-changing number of civilian jobs and military personnel on base.
- The desirability of living in Rosamond and Willow Springs is correlated to home prices and rental rates in Palmdale/Lancaster.
- The cost of traveling the added distance from Rosamond and Willow Springs to employment centers is greatly dependent of energy prices. (Kern County 2008a; Kern County 2008b)

5.6.3 Environmental Analysis

5.6.3.1 Significance Criteria

Factors used to evaluate the significance of a project related to land use are set forth in Appendix G of the California Environmental Quality Act (CEQA). Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential impacts to land use associated with the construction and operations of the project, Appendix G, asks if the project would:

- Physically divide an established community?
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?
- Conflict with any applicable habitat conservation plan or natural community conservation plan?
- Convert prime farmland, unique farmland, or farmland of statewide importance (farmland), as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to nonagricultural use?
- Involve other changes in the existing environment which, given their location and nature, could result in conversion of farmland to nonagricultural use?
- Conflict with existing zoning for agricultural use, or a Williamson Act contract?

- 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))?
- Result in the loss of forest land or conversion of forest land to non-forest use?
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use or conversion of forest land to non-forest use?

5.6.3.2 Potential Effects on Land Use during Willow Rock Energy Storage Center Construction and Operation

5.6.3.2.1 Divide an Established Community

Neither the WRESC nor the potential gen-tie line routes will physically divide an established community. In addition to the vacant parcels where the WRESC will be located, the Applicant has identified a series of existing ROWs for siting a gen-tie line that will connect the WRESC to the SCE Whirlwind Substation. For instance, as the gen-tie line route parallels Mojave-Tropico Rd, it will extend pass a few single-family residences before running to the SCE Whirlwind Substation.

Upon reaching Rosamond Boulevard, the gen-tie line will continue to parallel the existing roadway as its runs passed a few single-family residences, and a growing number of renewable energy projects characterize this portion of Rosamond and Willow Springs.

The WRESC Site is currently zoned by Kern County as Limited Agriculture (A-1). The Limited Agriculture designation allows for several land uses that are compatible with an energy storage facility and interconnection gen-tie line. While the surrounding Limited Agriculture (A-1) and Exclusive Agriculture (A) designations allow for single-family residences, they do not permit dense residential development characteristic of subdivisions and urban communities. As noted in Section 5.6.2.3 below, the Applicant is requesting a rezone to Exclusive Agriculture (A) based on the recommendation of Kern County. The Exclusive Agriculture (A) designation would provide for expanded land uses such as the proposed WRESC through the completion of a CUP.

As explained in Section 5.6.1. describing the setting, the construction and operation of the WRESC by the Applicant will not divide an established community, affect access to a city or project area, or introduce incompatible land uses to the Study Area. Additionally, consistent with existing zoning designations, the WRESC will not displace existing nonindustrial development or result in new development that will physically divide future neighborhoods.

5.6.3.2.2 Conflict with an Applicable Land Use Plan, Policy, or Regulation

Consistent with the Application for Certification (AFC) process, the CEC will review the Applicant's development and design plans for consistency with applicable land use plans, policies, and regulations.

Table 5.6-9, below, shows the zoning designations for the WRESC and interconnection gen-tie lines and WRESC's conformity with the allowable land uses. Similarly, **Table 5.6-10,** below, details the Project's conformity with local land use plans and policies.

In the absence of the CEC's jurisdiction, a CUP would require Kern County Planning Commission approval. The Warren-Alquist Act provides the CEC with jurisdictional authority over compliance with local rules and regulations. The CEC will work with representatives from Kern County on CUP requirements and conditions.

The installation of the WRESC is consistent with the expansion of renewable energy development within the Study Area and with the proposed rezone of the WRESC Site to Exclusive Agriculture (A). As discussed in Section 5.6.2.3, the Project will be consistent with the area's zoning, general plan, and specific plan designations. As such, implementation of the WRESC will not conflict with any applicable land use plan, policy, or regulation; therefore, environmental impacts related to land use are less than significant.

Table 5.6-9: Project Conformity with Local Zoned Land Uses

Zoning Designation	Further Designations	Conformity with an Applicable Land Use Plan, Policy, or Regulation
Estate (E)	*Estate .25 acres, mobile home combining*	*Allowable uses in this zone include utility and communication facilities, as well as resource extraction and energy development. Additionally, Chapter 19.16 of the zoning ordinance permits an expansion of uses under the categories of utility and communication facilities and resource extraction and energy development with the completion of a Conditional Use Permit (CUP).*
	Estate .25 acres, residential suburban combining, mobile home combining	
	Estate 1-acre, residential suburban combining, mobile home combining	
	Estate 1-acre, residential suburban combining, mobile home combining, floodplain secondary combining [a]	
	Estate 2.5 acres, residential suburban combining	
	Estate 2.5 acres, residential suburban combining, floodplain secondary combining [a]	
	Estate 2.5 acres, residential suburban combining, floodplain secondary combining, mobile home combining [a]	
	Estate 2.5 acres, residential suburban combining, mobile home combining	
	Estate 5 acres, residential suburban combining, floodplain secondary combining [a]	
	Estate 10 acres, residential suburban combining, floodplain secondary combining [a]	
	Estate 20 acres, residential suburban combining, geologic hazard combining, floodplain secondary combining [a]	
Exclusive Agriculture (A)	*Exclusive agriculture, Exclusive agriculture, floodplain secondary combining* [a]	*Specifically includes electric power generating plants as wells as rock, gravel, sand concrete, aggregate and soils crushing, processing, or distribution as conditionally permitting uses in Chapter 19.12.030 (G) as conditionally permitted uses*
General Commercial (C-2)	*General commercial, precise development combining*	*Allowable uses in this zone include utility and communication facilities, as well as resource extraction and energy development. Additionally, Chapter 19.32 of the zoning ordinance permits an expansion of uses under the categories of utility and communication facilities and resource extraction and energy development with the completion of a CUP.*
	General commercial, floodplain secondary combining [a]	
	General commercial, precise development combining, floodplain secondary combining [a]	
	General commercial, precise development combining, airport approach height combining, floodplain secondary combining [a]	

Zoning Designation	Further Designations	Conformity with an Applicable Land Use Plan, Policy, or Regulation
Light Industrial (M-1)	*Light industrial*	*Allowable uses in this zone include utility and communication facilities, as well as resource extraction and energy development. Additionally, Chapter 19.36 of the zoning ordinance permits an expansion of uses under the categories of utility and communication facilities and resource extraction and energy development with the completion of a CUP.*
Limited Agriculture (A-1)	*Limited agriculture*	*Allowable uses in this zone include utility and communication facilities, as well as resource extraction and energy development. Additionally, Chapter 19.14 of the zoning ordinance permits an expansion of uses under the categories of utility and communication facilities and resource extraction and energy development with the completion of a CUP.*
	Limited agriculture, mobile home combining	
	Limited agriculture, airport approach height combining	
Neighborhood Commercial (C-1)	*Neighborhood commercial, precise development combining, airport approach height combining, floodplain secondary combining**	*Allowable uses in this zone include utility and communication facilities, as well as resource extraction and energy development. Additionally, Chapter 19.30 of the zoning ordinance permits an expansion of uses under the categories of utility and communication facilities and resource extraction and energy development with the completion of a CUP.*
Mobile Home Park(MS)	*Mobile Home Park*	*Chapter 19.26 of the zoning ordinance permits an expansion of uses under the category of resource extraction and energy development with the completion of a CUP.*
Low-Density Residential (R-1)	*Low density residential*	*Allowable uses in this zone include utility and communication facilities, as well as resource extraction and energy development. Additionally, Chapter 19.18 of the zoning ordinance permits an expansion of uses under the categories of utility and communication facilities and resource extraction and energy development with the completion of a CUP.*
	Low density residential, airport approach height combining	

Zoning Designation	Further Designations	Conformity with an Applicable Land Use Plan, Policy, or Regulation
Open Space (OS)	*Open space*	*Allowable uses in this zone include utility and communication facilities. Additionally, Chapter 19.44 of the zoning ordinance permits an expansion of uses under the categories of utility and communication facilities and resource extraction and energy development with the completion of a CUP.*
Platted Lands (PL)	*Platted lands, residential suburban combining*	*Allowable uses in this zone include utility and communication facilities, as well as resource extraction and energy development. Additionally, Chapter 19.53 of the zoning ordinance permits an expansion of uses under the categories of utility and communication facilities and resource extraction and energy development with the completion of a CUP.*
Recreation-Forestry (RF)	*Recreation-forestry*	*Allowable uses in this zone include utility and communication facilities, as well as resource extraction and energy development. Additionally, Chapter 19.42 of the zoning ordinance permits an expansion of uses under the categories of utility and communication facilities and resource extraction and energy development with the completion of a CUP.*
Natural Resource (NR)	*Natural Resource*	*Allowable uses in this zone include utility and communication facilities, as well as resource extraction and energy development. Additionally, Chapter 19.46 of the zoning ordinance permits an expansion of uses under the categories of utility and communication facilities and resource extraction and energy development with the completion of a CUP.*

a. Uses prohibited that will likely increase the flood hazard or affect the water-carrying capacity of the floodplain beyond the limits resulting from encroachment in floodplain secondary combining districts

Table 5.6-10: Project Conformity with Local Land Use Plans and Policies

Goal/Policy	Project Consistency
Kern County	
Land Use, Open Space, and Conservation Element	
Physical and Environmental Constraints	
Goal 1: To strive to prevent loss of life, reduce personal injuries, and property damage, minimize economic and social diseconomies resulting from natural disaster by directing development to areas which are not hazardous.	*The WRESC is consistent with Goal 1 and Policies 1 and 11. The Project is compatible with adjacent land uses. Refer to Section 5.10, Socioeconomics, for additional information on the economic benefits of implementing the WRESC. Refer to Section 5.15 for additional information on water resources.*
Policy 1: Kern County will ensure that new developments will not be sited on land that is physically or environmentally constrained.	
Policy 11: Protect and maintain watershed integrity within Kern County.	
Public Facilities and Services	
Goal 1: Kern County residents and businesses should receive adequate and cost-effective public services and facilities. The County will compare new urban development proposals and land use changes to the required public services and facilities needed for the proposed project.	*The WRESC is consistent with Goals 1 and 5. The WRESC includes construction of a new energy storage facility, which will contribute to future sustainable development within the county. Water will be provided via an Antelope Valley East Kern (AVEK) Water Agency main connection that is located directly adjacent to WRESC Site along Sierra Highway. AVEK has confirmed that this main has adequate capacity to supply the Project's full requirements. Refer to Section 5.15 for additional information on water resources. Refer to Section 5.10 for additional information on socio-economic impacts of implementing the WRESC.*
Goal 5: Ensure that adequate supplies of quality (appropriate for intended use) water are available to residential, industrial, and agricultural users within Kern County.	
Policy 1: New discretionary development will be required to pay its proportional share of the local costs of infrastructure improvements required to service such development.	
Policy 3: Individual projects will provide availability of public utility service as per approved guidelines of the serving utility.	
Resource	
Goal 1: To contain new development within an area large enough to meet generous projections of foreseeable need, but in locations which will not impair the economic strength derived from the petroleum, agriculture, rangeland, or mineral resources, or diminish the other amenities which exist in the County.	*The WRESC is consistent with Goals 1, 3, and 6 and Policy 1. The WRESC includes construction of a new energy storage facility which will contribute to future sustainable development within Kern County.*
Goal 3: To ensure that the development of resource areas minimizes effects of neighboring resource lands.	
Goal 6: Encourage alternative sources of energy, such as solar and wind energy, while protecting the environment.	
Policy 1: Appropriate resource uses of all types will be encouraged as desirable and consistent interim uses in undeveloped portions of the County regardless of General Plan designation.	
General Provisions	
Goal 1: Ensure that the County can accommodate anticipated future growth and development while maintaining a safe and healthful environment and a prosperous economy by preserving valuable natural resources, guiding development away from hazardous areas, and assuring the provision of adequate public services.	*The WRESC is consistent with Goal 1, Policy 8. The WRESC includes construction of a new energy storage facility which will contribute to future sustainable development within Kern County.*
Policy 8: The County shall ensure that new industrial uses and activities are sited to avoid or minimize significant hazards to human health and safety in a manner that avoids over concentrating such uses in proximity to schools and residents	

Goal/Policy	Project Consistency
Public Services and Facilities	
Policy 9: New development should pay its pro rata share of the local cost of expansions in services, facilities, and infrastructure which it generates and upon which it is dependent.	*The WRESC is consistent with Policies 9 and 16. The Applicant will be solely responsible for the construction and operation of the WRESC in Kern County, California. Refer to Section 5.10 for additional information on tax and socio-economics related to the development of the WRESC.*
Policy 16: The developer shall assume full responsibility for costs incurred in service extension or improvements that are required to serve the project.	
Air Quality	
Policy 18: The air quality implications of new discretionary land use proposals shall be considered in approval of major developments.	*The WRESC is consistent with Policies 18 and 20. The proposed actions is an energy storage facility. The facility does not require fossil fuels for its operation. Refer to Section 5.01 for additional information on air quality impacts of implementing the WRESC.*
Policy 20: The County shall include fugitive dust control measures as a requirement for discretionary projects and as required by the adopted rules and regulations of the San Joaquin Valley Unified Air Pollution Control District and the Kern County Air Pollution Control District on ministerial permits.	
Archaeological, Paleontological, Cultural, and Historical Preservation	
Policy 25: The County will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors.	*The WRESC is consistent with Policy 25. Refer to Section 5.3, Cultural Resources, and Section 5.8, Paleontological Resources, for additional information on Archaeological, Paleontological, Cultural, and Historic Preservation.*
Threatened and Endangered Species	
Policy 27: Threatened or endangered plant and wildlife species should be protected in accordance with State and federal laws.	The WRESC is consistent with Policies 27, 28, and 29. Refer to Section 5.2, Biological Resources, for additional information on threatened and endangered species. The California Department of Fish and Wildlife was consulted in the survey of sensitive biological species.
Policy 28: County should work closely with State and federal agencies to assure that discretionary projects avoid or minimize impacts to fish, wildlife, and botanical resources.	
Policy 29: The County will seek cooperative efforts with local, State, and federal agencies to protect listed threatened and endangered plant and wildlife species through the use of conservation plans and other methods promoting management and conservation of habitat lands.	
Surface Water and Groundwater	
Policy 34: Ensure that water quality standards are met for existing users and future development.	*The WRESC is consistent with Policies 34, 41, and 43. Refer to Section 5.15, Water Resources, for additional information on surface water and groundwater.*
Policy 41: Review development proposals to ensure adequate water is available to accommodate projected growth.	
Policy 43: Drainage shall conform to the Kern County Development Standards and the Grading Ordinance.	
Circulation Element	
Highway	
Goal 5: Maintain a minimum Level of Service (LOS) D.	*Refer to Section 5.12 for additional information on Traffic and Transportation.*

Goal/Policy	Project Consistency
Trucks and Highways (Part 1)	
Goal 1: Provide for Kern County's heavy truck transportation in the safest way possible.	*The WRESC is consistent with Goal 1, 2, and 3 and Policy 1. Refer to Section 5.12, Traffic and Transportation, for additional information on trucks and truck routes.*
Goal 2: Reduce potential overweight trucks.	
Goal 3: Use State Highway System improvements to prevent truck traffic in neighborhoods.	
Policy 1: Caltrans should be made aware of the heavy truck activity on Kern County's roads.	
Trucks and Highways (Part 2)	
Goal 1: Reduce risk to public health from transportation of hazardous materials.	*The WRESC is consistent with Goal 1 and Policy 1. Refer to Section 5.14, Waste Management, for additional information on transportation and storage of hazardous materials.*
Policy 1: The commercial transportation of hazardous material, identification and designation of appropriate shipping routes will be in conformance with the adopted Kern County and Incorporated Cities Hazardous Waste Management Plan.	
Noise Element	
Sensitive Noise Areas	
Goal 1: Ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained.	*The WRESC is consistent with Goal 1 and Policies 1, 4, and 7. Refer to Section 5.7, Noise, for additional information on facility operations, construction schedules, and mitigation measures.*
Policy 1: Review discretionary industrial, commercial, or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses.	
Policy 4: Utilize good land use planning principles to reduce conflicts related to noise emissions.	
Policy 7: Employ the best available methods of noise control.	
Safety Element	
Introduction	
Goal 1: Minimize injuries and loss of life and reduce property damage.	*The WRESC is consistent with Goal 1 and Policy 1. The Applicant will submit design plans to the California Energy Commission (CEC) for review and approval prior to the commencement of construction, which will ensure design review consistent with the county's safety requirements.*
Policy 1: The County shall require development for human occupancy to be placed in a location away from an active earthquake fault in order to minimize safety	
Landslides, Subsidence, Seiche, and Liquefaction	
Policy 1: Determine the liquefaction potential at sites in areas of shallow groundwater (Map Code 2.3) prior to discretionary development and determine specific mitigation to be incorporated into the foundation design, as necessary, to prevent or reduce damage from liquefaction in an earthquake.	*The WRESC is consistent with Policies 1 and 3. Refer to Section 5.4, Geological Hazards, for additional information on potential hazards and mitigation measures. The Applicant will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with the county's safety requirements.*
Policy 3: Reduce potential for exposure of residential, commercial, and industrial development to hazards of landslide, land subsidence, liquefaction, and erosion.	
Wildland and Urban Fire	
Policy 1: Require discretionary projects to assess impacts on emergency services and facilities.	*The WRESC is consistent with Policies 1, 3, 4, and 6. The Applicant will submit design plans to the CEC for review and approval prior to the*
Policy 3: The County will encourage the promotion of fire prevention methods to reduce service protection costs and costs to taxpayers.	

Goal/Policy	Project Consistency
Policy 4: Ensure that new development of properties have sufficient access for emergency vehicles and for the evacuation of residents.	*commencement of construction, which will ensure design review consistent with the county's safety requirements.*
Policy 6: All discretionary projects shall comply with the adopted Fire Code and the requirements of the Fire Department.	
Hazardous Materials	
Policy 1: The proposed siting or expansion of hazardous waste facilities will be in conformance with the adopted Kern County and Incorporated Cities Hazardous Waste Management Plan.	*The WRESC is consistent with Policy 1. Refer to Section 5.14, Waste Management, for additional information on transportation and storage of hazardous materials.*
Importance of Energy to Kern County	
Policy 8: The County should work closely with local, state, and federal agencies to assure that energy projects (both discretionary and ministerial) avoid or minimize direct impacts to fish, wildlife, and botanical resources, wherever practical.	*The WRESC is consistent with Policies 8 and 10. The WRESC includes construction of a new energy storage facility which will contribute to future sustainable development within Kern County.*
Policy 10: The County should require acoustical analysis for energy project proposals that might impact sensitive and highly sensitive uses in accordance with the Noise Element of the General Plan.	
Kern County's Economic Dependence on the Oil Marketplace	
Goal 1: To reduce the County's susceptibility to fluctuations in the petroleum production levels, and to encourage diversification of the economy.	*The WRESC is consistent with Goal 1 and Policy 4. The WRESC includes construction of a new energy storage facility that will contribute to future sustainable development within Kern County.*
Policy 4. The County should encourage the development of renewable energy industries to diversify the energy economy in Kern County.	
Transmission Lines	
Goal 1: To encourage the safe and orderly development of transmission lines to access Kern County's electrical resources along routes, which minimize potential adverse environmental effects.	*The WRESC is consistent with Goal 1 and Policy 5. The Applicant will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with best practices.*
Policy 5: The County should discourage the siting of above-ground transmission lines in visually sensitive areas.	
Willow Springs	
Land Use Elements	
Land Use	
Goal 1: To ensure compatible uses of land consistent with both short- and long-term planning objectives of the County.	*The WRESC is consistent with Goal 1, 2 and 9. The Project is compatible with adjacent land uses. Refer to Section 5.10, Socioeconomics, for additional information on the economic benefits of implementing the WRESC*
Goal 2: To promote a balanced and functional mix of land uses consistent with the goals and policies of the Kern County General Plan.	
Goal 9: To achieve consistency between zoning and the policies and objectives of the Specific Plan.	
Resource	
Goal 3: Encourage retention of productive agricultural and dormant mineral resources by imposing a restriction on allowing urban type land uses on nearby adjacent lands.	*The WRESC is consistent with Goal 3. The WRESC includes construction of a new energy storage facility, which will contribute to future sustainable development within Kern County. The Applicant will submit design plans to*
Policy 1: Provide a method encouraging the preservation of agricultural land.	

Goal/Policy	Project Consistency
Policy 2: Initial development within the Update area shall, when possible, be directed towards previously impacted areas (i.e., agricultural fields).	*the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with best practices.*
Policy 3: To ensure compliance with applicable State and federal laws and to protect the biological resources present in the Specific Plan area.	
Air Quality	
Goal 1: Imposition of appropriate mitigation measures to reduce where practical to do so, the effect short-term and long-term projects have on the area which involve grading activities, erosion controls, revegetation of disturbed sites, and provisions to introduce into the plan area a competitive job market to reduce travel times.	*The WRESC is consistent with Goal 1 and Policy 1. For additional information of air quality, refer to Section 5.1. The proposed action is an energy storage facility. The facility does not require fossil fuels for its operation. The Applicant will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with best practices.*
Policy 1: Compliance with the Mitigation/Implementation Measures and enactment of an approved Air Quality Attainment Plan.	
Biological Resources	
Policy 1: Where possible, development shall be designated to avoid displacement of sensitive species.	*The WRESC is consistent with Policies 1, 2, and 3. Refer to Section 5.2, Biological Resources, for additional information on threatened and endangered species.*
Policy 2: Focused surveys shall be conducted by a County-approved biologist to establish the presence or absence of sensitive species.	
Policy 3: Initial development within the area covered under the Willow Springs Specific Plan, when possible, will be directed towards previously impacted areas.	
Cultural Resources	
Goal 1: To preserve cultural resources contained on sensitive sites located within the Willow Springs Specific Plan area.	*The WRESC is consistent with Goal 1 and Polices 1, 2, and 15. Refer to Section 5.3, Cultural Resources, and Section 5.8, Paleontological Resources, for additional information on cultural resources*
Policy 1: Archaeological investigations shall be required of specific properties proposed for development.	
Policy 2: Recorded archaeological sites shall be subjected to individual studies prior to development.	
Policy 15: Require cultural resources report for those areas with high probability for prehistoric activity prior to issuance of any grading permits.	
Seismic Safety and Safety	
Goal 7: Minimize damage to public facilities and utilities, such as water and gas mains, electric, telephone, and sewer lines, streets, and bridges located in areas of special flood hazard.	*The WRESC is consistent with Goal 7 and Policy 1. Refer to Section 5.4, Geological Hazards, for additional information on potential hazards and mitigation measures. The Applicant will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with the county's safety requirements.*
Policy 1: New development within the 100-year floodplain shall be regulated in accordance with the Floodplain Management Section of the Department of Planning and Development Services according to the Flood Damage Prevention Ordinance, the Kern Land Division Ordinance, and the Kern County Zoning Ordinance as may be amended from time to time.	
Public Facilities	
Goal 3: To restrict, if possible, any further and/or unnecessary drawdown of the water table within the plan area.	*The WRESC is consistent with Goal 3 and Policies 2 and 4. The WRESC includes construction of a new energy storage facility, which will contribute to future sustainable development within the county. Refer to Section 5.10*
Policy 2: In evaluating a development application, Kern County will consider both its physical and fiscal impact on the local school district and other public facilities. If it is found that the district or facilities involved will, as a result, require additional facilities or	

Goal/Policy	Project Consistency
incur costs requiring additional local revenues, the development project will be required as a condition of approval to contribute funds to the district for the costs directly attributable to the project.	*for more information on impacts to schools and taxes from implementing the WRESC.*
Policy 4: New development will be required to pay its proportional share of the local costs of infrastructure improvements required to service such development.	
Industrial	
Goal 1: To encourage well-planned industrial development to ensure compatibility with adjacent land uses.	*The WRESC is consistent with Goals 1, 2, and 3 and Policies 2 and 8. The WRESC includes construction of a new energy storage facility, which will contribute to future sustainable development within the county. As demonstrated in the description of Limited Agriculture above, allowable land uses have similar components as the WRESC. Refer to Section 5.01 for more information on Air Quality and Section 5.12 for more information on Transportation*
Goal 2: To accommodate a wide variety of industrial uses while ensuring compatibility with the area and	
adjacent land uses.	
Goal 3: To make the best use of existing transportation routes and facilities, natural barriers, and wind patterns as a basis for siting industry.	
Noise	
Goal 2: To minimize disruption to the quality of life resulting from excessive noise.	*The WRESC is consistent with Goals 2 and 3 and Policies 1 and 3. Refer to Section 5.7, Noise, for additional information on facility operations, construction schedules, and mitigation measures.*
Goal 3: To maintain reasonable noise level standards, consistent with the Kern County Noise Element.	
Policy 1: Noise emissions from new development will be controlled and off-site levels limited to the standards of the Kern County General Plan Noise Element	
Circulation	
Goal 5: To maintain public safety within the plan area by providing a more direct and efficient circulation system for law enforcement and fire protection vehicles.	*The WRESC is consistent with Goals 5 and 7. Refer to Section 5.12, Traffic and Transportation, for additional information on trucks and truck routes.*
Goal 7: To provide an adequate circulation system which will support the proposed land uses.	
Water Quality and Availability	
Goal 1: To ensure that new developments are provided with an adequate water supply and wastewater disposal/treatment facilities.	*The WRESC is consistent with Goal 1 and Policies 1 and 2. Refer to Section 5.15, Water Resources, for additional information on surface water and groundwater.*
Policy 1: Water supply method and wastewater disposal/treatment facility shall be as required by Kern County.	
Policy 2: Separate environmental documentation shall be required for the methods of water supply and wastewater disposal/treatment selected.	
General Provision	
Goal 9: Fire flow provisions and on-site fire protection standards (i.e., sprinklers/water storage) shall follow minimum standards provided by the Kern County Fire Department.	*The Project is consistent with Goal 9. The Applicant will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with the county's safety requirements.*

Goal/Policy	Project Consistency
Rosamond	
Land Use Element	
Residential	
To promote the efficient and economical use of residential land and ensure that new urban densities (Map Code 5.45 and greater) are provided with urban infrastructure (paved streets) and are serviced by the Rosamond Community Services District.	*The WRESC is consistent with Residential Goals. The Applicant will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with best practices.*
Commercial	
To ensure that an adequate and geographically balanced supply of land is designated for a range of commercial purposes, recognizing existing and future patterns of supply and demand, the dependence of commercial facilities on available capacity in public service infrastructure, and the other locational factors that contribute to the economic success of commercial activities, so as to strengthen the local economy and enhance the quality of life of Rosamond residents.	*The WRESC is consistent with Commercial Goals. Refer to Section 5.10, socioeconomics, for additional information on the economic benefits of implementing WRESC.*
To establish a community atmosphere of the type which will attract new commercial developments.	
Establish commercial areas which will benefit both the traveling public motorist and the community as a whole.	
Encourage well-planned, aesthetically pleasing commercial development.	
Provide for eventual expansion of some commercial areas due to major construction.	
To promote the development of vacant sites, in-fill, and building rehabilitation where economically feasible within the established downtown area.	
Extension of public infrastructure and services where necessary for all projects located within the community services district boundaries.	
Industrial	
Encourage well-planned industrial development with appropriate on- and off-site improvements which will be compatible with adjacent and surrounding land uses.	*The WRESC is consistent with Industrial Goals. The WRESC includes construction of a new energy storage facility, which will contribute to future sustainable development within the county. The WRESC is located near Sierra Highway and SR 14. Additionally, The WRESC sits opposite an active freight rail corridor. Refer to Section 5.12 Traffic and Transportation for more information on transportation.*
Accommodate a wide variety of industrial uses while observing Goal (1).	
To make the best use of existing transportation routes and facilities, natural barriers, and wind patterns as a basis for siting industry.	
To encourage development of industrial parks, with appropriate buffers, particularly where an industrial use lies adjacent to residentially designated lands.	
Resource	
To achieve compatibility of adjacent land uses within the plan area.	*The WRESC is consistent with Resource Goals. The WRESC includes construction of a new energy storage facility, which will contribute to future sustainable development within Kern County. The Applicant will submit design plans to the CEC for review and approval prior to the*
To establish zoning which is consistent with present and future intended land use.	

Goal/Policy	Project Consistency
	commencement of construction, which will ensure design review consistent with best practices.
Public Facilities	
To provide adequate waste disposal systems within the plan area in order to safeguard the public health and public and private investments.	*The WRESC is consistent with Public Facility Goals. The WRESC includes construction of a new energy storage facility, which will contribute to future sustainable development within the county.*
To ensure a safe, reliable supply of water for both new and existing residential development.	
To feasibly restrict, if possible, any further and/or unnecessary drawdown of the water table within the plan area	
To provide adequate sites for Southern Kern Unified School District educational facilities.	
The establishment of parks and recreational facilities of varying size, function, and location to serve Rosamond residents.	
Physical Constraints	
To promote a safe and healthful living environment, reduce the potential for property damage and injury by requiring development standards that adequately mitigate these environmental constraints where feasible to do so.	*The WRESC is consistent with Physical Constraint Goals. The Project is compatible with adjacent land uses. Refer to Section 5.10, Socioeconomics, for additional information on the economic benefits of implementing the WRESC.*

Sources: Kern County 2008a, 2008b, 2009

5.6.3.2.3 Conflict with an Applicable Habitat Conservation Plan

The WRESC is not located within the limits of any adopted HCP, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan; thus, there will be no impact.

5.6.3.2.4 Convert Farmland to Nonagricultural Uses

The parcel that will make up the WRESC is not being used for agricultural purposes. Additionally, the CDOC maps the parcel and potential gen-tie line route lands as Non-agricultural and Natural Vegetation. The Non-agricultural and Natural Vegetation designation does not conform to CDOC's definition of farmland. As noted, the zoned designation for the Study Area is Limited Agriculture. The Limited Agriculture designation includes various land uses, including those associated with the WRESC. Therefore, the WRESC appurtenances will not result in conversion of designated agricultural lands to other land use.

5.6.3.2.5 Cause Changes that will Result in the Conversion of Farmland

The parcels within the WRESC Study Area, and the Study Area for the preferred and optional gen-tie line routes do not currently support farming. As previously noted, the WRESC is zoned Limited Agricultural. The Limited Agricultural designation includes various land uses, including those related to utility and communication facilities, as well as resource extraction and energy development. Future development within Kern County, Rosamond, and Willow Springs will comply with local comprehensive land use planning documents and ordinances. As such, the WRESC will not cause land use changes that will induce other land use changes resulting in the long-term conversion of farmland.

5.6.3.3 Compatibility with Existing and Designated Land Uses and Applicable Planning Policies

The State of California's Planning and Zoning Law (Section 65860) requires that consistency exist between the General Plan, which represents the County's long-range public policy, and the Zoning Ordinance, a set of specific development regulations.

5.6.3.3.1 General Plan and Zoning Ordinance Consistency

As stated in Kern County's General Plan, "no land division, parcel map, conditional use permit, or rezoning can be approved unless it is found to be consistent with the adopted plan." The current General Plan for Kern County was adopted on September 22, 2009. The stated intent of Kern County's General Plan is to serve as a governing document that guides the physical growth and change in the community (Kern County 2009). The adopted Kern County General Plan was designed to accommodate revisions and amendments to the policies, land use map, and elements.

Table 5.6-10 lists the General Plan's policies, goals, and describes WRESC's conformity with the plan's components. Similarly, **Table 5.6-7** lists the zoning ordinances for the Project Study Area and **Table 5.6-9** lists WRESC's conformity with the corresponding zoning ordinance. Consistency between the Kern County General Plan and Zoning Ordinance was determined by comparing the main WRESC Site's General Plan designation 8.5 Resource Management and the corresponding zoning ordinance, Limited Agriculture (A-1) and proposed rezone ordinance Exclusive Agriculture (A). Additionally, a review of the consistency between WRESC and potential construction support parcels designated General Commercial (C-2) and Highway Commercial (CH) is included herein.

General Plan Land Use Designation 8.5 Resource Management

The following describes the General Plan's land use description for 8.5 Resource Management:

> *"Primarily open space lands containing important resource values such as wildlife habitat, scenic values, or watershed recharge areas. These areas may be characterized by physical constraints or may constitute an important watershed recharge area or wildlife habitat or may have value as a buffer between resource areas and urban areas. Other lands with this resource attribute are undeveloped, non-urban areas that do*

not warrant additional planning within the foreseeable future because of current population (or anticipated increase), marginal physical development, or no subdivision activity."

*"**Uses shall include, but are not limited to**, the following: recreational activities; livestock grazing; dry land farming; ranching facilities; wildlife and botanical preserves; and timber harvesting; one single-family dwelling unit; irrigated croplands; water storage or groundwater recharge areas; mineral; aggregate; petroleum exploration and extraction; open space and recreational uses; one single-family dwelling on legal residentially zoned lots on effective date of this General Plan; land within development areas subject to significant physical constraints; State and federal lands which have been converted to private ownership (Kern County 2009)."*

Land Uses Under Zoning Ordinance Limited Agriculture (A-1)

The WRESC parcel and most of the parcels that would support the facility's construction are zoned Limited Agriculture (A-1). The purpose of the Limited Agriculture (A-1) District (*WRESC's pre-AFC designation*) is to designate areas suitable for a combination of estate-type residential development, agricultural uses, and other compatible uses. A complete description of land uses allowable under Limited Agriculture (A-1) is presented in Appendix 5.6D.

5.6.3.3.2 Consistency between General Plan Land Use 8.5 Resource Management and Limited Agriculture (A-1)

As demonstrated in **Table 5.6-10**, WRESC's innovative approach to energy storage and gen-tie clearly conforms to the Kern County 2009 General Plan's listed goals and policies of supporting energy development within its jurisdiction. The parcels associated with the WRESC likely carry the 8.5 Resource Management designation because they are "…*undeveloped, non-urban areas that do not warrant additional planning within the foreseeable future..."* WRESC's innovative approach to energy storage at this location was not known or considered when the General Plan was last amended in 2009.

With the issuance of a CUP, the permissible land uses under Limited Agriculture (A-1) include energy infrastructure as the category of Limited Agriculture (A-1) *Resource Extraction and Energy Development Uses*, uses includes, "electrical power generating plant, excluding nuclear or coal powered." The WRESC Project fits squarely within the category of conditionally approved projects for Limited Agriculture (A-1).

5.6.3.3.3 Process for Ensuring Consistency between Kern County's General Plan and Kern County's Zoning Ordinance

Kern County's General Plan includes a General Plan and Zoning Consistency Matrix to assist in identifying consistency between a designated land use and zoned activities. The Matrix, which is for planning purposes only, works by comparing each zoned district with land use categories set forth in the General Plan. The Matrix illustrates the suitability of the specific zoning districts with the policies specified in the text of the General Plan. The Matrix applies two degrees of compatibility to land use designation and zoning:

Consistent: Zones which specifically implement the policies specified in the General Plan or allow uses found to be conditionally acceptable in such zones.

Inconsistent: Zones which are inconsistent with General Plan policies for a particular land use designation.

The Matrix indicates that 8.5 Resource Management and Limited Agriculture (A-1) are inconsistent. After consulting with the Kern County Planning and Natural Resources Department regarding this potential inconsistency, it was recommended that the Applicant consider a request to rezone the WRESC Site to Exclusive Agriculture (A) to eliminate a potential inconsistency with the General Plan. The Matrix indicates that Exclusive Agriculture (A) 20 acre and Exclusive Agriculture (A) 80-acre designations would be consistent with 8.5 Resource Management (Min. 20 Acres). Rezoning of WRESC's parcel to Exclusive Agriculture (A) would bring the designated land use and zoned land uses for the WRESC Site into alignment.

Administratively rezoning the WRESC parcel under CCR title 15061(b)(3) common sense exemption under CEQA, would address potential consistency concerns raised by Kern County between the General Plan land use designation 8.5 Resource Management and the zoning designation Limited Agriculture (A-1).

5.6.3.3.4 Request to Rezone WRESC Site to Exclusive Agriculture

The Applicant has submitted a request to Kern County to rezone the WRESC Site to Exclusive Agriculture (A).

The purpose of Exclusive Agriculture (A) is to designate areas suitable for agricultural uses and to prevent the encroachment of incompatible uses onto agricultural lands and the premature conversion of such lands to nonagricultural uses. Uses in the Exclusive Agriculture (A) are limited primarily to agricultural uses and other activities compatible with agriculture.

The allowable uses under Exclusive Agriculture (A) are broad and do not suggest a desired transition to or support of residential development. The allowable uses do consider or support certain industrial operations related to energy development and resource extraction. Under the category of *Resource Extraction and Energy Development Uses*, a host of energy related activities are permissible. These allowable uses under Exclusive Agriculture (A) include "Electrical power generating plant" (Kern County 2022; Section19.12.030.G, "Uses permitted with a conditional use permit").

With the issuance of a CUP, Resource Extraction and Energy Development Uses under Exclusive Agriculture (A) expand to include activities such as electrical power generating plant, permanent explosives storage, mining, and mineral extraction pursuant to Chapter 19.100, and rock, gravel, sand, concrete, aggregate, or soils crushing, processing, or distribution. The pending request to rezone WRESC Site from Limited Agriculture (A-1) to Exclusive Agriculture (A), once approved, will establish consistency between the Zoning Ordinance, the General Plan and the proposed WRESC.

5.6.3.3.5 Temporary Use of Properties Zoned General Commercial C-2 and Highway Commercial (CH)

Construction of WRESC will require temporary laydown of construction materials and parking outside the main WRESC Site. The Applicant has identified four parcels (APN 471-061-05, 471-061-06, 471-061-07, and 471-061-08) to the southwest of WRESC that may be needed on a temporary basis to support the Project's construction. These four parcels are currently zoned General Commercial (C-2).

The purpose of the General Commercial (C-2) District is to designate areas for the widest range of retail commercial activities, including regional shopping centers and heavy commercial uses. The C-2 District may also be combined with the Cluster (CL) Combining District to achieve innovative, creative office or commercial development. The C-2 District should be located on major highways.

The General Plan identifies the area that corresponds to parcels APN 471-061-05, 471-061-06, 471-061-07, and 471-061-08 as 4.1 Accepted County Plan Areas. The following describes the land uses associated with General Plan land use designation Accepted County Plan Areas:

> *"A designation of areas for which specific land use plans have already been prepared and approved. These plans are accepted and incorporated by this reference and the respective land use map associated with each such plan is hereby adopted as the General Plan diagram for each such area. Each plan area is indicated on the General Plan map" (Kern County 2022).*

The Applicant has also identified a site west of SR 14 that may also be needed for temporary parking and laydown of construction materials. Parcel APN 431-022-08 maintains the General Plan land use designation of 8.5 Resource Management and 6.3 Highway Commercial (CH). The 6.3 Highway Commercial portion of the parcel corresponds to zoning ordinance designation General Commercial (C-2).

The purpose of the Highway Commercial (CH) District is to designate areas for uses and services normally associated with the traveling public. The Highway Commercial (CH) District shall be located adjacent to or in close proximity to major highways. The Highway Commercial (CH) District may be combined with the Cluster (CL) Combining District to achieve innovative, creative commercial development. The Highway Commercial (CH) District is intended to promote a unified grouping of travel-oriented uses, such as gas stations, restaurants, and motels. It is also intended to permit limited urban type uses in rural areas adjacent to highways with a minimum of

encroachment on surrounding agricultural activities. The following describes the land uses associated with General Plan land use designation Highway Commercial for parcel:

> *Uses that provide services, amenities, and accommodations at key locations along major roadways to visitors and through traffic. Uses shall include, but are not limited to, the following: Hotels, motels, restaurants, garages, service stations, recreational vehicle parks, fast-food restaurants, truck stops, and truck washes (Kern County 2022).*

While the activities associated with WRESC's construction are not listed under permissible land uses, future uses of these parcels would require clearing for temporary construction parking and laydown. No permanent facilities would be located on these parcels. If Kern County does not accept the temporary construction activities as a compatible land use with 4.1 Accepted County Plan Areas or 6.3 Highway Commercial, a General Plan amendment may be required to update the Land Use, Open Space & Conservation Element Kern County General Plan Map that corresponds with parcels APN 471-061-05, 471-061-06, 471-061-07, 471-061-08, and 431-022-08.

By law, the legislative body of the county can amend any mandatory element of the general plan only four (4) times a year. Accordingly, the Planning and Natural Resources Department staff schedules four (4) "windows" per year at the Board of Supervisors to consider amendments to the general plan (Kern 2024). The process for amending the General Plan in Kern County is as follows:

1) The application to amend the General Plan is in two (2) parts, beginning with the "Notice of Intent" (NOI).
2) The NOI is reviewed by staff and, in most cases, is considered by the Pre-Application Review Committee (PARC).
3) Most general plan amendments require some form of environmental study. The environmental study can take the form of a Negative Declaration, a Mitigated Negative Declaration, or an Environmental Impact Report. Most general plan amendments require some form of environmental study. *The AFC could serve as the environmental study.*
4) After the PARC meeting, the applicant must gather all the necessary information, complete an application for general plan amendment and, together with the proper filing fees, submit the package to the Planning Department. This constitutes the second part of the application process.
5) The Commission will hold one (1) or more public hearings to maximize public input into the Project. Prior to hearings before the Commission, a staff report will be prepared. The staff report contains information on the proposed Project, an analysis of the proposal in relation to surrounding properties and land uses, and a staff recommendation.
6) On the conclusion of these hearings, the Planning Commission will forward a recommendation to the Board of Supervisors for final consideration.
7) The Board will consider the proposed amendment at one of the designated "windows."

Since acceptable processes are in place to ensure consistency between the Kern County adopted 2009 General Plan, 2022 Zoning Ordinance, and WRESC, no significant impact to land use consistency within Kern County is anticipated for the WRESC Project.

5.6.3.4 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when

viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects."

Cumulative impacts on land use could occur if the impacts associated with the development of the WRESC and have the potential top combine with the impacts from other related past, present, and reasonably foreseeable probable future projects and will be inconsistent with applicable plans and policies or have other cumulative land use-related impacts.

The spatial setting for the analysis of cumulative impacts is roughly equal to the western Antelope Valley portion of Kern County and the temporal setting occurs between the known past and the life of the Project (estimated 50 years). The spatial setting was selected due to the similarity of land use within the area and bounding geographical features. The cumulative effects analysis for land use evaluates the cumulative impact to regional land use patterns of project development within the spatial setting.

Types of foreseeable developments within the spatial setting include new industrial facilities such as the Mojave Micro Mill[2] project, Gem Hill Quary project,[3] new energy facilities, residential development, and various projects that require changes in zoning and land use designation. The anticipated impacts of WRESC in conjunction past, present, and reasonably foreseeable projects will increase urbanization. The increase in urbanization within the spatial setting will result in a loss of open space within Antelope Valley. While cumulative impacts to land use from WRESC may occur when combined with past, present, and reasonably foreseeable future projects, they are not anticipated to be significant. For instance, impacts to land use within the WRESC vicinity are restricted by the presence of Sierra Highway immediately to the east, SR 14 to the west, and Dawn Road to the south. Additionally, cumulative impacts to land use are minimized by the presence of EAFB within the spatial setting.

This analysis of land use has demonstrated that the Project will be consistent with land use plans and policies and is compatible with adjacent uses. Therefore, the Project will not be cumulatively considerable with respect to land use compatibility. For these reasons, the WRESC will not cause a significant cumulative impact on land use within the Study Area.

5.6.4 Best Practices, Design Features, and Mitigation Measures

Because the WRESC will cause no significant adverse impacts to land use and or lands protected or managed by land use plans, no additional mitigation measures beyond those incorporated into the Project's design are necessary.

5.6.5 Laws, Ordinances, Regulations, and Standards

This section lists and discusses the land use LORS that apply to WRESC. Consistent with AFC requirements, all plans, and local and state regulations applicable to the 1-mile area surrounding the WRESC and 0.25-mile area surrounding the offsite interconnection gen-tie line are summarized below. As discussed above, the WRESC is located in the Ansel area of unincorporated Kern County with Project components intersecting portions of the communities of Rosamond and Willow Springs.

5.6.5.1 Federal Laws, Ordinances, Regulations, and Standards

Because the WRESC is located on private lands within the State of California and in Kern County, there are no land-use-related federal laws and regulations that apply to the construction and operation of the Project. The Applicant is consulting with Kern County and EAFB on the development of the WRESC. The Project's gen-tie line

[2] Mojave Micro Mill is intended to be a state-of-the-art steel micro mill. The mill's products would be used in major infrastructure projects and major commercial projects. The proposed WRESC Site is in the unincorporated area of southeastern Kern County, approximately 5 miles northeast from the unincorporated community of Rosamond and approximately 8 miles southeast from the unincorporated community of Mojave (Kern County 2023).

[3] The Gem Hill Quarry project proponent (CalPortland Company) involves a surface mining operation and development of a reclamation plan on 82 acres of an approximately 210-acre reclamation plan boundary (CEQAnet Web Portal 2024).

may intersect federal lands managed by BLM. A ROW grant from the BLM may be necessary for the construction of a gen-tie line across their lands. This may require the submittal and approval of standard form (SF)-299.

5.6.5.2 State Laws, Ordinances, Regulations, and Standards

5.6.5.2.1 Warren-Alquist Act

The AFC process is a certified regulatory process pursuant to the Warren-Alquist Act and, therefore, fulfills the requirements of CEQA. CEQA is codified in the California Public Resources Code, Section 21000-21178.1. Guidelines for implementation of CEQA are codified in the CCR, Sections 15000-15387.

5.6.5.2.2 California Land Conservation Act (Williamson Act)

The California Land Conservation Act of 1965, commonly known as the Williamson Act, was enacted to encourage preservation of agricultural lands and encourage open space preservation and efficient urban growth. The Williamson Act provides incentives to landowners through reduced property taxes to create an agricultural preserve and agree to keep their land in agricultural production (or another compatible use) for at least 10 years. Maps, statistics, and reports on Williamson Act lands are available online. Kern County's interactive map for land use planning indicated that neither the WRESC nor potential gen-tie line route options are designated as preserved agricultural lands under the Williamson Act (Kern County GIS, 2023).

5.6.5.3 Local Laws, Ordinances, Regulations, and Standards

Each California government's General and Specific Plan (California State Planning Law, Government code Section 65302 et seq.) includes land use provisions that reflect the goals and policies that guide the physical development of land in their jurisdiction. The Kern County Planning and Natural Resource Department is responsible for enforcing the county zoning ordinances for Kern County, the Ansel area of Kern County, and the communities of Rosamond, and Willow Springs. **Table 5.6-11** lists the applicable LORS, the agencies that administer them, and the AFC section that discusses the Project's conformance with the LORS.

Table 5.6-11: Laws, Ordinances, Regulations, and Standards for Land Use

Laws, Ordinances, Regulations, and Standards	Requirement/Applicability	Administering Agency	AFC Section Explaining Consistency
State			
CEQA Public Resources Code (PRC), Sections 21000-21178.1, including Guidelines for implementation of CEQA are codified in the CCR Sections 15000-15387	*Establishes policies and procedures for review of proposed power plants in California.*	*CEC*	*Section 5.6.5.2*
Warren-Alquist Act PRC, Section 25000 et seq.	*Legislation that created and gives statutory authority to the CEC.*	*CEC*	*Section 5.6.5.2*
California Lands Conservation Act (Williamson Act)	*Preserves agricultural land and encourages open space preservation and efficient urban growth.*	*CDOC*	*Section 5.6.5.2*
CEQA PRC Code, Sections 21000-21178.1, including Guidelines for implementation of CEQA are codified in the CCR Sections 15000-15387	*Establishes policies and procedures for review of proposed power plants in California.*	*CEC*	*Section 5.6.5.2*
Local			
County of Kern General Plan	*Comprehensive long-range plan to serve as the guide for the physical development of Kern County.*	*Kern County Planning and Natural Resources Department*	*Section 5.6.2.2, Section 5.6.2.3, and Tables 5.6-5 and 5.6-6*
County of Kern Willow Springs Specific Plan	*Comprehensive long-range plan to serve as the guide for the physical development of Willow Springs.*	*Kern County Planning and Natural Resources Department*	*Section 5.6.2.3, and Tables 5.6-5 and 5.6-6*

Laws, Ordinances, Regulations, and Standards	Requirement/Applicability	Administering Agency	AFC Section Explaining Consistency
County of Kern Zoning Ordinance	*Establishes zoning districts governing land use and the placement of buildings and district improvements.*	*Kern County Planning and Natural Resources Department*	*Section 5.6.2.3 and Section 5.6.2.3*
County of Kern Rosamond Specific Plan	*Comprehensive long-range plan to serve as the guide for the physical development of Rosamond.*	*Kern County Planning and Natural Resources Department*	*Section 5.6.2.3, and Tables 5.6-5 and 5.6-6*
Airport Land Use Compatibility Plan	*Comprehensive long-range plan to serve as the guide for the development of .airports and surrounding areas to prevent new noise and safety problems.*	*Kern County Planning and Community Development Department*	*Section 5.6.1.2.5*

5.6.6 Agencies and Agency Contacts

Agencies and contacts are provided in **Table 5.6-12**.

Table 5.6-12: Agency Contacts for Land Use

Issue	Agency	Contact
Zoning and Land Use Data	*Kern County Planning and Natural Resources Department*	*Lorelei H. Oviatt AICP, Director* *Phone: (661) 862-8866* *Public Services Building* *2700 "M" Street., Suite 100* *Bakersfield, CA 93301-2370*
Military Use Consistency	*Edwards Air Force Base*	*Malcolm Warney* *malcolm.warney@us.af.mil*
Rights-of-Way	*BLM*	*Paul Rodriquez* *Realty Specialist* *BLM Ridgecrest Field Office* *300 S. Richmond Road, Ridgecrest, CA 93555* *PRodriqu@blm.gov* *760-384-5400*
Notice of Construction (if required)	*Federal Aviation Administration*	*Jaime Duran* *Lead Airport Planner* *FAA Los Angeles Airports District Office* *777 S Aviation Blvd, Ste 150 El Segundo, CA 90245* *jaime.duran@faa.gov* *424-405-7271*

5.6.7 Permits and Permit Schedule

Because of the exclusive jurisdiction of the CEC, no other state law land use permits are required for the WRESC. Nevertheless, the Applicant will continue to work cooperatively with Kern County and the Commission to demonstrate compliance with applicable LORS.

5.6.8 References

Bureau of Land Management (BLM). 2005. West Mojave Plan. https://permanent.fdlp.gov/lps125985/Vol-1-Chapter1_Bookmarks.pdf. Website accessed July 20, 2021.

California Department of Conservation (CDOC). 2020. FMMP - Rural Land Mapping Project. https://www.conservation.ca.gov/dlrp/fmmp/Pages/rural_land_mapping.aspx. Website accessed September 27, 2023.

CDOC. 2021. Important Farmland Mapping Categories and Soil Taxonomy Terms. https://www.conservation.ca.gov/dlrp/fmmp/Documents/soil_criteria.pdf. Website accessed September 27, 2023.

CDOC. 2022. California Important Farmland Finder. https://maps.conservation.ca.gov/DLRP/CIFF/. Website accessed September 27, 2023.

California Department of Finance (CDOF). 2023. Demographics. https://www.dof.ca.gov/Forecasting/Demographics/. Website accessed September 27, 2023,.

California Department of Transportation (Caltrans). 2021. Scenic Highways: California State Scenic Highways https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways. Website accessed July 20, 2021.

California Military Land Use Compatibility Analyst (CMLUCA). 2023. California Military Land Use Compatibility https://cmluca.gis.ca.gov/. Website accessed September 27, 2023.

CEQAnet Web Portal. 2024. Gem Hill Quarry Project by CalPortland Company (PP21404). https://ceqanet.opr.ca.gov/2021110076. Website accessed February 9, 2024.

Edwards Air Force Base (EAFB). 2021. Base Guide https://permanent.fdlp.gov/lps125985/Vol-1-Chapter1_Bookmarks.pdf https://www.edwards.af.mil/Portals/50/documents/2020/November/200890%20Base%20Guide-reduced.pdf. Website accessed August 31, 2023.

Kern County. 2008a. Willow Springs Specific Plan. https://psbweb.co.kern.ca.us/planning/pdfs/SPs/WillowSprings_SP.pdf. Website accessed July 20, 2021.

Kern County. 2008b. Rosamond Specific Plan. https://kernplanning.com/planning/planning-documents/specific-plans/. Website accessed August 31, 2023.

Kern County. 2009. Kern County General Plan. https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_Complete.pdf. Website accessed August 31, 2023.

Kern County. 2012. Airport Land Use Compatibility Plan. https://shafter.com/DocumentCenter/View/5050/Airport-Land-Use-Compatibility-Plan. Website accessed January 21, 2024.

Kern County. 2022. Zoning ordinance. https://psbweb.co.kern.ca.us/planning/pdfs/KCZONov2022.pdf. Website accessed July 27, 2code 023.

Kern County Assessor Recorder Office. 2023. Assessor Property Search. https://www.kerncounty.com/government/departments/assessor-recorder/property/assessor-property-search. Website accessed September 27, 2023.

Kern County GIS. 2023. https://maps.kerncounty.com/H5/index.html?viewer=KCPublic. Website accessed August 30, 2023.

Kern County. 2023. Draft Environmental Impact Report SCH# 2022100646 Volume 1 Chapters 1 through 11. Mojave Micro Mill Project by PSGM3 Holdings Corp (Pacific Steel Group) (PP22402). November 2023.Military OneSource. 2023. Edwards AFB. https://installations.militaryonesource.mil/in-depth-overview/edwards-afb. Website accessed August 31, 2023.

Rosamond Skypark Association, 2024. A Few Facts About Our Skypark. https://www.skypark.org/faq/faqs.html. Website accessed January 21, 2024.

U.S. Environmental Protection Agency (U.S. EPA). 2021. EJSCREEN Mapper. https://ejscreen.epa.gov/mapper/. Website accessed July 20, 2021.

5.7 Noise

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California. The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH.

This section presents the noise impact assessment related to the WRESC. Section 5.7.1 discusses the fundamentals of acoustics. Section 5.7.2 describes the affected environment, including baseline noise level survey methodology and results. Section 5.7.3 presents an environmental analysis of the construction and operation of the energy storage center and associated facilities. Section 5.7.4 discusses cumulative effects. Section 5.7.5 discusses mitigation measures. Section 5.7.6 presents applicable laws, ordinances, regulations, and standards (LORS). Section 5.7.7 presents agency contacts, and Section 5.7.8 presents permit requirements and schedules. Section 5.7.9 contains the references used to prepare this section.

5.7.1 Fundamentals of Acoustics and Vibration

Acoustic values can be described in terms of noise or sound. **Sound** is generated by pressure fluctuations in the air. **Noise** is generally defined as any "unwanted" sound and is therefore based on human perception, but the terms noise and sound are often used interchangeably. Sound propagation involves three principal components: a noise source, a person or a group of people, and the transmission path. While the noise source and the transmission path are easily quantified (i.e., by direct measurements or through predictive calculations), the effect of noise on humans is the most difficult to determine due to varying responses to the same or similar noise patterns and therefore it is difficult to predict how any individual will respond.

Noise and noise levels are used to describe ambient levels perceived by offsite receptors, while sound and sound emissions describe acoustic energy emitted by activities/equipment associated with a project. The **sound power level (SWL)** is the acoustic energy emitted by a source which produces a sound pressure at some distance from the source. The level of noise is related to its magnitude, which is referred to as **sound pressure level (SPL)** and is measured in units called **decibels (dB)**. For the purposes of this report, SPL and references to "sound level" can be assumed to be the same. The higher the decibel value, the louder the sound. Decibels are calculated as a logarithmic function of the measured SPL in the air to a reference effective pressure, which is considered the hearing threshold, or:

$$SPL = 20 \log_{10} (P_e/P_o)$$

where: P_e = measured effective pressure of sound wave in micropascals (μPa), and

P_o = reference effective pressure of 20 μPa.

Noise data and analysis are primarily given in terms of **frequency** distribution. The levels are grouped into **octave bands**. Typically, the center frequencies for each octave band are 31.5, 63, 125, 250, 500, 1000, 2000, 4000, and 8,000 Hertz (Hz). The human ear responds to the pressure variations in the atmosphere that reach the eardrum. These pressure variations are composed of different frequencies that give each sound we hear its unique character.

Due to the complexity of human ear functions, the measurement of different noise sources does not always correspond to relative loudness or annoyance. It is common practice to sum sound levels over the entire audible spectrum (i.e., 20 Hz to 20,000 Hz) to give an overall sound level, but human hearing varies in sensitivity depending on the frequency of the sound. Specifically, the human ear is most responsive to sound within the 1,000 to 6,000 Hz frequency range. To account for the response of humans, it is common to use the "***A-weighted***" sound level (noted in units of **dBA**) in evaluating noise sources and their effects on a human since it models how the human ear responds to noise levels in the sensitive frequencies outlined above. Typical SPLs of common noise sources are presented in **Table 5.7-1**.

Since the decibel scale is logarithmic, a sound that is twice the SPL as another will be 3 decibels (dB) higher. A change of 3 dBA is generally barely perceptible by humans, while a 5 dBA change is perceptible, and a 10 dBA increase is perceived as a doubling of the SPL (Cowan 1994).

Measured SPL data collected during a typical noise study consists of the following noise parameters:

- L_{eq} – The SPL averaged over the measurement period; this parameter is the continuous steady SPL that would have the same total acoustic energy as the real fluctuating noise over the same time.
- L_{max} – The maximum SPL for the sampling period.
- L_{min} – The minimum SPL for the sampling period.
- L_n – The SPLs that were exceeded *n* percent of the time during the sampling period. For example, L_{90} is the level exceeded 90 percent of the time.

The SPL averages were calculated using the following formula:

$$\text{Average SPL} = 10 \text{ Log } \frac{\sum_{i=1}^{N} 10^{(SPL_i/10)}}{N}$$

where: N = number of observations

SPL = individual SPL in data set

Some noise sources and industrial activities are inherently likely to give rise to tonal noise, otherwise known as a "***pure tone.***" Pure tones are more noticeable than broadband noise and therefore more intrusive. The identification of pure tones can be quantified by using the method developed in Annex D of International Standard Organization (ISO) 1996:2007(E). This method identifies a pure tone using the time-average SPL in the one-third-octave band equal to or exceeding the time-averaged SPLs of both adjacent one-third-octave bands in accordance with the following:

- 15 dB in low-frequency bands (25 Hz to 125 Hz)
- 8 dB in middle-frequency bands (160 Hz to 400 Hz)
- 5 dB in high-frequency bands (500 Hz to 10,000 Hz)

Environmental noise levels vary over time and are described using an overall sound level known as the **L_{eq}**, or equivalent SPL. The L_{eq} is the energy averaged continuous SPL that has the same total energy as the time-varying noise level over a stated time. The day-night average SPL (L_{dn}) is a common metric for evaluating sound impacts to noise sensitive receptors. The L_{dn} is the 24-hour average SPL calculated with a 10 dBA "penalty" added to nighttime hours (10 p.m. to 7 a.m.). This is done to evaluate potential human response in residential land uses where humans are more sensitive to nighttime noise impacts. The equation for L_{dn} is:

$$L_{dn} = 10 \log \frac{15 \times 10^{\frac{L_d}{10}} + 9 \times 10^{\frac{L_n+10}{10}}}{24}$$

where: L_d = daytime L_{eq} for the period 0700 to 2200 hours

L_n = nighttime L_{eq} for the period 2200 to 0700 hours

The L_{dn} can be calculated based on the overall equivalent day-night SPL values (L_{eqdn}) and as a percentile such as the L_{90} (L_{90dn}). The SPLs of typical noise environments are presented in **Table 5.7-2**.

The U.S. Environmental Protection Agency (U.S. EPA) has recommended an outdoor L_{dn} of 55 dBA for residential and farming areas. For industrial areas, an L_{eq} of 70 dBA is suggested. The Department of Housing and Urban Development (HUD)-recommended goal for exterior noise levels is not to exceed an L_{dn} of 55 dBA. In contrast to the U.S. EPA's recommendation, the HUD recommendation for exterior noise is 65 dBA measured as L_{dn}.

State and local limits can follow these guidelines closely or deviate from them. For example, Kern County's noise ordinance set the noise limit for all non-mobile sources of noise produced by commercial and industrial uses, except for those located within the M-3 district, and located within five hundred (500) feet of property developed residentially and zoned for residential use (E, R-1, R-2 and R-3) as 65 dBA as an L_{dn}. Sources meeting this definition shall not generate noise that exceeds 65 dBA, or which would result in an increase of 5 dBA or more from ambient sound levels, whichever is greater, between the hours of ten (10:00) p.m. and seven (7:00) a.m.

Table 5.7-1: Sound Pressure Levels of Typical Sounds Sources

Activity/Sound	Sound Pressure Level (dBA)
Air Raid Siren at 50 feet	*120*
Jackhammer at 15 meters	*95*
Loud Shout	*90*
Heavy Truck at 15 m	*85*
Vacuum Cleaner at 3 m	*70*
Automobile (100 kilometers per hour (at 30 meters	*65*
Normal Conversation at 1 meter	*60*
Quiet Living Room	*40*
Soft Whisper at 2 meters	*35*
Unoccupied Broadcast Studio	*28*
Threshold of Hearing	*0*

Source: Harris 1991

Table 5.7-2: Sound Pressure Levels of Typical Environments

Activity/Sound	Sound Pressure Level (dBA)
Rock Concert	*110*
Subway Platform with Passing Train	*100*
Sidewalk with Passing Heavy Truck or Bus	*90*
Sidewalk by Typical Highway	*80*
Sidewalk of Typical Road with Passing Traffic	*70*
Typical Urban Area	*60–70*
Typical Suburban Area	*50–60*
Quiet Suburban Area at Night	*40–50*
Typical Rural Area at Night	*30–40*
Quiet Living Room	*40*
Isolated Broadcast Studio	*20–30*

Source: Harris 1991

Generally, the noise assessment is carried out on locations where it is expected that noise effects from project-related activities can affect humans. Specific study areas have been identified as being representative of all sensitive receptors, which could be affected by noise emissions associated with project activities.

5.7.2 Affected Environment

5.7.2.1 Local Land Use and Noise Sources

The terrain immediately surrounding the WRESC Site is mostly flat at an elevation of approximately 2,500 feet with slight elevation changes to the west to northwest and significant increases to elevation at distances greater than 1 mile from the WRESC Site in multiple directions. The Project Area is sparsely populated with some residential land use accessed from roadways. Land use in the Project's vicinity is primarily undeveloped and unoccupied private land located within the regional State Route (SR) 14 and Sierra Highway transportation corridors. The impact area for this noise study included receptors located within 2 miles of the Project because the immediate area is sparsely populated, and noise attenuates with distance.

Existing sources of noise in the Project Area include highway noise from SR 14 and Sierra Highway, local roadway noise, railroad operations, and sounds of nature typical to the high desert area.

The receptors most sensitive to noise typically include residences, hospitals, schools, parks, and churches. These receptors are identified as noise sensitive area (NSA) locations (Kern County General Plan, Nosie Element, 3.2 Noise Sensitive Areas). There are no hospitals, schools, parks or churches in the immediate Project Area. The closest NSA locations are all residences; no other NSA locations are located within 2 miles of the WRESC Site.

5.7.2.2 Ambient Noise Survey

The existing noise environment (baseline) was quantified during a field noise survey where ambient noise was measured and recorded. Procedures and results are assessed in this subsection.

Noise Measurement Procedures

Baseline noise levels were measured at six locations to determine existing sound levels in the noise study impact area. Five measurements were collected in the surrounding area with priority given to NSA locations and one measurement was collected on the WRESC Site from May 22 to 25, 2023. The closest NSA locations were all residences and were located to the northwest, north, south, and west. No NSA locations were identified to the east. As noise attenuates over distance, only the closest residences in these directions were considered as they would be exposed to the greatest sound levels from Project sources. The continuous monitoring locations (CML) collected area-wide sound data for 25 consecutive hours that are representative of the Project Area and the closest NSA locations. CML-1 was chosen because it is the closest NSA to the Project and would potentially be exposed to the highest level of sound from Project sources. CML-6 was located on the Project property to represent the immediate and surrounding properties.

Additional individual baseline measurements were collected at or near existing sensitive receptors most likely to be affected by the Project during the daytime and at night. Data at the remaining four offsite monitoring locations (ML) included daytime and nighttime (between 10 p.m. and 7 a.m.) measurements collected for a minimum of 15 minutes and are representative of the existing environment as determined by the onsite noise specialist. ML-5 was a daytime-only measurement as it was remote, no NSA nearby, and nighttime travel to the location was deemed a risk. A summary of the monitoring locations, dates, and sample type are presented in **Table 5.7-3**. These locations, along with the current plot plan and noise sensitive receptors, are presented in **Figure 5.7-1**.

Table 5.7-3: Monitoring Locations Included in the Baseline Noise Study

Site	Existing Land Use	Geographic UTM Coordinates		Monitoring Dates	Sample Type
		Latitude	Longitude		
CML-1	*Residence*	*393496 m E*	*3864881 m N*	*May 24–25, 2023*	*25-hour continuous monitoring*
ML-2	*Residence*	*395186 m E*	*3866725 m N*	*May 23 and May 25, 2023*	*15-minute minimum daytime/nighttime*
ML-3	*Residence*	*395354 m E*	*3863487 m N*	*May 22 and May 24, 2023*	*15-minute minimum daytime/nighttime*
ML-4	*Residence*	*394854 m E*	*3860249 m N*	*May 22 and May 24, 2023*	*15-minute minimum daytime/nighttime*
ML-5	*Residence*	*391748 m E*	*3863567 m N*	*May 25, 2023*	*15-minute minimum daytime*
CML-6	*WRESC Site*	*394381 m E*	*3863678 m N*	*May 22–24, 2023*	*25-hour continuous monitoring*

UTM = Universal Transverse Mercator

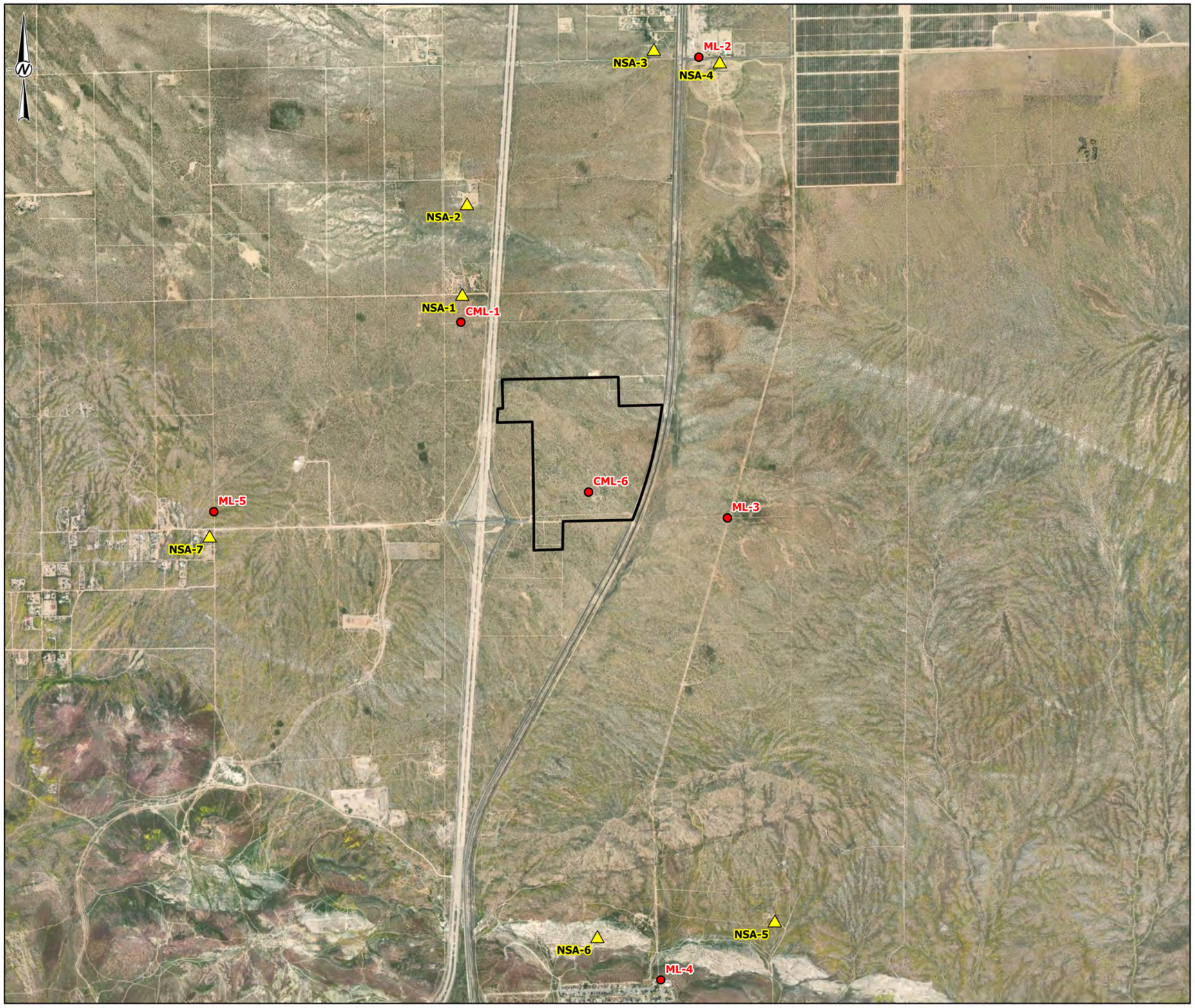
The monitoring duration is dependent on the complexity of the noise environment being monitored. The more complex the environment, the longer the preferred monitoring duration, and less complex environments require short monitoring duration. Daytime noise environments are typically more complex than nighttime environments due to the presence of more human activities during the daytime that generate noise. The Project Area for the WRESC was found to be of minimal complexity, with local traffic noise being the primary noise source; therefore, all measurements were taken for a minimum of 15 minutes. The noise measurements obtained in this study exceeded the minimum background measurement period outlined in American National Standards Institute (ANSI)/American National Standard (ASA) S12.9-2013 is 10 minutes (ANSI/ASA 2013). In addition, measurements at multiple locations provide a better description of area-wide noise baseline levels than longer measurements at fewer locations over a similar timeline.

The study used measurement techniques set forth by ANSI/ASA S12.9-2013/Part 3, 2013, including a Type 1 sound level meter set to the slow response mode to obtain consistent, integrated, A-weighted SPLs. Concurrent one-third octave band frequencies were also measured at all sites. The octave band data from each monitoring site were measured and stored during each monitoring period. The SPL data were analyzed in both dB and dBA.

The study used the following noise monitoring equipment:

- Larson Davis Model 824 and 831 Precision Integrating Sound Level Meters with Real-Time Frequency Analyzers
- Larson Davis Model PRM902 Microphone Preamplifier
- Larson Davis Model 2560 Pre-polarized ½-inch Condenser Microphone
- Windscreen, tripod, and various cables
- Larson Davis Model CAL200 Sound Level Calibrator (CAL200), 94/114 dB at 1,000 Hz

Monitoring was conducted using the sound level meter mounted on a tripod at a minimum height of 1.5 meters (5 feet) above grade. A windscreen was used since measurements were taken outdoors. The windscreen protects the microphone from interference from wind up to a constant wind speed of 12 miles per hour (mph). Measurements were extended or delayed if wind gusts continually exceeded 12 mph to limit wind-related noise interferences. Data collected with winds continually exceeding 12 mph were omitted. The microphone was positioned so that a random incidence response was achieved. The sound level meter and octave band analyzer were calibrated immediately before and just after each sampling period using the CAL200 to provide a quality control check of the sound level meter's operation during monitoring.



LEGEND

- WRESC SITE
- NOISE SENSITIVE AREA (NSA)
- MONITORING LOCATIONS

1:27,000

0 1,125 2,250 4,500 Feet

REFERENCE(S)
BASEMAP - ESRI PROVIDED BASEMAP SERVICE.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
NOISE MONITORING AND NOISE SENSITIVE AREA LOCATIONS

CONSULTANT

wsp

YYYY-MM-DD	2024-01-19
DESIGNED	JAM
PREPARED	JAM
REVIEWED	GM
APPROVED	SH

PROJECT NO.
31406639.003

FIGURE
5.7-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: G:\Hydrostor\Ansel\99_PROJECTS\31406639.000_Hydrostor\Ansel\Noise\Figure5.7-1.aprx PRINTED ON: AT: 4:07:45 PM

The operator recorded detailed field notes during monitoring that included major noise sources in the area. The Larson Davis sound level meters comply with Type I – Precision requirements set forth for sound level meters and for one-third octave filters. Calibration reports for the Larson Davis sound level meters can be found in **Appendix 5-7A**. Wind speed and other meteorological parameters were monitored and recorded using a Kester 5500 weather meter mounted on a tripod at a height similar to that of the sound level meter at each of the 25-hour monitoring sites. The wind speed data were later used to remove noise data collected during periods where wind speed averages exceeded 12 mph. Onsite weather data collected during 25-hour measurements are presented in **Appendix 5-7B**.

Existing Baseline Environment

Noise levels in the Project Area are variable; the major noise sources were traffic (including truck traffic) on Sierra Highway and CA-14, trains traveling along the railroad corridor that runs parallel to Sierra Highway, wind noise, and typical sounds of nature. It should be noted, that given the proximity of Edwards Airforce Base, WSP did not notice any obvious air traffic coming from air force base activity during the baseline study. Noise levels were lower at monitoring locations that were further away from CA-14 and Sierra Highway. Site ML-4 was the located on the edge of a suburban subdivision; the other monitoring locations were in rural areas. Natural topography also provided attenuation for sites to the west and south due to ridges between the monitoring locations and major road sources. A summary of all measurements can be found in **Table 5.7-4**.

Table 5.7-4: Noise Summary Table Baseline Ambient Sound Pressure Levels

Monitoring Location	Date	Time	Start Time	Sound Pressure Levels (dBA)								Observations
			(HH:MM)	L_{Min}	L_{max}	L_{10}	L_{50}	L_{90}	L_{eq}	L_{90dn} [a]	L_{eqdn} [b]	
CML-1	*May 24 to 25, 2023*	*25-Hour*	*8:00*	*26.0*	*78.5*	*52.4*	*48.9*	*46.3*	*49.8*	*52.3*	*55.8*	*Wind, traffic from CA-14. Insects, birds.*
ML-2	*May 25, 2023*	*Daytime*	*7:35*	*42.8*	*73.3*	*53.4*	*48.1*	*45.0*	*52.6*			*Pauses for local cars/trucks. Birds, wind, traffic on CA-14/Sierra Highway.*
	May 23, 2023	*Nighttime*	*0:20*	*34.7*	*69.3*	*48.0*	*43.3*	*38.4*	*46.6*	*46.6*	*54.6*	*Distant dog, local cars, cars along Sierra Highway.*
ML-3	*May 25, 2023*	*Daytime*	*7:04*	*41.3*	*55.1*	*46.1*	*44.3*	*42.6*	*44.6*			*Birds, traffic on CA-14/Sierra Highway, wind.*
		Nighttime[c]						*32.1*	*35.9*	*42.4*	*45.1*	
ML-4	*May 24, 2023*	*Daytime*	*9:28*	*38.5*	*62.3*	*49.6*	*45.2*	*42.1*	*46.8*			*Windy, clear skies, constant birds. Local cars. Traffic on CA-14. Dogs.*
	May 22, 2023	*Nighttime*	*23:08*	*38.4*	*61.4*	*45.8*	*42.5*	*40.7*	*43.7*	*47.3*	*50.7*	*Traffic in Rosamond, distant dogs, slight hum from building inside fence of tank*
ML-5	*May 24, 2023*	*Daytime*	*8:56*	*34.0*	*55.9*	*46.0*	*39.5*	*36.1*	*43.0*			*Birds, wind, distant rooster*
	May 22, 2023	*Nighttime*	*22:22*	*31.4*	*56.0*	*37.6*	*34.8*	*32.1*	*35.9*	*39.4*	*44.3*	*Insects, distant dogs, distant highway traffic*
CML-6	*May 22 to 24, 2023*	*25-Hour*	*17:00*	*30.5*	*77.5*	*51.7*	*48.3*	*45.9*	*49.2*	*52.9*	*55.7*	*Wind, traffic from CA-14 and Sierra Highway. Cars along Dawn Road. Insects, birds. Trains.*

Source: WSP USA Inc., 2023
[a] Calculated using the daytime L_{90} and the nighttime L_{90}
[b] Calculated using the daytime L_{eq} and the nighttime L_{eq}
[c] ML-5 nighttime L_{90} and L_{eq} used to predict calculated L_{dn} at ML-3

Continuous 25-Hour Monitoring

Continuous 25-hour monitoring was conducted at two monitoring locations: CML-1 and CML-6. CML-1 was located northwest of the WRESC Site and west of CA-14. Sounds of nature (birds, insects, etc.), traffic along CA-14, and wind noise were the observed sounds at this location during the study.

The L_{eq} and L_{90} measured at the WRESC Site were 49.8 and 46.3 dBA, respectively, and the L_{dn} calculated as both an L_{eq} (L_{eqdn}) and an L_{90} (L_{90dn}) were 55.8 dBA and 52.3 dBA, respectively. Hourly noise levels that were significantly affected by high wind speeds (greater than 12 mph) were removed from the calculations and data presented. L_{90} is commonly used when comparing noise monitoring results between locations or over time. This excludes most transient and intermittent noise sources, such as traffic noise, airplane noise, birds chirping, etc. L_{90} is better used to compare measurements between sites or over long periods of time where transient noises may vary greatly. **Figure 5.7-2** presents all the data collected as 1-minute intervals, including data affected by wind speeds greater than 12 mph. **Table 5.7-1** shows hourly noise data measured during periods with wind less than 12 mph for 25 hours, with one exception noted in the table below. The 20:00 hour exceeded 12 mph (12.6 mph; however, the noise levels did not appear to be elevated when compared to the contiguous hours, therefore the sound levels were included. The difference between the L_{eq} and L_{90} was caused by transient noises such as passing trains and traffic along CA-14.

Table 5.7-5: Summary of Continuous 25-Hour CML- 1 Site Sound Pressure Levels (dBA)

Date	Time	Wind Speed (mph)	L_{10}	L_{50}	L_{90}	L_{eq}
Wednesday, May 24, 2023	*08:00*	*8.8*	*53.1*	*49.1*	*47.3*	*50.4*
	09:00	*11.5*	*53.8*	*50.2*	*47.6*	*51.2*
	10:00	*11.4*	*52.4*	*49.2*	*46.4*	*50.0*
	11:00	*9.1*	*54.2*	*50.0*	*47.2*	*51.3*
	14:00	*11.1*	*56.3*	*51.5*	*48.6*	*53.1*
	19:00	*11.0*	*53.0*	*49.8*	*46.9*	*50.5*
	20:00 [b]	*12.6*	*51.4*	*48.2*	*45.4*	*48.9*
	21:00	*7.7*	*49.1*	*45.9*	*43.4*	*46.6*
	22:00	*9.5*	*47.5*	*44.3*	*41.6*	*45.1*
	23:00	*5.2*	*46.2*	*43.1*	*40.3*	*43.7*
Thursday, May 25, 2023	*00:00*	*3.3*	*50.2*	*45.8*	*41.7*	*47.0*
	01:00	*4.8*	*49.8*	*45.1*	*41.1*	*46.5*
	02:00	*10.4*	*51.8*	*47.9*	*44.4*	*48.9*
	03:00	*8.2*	*51.2*	*47.5*	*43.9*	*48.4*
	04:00	*5.7*	*51.8*	*49.2*	*46.2*	*49.6*
	05:00	*3.1*	*55.7*	*53.0*	*50.8*	*53.5*
	06:00	*8.3*	*53.5*	*50.5*	*48.3*	*51.3*
	07:00	*8.7*	*51.4*	*48.7*	*46.7*	*49.3*
	08:00	*9.9*	*49.1*	*46.7*	*44.6*	*47.2*
	09:00	*8.5*	*51.8*	*47.7*	*45.5*	*49.1*
	10:00	*10.6*	*51.8*	*48.7*	*46.4*	*49.4*
	11:00	*9.8*	*51.1*	*48.3*	*46.1*	*48.9*
	12:00	*9.4*	*50.8*	*48.0*	*45.7*	*48.6*
	13:00	*10.9*	*52.8*	*49.7*	*47.3*	*50.4*

Date	Time	Wind Speed (mph)	L_{10}	L_{50}	L_{90}	L_{eq}
	14:00	*11.2*	*54.7*	*51.3*	*48.6*	*52.2*
Average [a]			*52.4*	*48.9*	*46.3*	*49.8*
Daytime (7:00 a.m.–10:00 p.m.)			*52.7*	*49.2*	*46.7*	*50.1*
Nighttime (10:00 p.m.–7:00 a.m.)			*51.7*	*48.5*	*45.7*	*49.2*
L_{dn} [a]					*52.3*	*55.8*

Source: WSP USA Inc., 2023

[a] *Calculated using valid hours from 08:00 on May 24 through 14:00 on May 25. Hours of 12:00, 13:00, and 15:00 through 18:00 on May 24, 23 were omitted due to wind interference.*

[b] *Wind speed average greater than 12 mph, but data used as wind gusts were less significant and data showed less interferences with the overall noise levels.*

Site CML-6 was located in the middle of the WRESC Site to the west of the access road from Dawn Road. Sounds of nature (birds and insects, etc.), traffic along Sierra Highway and CA-14, trains, and wind noise were the observed sounds during the study at this location.

The L_{eq} and L_{90} measured at the long-term onsite monitoring location were 49.2 and 45.9 dBA, respectively, and the L_{eqdn} and an L_{90dn} were 56.1 dBA and 53.3 dBA respectively. **Figure 5.7-3** presents all the data collected as 1-minute intervals, including data affected by wind speeds greater than 12 mph. **Table 5.7-6** shows hourly noise data measured during periods with wind less than 12 mph for 25 hours. Observed nighttime sound levels were largely a result of train noise and insect noise. The difference between the L_{eq} and L_{90} was caused by transient noises such as trains, and traffic along Sierra Highway and CA-14.

Table 5.7-6: Summary of Continuous 25-Hour CML-6 Site Sound Pressure Levels (dBA)

Date	Time	Wind Speed (mph)	L_{10}	L_{50}	L_{90}	L_{eq}
Monday, May 22, 2023	*17:00*	*10.0*	*51.7*	*48.0*	*45.4*	*49.1*
	18:00	*9.2*	*49.9*	*47.2*	*45.0*	*47.8*
	19:00	*5.9*	*46.9*	*44.0*	*42.0*	*44.6*
	20:00	*4.6*	*47.7*	*45.2*	*43.2*	*45.9*
	21:00	*3.9*	*49.7*	*47.4*	*45.6*	*47.9*
	22:00	*3.0*	*49.5*	*47.3*	*45.3*	*47.6*
	23:00	*2.7*	*48.3*	*46.1*	*44.1*	*46.5*
Tuesday, May 23, 2023	*0:00*	*5.2*	*50.3*	*48.1*	*46.3*	*48.5*
	1:00	*5.0*	*47.9*	*45.3*	*43.1*	*45.8*
	2:00	*1.5*	*49.4*	*46.5*	*44.2*	*47.1*
	3:00	*2.7*	*48.8*	*46.4*	*44.5*	*46.9*
	4:00	*3.7*	*55.2*	*51.4*	*48.4*	*52.3*
	5:00	*4.5*	*54.7*	*51.7*	*49.6*	*52.4*
	6:00	*5.0*	*54.4*	*52.6*	*51.2*	*52.9*
	7:00	*6.2*	*50.2*	*47.8*	*46.4*	*48.3*
	8:00	*5.7*	*47.2*	*44.4*	*42.2*	*45.0*
	9:00	*6.7*	*50.0*	*44.8*	*42.4*	*47.3*
	10:00	*7.1*	*47.9*	*44.7*	*42.2*	*45.5*
	11:00	*7.8*	*53.3*	*47.7*	*43.9*	*49.9*
	12:00	*12.0*	*53.9*	*48.6*	*45.3*	*50.6*

Date	Time	Wind Speed (mph)	L_{10}	L_{50}	L_{90}	L_{eq}
	17:00	*10.1*	*55.8*	*51.3*	*48.1*	*52.8*
	18:00	*11.4*	*53.3*	*49.2*	*46.3*	*50.6*
	19:00	*6.8*	*50.8*	*47.5*	*45.1*	*48.4*
	20:00	*9.0*	*52.9*	*48.8*	*45.9*	*50.0*
	21:00	*9.3*	*52.0*	*48.6*	*46.1*	*49.5*
Average [a]			*51.7*	*48.3*	*45.9*	*49.2*
Daytime (7:00 am–10:00 pm)			*51.7*	*47.9*	*45.3*	*49.1*
Nighttime (10:00 pm–7:00 am)			*51.9*	*49.2*	*47.2*	*49.7*
L_{dn} [a]					*53.3*	*56.1*

Source: WSP USA Inc., 2023
[a] *Calculated using valid hours from 17:00 on May 22, 2023 through 21:00 on May 23, 2023. Hours between 13:00 and 16:00 on May 23, 2023, were omitted due to wind interference.*

Short-Term Monitoring

Short-term monitoring was conducted at four locations: ML-2, ML-3, ML-4, and ML-5. Vehicle traffic along CA-14 and Sierra Highway is the major noise source in the area and was generally greater during the daytime than at night nighttime. The daytime L_{eq} ranged from a low of 43.0 dBA at ML-5 to a maximum of 52.6 dBA at ML-2. The nighttime L_{eq} ranged from a low of 35.9 dBA at ML-5 to a high of 46.6 dBA at ML-2.

The daytime L_{90} ranged from a low of 36.1 dBA at ML-5 to a maximum of 45.0 dBA at ML-2. The nighttime L_{90} ranged from a low of 32.1 dBA at ML-5 to a high of 40.7 dBA at ML-4.

The day-night average (L_{dn}) SPLs are used to account for the potential sensitivity to nighttime noise at residential receptors. The overall average L_{dn} as an L_{eq} (L_{eqdn}) ranged from 54.6 dBA at ML-2 to 44.3 dBA at ML-5. The L_{dn} as an L_{90} (L_{90dn}) ranged from 39.4 dBA at ML-5 to 47.3 dBA at ML-4. Insect noise was common at all locations at night.

ML-2 – Short-term Monitoring Location

ML-2 is located along Sopp Road near a residence and a railroad crossing north of the WRESC site. Traffic along Sierra Highway, local traffic, and sounds of nature (i.e., birds, insects) were the common noise sources observed during the study.

Overall, the noise levels at this site were variable during the day and at night. The daytime L_{eq} was 52.6 dBA compared to a nighttime L_{eq} of 46.6 dBA with an L_{eqdn} of 54.6 dBA. The L_{90} used to compare inter-site readings was 45.0 dBA during the day and 38.4 dBA at night with an L_{90dn} of 46.6 dBA.

ML-3 – Short-Term Monitoring Location

ML-3 is directly east of the WRESC site across Sierra Highway near the approximate location where Dawn Road and 10th Street (out of Rosemond) would intersect. Sounds of nature (birds and insects, etc.), wind, and highway noise were noise sources observed during the study.

Overall, the noise levels at this site had slight variations during the daytime. The L_{eq} and L_{90} observed during the daytime measurement were 44.6 dBA and 42.6 dBA, respectively. The L_{eqdn} was 45.1 dBA and the L_{90dn} of 42.4 dBA. There was no nighttime measurement at this site, so the L_{dn} was calculated using the nighttime measurement from ML-5.

Figure 5.7-2: CML-1 Site, Baseline Sound Pressure Levels, 1-Minute Intervals

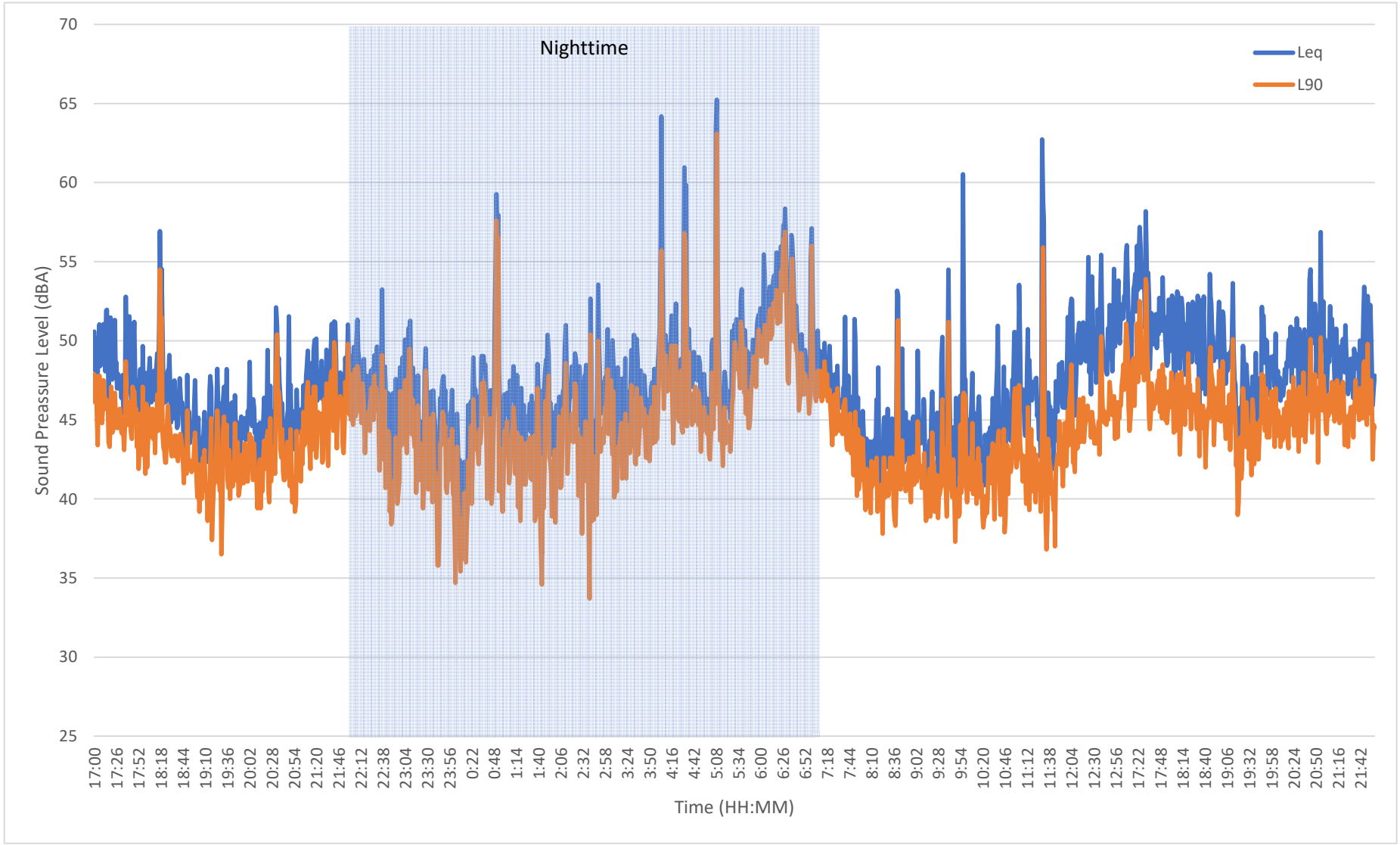
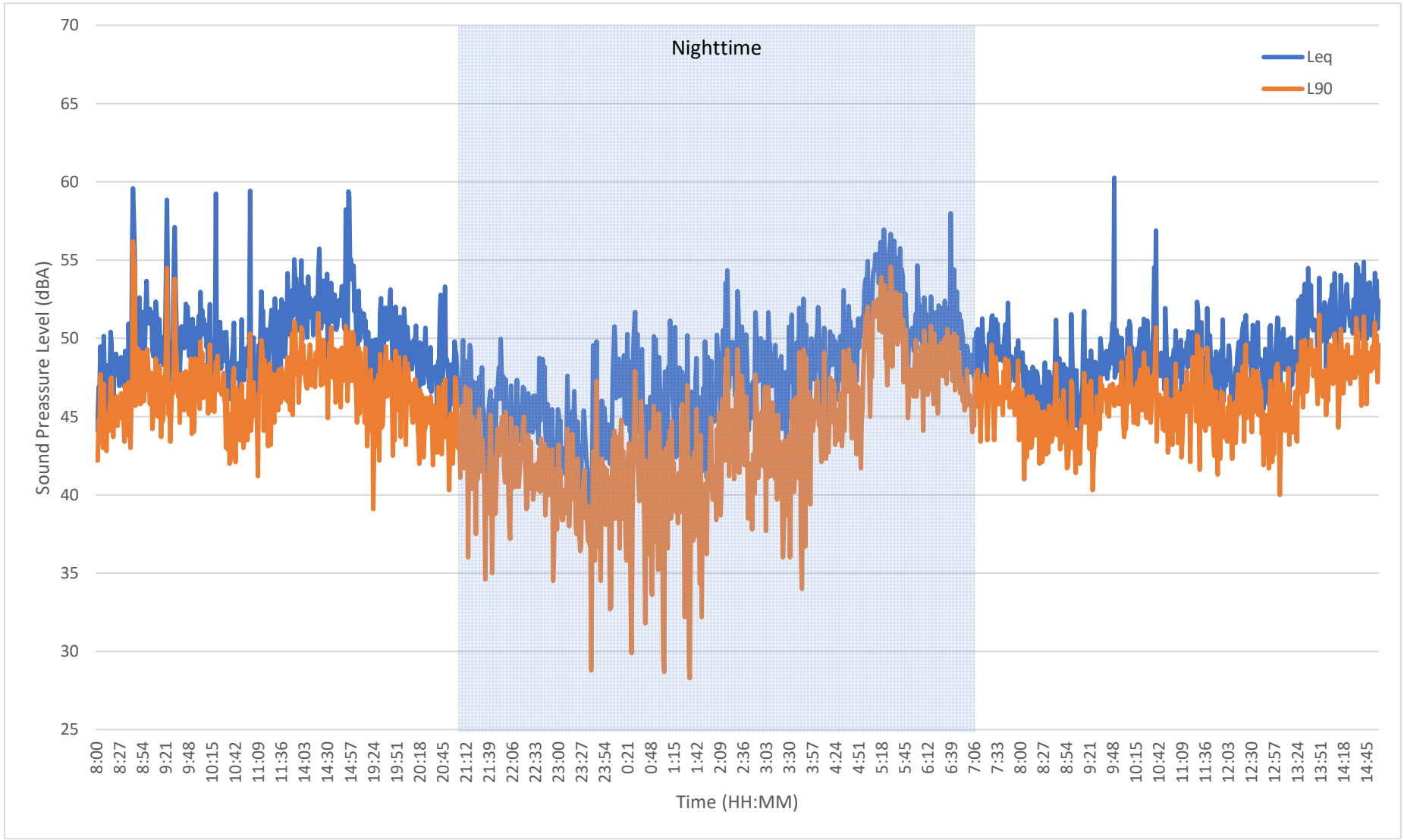


Figure 5.7-3: CML-6 Site, Baseline Sound Pressure Levels, 1-Minute Intervals



ML-4 – Short-Term Monitoring Location

ML-4 is located south of the WRESC site at the end of United Street in Rosamond. Sounds of nature (birds and insects, etc.), neighborhood noise and local traffic, cars on CA-14, and wind were the noise sources observed during the study.

The daytime L_{eq} was 46.8 dBA compared to a nighttime L_{eq} of 43.7 dBA with an L_{eqdn} of 50.7 dBA. The L_{90} used to compare inter-site readings was 42.1 dBA during the day and 40.7 dBA at night with an L_{90dn} of 47.3 dBA.

ML-5 – Short-Term Monitoring Location

ML-5 is located west of the WRESC Site along 30th Street SW located near to the closest residential receptors west of the Project. Distant traffic from the CA-14, neighborhood noise, wind, and sounds of nature (insects and birds) were sources observed during the study.

The daytime L_{eq} was 43.0 dBA compared to a nighttime L_{eq} of 35.9 dBA with an L_{eqdn} of 44.3 dBA. The L_{90} used to compare inter-site readings was 36.1 dBA during the day and 32.1 dBA at night with an L_{90dn} of 39.4 dBA.

5.7.3 Environmental Analysis

Noise will be produced during construction and operation of the Project. Potential noise impacts from construction and operation activities are assessed in this subsection.

5.7.3.1 Significance Criteria

Factors used to evaluate the significance of project-related noise are set forth in Appendix G of the California Environmental Quality Act (CEQA). Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential impacts to Noise associated with the construction and operations of the project, Appendix G, asks if the project would result in:

- Exposure of people to noise levels above standards established in the local General Plan or noise ordinance
- Exposure of people to excessive ground-borne noise levels or vibration
- Substantial permanent increase in ambient noise levels in the project vicinity
- Substantial temporary or periodic increase in ambient noise levels in the project vicinity

The design basis for noise control is the most stringent (lowest), noise level required by any of the applicable LORS. Therefore, noise from the project is evaluated against the Kern County standards outlined in the Noise Element of the Kern County General Plan. As noted above, there are no Noise Sensitive Areas at or near the WRESC Site: no hospitals, schools, parks or churches in the immediate Project Area. The closest NSA locations are all residences; no other NSA locations are located within 2 miles of the WRESC Site. Recognizing this fact, it is nevertheless instructive to note that the Kern General Plan policy states that the County should "Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into the project design. Such mitigation shall be designed to reduce noise to the following levels:

a) 65 dB L_{dn} or less in outdoor activity areas;

b) 45 dB L_{dn} or less within interior living spaces or other noise sensitive interior spaces." (Kern County General Plan, Nosie Element, 3.2 Noise Sensitive Areas, Policy 5.)

The California Energy Commission (CEC) staff has previously stated that an increase in background noise levels up to 5 dBA in a residential setting is considered insignificant; an increase of more than 10 dBA is generally considered potentially significant; and an increase between 5 and 10 dBA may be either potentially significant or insignificant, depending on the particular circumstances of the project. The CEC also has concluded in the past that construction noise is typically insignificant if the construction activity is temporary, if noisy construction activities are limited to daytime hours, and if all feasible noise abatement measures are implemented for noise-producing equipment.

5.7.3.2 Construction Impacts

5.7.3.2.1 Center Construction Noise

Construction of the Project is expected to be typical of other conventional power plants in several aspects, including the schedule, equipment used, and other types of activities. In addition to these aspects, there will be atypical construction phases for power plant construction as there will be phases similar to those used for a small mine or quarry. These atypical activities include the removal and hauling of overburden and the digging/drilling of shafts similar to that of a mine. The noise level will vary during the construction period depending on the construction phase. For this study, the period of construction where the most equipment has been planned to be operating at the same time was analyzed as the worst case (loudest) period of construction. This period was construction months 18 to 19 and included both surface and aboveground cavern work. Underground work was assumed to not impact offsite receptors.

Because specific noise source information for the types of equipment expected to be used during construction were not available, information from similarly sized construction equipment was used. Data used to determine impacts were sourced from vendor-supplied noise source data, field data collected by WSP, and U.S. EPA noise studies. In the 1970s, the U.S. EPA Office of Noise Abatement and Control developed sound levels from individual pieces of construction equipment (U.S. EPA 1971). While some data represent sound levels for equipment more than 40 years old, they would be considered conservative—i.e., modeled sound levels that are higher than are likely to occur. Sound levels of more modern construction equipment have evolved toward quieter designs to protect operators from exposure to high noise levels.

The number of pieces of equipment and schedule (usage rates) were provided by Kiewit in 2023 and incorporated into this study.

Construction Noise Impact Methodology

The impact evaluation of the Project was performed using CadnaA, an environmental noise propagation computer program that was developed to assist with noise propagation calculations for major noise sources and projects. For this analysis, the major noise sources modeled are associated with Project construction activities between months 18 and 19. This is the most conservative approach as this is when the most construction equipment will be operating at the same time. The daytime surface work includes 140 pieces of construction equipment operating during the daytime, and it is expected that this will be the time with the highest noise impacts. Cavern work is proposed to be conducted 24 hours a day for a period of time with an estimated eight pieces of surface equipment operating at night to support that underground work. Modeling was conducted for expected surface work during daytime and at night. The sources were modeled using an expected operational usage factor and do not include any periodic startup or shutdown noises.

Noise source sound power levels are entered as octave band SPLs. Coordinates for sources and receptors, either rectangular or polar, can be specified by the user. All noise sources are assumed to be area sources that can be simulated by several point sources located in a defined area. As construction equipment is often mobile, and no permanent equipment will be utilized, this is the best means of representing construction noise sources. Sound propagation is calculated by accounting for hemispherical spreading and three other user-identified attenuation options: atmospheric attenuation, path-specific attenuation, and barrier attenuation. Atmospheric attenuation is calculated using the data specified in the International Standards Organization Attenuation of Sound During Propagation Outdoors, Part 1: Calculations of the Absorption of Sound by the Atmosphere (ISO 1993). Path-specific attenuation can be specified to account for the effects of ground, vegetation, foliage, and wind shadow. Directional source characteristics and reflection can be simulated using path-specific attenuation.

Total and A-weighted SPLs are calculated. **Table 5.7-7** lists the configuration of the calculation parameters used to complete noise modeling for the Project.

Table 5.7-7: Noise Model Configuration Parameters

Parameter	Model Setting	Description/Notes
Standards	*ISO 9613 only*	*All sources and attenuators are treated as required by the cited standard.*
Source directivity	*Horizontal area sources*	*No directivity was applied to modeled sources.*
Ground absorption	*0.5*	*Soft ground appropriate for the current and future area which is composed of boreal forest and soil-covered terrain*
Temperature/humidity	*0°C / 90% relative humidity*	*Assumed weather conditions to conservatively estimate effects that increase noise propagation, such as temperature inversions.*
Wind conditions	*Default ISO 9613 – moderate inversion condition*	*The propagation conditions in the ISO standard are valid for wind speeds between 4 and 18 kilometers per hour (2.5 and 11.2 miles per hour); all points are considered downwind.*
Terrain	*Existing terrain considered*	*Existing ridgeline and changes in elevation in the impact area will affect sound propagation.*
Reflections	*1*	*One reflection is taken into account as mirror image sources from reflecting structures.*
Construction Operations	*Day and night*	*Minimal construction activities are anticipated during nighttime hours and on weekends. Anticipated work during nighttime hours and weekends is limited to rock handling on the surface from the continual operations of the underground workings.*
Noise Mitigation	*None*	*The model does not include the planned natural buffers or existing foliage that will remain during project operations.*

SPLs, noise source data, day/night operations, and usage rates input into the model are presented in **Table 5.7-8**. General compliance with Occupational Safety and Health Administration (OSHA) regulations requires that heavy equipment outlined in the table is typically required to use backup alarms as a worker health and safety measure. Such alarms were not included in this study.

Table 5.7-8: Construction Noise Source Sound Power Level Data

Equipment ID	Location	Number Used	Usage Rate (Hr/day)	Source Height (m)	SWL at Octave Band Centre Frequencies									dBA	dB	Source
					31.5	63	125	250	500	1000	2000	4000	8000			
Surface Work - Month 18 to 19																
Diesel Generators (60 KW/100 HP))	*General*	*12*	*8*	*1*		*103*	*111*	*106*	*99*	*99*	*94*	*89*	*85*	*103.6*	*112.5*	*Noise from Construction, EPA 1971 (Const_8)*
Pick-up Trucks (150 HP)	*General*	*25*	*4*	*2*	*67*	*72*	*86*	*92*	*98*	*99*	*98*	*94*	*88*	*103.9*	*104.1*	*Field Measurement 12/20/11 @ Wolf Creek_gbm*
Wheel Loader (120 HP)	*Civil*	*2*	*4*	*2*		*102*	*110*	*101*	*102*	*99*	*93*	*89*	*82*	*103.7*	*111.7*	*Cat 988 Wheel Loader*
Crawler Loader (120 HP)	*Civil*	*12*	*4*	*2*		*102*	*110*	*101*	*102*	*99*	*93*	*89*	*82*	*103.7*	*111.7*	*Cat 988 Wheel Loader*
Grader (160 HP)	*Civil*	*7*	*4*	*2*		*103*	*115*	*106*	*107*	*103*	*101*	*97*	*87*	*109.1*	*116.5*	*Cat 14M Grader*
Crawler Dozer (120 HP)	*Civil*	*2*	*4*	*2*		*103*	*115*	*106*	*107*	*103*	*101*	*97*	*87*	*109.1*	*116.5*	*Vendor Supplied - Cat_D10/D11/D7 LGPa*
Scraper (270 HP)	*Civil*	*9*	*4*	*2*		*107*	*104*	*102*	*103*	*100*	*97*	*95*	*97*	*105.3*	*110.4*	*Noise from Construction, U.S. EPA 1971 (Const_4)*
Backhoe (120 HP)	*Civil*	*16*	*4*	*2*	*68*	*81*	*93*	*97*	*99*	*100*	*100*	*94*	*88*	*105.0*	*105.7*	*Excavator - Komatsu PC 300, Field Measurement*
Roller (100 HP)	*Civil*	*11*	*4*	*2*	*70*	*87*	*99*	*106*	*111*	*113*	*108*	*101*	*93*	*115.6*	*116.5*	*Cat CS76 Compactor*
Pile Driver Hammer (250 HP)	*Civil*	*4*	*4*	*2*	*131*	*132*	*127*	*116*	*119*	*122*	*124*	*117*	*110*	*127.5*	*135.5*	*Edison Electric Institute (Miller 1984)*
Crane (200 HP)	*Power Block*	*2*	*4*	*2*		*112*	*119*	*117*	*115*	*110*	*105*	*99*	*93*	*115.6*	*122.4*	*Noise from Construction, U.S. EPA 1971*
Welder (50 HP)	*Power Block*	*5*	*6*	*1*		*103*	*111*	*106*	*99*	*99*	*94*	*89*	*85*	*103.6*	*112.7*	*Noise from Construction, U.S. EPA 1971*
Crane (200 HP)	*Spheres*	*2*	*8*	*2*		*112*	*119*	*117*	*115*	*110*	*105*	*99*	*93*	*115.6*	*122.4*	*Noise from Construction, U.S. EPA 1971*
Welder (50 HP)	*Spheres*	*4*	*6*	*1*		*103*	*111*	*106*	*99*	*99*	*94*	*89*	*85*	*103.6*	*112.7*	*Noise from Construction, U.S. EPA 1971*
Crane (200 HP)	*Primary Eq't*	*3*	*8*	*2*		*112*	*119*	*117*	*115*	*110*	*105*	*99*	*93*	*115.6*	*122.4*	*Noise from Construction, U.S. EPA 1971*
Welder (50 HP)	*Primary Eq't*	*8*	*8*	*1*		*103*	*111*	*106*	*99*	*99*	*94*	*89*	*85*	*103.6*	*112.7*	*Noise from Construction, U.S. EPA 1971*
Crane (200 HP)	*Structural*	*2*	*4*	*2*		*112*	*119*	*117*	*115*	*110*	*105*	*99*	*93*	*115.6*	*122.4*	*Noise from Construction, U.S. EPA 1971*
Welder (50 HP)	*Structural*	*2*	*8*	*1*		*103*	*111*	*106*	*99*	*99*	*94*	*89*	*85*	*103.6*	*112.7*	*Noise from Construction, U.S. EPA 1971*
Crane (200 HP)	*Piping*	*10*	*4*	*2*		*112*	*119*	*117*	*115*	*110*	*105*	*99*	*93*	*115.6*	*122.4*	*Noise from Construction, U.S. EPA 1971*
Welder (50 HP)	*Piping*	*2*	*8*	*1*		*103*	*111*	*106*	*99*	*99*	*94*	*89*	*85*	*103.6*	*112.7*	*Noise from Construction, U.S. EPA 1971*
Cavern Work - Month 18 to 19																
Hoist (1500 HP)	*Cavern*	*1*	*24*	*2*	*55*	*70*	*82*	*89*	*95*	*98*	*99*	*96*	*87*	*103.8*	*103.4*	*Table 11.25 from (Bies and Hansen 2003)*
Galloway (500 HP)	*Cavern*	*1*	*24*	*2*	*52*	*67*	*79*	*86*	*92*	*95*	*96*	*93*	*84*	*100.8*	*100.4*	*Table 11.25 from (Bies and Hansen 2003)*
Wheel Loader (120 HP)	*Cavern*	*1*	*18*	*1*	*0*	*112*	*119*	*117*	*115*	*110*	*105*	*99*	*93*	*115.6*	*122.3*	*Noise from Construction, U.S. EPA 1971*
Haul Truck (370 HP)	*Cavern*	*1*	*18*	*2*	*67*	*72*	*86*	*92*	*98*	*99*	*98*	*94*	*88*	*103.9*	*104.1*	*Noise from Construction, U.S. EPA 1971*
Off Road Dump Truck (370 HP)	*Cavern*	*2*	*18*	*2*	*67*	*72*	*86*	*92*	*98*	*99*	*98*	*94*	*88*	*103.9*	*104.1*	*Noise from Construction, U.S. EPA 1971*
Front End Loader (250 HP)	*Cavern*	*1*	*20*	*1*	*0*	*112*	*119*	*117*	*115*	*110*	*105*	*99*	*93*	*115.6*	*122.3*	*Noise from Construction, U.S. EPA 1971*
All Terrain Forklift (110 HP)	*Cavern*	*1*	*12*	*1*	*0*	*109*	*106*	*93*	*88*	*88*	*89*	*80*	*71*	*95.5*	*110.3*	*Noise from Construction, U.S. EPA 1971*
Water Pumps	*Shafts*	*3*	*24*	*1*	*55*	*70*	*82*	*89*	*95*	*98*	*99*	*96*	*87*	*104*	*103*	*Table 11.25 from (Bies and Hansen, 2003)*
Air Compressors	*Shafts*	*3*	*20*	*1*	*100*	*95*	*95*	*94*	*97*	*100*	*100*	*98*	*95*	*105.6*	*107.3*	*Large Air Compressor, Guyer 2013*
Drill Rigs	*Shafts*	*3*	*20*	*3*	*118.4*	*112.1*	*111.1*	*108.2*	*99.0*	*94.9*	*90.7*	*84.3*	*78.9*	*103.3*	*120.3*	*Drillmec HH-220 Rig*
Backhoe (120 HP)	*Shafts*	*3*	*12*	*2*	*68*	*81*	*93*	*97*	*99*	*100*	*100*	*94*	*88*	*105.0*	*105.7*	*Excavator - Komatsu PC 300, Field Measurement*
Telehandlers	*Shafts*	*3*	*12*	*2*		*112*	*119*	*117*	*115*	*110*	*105*	*99*	*93*	*115.6*	*122.4*	*Noise from Construction, U.S. EPA 1971*
20 Ton All Terrain Cranes	*Shafts*	*3*	*10*	*2*		*112*	*119*	*117*	*115*	*110*	*105*	*99*	*93*	*115.6*	*122.4*	*Noise from Construction, U.S. EPA 1971*
Long Stick Track Hoe	*Shafts*	*1*	*6*	*2*	*68*	*81*	*93*	*97*	*99*	*100*	*100*	*94*	*88*	*105.0*	*105.7*	*Excavator - Komatsu PC 300, Field Measurement*
Welder (50 HP)	*Shafts*	*3*	*4*	*1*		*103*	*111*	*106*	*99*	*99*	*94*	*89*	*85*	*103.6*	*112.7*	*Noise from Construction, U.S. EPA 1971*
Pick-up Trucks (150 HP)	*Shafts*	*12*	*4*	*2*	*67*	*72*	*86*	*92*	*98*	*99*	*98*	*94*	*88*	*103.9*	*104.1*	*Field Measurement 12/20/11 @ Wolf Creek_gbm*

Equipment ID	Location	Number Used	Usage Rate (Hr/day)	Source Height (m)	SWL at Octave Band Centre Frequencies									dBA	dB	Source
					31.5	63	125	250	500	1000	2000	4000	8000			
Berm Work – Continuous																
Conveyor	*Berm*	*3*			*51*	*51*	*54*	*56*	*59*	*59*	*58*	*53*	*45*	*63.7*	*65.3*	*Typical Mine Sources*
Hopper	*Berm*	*1*			*110*	*119*	*123*	*113*	*109*	*111*	*109*	*104*	*93*	*115.8*	*125.3*	*Typical Mine Sources*
Primary Crusher	*Berm*	*1*			*110*	*117*	*117*	*110*	*108*	*108*	*104*	*98*	*90*	*112.1*	*121.3*	*Typical Mine Sources*
Grizzly Feeder	*Berm*	*1*			*74*	*74*	*77*	*79*	*82*	*82*	*81*	*76*	*68*	*86.7*	*88.3*	*Typical Mine Sources*
Screen	*Berm*	*2*			*87*	*87*	*90*	*92*	*95*	*95*	*94*	*89*	*81*	*99.7*	*101.3*	*Typical Mine Sources*
Front End Loader	*Berm*	*2*			*0*	*112*	*119*	*117*	*115*	*110*	*105*	*99*	*93*	*115.6*	*122.4*	*Noise from Construction, U.S. EPA 1971*
Bulldozer/Grader	*Berm*	*1*			*0*	*107*	*104*	*102*	*103*	*100*	*97*	*95*	*97*	*105.3*	*110.9*	*Noise from Construction, U.S. EPA 1971*
Dump Truck Volvo A25E	*Berm*	*2*			*67*	*72*	*86*	*92*	*98*	*99*	*98*	*94*	*88*	*103.9*	*104.1*	*Field Measurement 12/20/11 @ Wolf Creek_gbm*
Water Truck	*Berm*	*1*			*67*	*72*	*86*	*92*	*98*	*99*	*98*	*94*	*88*	*103.9*	*104.1*	*Field Measurement 12/20/11 @ Wolf Creek_gbm*

Modeling Results

Modeling results are summarized in **Table 5.7-9** and illustrated in **Figure 5.7-4** for daytime and **Figure 5.7-5** for nighttime**.** The modeling results show that noise propagation is affected mainly by distance but also by changes in terrain causing varying noise levels at increasing distances from noise sources.

Table 5.7-9: Modeled Construction Noise Levels at Residential Receptors

Site	Land Use	Distance [c] (feet)	Baseline			Modeled [a]		Predicted [b]		
			Day	Night	L_{dn}	Day	Night	Day	Night	L_{dn}
NSA 1	*Residential*	*4,100*	*47*	*46*	*52*	*47*	*34*	*50*	*46*	*53*
NSA 2	*Residential*	*5,900*	*47*	*46*	*52*	*44*	*30*	*48*	*46*	*53*
NSA 3	*Residential*	*9,100*	*45*	*38*	*47*	*40*	*26*	*46*	*39*	*47*
NSA 4	*Residential*	*8,850*	*45*	*38*	*47*	*40*	*26*	*46*	*39*	*47*
NSA 5	*Residential*	*9,300*	*42*	*41*	*47*	*38*	*24*	*44*	*41*	*48*
NSA 6	*Residential*	*9,250*	*42*	*41*	*47*	*39*	*25*	*44*	*41*	*48*
NSA 7	*Residential*	*8,100*	*36*	*32*	*39*	*41*	*27*	*42*	*33*	*42*

Source: WSP USA Inc, 2023.

[a] Modeled daytime and nighttime noise generated by proposed center operations configuration calculated by the noise model Cadna A. L_{dn} is not a modeled output, but a calculated one.

[b] Predicted impacts were calculated by logarithmically adding the modeled impacts to the baseline measurements.

[c] Distance from closest Project property boundary.

The daytime construction noise impacts at the seven identified NSA locations ranged from a high of 47 dBA at NSA 1 to a low of 38 dBA at NSA 5. The highest daytime contributor to the modeled noise level at NSA 01 was pile driver operations during surface work. The nighttime construction noise impacts at the NSA locations ranged from a high of 34 dBA at NSA 1 to a low of 24 dBA at NSA 5. The highest nighttime contributor to the modeled noise level at NSA 01 was front-end loader operations. Detailed construction noise model inputs and modeled receptors can be found in **Appendix 5.7C.**

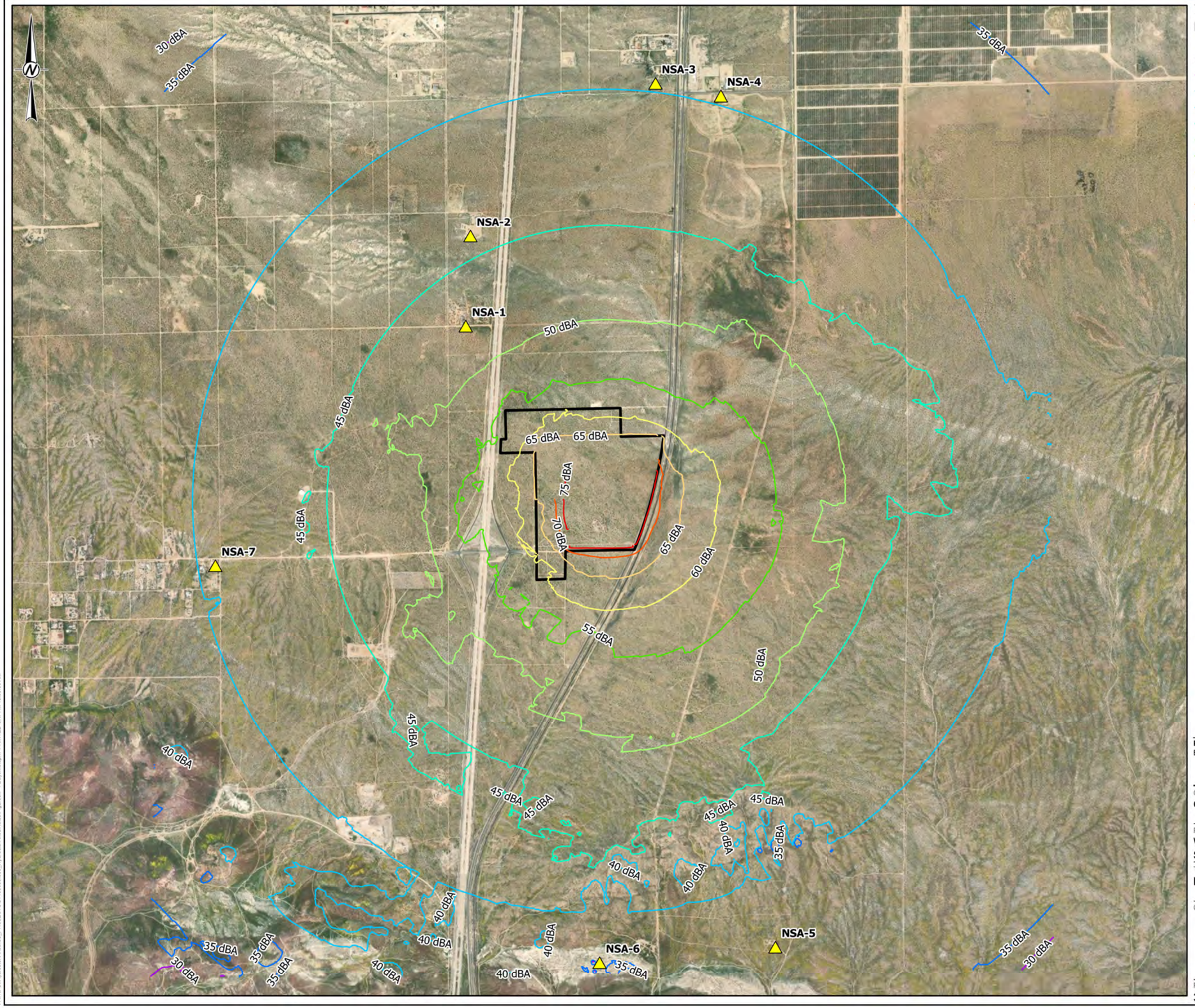
Cumulative effects were calculated by logarithmically adding modeled results to the calculated baseline daytime and nighttime sound levels at the seven NSA locations identified in the impact area. The predicted noise levels ranged from 50 dBA at NSA 1 to 42 dBA at NSA 7 during the daytime and 46 dBA at NSA 1 and NSA 2 to 33 dBA at NSA 7 at night. The maximum predicted L_{dn} was calculated by adding the modeled construction noise levels to the calculated baseline levels and ranged from 53 dBA at NSA 1 and NSA 2 to 42 dBA at NSA 7.

The CEC staff considers an increase to baseline L_{dn} of 5 dBA or less as insignificant and an increase of 10 dBA or more to be potentially significant. Based on these criteria, the Project will have no significant impacts on the closest seven NSA locations with a daytime increase to baseline between 1 dBA and 6 dBA and a nighttime increase to baseline of 1 dBA at only one NSA. Additionally, the maximum calculated L_{dn} was recalculated by adding the modeled construction noise levels to the daytime baseline L_{90} and is 53 dBA at NSA 1 and NSA 2, which is well below the Kern County standard for Noise Sensitive Areas of an L_{dn} of 65 dBA. This suggests the overall impact from the Project will be less than significant.

5.7.3.2.2 Construction Vibration

5.7.3.2.2.1 Construction Equipment

While large construction equipment can create vibration, this typically dissipates rapidly. Since there are no structures or dwellings within 1,000 feet of the Project Boundary, vibration from construction equipment is not expected to have any offsite impacts, and no additional mitigation beyond the Project's design features would be required.



LEGEND

- WRESC SITE
- NOISE SENSITIVE AREA (NSA)

NOISE CONTOURS (DECIBALS)

- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

1:27,000

0 1,125 2,250 4,500 Feet

REFERENCE(S)
BASEMAP - ESRI PROVIDED BASEMAP SERVICE.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

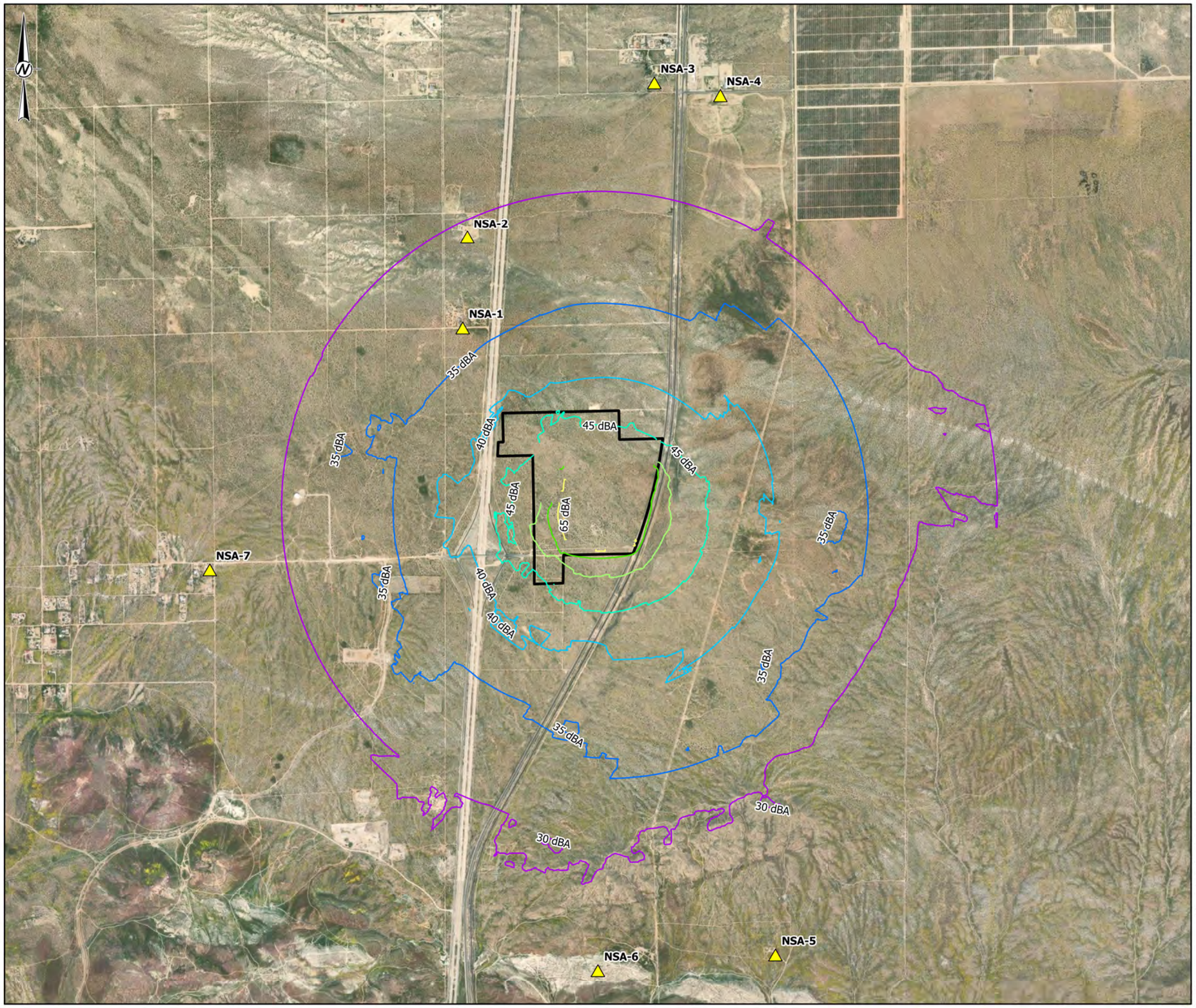
TITLE
DAYTIME CONSTRUCTION NOISE MODELING IMPACTS

CONSULTANT

YYYY-MM-DD	2024-02-08
DESIGNED	JAM
PREPARED	JAM
REVIEWED	GM
APPROVED	SH

PROJECT NO.
31406639.003

FIGURE
5.7-4



LEGEND

- WRESC SITE
- NOISE_SENSITIVE_AREA

NOISE CONTOURS (DECIBALS)

- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65

1:27,000

0 1,125 2,250 4,500 Feet

REFERENCE(S)
BASEMAP - ESRI PROVIDED BASEMAP SERVICE.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
NIGHTTIME CONSTRUCTION NOISE MODELING IMPACTS

CONSULTANT
wsp

YYYY-MM-DD	2024-02-08
DESIGNED	JAM
PREPARED	JAM
REVIEWED	GM
APPROVED	SH

PROJECT NO.
31406639.003

FIGURE
5.7-5

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5.7.3.2.2.2 Controlled Detonation of Explosives

The Project will require the excavation of a compressed air storage cavern at a target depth of approximately 2,000 to 2,500 feet below the ground surface in hard bedrock. Initial access to the cavern depth will be gained using a combination of conventional rotary drilling technique and controlled detonations near but not on the surface. Once the vertical shaft(s) have been drilled down to the target depth, controlled detonation of explosives is expected to be used over the next construction phase to complete the excavation of the storage cavern. This will include controlled detonations to excavate the main cavern, as well as controlled detonations for benching. Preliminary construction planning indicates that this phase could last up to 2 years and include up to two controlled detonations per day. Underground controlled detonations of explosives twice daily between shift changes are expected to be up to a few seconds in duration during those two detonation periods.

Noise and Air-born Vibration

The noise and vibration (air-overpressure) traveling up through the shaft and to the closest receptors through the air will generate both an audible noise and pressure that could be perceptible. At the opening of the shaft, the maximum air-overpressure level is estimated to be approximately 124 linear decibels level (dBL) and 78 dBA as a noise level. Using the inverse square law, it can be shown that for each doubling of distance from a point source, the SPL decreases by approximately 6 dB. For a 2,000-foot shaft, it can be assumed that the attenuation would doubly decrease (decrease by approximately12 dB per doubling of distance). To be conservative, the attenuation effects from the shaft were not considered in in this study. Given that the closest residence (NSA 1) is approximately 1 mile from the Project Boundary, the estimated instantaneous air-overpressure and noise that would be experienced at this receptor would be 113 dBL and 67 dBA, respectively. While potentially observable, these daytime-only events are short in duration (a few seconds or less) and are not expected to increase time-weighted averages that are compared to regulatory thresholds. Therefore, noise and vibration associated with controlled detonations are not expected to exceed any regulatory limits, create health issues, or create a nuisance situation.

Ground Vibration

Based on a desktop review of the Project Area and site reconnaissance performed as part of this assessment, there are only two receptors with structures within 5,000 feet of the Project Boundary, NSA 1 at approximately 5,400 feet and the Dawn Road / CA-14 overpass located approximately 2,500 feet west of the closest Project Boundary. The Code of Federal Regulations (CFR), under Title 30, Captor VII, Subchapter B, Part 715 regulates the use of explosives and sets the maximum ground vibration to not exceed 1.00 inches per second (in/sec) at 301 to 5,000 feet from the detonation site.

Site-specific analysis for controlled detonations to excavate the cavern, bench-controlled detonations inside the cavern, and controlled detonations to sink the shaft has been conducted and is presented in **Appendix 5.7D**. The maximum vibration at the nearest structure is estimated to be less than 0.40 in/sec at a distance of 1,280 feet from the shaft entrance during controlled detonations to sink the shaft. This is approximately half the distance to the Dawn Road / CA-14 overpass, which is the closest structure to the shaft. This assumes the use of recommended electronic detonators. All other receptors are residences greater than 5,000 feet away from the shaft. Maximum ground vibration at these receptors are expected to be less than 0.10 in/sec, which is below the vibration level noticeable to an attentive receptor and is well below the CFR regulation of 1.00 in/sec. Additionally, the controlled detonation work would be carried out by a mining company with Bureau of Alcohol, Tobacco and Firearms Arms-certified personnel, and all activity would be completed consistent with federal OSHA, California Division of Occupational Safety and Health Administration (Cal/OSHA), Mine Safety and Health Administration, and any other applicable LORS.

Based on WSP's understanding of the Project, noise and vibration impacts from controlled detonation of explosives will be temporary, generate short-term impacts, and be potentially perceptible, but have negligible impacts.

5.7.3.2.3 Worker Exposure to Noise

Worker exposure levels during the construction of the WRESC will vary depending on the phase of the Project and the proximity of the workers to the noise-generating activities. GEM Project will develop a Hearing Protection

Plan that complies with Cal/OSHA requirements. The Hearing Protection Plan will be incorporated into the Project's construction Health and Safety Plan and will require appropriate hearing protection for workers and visitors throughout the construction period.

5.7.3.3 Operational Impacts

5.7.3.3.1 Worker Exposure

Based on the noise levels of the indoor components of the WRESC, it is highly likely that hearing protection will be required in the power block area. At this stage of the Project, vendor equipment has not been specified and vendor noise specifics/guarantees are unknown. Given an indoor environment and the expected size of the equipment, near-field maximum noise levels of 90 dBA at 3 feet could be exceeded.

Based on the noise levels of outdoor components, worker exposure to elevated noise levels in the outdoor environment will be limited to periods of time while working directly on, or next to, noise generating equipment, if at all. Additionally, because there are no permanent or semi-permanent workstations located near any piece of outdoor equipment, no visiting worker's time-weighted average exposure to noise should routinely approach the level allowable under OSHA standards (29 CFR 1910.95).

Signs requiring the use of hearing protection devices will be posted in all areas where noise levels commonly exceed 85 dBA, such as inside acoustical enclosures, and the Project will comply with applicable Cal/OSHA requirements. Outdoor levels throughout the plant will typically range from 90 dBA near certain equipment to roughly 65 dBA in areas more distant from any major noise source. Therefore, noise impacts to visiting workers during operation will be less than significant.

5.7.3.3.2 Transmission Line and Switchyard Noise Levels

One of the electrical effects of high-voltage transmission lines is corona. Corona is the ionization of air that occurs at the surface of the energized conductor and suspension hardware attributable to very high electric field strength at the surface of the metal during certain conditions. Corona may result in radio and television reception interference, audible noise, light, and the production of ozone. Corona is generally a principal concern with transmission lines of 345 kilovolts (kV) and greater and with lines that are at higher elevations. Corona noise is also generally associated with foul weather conditions. Existing audible noise associated with the transmission lines in the area will be of the same magnitude upstream and downstream of the WRESC. Because the WRESC design voltage is 230 kV, it is expected that no corona-related design issues will be encountered, and any related impacts will be less than significant and temporary during foul weather events.

5.7.3.3.3 Plant Operational Noise Modeling

The operation of the WRESC is expected to be typical of other power plants with major noise-generating equipment located indoors, including schedule, equipment used, and other types of activities. A noise model of the proposed WRESC was developed by WSP.

Operational Noise Impact Methodology

The general methodology used to evaluate the operational noise is outlined in Section 5.7.3.2.1. For this analysis, all major noise sources will be modeled as operating during a normal fully operational scenario. No shutdown, startup, or emergency operations were considered. Silencers for large valves will be used to mitigate noise during commissioning, but these venting activities are not included in the normal operations of the facility. All noise sources are assumed to be point sources; area sources can be simulated by several point sources located in a defined area. Indoor noise sources are modeled at the outer face of the structure as vertical or horizontal area sources.

The model predicted the maximum noise levels produced by the Project using expected outdoor noise sources. The sources were modeled using an expected operational usage factor of 100 percent. This is a conservative assumption as there are different operational cycles where some equipment will be operating while other equipment will be shut down. Additionally, the model assumed flat terrain on the WRESC Site, no berms were included.

Table 5.7-10 lists the configuration of the calculation parameters used to complete noise modeling for the Project.

Table 5.7-10: Noise Model Configuration Parameters

Parameter	Model Setting	Description/Notes
Standards	*ISO 9613 only*	*All sources and attenuators are treated as required by the cited standard.*
Source directivity	*Chimney*	*Directivity is only applied to stack exhaust in the vertical direction.*
Ground absorption	*0.5*	*Soft ground appropriate for the current and future area, which is composed of boreal forest and soil-covered terrain*
Temperature/humidity	*0°C / 90% relative humidity*	*Assumed weather conditions to conservatively estimate effects which increase noise propagation such as temperature inversions.*
Wind conditions	*Default ISO 9613 – moderate inversion condition*	*The propagation conditions in the ISO standard are valid for wind speeds between 4 and 18 kilometers per (2.5 and 11.2 miles per hour); all points are considered downwind.*
Terrain	*Existing terrain considered*	*Existing ridgeline and changes in elevation in the impact area will affect sound propagation, no onsite berms were included*
Reflections	*1*	*One reflection is taken into account as mirror image sources from reflecting structures.*
Noise Mitigation	*None*	*No mitigation measures assumed for operations.*

SPLs, noise source data, and usage rates input into the model are presented in **Table 5.7-11**.

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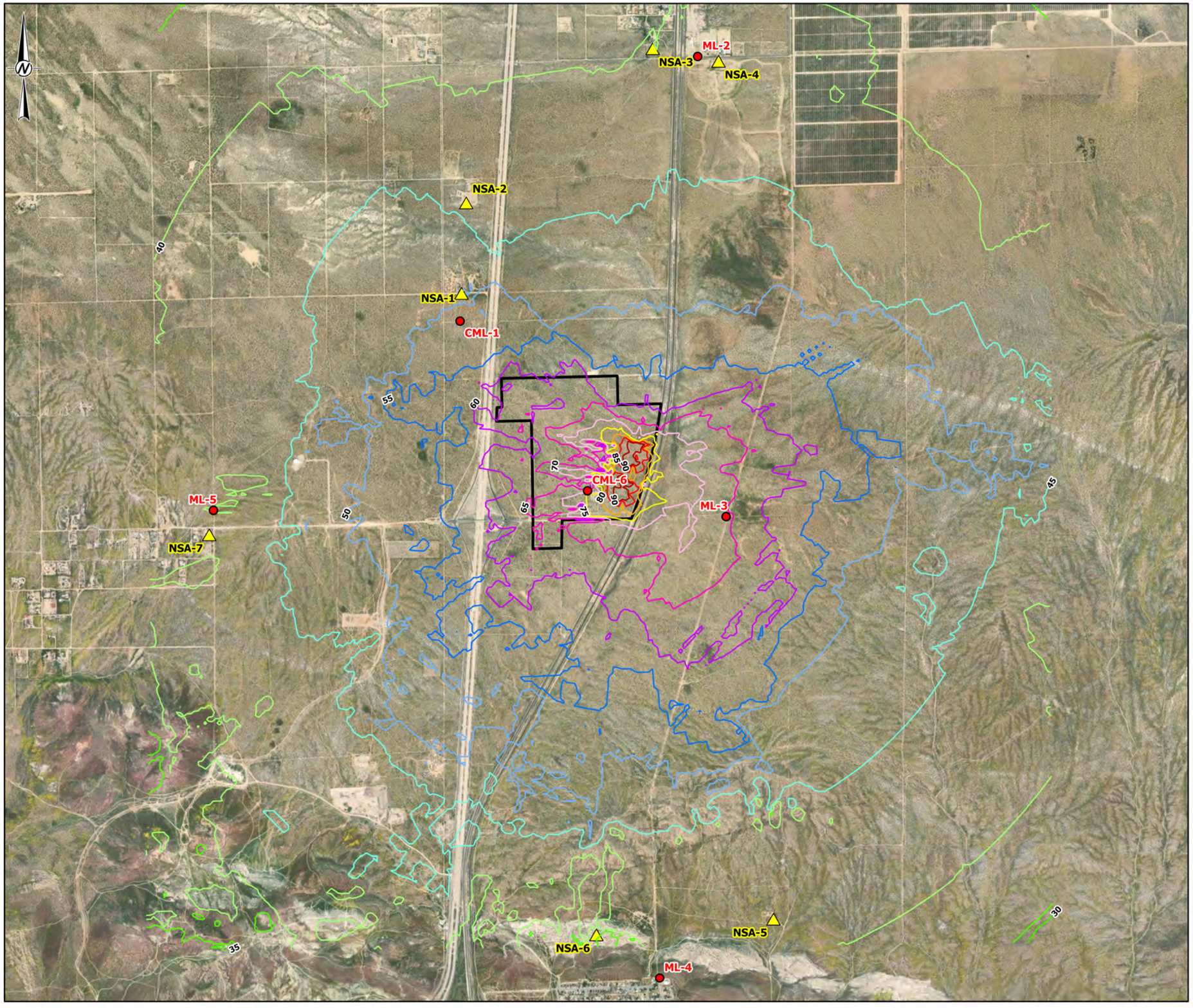
Table 5.7-11: Operations Noise Source Sound Power Level Data

Equipment ID	Location	Type	Number Used	Source Height (m)	SWL at Octave Band Centre Frequencies									dBA	dB	Source
					31.5	63	125	250	500	1000	2000	4000	8000			
LP Compressor - 45,740 kW	*Exterior*	*Mechanical*	*4*	*5*		*91*	*101*	*113*	*124*	*129*	*130*	*131*	*129*	*136.7*	*135.6*	*Turbo Compressor train 9,966 kW*
IP Compressor - 22,840 kW	*Exterior*	*Mechanical*	*4*	*5*	*107*	*103*	*108*	*107*	*105*	*108*	*113*	*110*	*103*	*116.9*	*117.2*	*BOG Compressor from Floridian LNG*
HP Compressor - 22,630 kW	*Exterior*	*Mechanical*	*4*	*5*		*91*	*94*	*101*	*101*	*102*	*104*	*100*	*91*	*108.5*	*108.9*	*Siemens Compresser STC-SV 11,404 kW*
Thermal Coolers - 39 Units	*Exterior*	*Mechanical*	*2*	*9*	*109*	*112*	*112*	*109*	*106*	*102*	*99*	*96*	*88*	*108.5*	*117.7*	*Calculated from 2x40 HP (Guyer 2013)*
Thermal Coolers - 39 Units	*Exterior*	*Mechanical*	*1*	*9*	*110*	*113*	*113*	*110*	*107*	*103*	*100*	*97*	*89*	*108.8*	*118.0*	*Calculated from 2x40 HP (Guyer 2013)*
Air Inlet	*Exterior*	*Mechanical*	*4*	*8*	*112*	*115*	*115*	*99*	*93*	*94*	*97*	*90*	*78*	*103.2*	*119.1*	*GE Power & Water Lauderdale Pealer_7FA05_0315*
Turbine Air Discharge Exhaust Stacks	*Exterior*	*Mechanical*	*4*	*38*	*108*	*106*	*97*	*86*	*79*	*75*	*67*	*52*	*33*	*85.5*	*108.5*	*FPL 1/24/02 (PBGU 2 T. Joseph)*
HP Turbine	*Exterior*	*Mechanical*	*12*	*5*	*124*	*124*	*120*	*119*	*117*	*112*	*106*	*103*	*102*	*118.0*	*127.6*	*LP Turbine Black & Veatch*
Thermal Fluid Pump 1361 kW, 836 m^3/hr	*Exterior*	*Mechanical*	*4*	*2*	*93*	*94*	*95*	*97*	*97*	*100*	*97*	*93*	*87*	*103.5*	*105.4*	*Guyer, 2013 An Introduction to Sound Level Data*
Cooling Circ Pump - discharge 53 kW, 291 m^3/hr	*Exterior*	*Mechanical*	*4*	*2*	*95*	*96*	*97*	*98*	*97*	*99*	*96*	*92*	*86*	*102.8*	*105.3*	*Devon Project - Circ Pump, 55 kW*
Comp. Air Dryer Package 253 kW	*Exterior*	*Mechanical*	*4*	*2*	*104*	*107*	*107*	*104*	*101*	*97*	*94*	*91*	*83*	*103.2*	*111.7*	*Compressed air dryer, coal project*
Hot Tank Transfer Pump 1361 kW, 836 m^3/hr	*Exterior*	*Mechanical*	*1*	*2*	*99*	*100*	*101*	*102*	*101*	*103*	*100*	*96*	*90*	*106.8*	*109.3*	*Devon Project - HP BFW Pump, 1,100 kW*
Transformer 350/420 MVA	*Exterior*	*Electrical*	*2*	*3*	*101*	*107*	*109*	*104*	*104*	*98*	*93*	*86*	*79*	*104.3*	*112.6*	*FPL Data (Tom Joseph)*
Transformer 125 MVA	*Exterior*	*Electrical*	*16*	*3*	*99*	*105*	*107*	*102*	*102*	*96*	*91*	*82*	*77*	*102.3*	*110.6*	*FPL Data*
Motor - 50 MW Synchronous 1800 rpm, 13.8 kV	*Exterior*	*Electrical*	*12*	*2*	*97*	*99*	*101*	*101*	*101*	*101*	*101*	*98*	*91*	*106.6*	*108.9*	*Calculated based on Bies and Hansen, 2003 Table 11.25*

BOG = Boil Off Gas; GE = General Electric; FPL = Florida Power and Light; HP = high pressure; IP = intermediate pressure; kW = kilowatts; LNG = liquefied natural gas; LP = low pressure; MW = megawatt; m^3/hr = cubic meters per hour; MVA = megavolt amperes; RPM = revolutions per minute



LEGEND

- WRESC SITE
- NOISE SENSITIVE AREA (NSA)
- MONITORING LOCATIONS

OPERATION CONTOURS (DECIBALS)

- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- 80
- 85
- 90

1:27,000

0 1,125 2,250 4,500 Feet

REFERENCE(S)
BASEMAP - ESRI PROVIDED BASEMAP SERVICE.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
OPERATIONAL NOISE MODELING IMPACTS

CONSULTANT

YYYY-MM-DD	2024-02-08
DESIGNED	JAM
PREPARED	JAM
REVIEWED	GM
APPROVED	SH

PROJECT NO.
31406639.003

FIGURE
5.7-6

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Modeling Results

Modeling results are summarized in **Table 5.7-12** and illustrated in **Figure 5.7-6**. The modeling results show that noise propagation is affected by changes in terrain to the west and south, causing varying noise levels at increasing distances from noise sources. Noise propagation was also affected by onsite buildings, tanks, and walls, some of which are sources themselves but also act as barriers. Vegetation is very limited in the area and would not limit noise propagation.

The daytime noise impacts at the seven identified NSAs range from a high of 50 dBA at NSA 01 to a low of 40 dBA at several NSA locations. The highest contributor to the modeled noise level at NSA 01 is the closest low-pressure compressor. Detailed operational noise model inputs and modeled receptors can be found in **Appendix 5.7E.**

Table 5.7-12: Modeled Operational Noise Levels at Residential Receptors

Site	Land Use	Modeled Results (dBA) [a]
NSA 01	*Residential*	*50*
NSA 02	*Residential*	*43*
NSA 03	*Residential*	*40*
NSA 04	*Residential*	*42*
NSA 05	*Residential*	*41*
NSA 06	*Residential*	*40*
NSA 07	*Residential*	*41*

a Modeled noise generated by proposed center operations configuration calculated by the noise model CadnaA.

Tonal Noise

Tonal noise can be more of a nuisance to offsite receptors than broadband noise sources. At the nearby residential locations, no significant tones were identified in the baseline noise measurements, and none are anticipated from Project operations. However, audible tones are not impossible because certain sources within the plant (such as the compressor inlets, transformers, and pump motors) have been known to produce significant tones at times, primarily during startup. The Applicant's engineer will anticipate the potential for audible tones in the final design specifications of the plant's equipment and will take necessary steps to prevent sources from emitting tones that might be disturbing at the nearest receptors. Tonal noise issues are rare with similar types of equipment and, when evident, can be mitigated to reduce these sources of noise.

5.7.3.3.4 Ground and Airborne Vibration

The Project will consist of four 130 MW (nominal gross) power blocks. Each power block will contain a motor-driven air compressor drivetrain, heat exchangers, and an air turbine generator, and ancillary equipment. Each power block will share a common set of water storage tanks (hot and cold), as well as the air storage cavern. Such equipment is not known to cause offsite ground vibration or airborne low-frequency noise (LFN) during normal operations. LFN is possible during startup conditions when turbines and motors can spin at a certain frequency, causing LFN, but these instances are rare and occur for a very short duration (several minutes). Unlike a typical power plant, there is no combustion, lessening the possibility of LFN issues.

Any necessary steps needed to prevent ground or airborne LFN or vibration potential will be incorporated into the engineering design and specifications for Project equipment. The equipment that will be used in the project is well balanced and is designed to produce very low vibration levels throughout the life of the Project. Imbalances could contribute to ground- and airborne vibration levels in the vicinity of the equipment. Typically, vibration-monitoring systems are installed for this type of equipment and are designed to ensure that the equipment remains balanced. Should an imbalance occur, the event would be detected, and the equipment would automatically shut down. Given these protective measures, impacts related to ground- and airborne vibrations will be less than significant.

5.7.4 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects."

As shown in **Table 5.7-13**, the predicted impacts were calculated by logarithmically adding operational modeled results to baseline daytime and nighttime sound levels at monitoring locations and at the 17 additional NSAs identified in the impact area.

The predicted L_{dn} impact levels at the offsite sensitive receptor locations range from a high of 57 dBA at NSA 01 to a low of 48 dBA at NSA 07. The maximum predicted difference in L_{dn} (Predicted L_{dn} value – Baseline L_{dn}) at a sensitive receptor is 3 dBA at NSA 07. Predicted increase to baseline is driven mainly by the lower baseline noise levels to the west of the WRESC Site. NSAs to the northwest of the WRESC Site are predicted to have greater noise impacts from the operations, but those NSAs are subject to a higher baseline noise levels due to their proximity to a traffic corridor.

CEC Staff considers an increase to baseline L_{dn} of 5 dBA or less as insignificant and an increase of 10 dBA or more to be significant. Based on these criteria, the WRESC will have no significant impacts on the closest seven NSAs. This suggests that the overall impact from the Project will be limited.

Table 5.7-13: Modeled and Predicted Noise Levels at Boundary and Residential Receptors

		A-Weighted Sound Levels (dBA)							
		Baseline [a]			Modeled [b]	Predicted [c]			
Site	Land Use	L_{90}, Day	L_{90}, Night	L_{dn} (L_{eq})	Day/Night	Day	Night	L_{dn}	L_{dn} Difference [d]
NSA 01	*Residential*	*47*	*46*	*56*	*50*	*51*	*51*	*57*	*2*
NSA 02	*Residential*	*47*	*46*	*56*	*43*	*48*	*48*	*54*	*0*
NSA 03	*Residential*	*45*	*38*	*55*	*40*	*46*	*42*	*50*	*0*
NSA 04	*Residential*	*45*	*38*	*55*	*42*	*47*	*43*	*50*	*0*
NSA 05	*Residential*	*42*	*41*	*51*	*41*	*45*	*44*	*50*	*0*
NSA 06	*Residential*	*42*	*41*	*51*	*40*	*44*	*43*	*50*	*0*
NSA 07	*Residential*	*36*	*32*	*44*	*41*	*42*	*41*	*48*	*3*

a Baseline from the most comparable monitoring locations used for NSA baseline.
b Modeled noise generated by proposed center operations configuration calculated by the noise model CadnaA.
c Predicted impacts were calculated by logarithmically adding the modeled impacts to the baseline L_{90} measurements.
d Baseline L_{dn} subtracted from predicted L_{dn} to zero.

Outdoor conversations may experience mild annoyance when ambient noise levels are above 55 dBA; levels above 65 dBA are considered significant interference to conversations held outdoors (EPA 1974). The Kern County noise standard is 65 dBA as an L_{dn}. The predictive noise model suggests that noise generated by Project operations will be below these levels at the nearest residential receptors during daytime hours when outdoor activities are more likely. Therefore, no adverse impacts to outdoor activities from Project operations are expected.

Homes have an average effective sound attenuation of 15 dBA between the outdoors and indoors (EPA 1974). The highest predicted outdoor sound level at an NSA is 51 dBA at NSA 01 with an L_{dn} of 57 dBA. This predicted indoor sound level from the Project would be 36 dBA and the indoor L_{dn} would be 42 dBA. This is below the EPA's guideline and Kern County standard for Nosie Sensitive Areas of 45 dBA as an L_{dn} for interior spaces of sensitive receptors.

5.7.5 Best Practices, Project Design Features, and Mitigation Measures

The Applicant proposes to implement the following measures to avoid and minimize any potential noise impacts.

5.7.5.1 Noise Hot Line

The Applicant will establish a telephone number for use by the public to report any significant undesirable noise conditions associated with the construction and operation of the Project. If the telephone is not staffed 24 hours per day, the Project owner will include an automatic answering feature with date and time stamp recording to answer calls when the phone is unattended. This telephone number will be posted at the WRESC Site during construction in a manner visible to passersby. This telephone number will be maintained until the project has been operational for at least 1 year.

5.7.5.2 Noise Complaint Resolution

Throughout Project construction and operation, the Project owner will document, investigate, evaluate, and attempt to resolve all legitimate Project-related noise complaints. The Applicant or authorized agent will do the following:

- Use the Noise Complaint Resolution Form typically suggested by CEC or a functionally equivalent procedure to document and respond to each noise complaint.
- Attempt to contact the person(s) making the noise complaint within 24 hours.
- Conduct an investigation to attempt to determine the source of noise related to the complaint.
- If the noise complaint is legitimate, take all feasible measures to reduce the noise at its source.

5.7.5.3 Construction Hours

Following the Kern County Municipal Code, Chapter 8.36 Noise Control and Chapter 19.80, noisy construction work will not take place between the hours of 9 p.m. and 7 a.m. on weekdays or 9 p.m. and 8 a.m. on weekends within 1,000 feet of an occupied residential dwelling. Heavy equipment operations and other engine-powered equipment will be equipped with adequate mufflers and will be maintained to run properly and with all enclosures intact and closed. Heavy equipment will be operated following posted speed limits. Truck engine exhaust brake use will be limited to emergencies.

5.7.6 Laws, Ordinances, Regulations, and Standards

The LORS discussed in this section were used to evaluate the Project's noise impacts during construction and operation and are discussed briefly in previous subsections. A summary of the LORS is presented in **Table 5.7-14**.

Table 5.7-14: Summary of Laws, Ordinances, Regulations, and Standards for Noise

LORS	Jurisdiction	Requirements	Agency	Section
U.S. EPA Noise Control Act, 1972	*Federal*	*Guidelines for state and local Governments*	*U.S. EPA*	*5.7.6.1.1*
Occupational Health and Safety Act of 1970	*Federal*	*Exposure of workers over 8-hour shift limited to 90 dBA*	*OSHA*	*5.7.6.1.2*
Cal/OSHA, Title 8 CCR Article 105 Sections 095 et seq.	*State*	*Exposure of workers over 8-hour shift limited to 90 dBA*	*Cal/OSHA*	*5.7.6.2.1*

LORS	Jurisdiction	Requirements	Agency	Section
California Vehicle Code Sections 23130 and 23130.5	*State*	*Regulates vehicle noise limits on California highways.*	*Caltrans, California Highway Patrol, and the County Sheriff's Office*	*5.7.6.2.2*
Kern County General Plan, Chapter 3 Noise Element	*Local*	*Residential outdoor noise limit of 65 dBA as an L_{dn} and 45 dBA as an interior noise standard*	*Kern County*	*5.7.6.3*
Kern County Municipal Code, Chapter 8.36 Noise Control	*Local*	*Limit's construction noise hours to 6:00 a.m. to 9:00 p.m. on weekdays and 8:00 a.m. to 9:00 p.m. on weekends when located 1,000 feet or less from an occupied residence.*	*Kern County*	*5.7.6.3*
Kern County Municipal Code, Chapter 19.80 Special Development Standards	*Local*	*Residential outdoor noise standards of 65 dBA L_{dn} between the hours of seven (7:00) a.m. and ten (10:00) p.m. and shall not generate noise that exceeds 65 dBA, or which would result in an increase of 5 dBA or more from ambient sound levels, whichever is greater, between the hours of ten (10:00) p.m. and seven (7:00) a.m. These standards apply to all non-mobile sources of noise produced by commercial and industrial uses, except for those located within the M-3 district, and located within five hundred (500) feet of property developed residentially and zoned for residential use (E, R-1, R-2 and R-3). The WRESC Site will be rezoned to Exclusive Agriculture (A) Zone from its current Limited Agriculture (A-1).*	*Kern County*	*5.7.6.3*

Cal/OSHA = California Division of Occupational Safety and Health Administration; Caltrans = California Department of Transportation; CCR = California Code of Regulations; dBA = A-weighted decibels; L_{dn} = day-night average sound level; U.S. EPA = U.S. Environmental Protection Agency.

5.7.6.1 Federal Laws, Ordinances, Regulations, and Standards

5.7.6.1.1 U.S. EPA

Under the Clean Air Act, the U.S. EPA administrator established the Office of Noise Abatement and Control (ONAC) to carry out investigations and studies on noise and its effect on public health and welfare. Through ONAC, the U.S. EPA coordinated all federal noise control activities, but in 1981 the federal government concluded that noise issues were best regulated at the state and local levels. While there are no federal, state, or local standards that apply to the WRESC, the U.S. EPA has developed noise level guidelines requisite to protect public health and welfare against hearing loss, annoyance, and activity interference. These noise levels are contained in the U.S. EPA document "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" (U.S. EPA 1974). One of the purposes of this document was to provide a basis for state and local governments' judgments in setting standards. The document identifies a 24-hour exposure level of 70 dB as the level of environmental noise that will prevent any measurable hearing loss over a lifetime. Likewise, levels of 55 dB outdoors and 45 dB indoors are identified as preventing activity interference and annoyance. These levels of noise are defined as those that will permit spoken conversation and other activities such as sleeping, working, and recreation, which are part of the daily human condition (U.S. EPA 1974).

The HUD has promulgated noise criteria and standards "to protect citizens against excessive noise in their communities and places of residence." These criteria relate to short-term and day-night average SPLs.

The U.S. EPA recommends an outdoor L_{dn} of 55 dBA for residential and farming areas. For industrial areas, an L_{eq} of 70 dBA is suggested. The HUD-recommended goal for exterior noise levels is not to exceed an L_{dn} of 55 dBA. However, the HUD standard for exterior noise is 65 dBA measured as L_{dn}. Without numerical noise limits, an L_{dn} of 55 dBA as recommended by the U.S. EPA and HUD provides a recommended and conservative outdoor noise level for comparison of noise levels of the Project.

5.7.6.1.2 OSHA

OSHA regulates onsite noise levels. The permissible exposure level to noise for workers is 90 dBA over an 8-hour time-weighted average (TWA) work shift, to protect hearing (29 CFR 1910.95). If an employee is exposed to greater than 85 dBA as an 8-hour TWA, then a hearing conservation program will be implemented and will ensure exposure levels remain below 90 dBA 8-hour TWA through engineering controls or personal protective equipment.

5.7.6.2 State Laws, Ordinances, Regulations, and Standards

5.7.6.2.1 Cal/OSHA

Cal/OSHA has the same regulations as the federal OSHA regulations outlined previously. The regulations are contained in Title 8, California Code of Regulations, General Industrial Safety Orders, Article 105, Control of Noise Exposure.

5.7.6.2.2 California Vehicle Code

Noise limits are enforceable on highways by the California Highway Patrol and county sheriffs' offices. They are regulated under California Vehicle Code, Sections 23130 and 23130.5.

5.7.6.3 Local Laws, Ordinances, Regulations, and Standards

Guidelines for the Preparation and Content of Noise Elements of the General Plan published by the California Office of Noise Control in 1976 is a mandatory element of California Government Code Section 65302 (f)). Kern County has several ordinances applicable to the Project from a noise standpoint.

Kern County General Plan, Chapter 3 *Noise Element*

The Kern County General Plan, Chapter 3 Noise Element establishes noise performance standards for proposed industrial sites in Kern County. The chapter states that such projects must not "subject residential or other noise sensitive land uses to exterior noise levels above 65 dB(A) L_{dn} and interior noise levels above 45 dB(A) L_{dn}." This policy can be found in Section 3.2, Noise Sensitive Areas of the General Plan. (Kern County 2009)

Kern County, California Code of Ordinances, Chapter 8.36 *Noise Control*

This chapter sets limits to construction noise hours to 6:00 a.m. to 9:00 p.m. on weekdays and 8:00 a.m. to 9:00 p.m. on weekends. The limits are to "which is audible to a person with average hearing faculties or capacity at a distance of one hundred fifty (150) feet from the construction site if the construction site is within one thousand (1,000) feet of an occupied residential dwelling."

Kern County, California Code of Ordinances, Chapter 19.80 *Special Development Standards*

This chapter establishes that in residential settings, outdoor noise shall not exceed "an average sixty-five (65) dBA L_{dn} (twenty-four (24) hour median) between hours of seven (7:00) a.m. and ten (10:00) p.m. and shall not generate noise that exceeds 65 dBA, or which would result in an increase of 5 dBA or more from ambient sound levels, whichever is greater, between the hours of ten (10:00) p.m. and seven (7:00) a.m."

5.7.7 Agencies and Agency Contacts

No agencies were contacted directly to specifically discuss Project-related noise.

5.7.8 References

American National Standards Institute (ANSI), American National Standard (ASA). 2013. (1993 and Revised 2013). Quantities and Procedures for Description and Measurement of Environmental Sound – Part 3: Short-Term Measurements with an Observer Present. S12.9-2013 (Part 3). 1993, Revised 2013.

Bies, D.A., and C.H. Hansen (2003). *Engineering Noise Control 3rd Ed*. Spon Press: New York, NY.

Cowan, James P. 1994. *Handbook of Environmental Acoustics*. Van Nostrand Reinhold.

Federal Highway Administration (FHWA). 2006. Highway Construction Noise Handbook, Final Report.

Guyer, Paul J. 2013. *An Introduction to Sound Level Data for Mechanical and Electrical Equipment*. Continuing Education and Development, Inc. Stony Point, NY

Harris, Cyril M. .1991. *Handbook of Acoustical Measurements and Noise Control.* McGraw-Hill Companies

International Standards Organization (ISO). 1993. Attenuation of Sound during Propagation Outdoors, Part 1: Calculation of the Absorption of Sound by the Atmosphere. Geneva, Switzerland: ISO.

Kern County. 2009. Kern County General Plan. https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_Complete.pdf

Miller, Laymon N., et al. 1984. Electric Power Plant Environmental Noise Guide, 2nd Edition. Edison Electric Institute, New York.

U.S. Environmental Protection Agency. (U.S. EPA). 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. Washington, DC.

U.S. Environmental Protection Agency (U.S. EPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Office of Noise Abatement and Control. Washington, DC.

5.8 Paleontological Resources

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California. The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

The Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way (ROW) associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH. The size of the paleontological Study Area is a 0.25-mile area encompassing the Project Area. A geologic map at a scale of 1:24,000 is provided as **Figure 5.8-1**.

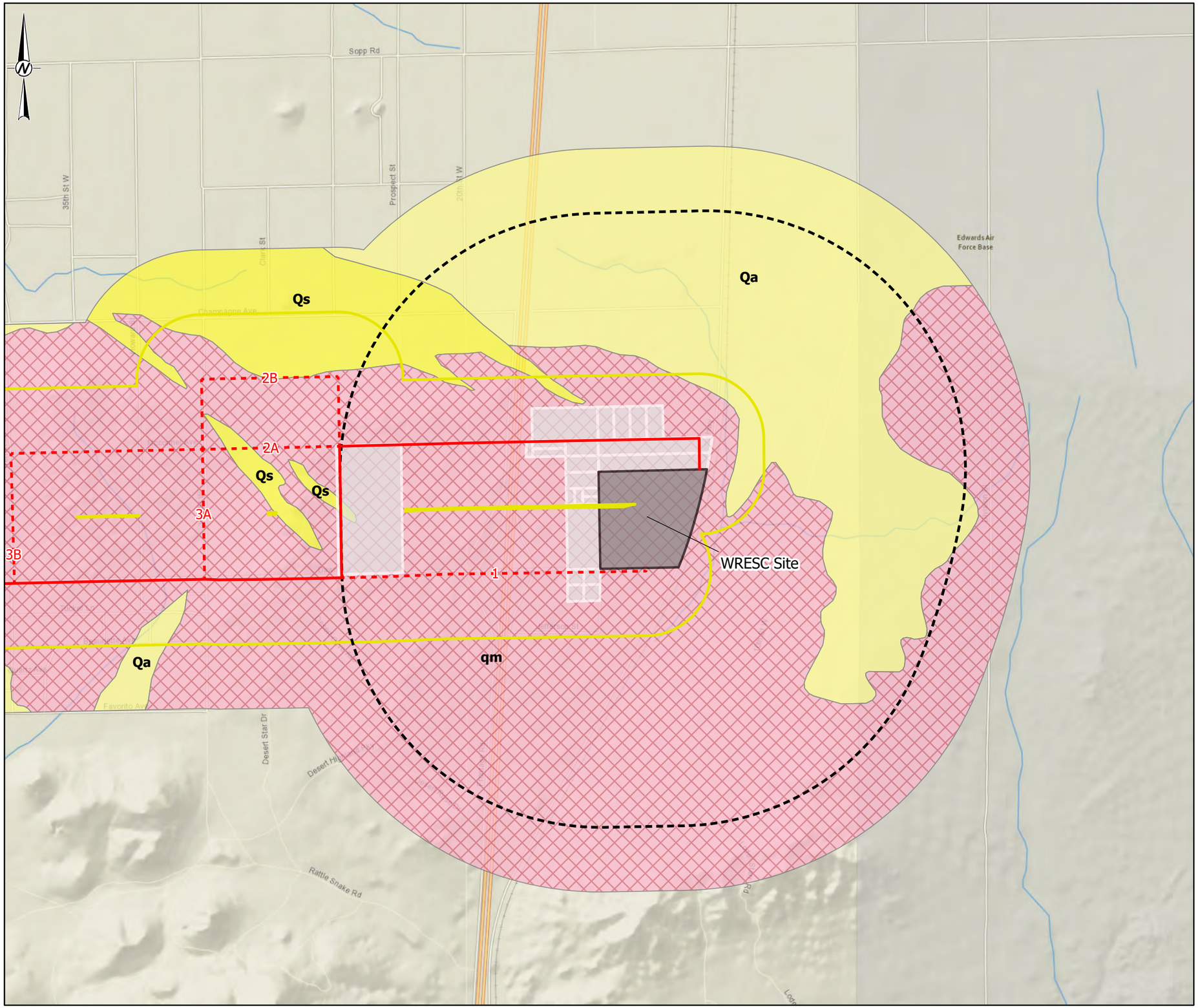
Paleontology is the scientific study of life in the geologic past, based on examination of fossilized remains of once living organisms. Fossilized remains include traces of organisms' existence, plants, invertebrates, vertebrates, and microfossils. Microfossils are very small organisms that require magnification to identify.

This section of the Application for Certification meets all siting regulations of the California Energy Commission (CEC) and conforms to the recommendations and standards of the Society for Vertebrate Paleontology (SVP). The CEC and SVP regulations, recommendations, and standards address the assessment of and mitigating impacts to paleontological resources resulting from ground-disturbing activities (CEC 2000, 2007; SVP 2010).

Matthew Sauter, M.S. of WSP USA Inc. prepared the paleontological resources inventory and impact assessment for the WRESC. Mr. Sauter received his Bachelor of Science in Geology from the University of Minnesota and his Master of Science in Paleontology from the South Dakota School of Mines and Technology. He has over 14 years of experience in impact assessment and mitigation planning related to paleontological resources throughout the American West. This evaluation of paleontological resources within the Study Area includes the following elements.

- Section 5.8.1 discusses the affected environment, including the resource inventory and its results.
- Section 5.8.2 presents the environmental analysis and impact assessment to paleontological resources.
- Section 5.8.3 considers cumulative effects to paleontological resources.
- Section 5.8.4 presents the mitigation measures proposed by the Applicant.
- Section 5.8.5 discusses applicable laws, ordinances, regulations, and standards (LORS).
- Section 5.8.6 lists involved agencies.
- Section 5.8.7 lists permits.
- Section 5.8.8 provides the references consulted.

Figure 5.8-1: Geologic Map



LEGEND

- PREFERRED ROUTE - ABOVEGROUND
- PREFERRED ROUTE - UNDERGROUND
- ROUTE OPTIONS 1-6 - ABOVEGROUND
- ROUTE OPTIONS 1-6 - UNDERGROUND
- WRESC SITE
- OTHER PROJECT PARCEL
- 1 MILE BUFFER BUFFER AROUND THE WRESC SITE
- 0.25 MILE BUFFER AROUND THE TRANSMISSION LINE

GEOLOGIC EXPLANATION

- QA - ALLUVIUM
- QS - WINDBLOWN SAND
- TF - FISS FANGLOMERATE
- TFB - FELSITE BRECCIA
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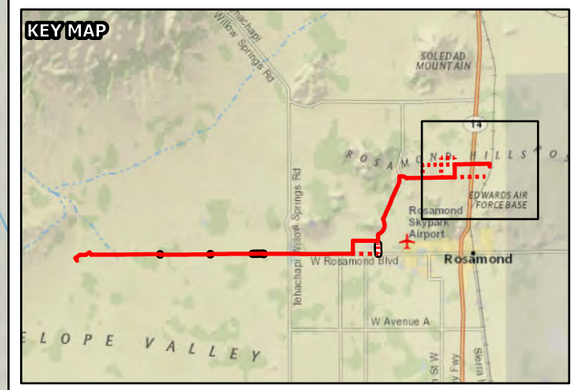
- QM - QUARTZ MONZONITE



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NOTE(S)

SEGMENT ALTERNATES ARE DENOTED WITH 1, 2A, 2B, 3A, 3B, 4, 5, & 6 LABELS

REFERENCE(S)

1. SURFICIAL GEOLOGY - UNITED STATES GEOLOGICAL SURVEY. GEOLOGIC INVESTIGATIONS OF SOUTHERN CALIFORNIA DESERTS. BULLETIN 1089-C. GEOLOGY OF THE WILLOW SPRINGS AND ROSAMOND QUADRANGLES, CALIFORNIA. DIBBLEE, T.W. PUBLISHED 1963.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
GEOLOGY MAP - WITH ROUTE OPTIONS
MAP 1 OF 6

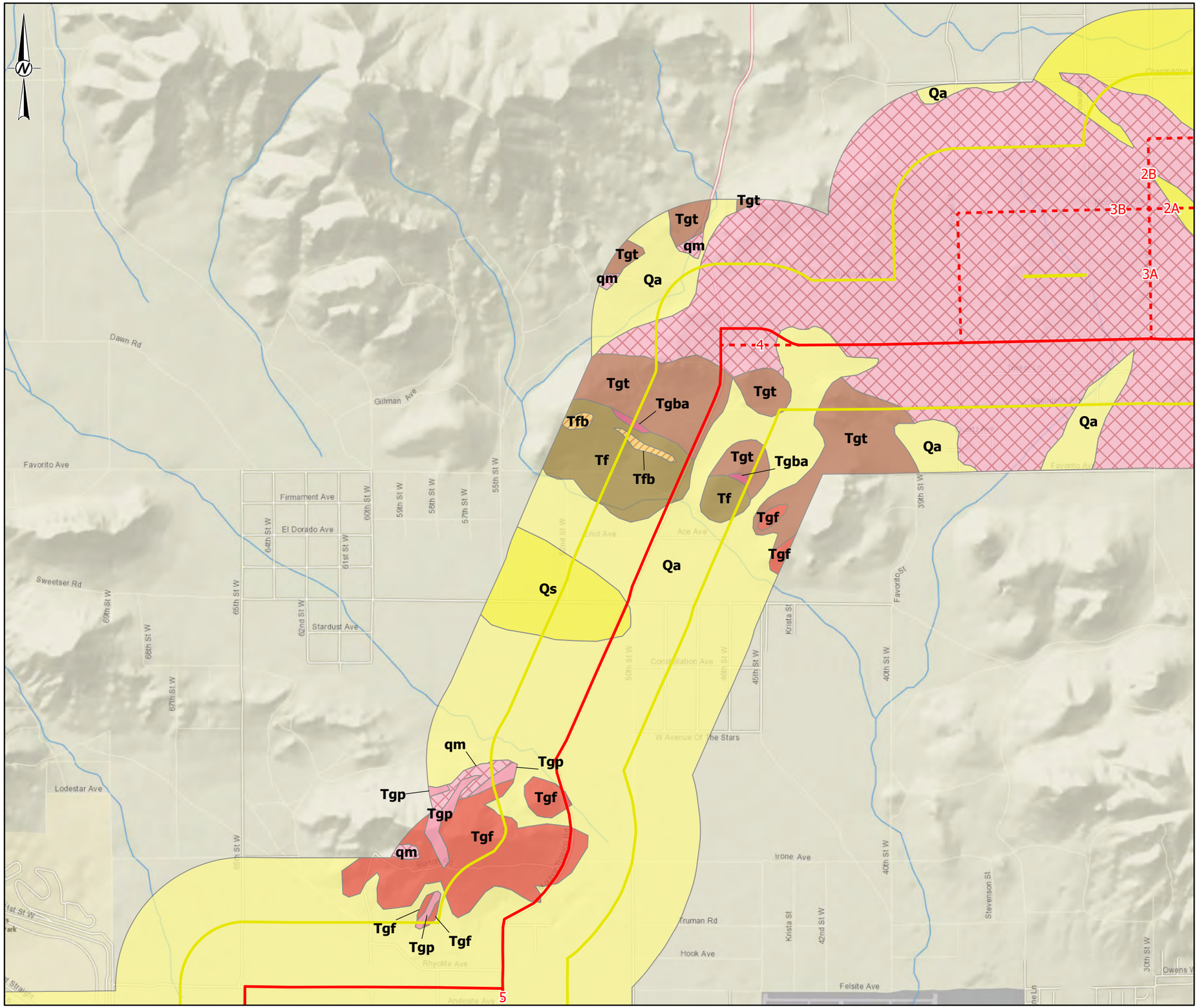
CONSULTANT

wsp

YYYY-MM-DD	2024-02-21
DESIGNED	JAM
PREPARED	RHG
REVIEWED	KD
APPROVED	JP

PROJECT NO.
31406639.003

FIGURE
5.8-1

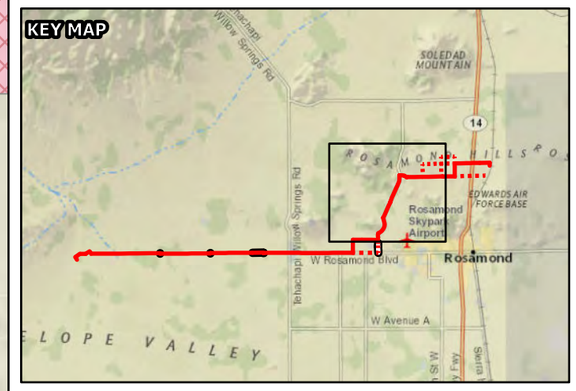


LEGEND

- PREFERRED ROUTE - ABOVEGROUND
- PREFERRED ROUTE - UNDERGROUND
- ROUTE OPTIONS 1-6 - ABOVEGROUND
- ROUTE OPTIONS 1-6 - UNDERGROUND
- WRESC SITE
- OTHER PROJECT PARCEL
- 0.25 MILE BUFFER AROUND THE TRANSMISSION LINE

GEOLOGIC EXPLANATION

- QA - ALLUVIUM
- QS - WINDBLOWN SAND
- TF - FISS FANGLOMERATE
- TFB - FELSITE BRECCIA
- TGBA - BASALT FLOW
- TGF - FELSITE AND PORPHYRITIC FELSITE
- TGP - PORPHYRY
- TGT - TUFF, TUFF-BRECCIA, AND TUFFACEOUS SANDSTONE
- QM - QUARTZ MONZONITE



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CLIENT
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PROJECT
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TITLE
GEOLOGY MAP - WITH ROUTE OPTIONS
MAP 2 OF 6

CONSULTANT

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PREPARED	RHG
REVIEWED	KD
APPROVED	JP

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FIGURE
5.8-1

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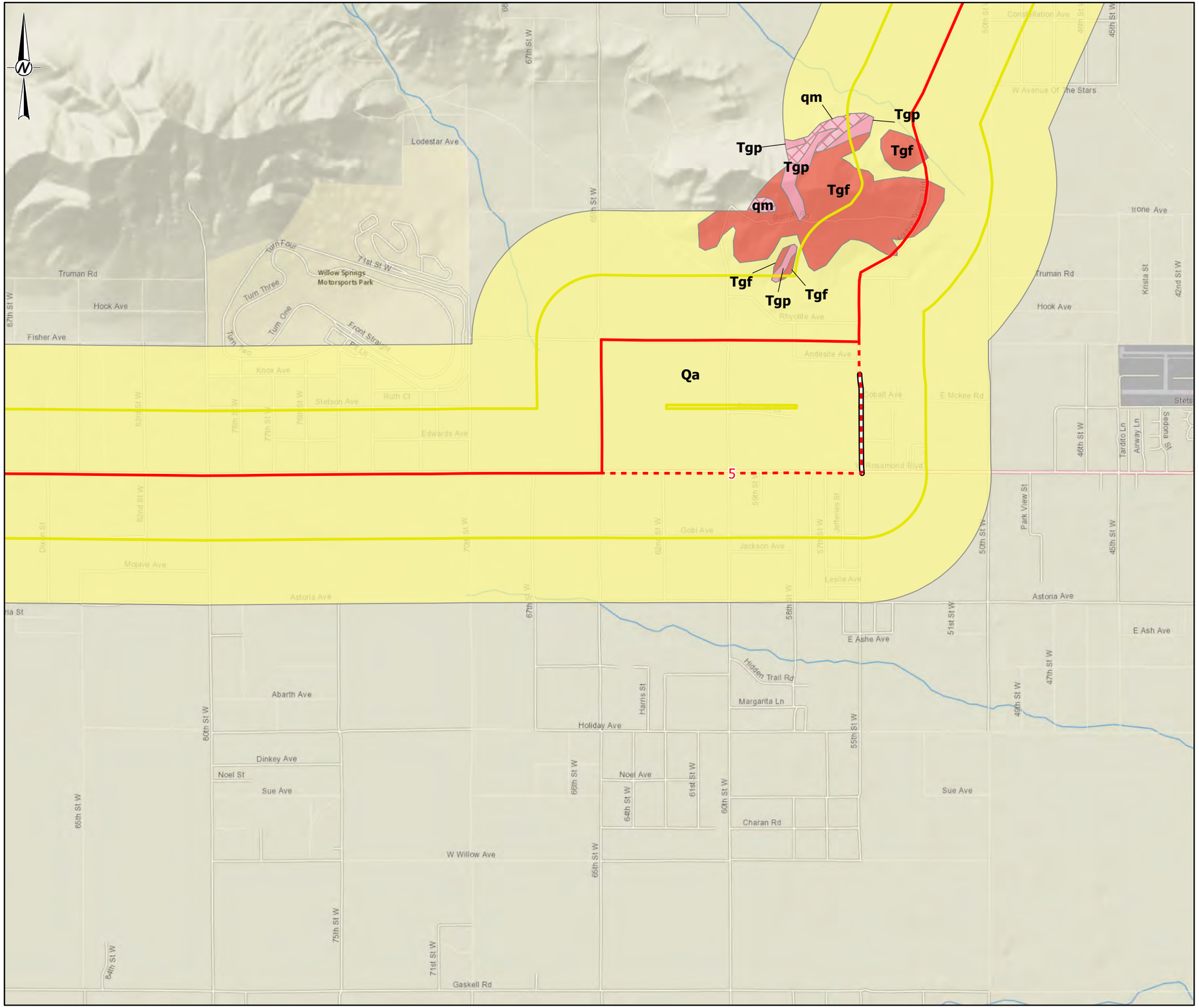

LEGEND

- PREFERRED ROUTE - ABOVEGROUND
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- ROUTE OPTIONS 1-6- ABOVEGROUND
- ROUTE OPTIONS 1-6- UNDERGROUND
- WRESC SITE
- OTHER PROJECT PARCEL
- 0.25 MILE BUFFER AROUND THE TRANSMISSION LINE

GEOLOGIC EXPLANATION

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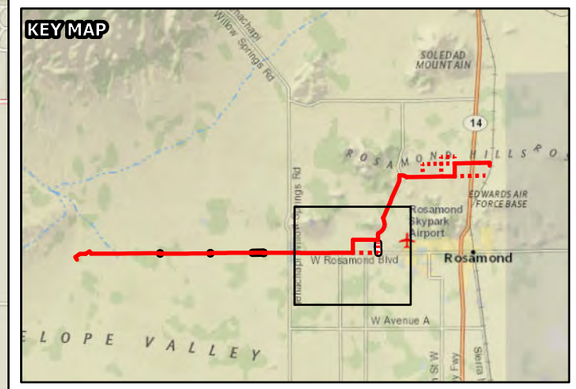
- QM - QUARTZ MONZONITE



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NOTE(S)

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CLIENT
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PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
GEOLOGY MAP - WITH ROUTE OPTIONS
MAP 3 OF 6

CONSULTANT

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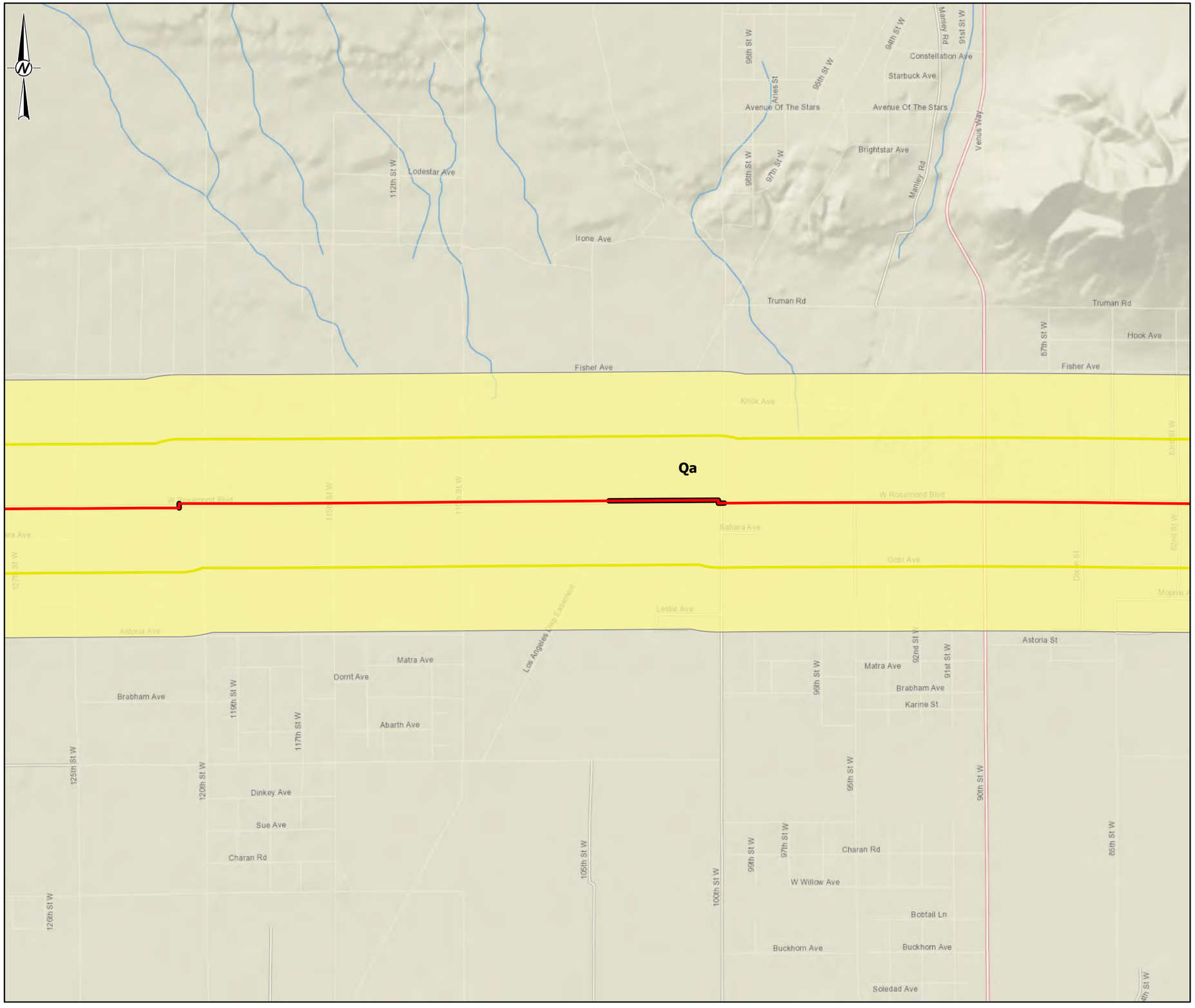
PREPARED	RHG
REVIEWED	KD
APPROVED	JP

PROJECT NO.
31406639.003

FIGURE
5.8-1



LEGEND

- PREFERRED ROUTE - ABOVEGROUND
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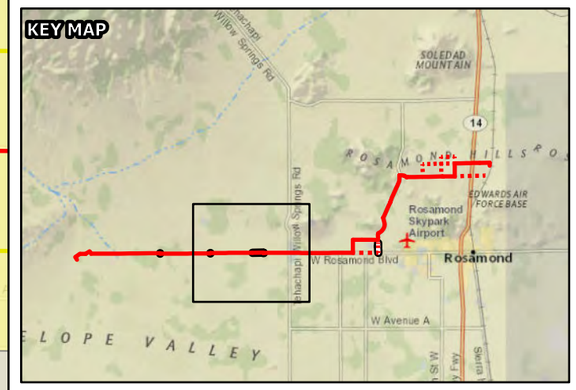

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CLIENT
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SUPPLEMENTAL AFC

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GEOLOGY MAP - WITH ROUTE OPTIONS
MAP 4 OF 6

CONSULTANT

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PROJECT NO.
31406639.003

FIGURE
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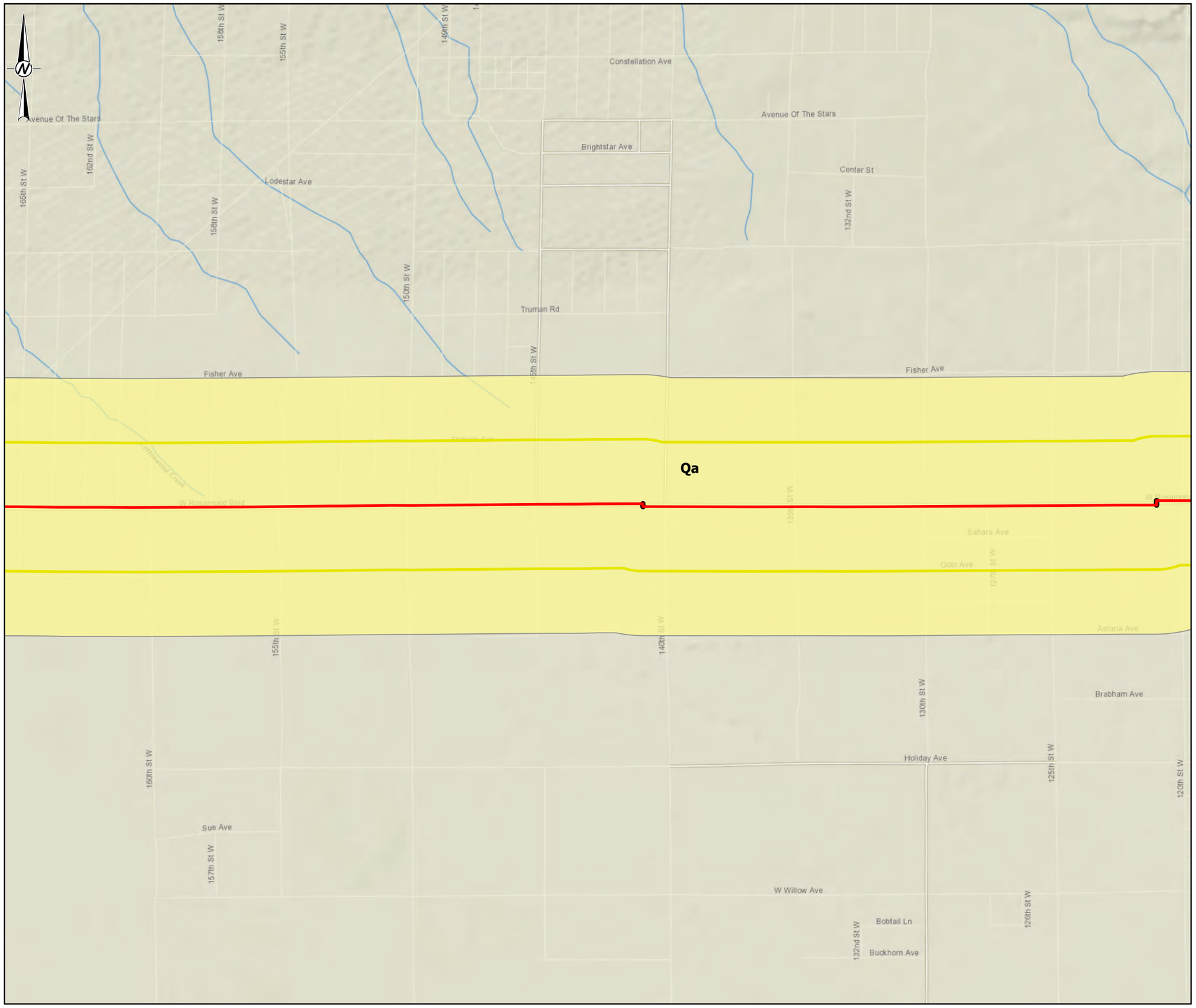

LEGEND

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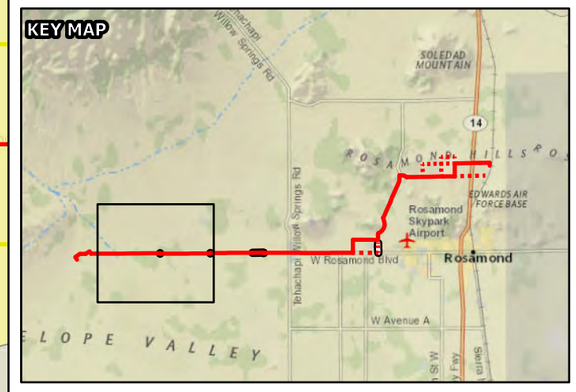
- WRESC SITE
- OTHER PROJECT PARCEL
- 0.25 MILE BUFFER AROUND THE TRANSMISSION LINE

GEOLOGIC EXPLANATION

- QA - ALLUVIUM
- QS - WINDBLOWN SAND
- TF - FISS FANGLOMERATE
- TFB - FELSITE BRECCIA
- TGBA - BASALT FLOW
- TGF - FELSITE AND PORPHYRITIC FELSITE
- TGP - PORPHYRY
- TGT - TUFF, TUFF-BRECCIA, AND TUFFACEOUS SANDSTONE
- QM - QUARTZ MONZONITE



1:24,000

0 1,000 2,000 4,000 Feet

NOTE(S)

SEGMENT ALTERNATES ARE DENOTED WITH 1, 2A, 2B, 3A, 3B, 4, 5, & 6 LABELS

REFERENCE(S)

1. SURFICIAL GEOLOGY - UNITED STATES GEOLOGICAL SURVEY. GEOLOGIC INVESTIGATIONS OF SOUTHERN CALIFORNIA DESERTS. BULLETIN 1089-C. GEOLOGY OF THE WILLOW SPRINGS AND ROSAMOND QUADRANGLES, CALIFORNIA. DIBBLEE, T.W. PUBLISHED 1963.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
GEOLOGY MAP - WITH ROUTE OPTIONS
MAP 5 OF 6

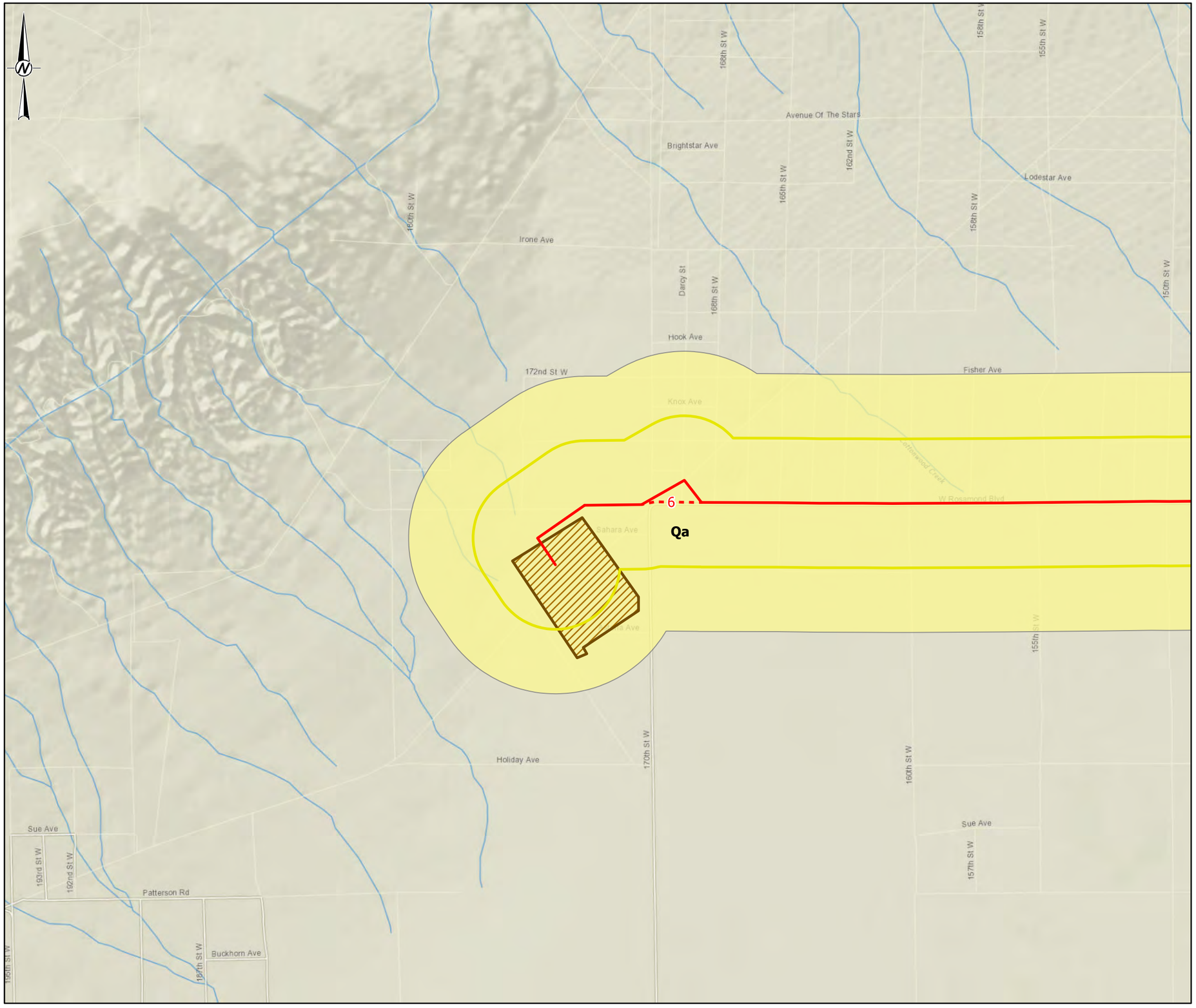
CONSULTANT

wsp

YYYY-MM-DD	2024-02-21
DESIGNED	JAM
PREPARED	RHG
REVIEWED	KD
APPROVED	JP

PROJECT NO.
31406639.003

FIGURE
5.8-1

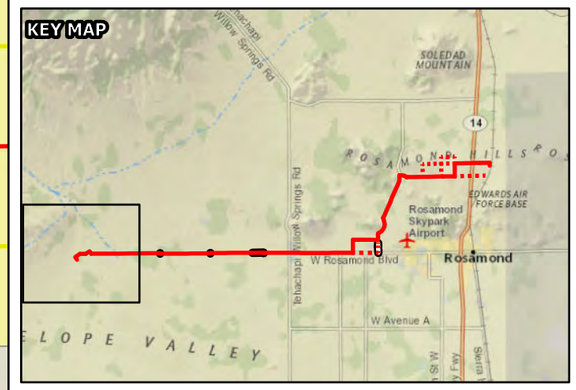


LEGEND

- PREFERRED ROUTE - ABOVEGROUND
- PREFERRED ROUTE - UNDERGROUND
- ROUTE OPTIONS 1-6- ABOVEGROUND
- ROUTE OPTIONS 1-6 - UNDERGROUND
- WRESC SITE
- OTHER PROJECT PARCEL
- SCE WHIRLWIND SUBSTATION
- 0.25 MILE BUFFER AROUND THE TRANSMISSION LINE

GEOLOGIC EXPLANATION

- QA - ALLUVIUM
- QS - WINDBLOWN SAND
- TF - FISS FANGLOMERATE
- TFB - FELSITE BRECCIA
- TGBA - BASALT FLOW
- TGF - FELSITE AND PORPHYRITIC FELSITE
- TGP - PORPHYRY
- TGT - TUFF, TUFF-BRECCIA, AND TUFFACEOUS SANDSTONE
- QM - QUARTZ MONZONITE



1:24,000

0 1,000 2,000 4,000 Feet

NOTE(S)

SEGMENT ALTERNATES ARE DENOTED WITH 1, 2A, 2B, 3A, 3B, 4, 5, & 6 LABELS

REFERENCE(S)

1. SURFICIAL GEOLOGY - UNITED STATES GEOLOGICAL SURVEY. GEOLOGIC INVESTIGATIONS OF SOUTHERN CALIFORNIA DESERTS. BULLETIN 1089-C. GEOLOGY OF THE WILLOW SPRINGS AND ROSAMOND QUADRANGLES, CALIFORNIA. DIBBLEE, T.W. PUBLISHED 1963.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
GEOLOGY MAP - WITH ROUTE OPTIONS
MAP 6 OF 6

CONSULTANT

YYYY-MM-DD	2024-02-21
DESIGNED	JAM
PREPARED	RHG
REVIEWED	KD
APPROVED	JP

PROJECT NO.
31406639.003

FIGURE
5.8-1

5.8.1 Affected Environment

This section describes the affected environment for paleontological resources. Figure 1-4 in Chapter 1, Introduction, presents the Study Area for this paleontological resource inventory and impact assessment. This section begins by describing the physiographic and geological context of the Study Area, and then describes the nature and types of fossil resources that occur near the WRESC. It concludes with an assessment of the scientific importance of fossils that construction personnel may encounter during development of the WRESC.

5.8.1.1 Physiographic and Geologic Setting

The WRESC's Study Area is located in the Mojave Desert, in the Sonoran Desert Section of North America's Basin and Range physiographic province, exemplified by alternating uplifted mountain ranges (horsts) and down-dropped basins (grabens) bounded by normal faults. Within the context of the greater Mojave Desert, the Study Area is located in the western Mojave Desert bordered on the northwest and southwest by mountain ranges surrounding a low-relief alluvial valley floor. The alluvial valley floor includes approximately seven undrained dry lake beds in the lowest part, including dry Rosamond Lake southwest of the Study Area (Dibblee 1967).

The Study Area's geology was originally mapped by T. W. Dibblee in 1957 as part of the western Mojave Desert at the scale of 1:250,000, then in 1963 at the scale of 1:62,500, and then by T. W. Dibblee and J. A. Minch in 2008 at the scale of 1:62,500 (the most recent and finest scale geologic mapping of the area currently available). The actual mapped locations and surface expressions of the various geologic units in the Study Area have remained largely unchanged through all of these revised map editions with the exception of increasing detail and division of individual subunits within the higher-order formations or assemblages. The rocks of the western Mojave Desert region, and its bordering mountains, may be grouped into the three following main divisions (Dibblee 1967).

1) Sediments and local basalt flows of Quaternary age
2) Sedimentary and volcanic rocks of Tertiary age
3) Crystalline rocks of pre-Tertiary age

These higher-order geologic divisions are divided into named and unnamed formations/assemblages as described below. Each of these geologic units is most generally defined by its type (sedimentary, igneous, or metamorphic), composition, and age. Sedimentary rocks may contain fragments of other rock types based on the source rock that provided the sedimentary material.

5.8.1.2 Resource Inventory

5.8.1.2.1 Resource Inventory Methods

Soil does not contain paleontological resources; however, geologic deposits and bedrock that underlie the soil layer do contain fossil and associated matrices. Therefore, to ascertain whether a particular project area has the potential to contain significant fossil resources in a subsurface context, it is necessary to review relevant scientific literature and geologic cartography to determine the geology and stratigraphy of the area. To delineate the boundaries of an area's paleontological sensitivity, it is necessary to determine the extent of the entire geologic unit, because paleontological sensitivity is not limited solely to surface exposures of fossil material.

To determine if prior discoveries of fossil localities have occurred in the Study Area or a particular rock unit, research included investigation of the following pertinent local and regional museum repositories, as well as specific literature sources.

- The Natural History Museum of Los Angeles County (NHMLAC)
- University of California Museum of Paleontology Database (2023)
- The Paleobiology Database (2023)
- *Paleontology Resources: A Key to Unlocking the Past*, prepared for Edwards Air Force Base (Science Applications International Corporation 1994)
- Other published geologic and paleontological literature that includes the Study Area

Sources also included publicly available information such as mapping of the local surface geology and scientific literature, including the following.

- Geologic Map of the Rosamond & Rogers Lake 15 Minute Quadrangles, Kern & Los Angeles Counties, California (Dibblee and Minch 2008a)
- Geologic Map of the Neenach & Willow Springs 15 Minute Quadrangles, Kern & Los Angeles Counties, California (Dibblee and Minch 2008b)
- Geology of the Willow Springs and Rosamond Quadrangles, California (Dibblee 1963)

WSP staff, Matt Sauter and Michael Amorelli, conducted a field visit to the Study Area on July 14, 2023, that included pedestrian survey of the portions of the gen-tie line that will cross or be located close to geologic units mapped as Tertiary-aged deposits to ground-truth their presence in the Study Area. The portions of the gen-tie line that cross geologic units mapped as Quaternary alluvium (e.g., the entire alignment west of the hills) were windshield surveyed for any outcrops composed of rocks older than the Quaternary.

5.8.1.2.2 Resource Inventory Results

The paleontological resource potential of geologic units mapped in the Study Area was assessed in accordance with SVP 2010 classification systems.

5.8.1.2.3 Geological Units in the Mojave Desert

The WRESC consists of an A-CAES and a series of linear gen-tie features crossing varying units of extrusive igneous and metamorphic geological formations, mostly mantled by Holocene-aged surficial alluvial deposits (Dibblee 1963). These surficial alluvial deposits consist of unconsolidated sand, silt, and gravel, deposited from 11,700 years ago to the present (Diblee 1963). Holocene-aged units are too young to contain scientifically significant paleontological resources and therefore have low paleontological sensitivity. The Holocene-aged unit may, however, overlie older Pleistocene-aged sediments in this area of the Mojave Desert. Pleistocene-aged sediments are between 2.6 million and 11,700 years old, and the depth to these older sediments is highly variable, depending on the thickness of the Holocene-aged unit. Pleistocene-aged deposits have the potential to contain terrestrial vertebrate, marine vertebrate, and invertebrate fossil specimens. Owing to the WRESC's location and topography, the Holocene units are likely as thin as 3 feet in the Study Area.

WSP confirmed that the geology of the hills (i.e., areas that are not mapped as Quaternary-aged alluvium) conforms to the assignments mapped in 1963 and 2008 (Dibblee 1963; Dibblee and Minch 2008a; Dibblee and Minch 2008b). **Table 5.8-1** describes the individual geologic units that occur in the Study Area.

Table 5.8-1: Geologic Units in the Study Area (presented in stratigraphic order, youngest top and oldest bottom)

Divisions	Geologic Assemblage / Formation	Map Symbol	Age	Description
Sediments and local basalt flows of Quaternary age	*Surficial sediments*	*Recent to Pleistocene*		
	Undeformed, undissected alluvial sediments	*Qa*	*Holocene*	*Alluvial silt, sand, and gravel of valley areas and floodplains*
		Qs	*Holocene*	*Loose, windblown sand, buff, fine-grained, well sorted, deposited as dunes or thin veneers on alluvium and clay*
Sedimentary and volcanic rocks of Tertiary age	*Fiss Fanglomerate*	*Miocene*		
	Alluvial fan deposit, well to weakly indurated; age, middle or upper Miocene	*Tf*	*Miocene*	*Fanglomerate, coarse, subrounded, brown to reddish or pink, of granitic to andesitic fragments from 6 inches to 8 feet in diameter in a poorly sorted sandy matrix*
		Tfb	*Miocene*	*Forms bold clifflike outcrops where indurated, or rounded hills where weakly consolidated*
	Gem Hill Formation	*Miocene*		

Divisions	Geologic Assemblage / Formation	Map Symbol	Age	Description
	Light-colored rocks of volcanic origin forming lower part of Tropico Group, unfossiliferous; middle to early Miocene in age	*Tgt*	*Miocene*	*Lithic tuff, of scattered to abundant small angular rock fragments, and pumice lapilli tuff, in a white, tan, and light green indurated matrix; includes Tgh*
		Tgba	*Miocene*	*Basalt flows, black, fine-grained, commonly vesicular, massive with fracture parting*
		Tgf	*Miocene*	*Part of Bobtail member, felsite to porphyritic felsite, cream white to tan, massive to conspicuously flow-laminated, with texture varying from aphanitic and glassy to porphyritic with mainly quartz phenocrysts*
		Tgp	*Miocene*	*Porphyry – igneous rocks composed of large crystals embedded in matrix of fine-grained crystals*
		Tgo	*Miocene*	*Perlite obsidian facies of Bobtail member, forms along outer margins of volcanic plugs, steel-gray, glassy, massive, with curved onionskin fracture*
Crystalline rocks of pre-Tertiary age	*Granitic and dioritic rocks*	*Jurassic or Cretaceous*		
	Unnamed intrusive rocks	*qm*	*Jurassic or Cretaceous*	*Quartz monzonite, gray-white, weathers buff-white, medium- to coarse-grained, massive, widespread, varies locally to granodiorite and granite*

5.8.1.2.4 Results of the Records Search and Literature Review

Edwards Air Force Base, westernmost boundary located less than 1 mile east of the WRESC Site, has been cataloging paleontological sites since 1977, when the base was required by Air Force regulations to “locate and plan on the master plan all paleontological sites” (Science Applications International Corporation 1994). Paleontological localities were reported from the mitigation efforts associated with construction of the All-American Pipeline on the northern boundary in old lakebed deposits, including camel, antelope, horse, rabbit, rodent, and plant fossils. *Late Cretaceous and Cenozoic Mammals of North America* (Woodburne et al. 2004) refers to significant paleontological localities in the Antelope Valley portion of the Mojave Desert but only from geologic units that are not present in the Study Area.

Online Locality Databases

WSP reviewed publicly available paleontological resource databases for recorded collections of paleontological resources either collected from the vicinity surrounding the Study Area or from outside the Study Area but from geologic units that occur within the Study Area, including the University of California Museum of Paleontology (UCMP) Collections – Locality Database (UCMP 2023) and Paleobiology Database (Paleobiology Database 2023). The UCMP online collection records were searched with the following search parameters.

- Continent: North America
- County: United States
- State/Prov: California
- County: Kern

The UCMP search returned a total of 2,070 records for the whole of Kern County, of which 59 contain plant fossils, 630 contain microfossils, 769 are listed invertebrate localities, 137 contain a mix of invertebrate and microfossils, 20 contain a mix of invertebrate and vertebrate fossils, and 455 contain vertebrate fossils. None of the localities that have an associated geologic formation were collected from the Fiss Fanglomerate or the Gem Hill Formation, the Tertiary units in the Study Area that contain sedimentary units. A total of 30 localities are referred to the Pleistocene epoch; these units are not typically named and therefore cannot be searched by name.

Of the 30 Pleistocene localities, none of the localities with names attached reference geographic or geophysical locations in the Study Area (e.g., Arvin Landfill Local Fauna is not in proximity to the Study Area).

The Paleobiology Database records, compiled from ongoing review of all paleontology literature, were searched with the following search parameters.

- Continent: North America
- County: United States
- State: California
- County: Kern

The Paleobiology Database search returned a total of 2,437 records for the whole of Kern County. However, none of these localities are assigned to the Fiss Fanglomerate or Gem Hill Formation endemic to the Study Area. The results were sorted by age to highlight localities from unnamed Pleistocene-aged deposits, of which there were 23. None of these localities have names linked to geographic or geophysical landmarks in the Study Area and are likely duplicative of the localities recorded in the UCMP records search based on name and species.

In summary, searches in both databases for named formations in the Study Area (Fiss Fanglomerate and Gem Hill Formation, endemic to the Study Area) did not return any locality results as searched within Kern County. In addition, online record searches did not return any fossil localities collected from unnamed Pleistocene-aged geologic units in the Study Area.

Museum Record Search

A museum record search was conducted with the NHMLAC, including the areas covered by USGS 7.5-minute quadrangle maps that contain the Study Area. As shown in **Appendix 5.08A**, the record search did not return any records of fossil localities recovered from the Tertiary-aged Gem Hill Formation or Fiss Fanglomerate but did return localities from Pleistocene-aged geologic units similar to those occurring in the Study Area. **Table 5.8-2** provides the results of the NHMLAC records search. Exact locations of the known localities of the records are provided in Appendix 5.8A, filed confidentially.

Table 5.8-2: Natural History Museum of Los Angeles County Record Search Results

Locality ID	Scientific Name	Common Name	Age	Geology	Depth
LACM VP 7891	*Hemiauchenia sp.*	*Camel*	*Pleistocene*	*Unknown*	*21 feet bgs*
LACM VP 7853	*Camelidae Unspecified*	*Camel Fish, amphibian, small mammal, reptile*	*Pleistocene*	*Unknown (sandy loess under a dune deposit strand, sandy siltstone to clayey siltstone)*	*3–11 feet bgs*
LACM VP 7884	*Camelops hesternus*	*Camel*	*Pleistocene*	*Unknown (fluvial brown clay)*	*4 feet bgs*
LACM IP 445	*Unspecified*	*Invertebrate*	*Pleistocene*	*Unknown*	*Unknown*

bgs = below ground surface

5.8.1.2.5 Results of the Field Survey

WSP performed a combination pedestrian and windshield survey of the WRESC Study Area, applying the windshield survey methodology for the proposed gen-tie line, as the entire route is located along existing public ROWs. In addition to the overarching windshield survey, focused pedestrian survey of the portions of the gen-tie line that will cross or be located close to geologic units mapped as Tertiary-aged deposits to ground-truth their presence in the Study Area was conducted to ground-truth the geologic mapping of the area. The field assessment of non-Quaternary-aged units matched confirmed the geologic mapping of the area. Pedestrian survey methodology was applied within the power plant facility footprint, using transect intervals no greater than 10 to 15 meters.

Special attention was paid to road cuts and washes with stratigraphic exposure, as well as known and mapped exposures of geological significance. Visibility ranged from 50 percent to 90 percent, mostly impeded by dry

grasses and other vegetation. The surficial sediments within the power plant facility footprint are consistent unconsolidated massive silt to gravel. Surficial sediments over the gen-tie line ROW are also consistent, although several exposures of quartz monzonite, rhyolite, breccia, and fanglomerate deposits were identified and evaluated adjacent to the route, and all were determined to have low to no potential for paleontological sensitivity. See **Table 5.8-3** in Section 5.8.1.2.6 for a summary of the sensitivity of each formation and deposit. No exposed paleontological resources were observed.

5.8.1.2.6 Paleontological Sensitivity of the WRESC Right-of-Way

The paleontological sensitivity analyses uses both the SVP Standard Procedures and the Bureau of Land Management's (BLM) Potential Fossil Yield Classification Systems to assess paleontological sensitivity and the level of effort required to manage potential impacts to significant fossil resources.

Under the 2010 SVP Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources (SVP 2010), geologic units are described as having (a) High, (b) Undetermined, (c) Low, or (d) No Potential for containing significant paleontological resources:

High Potential

Geologic units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Geologic units classified has having high potential for producing paleontological resources include but are not limited to sedimentary formations and some volcaniclastic formations (e.g., ashes or tephras), some low-grade metamorphic rocks that contain significant paleontological resources anywhere within their geographic extent, and sedimentary rock units temporally or lithologically suitable for preservation of fossils (e.g., middle Holocene and older fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.). Paleontological potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils, and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Geologic units that contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and geologic units that may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.

Undetermined Potential

Geologic units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these geologic units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to determine the specific paleontological resource potential of these geologic units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.

Low Potential

Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some geologic units have low potential for yielding significant fossils. Such geologic units will be poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception, not the rule, e.g., basalt flows or recent colluvium. Geologic units with low potential typically will not require impact mitigation measures to protect fossils.

No Potential

Some geologic units have no potential to contain significant paleontological resources, e.g., high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as quartz monzonite). Geologic units with no potential do not require protection or impact mitigation measures relative to paleontological resources.

In addition to the SVP Standard Procedures regarding assignment of paleontological potential assessment of geologic units, the BLM uses the Potential Fossil Yield Classification (PFYC) system as a uniform tool to assess potential occurrences of paleontological resources and evaluate possible impacts using mapped geologic units. The PFYC system provides baseline guidance for assessing paleontological resources as part of initial planning efforts and determining the need for further assessment of project impacts on resources. The BLM's PFYC assignments of geologic units within the Study Area are used below to support the assignment of paleontological sensitivity. The primary PFYC categories are as follows.

Class 1 – Very Low. Geologic units that are not likely to contain recognizable paleontological resources. Units assigned to Class 1 typically have one or more of the following characteristics.

- Geologic units are igneous or metamorphic, excluding airfall and reworked volcanic ash units.
- Geologic units are Precambrian in age.

1) Management concerns for paleontological resources in Class 1 units are usually negligible or not applicable.
2) Paleontological mitigation is unlikely to be necessary except in very rare or isolated circumstances that result in the unanticipated presence of paleontological resources, such as unmapped geology contained within a mapped geologic unit. For example, young fissure-fill deposits often contain fossils but are too limited in extent to be represented on a geological map; a lava flow may preserve evidence of past life; and caves may contain important paleontological resources. Such exceptions are the reason that no geologic unit is assigned a Class 0.

Overall, the probability of impacting significant paleontological resources in a Class 1 unit is very low and further assessment of paleontological resources is usually unnecessary. An assignment of Class 1 normally does not trigger further analysis unless paleontological resources are known or found to exist. Standard stipulations should be put in place prior to authorizing any land use action to accommodate an unanticipated discovery.

Class 2 – Low. Geologic units that are not likely to contain paleontological resources. Units assigned to Class 2 typically have one or more of the following characteristics.

- Field surveys have verified that significant paleontological resources are not present or are very rare.
- Units are generally younger than 10,000 years before present.
- Geologic units are recent aeolian deposits.

1) Sediments exhibit significant physical and chemical changes (i.e., diagenetic alteration) that make fossil preservation unlikely.
2) Except where paleontological resources are known or found to exist, management concerns for paleontological resources are generally low and further assessment is usually unnecessary except in occasional or isolated circumstances.

Paleontological mitigation is only necessary where paleontological resources are known or found to exist.

The probability of impacting significant paleontological resources is low. Localities containing important paleontological resources may exist but are occasional and should be managed on a case-by-case basis. An assignment of Class 2 may not trigger further analysis unless paleontological resources are known or found to exist. Standard stipulations should be put in place prior to authorizing any land use action to accommodate unanticipated discoveries.

Class 3 – Moderate. Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence. Units assigned to Class 3 have some of the following characteristics.

- They are marine in origin with sporadic known occurrences of paleontological resources.
- Paleontological resources may occur intermittently, but abundance is known to be low.
- Units may contain significant paleontological resources, but these occurrences are widely scattered.

The potential for unauthorized land use to impact a significant paleontological resource is known to be low to moderate.

1) Management concerns for paleontological resources are moderate because the existence of significant paleontological resources is known to be low. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for casual collecting.
2) Paleontological mitigation strategies will be proposed based on the nature of the proposed activity.

This classification includes units of moderate or infrequent occurrence of paleontological resources. Management considerations cover a broad range of options that may include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Surface-disturbing activities may require assessment by a qualified paleontologist to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources.

Class 4 – High. Geologic units that are known to contain a high occurrence of paleontological resource. Units assigned to Class 4 typically have the following characteristics.

- Significant paleontological resources have been documented but may vary in occurrence and predictability.
- Surface-disturbing activities may adversely affect paleontological resources.
- Rare or uncommon fossils, including nonvertebrate (such as soft body preservation) or unusual plant fossils, may be present.
- Illegal collecting activities may impact some areas.

1) Management concerns for paleontological resources in Class 4 are moderate to high, depending on the proposed action.
2) Paleontological mitigation strategies will depend on the nature of the proposed activity, but field assessment by a qualified paleontologist is normally needed to assess local conditions.

The probability for impacting significant paleontological resources is moderate to high and is dependent on the proposed action. Mitigation plans must consider the nature of the proposed disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access that could result in looting. Detailed field assessment is normally required, and on-site monitoring or spot checking may be necessary during land-disturbing activities. In some cases, avoidance of known paleontological resources may be necessary.

Class 5 – Very High. Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources. Units assigned to Class 5 have some or all of the following characteristics.

- Significant paleontological resources have been documented and occur consistently.
- Paleontological resources are highly susceptible to adverse impacts from surface-disturbing activities.
- Unit is frequently the focus of illegal collecting activities.

1) Management concerns for paleontological resources in Class 5 areas are high to very high.
2) A field survey by a qualified paleontologist is almost always needed. Paleontological mitigation may be necessary before or during surface-disturbing activities.

The probability for impacting significant paleontological resources is high. The area should be assessed prior to land tenure adjustments. Pre-work surveys are usually needed, and on-site monitoring may be necessary during land use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.

BLM Sensitivity Ratings

The publicly available BLM PFYC GIS layer for the Study Area does not include any geologic units with a PFYC assignment greater than Class 2 or Low, which corresponds to Quaternary-aged alluvium. Portions of the Study Area contain geologic units that have an Unknown PFYC assignment. These Unknown areas correspond to areas mapped as the Fiss Fanglomerate (map units Tf and Tfb). Because no paleontological resources have been recovered from the Fiss Fanglomerate, these units may be treated as having Low Sensitivity.

As a point of comparison, the nearest area to which the BLM has assigned a PFYC rating of greater than PFYC 2 is the PFCY 4, or High Sensitivity, associated with the Rosamond Lake beds over 3.5 miles southeast of the Study Area.

Based on the reviews of paleontological literature, online locality databases, museum record search, and BLM PFYC classifications, and as verified by the site visit, paleontological sensitivity ratings have been assigned to the geologic units present in the Study Area to set the baseline against which potential project impacts to paleontological resources is measured. **Table 5.8-3** explains and justifies the paleontological sensitivity ratings of the geologic units in the Study Area.

Table 5.8-3: Surficial Geologic Units in the Study Area (presented in stratigraphic order, youngest top and oldest bottom)

Divisions	Geologic Assemblage / Formation	Map Symbol	BLM PFYC	Sensitivity Assignment and Justification
Sediments and local basalt flows of Quaternary age	*Surficial sediments*	*Recent to Pleistocene*		
	Undeformed, undissected alluvial sediments	*Qa*	*2*	*Low Sensitivity. Quaternary-aged (Pleistocene and Holocene) surficial deposits typically have low potential to contain paleontological resources given their relatively young age; however, their potential to contain paleontological resources typically increases with depth and increasing age of deposits. Therefore, surface impacts (e.g., road grading) may have lower potential for impacts compared with deep excavations (e.g., foundations).*
		Qs	*2*	*Low Sensitivity. Windblown sand deposits are typically recent enough that they are unlikely to contain paleontological resources; however, over time they may have migrated over underlying older units that may have high potential.*
Sedimentary and volcanic rocks of Tertiary age	*Fiss Fanglomerate*	*Miocene*		
	Alluvial fan deposit, well to weakly indurated; middle or upper Miocene age	*Tf*	*Unknown*	*Low Sensitivity. This unit has no history of containing paleontological resources based on record searches at NHMLAC, online databases, and literature review.*
		Tfb	*Unknown*	*Low Sensitivity. This unit has no history of containing paleontological resources based on record searches at NHMLAC, online databases, and literature review.*
	Gem Hill Formation	*Miocene*		
	Light-colored rocks of volcanic origin forming lower part of Tropico Group, unfossiliferous; middle to early Miocene age	*Tgt*	*1*	*Low Sensitivity. Of all extrusive igneous rocks, airfall tuffs generally have greater potential to contain fossil resources; however, no records of fossil localities collected from Gem Hill Formation have been recorded in any of the sources reviewed for this project.*
		Tgba	*1*	*Low Sensitivity. Extrusive igneous rocks such as basalt flows do not typically contain paleontological resources except under the rarest circumstances.*
		Tgf	*1*	*No Potential. Intrusive igneous rocks do not contain paleontological resources.*
		Tgp	*1*	*Low Sensitivity. Intrusive igneous rocks do not contain paleontological resources.*

Divisions	Geologic Assemblage / Formation	Map Symbol	BLM PFYC	Sensitivity Assignment and Justification
		Tgo	*1*	*Low Sensitivity. Extrusive igneous rocks such as obsidian flows do not typically contain paleontological resources except under the rarest circumstances.*
Crystalline rocks of pre-Tertiary age	*Granitic and dioritic rocks*	*Jurassic or Cretaceous*		
	Unnamed intrusive rocks	*qm*	*1*	*No Potential. Intrusive igneous rocks do not contain paleontological resources.*

NHMLAC = Natural History Museum of Los Angeles County

5.8.2 Environmental Analysis

The surficial and immediate subsurface strata of the WRESC Study Area consists of Holocene alluvial deposits. Linear components of the gen-tie line consist of similar deposition overlaying a variety of low-sensitivity geological formations. The following subsections present the environmental effects to paleontological resources from construction and operation of the WRESC.

5.8.2.1 Paleontological Resource Significance Criteria

Factors used to evaluate the significance of Project-related paleontological resources are set forth in Appendix G of the California Environmental Quality Act (CEQA). Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

The current CEQA Guidelines have separated paleontological resources from cultural and tribal resources and grouped their assessment under Geology and Soils. In terms of potential impacts to paleontological resources associated with the construction and operations of the project, Appendix G, asks if the project would:

- Directly or indirectly destroy a unique paleontological resource or site or unique geological feature?

Pursuant to CEQA, significance of potential impacts is identified per the following guidelines.

- **Significant and Unavoidable** – An impact that cannot be reduced to below the threshold level given reasonably available and feasible mitigation measures.
- **Less than Significant with Mitigation Incorporated** – An impact that can be reduced to below the threshold level given reasonably available and feasible mitigation measures.
- **Less than Significant** – An impact that may be adverse but does not exceed the threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen environmental effect may be suggested if readily available and easily achievable.
- **No Impact** – The proposed project would have no effect on environmental conditions or would reduce existing environmental problems or hazards.

Impact assessment of paleontological resources is based on the geologic units likely to be affected by the Project (as described above) given the correlation between a given mapped geologic unit and the array of paleontological resources known to be contained within that unit based on previous projects, surveys, or academic fieldwork. The impact assessment represents the overlap of the existing environment, in this case the potential for geologic units to contain paleontological resources (sensitivity) that would potentially be disturbed by construction or maintenance activities under the proposed Project.

The paleontological sensitivity of the geologic units in the Study Area are developed based on the SVP's Standard Procedures and supported by the similar PFYC system used by the BLM, to assess potential impacts and conduct mitigation planning for paleontological resources.

An example of a significant impacts to paleontological resources would be if construction activities uncovered and destroyed paleontological resources before they could be collected and conserved in an appropriate accredited museum collection. Typical mitigation measures for paleontological resources include monitoring of construction activities that occur in geologic units assigned moderate or high sensitivity (see below for a summary of recommended mitigation measures). Less than significant impacts to paleontological resources would result from construction activities occurring within geologic units with low or no paleontological sensitivity.

5.8.2.2 Paleontological Resource Impact Assessment

Potential impacts to paleontological resources result from the intersection of sensitive paleontological resources that are part of the existing environment and ground disturbance associated with the construction and maintenance of the Project.

5.8.2.2.1 Direct Impacts

Direct impacts to paleontological resources may result through construction activities that would directly affect the surface and subsurface geology as a result of excavation or other ground-clearing activities, including transmission tower site clearing or access road grading. During construction, grading and excavation would occur throughout the Project Area, including footings for structures, surface reservoir, and evaporation pond. Gen-tie tower construction consists of excavation tower footings, placing concrete in the footings, erection of the tower, and installation of lines. Maintenance would need to be performed intermittently on the WRESC site and along the gen-tie line access road based on usage and storm events. Intermittent maintenance is not expected to disturb areas beyond those impacted during Project construction. Therefore, no additional impacts beyond those assessed for construction are anticipated to occur for paleontological resources as a result of operation and maintenance activities.

Of the nine mapped geologic units in the Study Area, all have been designated Low Sensitivity for paleontological resources based on their composition, age, and absence of recorded paleontological resources previously collected from the area. The Qa material has the greatest record of containing paleontological resources when assessed throughout its geographic distribution; however, Quaternary-aged alluvium is less likely to contain paleontological resources at surface (i.e., younger sediments), but potential may increase with depth of excavation. Still, given the unpredictable distribution of fossils within Quaternary-aged alluvium, this unit is generally regarded has having Low Sensitivity except in areas immediately surrounding known fossil localities, and no such localities have been identified in the Study Area.

The Tertiary-aged Fiss Fanglomerate includes varied interbedded or intrusive sedimentary and igneous rocks. Although it is sedimentary in nature, the Fiss Fanglomerate has no record of producing paleontological resources and, according to Project mapping, would experience limited effects from Project construction activities. Therefore, the proposed Project is not expected to impact significant paleontological resources within this formation.

The Tertiary-aged Gem Hill Formation, with the exception of an airfall tuff (Tgt), consists of intrusive igneous rocks or basalt flows that have no potential for containing paleontological resources. In extrusive igneous rocks, airfall tuffs may preserve fossil resources as plants and animals may have been entombed by the falling ash; however, no paleontological records have been recorded from any part of the Gem Hill Formation. Therefore, the proposed Project is not expected to impact significant paleontological resources within this formation.

Beyond Quaternary-aged alluvium and Tertiary-aged sedimentary and igneous units, ground-disturbing activities are expected to occur only over the mapped Mesozoic quartz monzonite (qm). Because these units are intrusive igneous in nature, no paleontological resources are expected to be contained within the geological units impacted by the Project; therefore, the proposed Project is not expected to impact significant paleontological resources within this formation.

In summary, the proposed WRESC will impact geologic units assessed as Low Sensitivity by construction activities that would generally occur in the uppermost geologic units (e.g., sedimentary units), and potential impacts are expected to be Less than Significant. Further, the implementation of mitigation measures, as summarized below, would ensure that any unanticipated discoveries of paleontological resources would be protected and the potential significant impact to the uncovered paleontological resource would be immediately mitigated.

5.8.2.2.2 Indirect Impacts

Indirect impacts to paleontological resources may result from the creation of new access roads that provide easier access to fossiliferous areas, increasing the likelihood of unanticipated discoveries and recovery of fossil resources by unauthorized parties. However, the gen-tie line will be located along existing roadways to the extent feasible, and any development of new access roads would be limited to such an extent that would not likely result in greater potential for discovery and collection of paleontological resources by unauthorized parties. Further, as stated above, the Project would primarily impact geologic units with low paleontological sensitivity, and any increased access from road development would therefore occur in Low Sensitivity geologic units.

5.8.2.2.3 Cumulative Impacts

Section 15355 of the CEQA Guidelines defines “cumulative impacts” as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.” Subsection b of Section 15355 states, in part, that “The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects.” Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project’s incremental effect is “cumulatively considerable.” Section 15065(a)(3) then defines “cumulatively considerable” as meaning “that the incremental effects of an individual project are significant when viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects.”

Cumulative impacts on paleontological resources result from the sum of various ground-disturbing projects that occur within a specific region, especially projects that would impact the same geologic units. As the total ground disturbance of a specific geologic unit increases, the potential for the paleontological resources contained in that unit to be impacted, if present, increases. This principle also applies to indirect cumulative effects: the greater the development that occurs within fossil-bearing geologic units, the greater the increased exposure of those units to unauthorized collection that would remove paleontological resources from their source rock and deprive them of their critical context, provenance, and usefulness to science.

5.8.3 Best Practices, Design Features, and Mitigation Measures

5.8.3.1 Project Paleontological Resource Specialist

Prior to construction, the Applicant will submit the name and résumé of a qualified Paleontological Resource Specialist (PRS) to the CEC for review and approval. The Applicant will provide the name and contact information of the PRS to the construction management team, paleontological resource monitors, and the Project compliance manager. The PRS will prepare a paleontological resources awareness module as part of the worker education program. The Applicant will make the PRS available during ground-disturbing activities in case there is an unanticipated paleontological discovery.

5.8.3.2 Construction Personnel Education

Prior to the initiation of ground-disturbing activities, the PRS will provide a briefing to personnel responsible for planning and conducting ground-disturbing activities with respect to the procedures to be followed in the event of an unanticipated discovery (see below), which is defined as the exposing or encountering of previously unidentified paleontological resources.

The goals of the briefing will be to:

- Describe known geologic units with high sensitivity for containing previously unidentified paleontological resources and methods to avoid adverse impacts to these resources (if present).
- Alert workers to the possible presence of important paleontological resources.
- Describe the potential nature of the resources, including examples of the types of fossils or features that may be encountered.
- Instruct workers on protocols to follow if paleontological resources are encountered (unanticipated discovery protocols, below).

5.8.3.3 Develop and Implement a Paleontological Resources Monitoring and Mitigation Plan

Prior to the start of construction, the Applicant will submit for review to the CEC a Paleontological Resources Monitoring and Mitigation Plan (PRMMP). This plan will be prepared by the PRS and outline monitoring procedures and protocols that workers will follow if they discover paleontological resources during the construction of the WRESC. The PRMMP will stipulate that if workers encounter paleontological resources, all work in the immediate area will stop and the Applicant's construction management team will notify the paleontological resource monitor. Construction will not resume near the paleontological find until the PRS releases the area.

The PRMMP will outline monitoring protocols and reporting requirements; however, general construction monitoring protocols are described below.

The qualified paleontologist will review the proposed ground-disturbing activities to determine the timing and location of paleontological monitoring assignments, including expected depth of excavation to determine if paleontologically sensitive geologic units would be encountered.

The paleontological resources monitor will examine excavated soil, rock, and exposed sidewalls for paleontological resources where surficial construction activities are occurring. Where subsurface evaluations are necessary, safety measures will be implemented to provide safe access for the paleontological resources monitor. However, subsurface excavations such as the shafts may not be safe for inspection and the monitor would conduct spot-checks of spoil piles produced by those excavation or drilling activities. These spot-checks would include cataloging and collecting any available data (e.g., approximate depth material was recovered from) during breaks in construction when it is safe for the paleontologist to approach the spoil pile. Once the shafts hit igneous intrusive rock (e.g., quartz monzonite), no further spot checking would be required as the potential for containing paleontological resources would drop to zero.

The paleontological resources monitor will document observations at each ground disturbance location on a paleontological resources monitoring form. If paleontological resources are observed during a ground-disturbing task, work within 50 feet of the discovery will stop and the resource will be described, photographed, and mapped. The paleontological resources monitor will provide photographs and a brief description of the resource to the qualified paleontologist. Based on the monitor's observations and photographs, the qualified paleontologist will determine if the individual resource is significant or non-significant.

- Following recordation of relevant location and stratigraphic data, significant paleontological resources will be stabilized, isolated, and removed in a manner that will best preserve and protect the resource (e.g., individual collection, jacketing and removal of a sediment block, collection of bulk sediment sample). Non-significant resources would not be collected. The paleontologist will then give the clearance for construction to restart.
- If the paleontological resource includes an extensive invertebrate fossil deposit, the deposit will be documented and a representative sample will be collected by the paleontological monitor.
- The paleontological resources monitor will have the authority to temporarily stop, suspend, or redirect work to investigate any unanticipated discovery. In these cases the Unanticipated Discovery protocols described in Section 5.8.3.4 shall be followed.
- The qualified paleontologist will review the paleontological resources monitor's observations of geological units impacted by ground-disturbing activities to refine paleontological monitoring requirements.

5.8.3.4 Unanticipated Discovery

An "unanticipated discovery" refers to any previously unidentified paleontological resources (regardless of significance) encountered during the course of ground-disturbing activities. Given the Low Sensitivity for paleontological resources to be present in the Study Area, on-site construction monitoring is not recommended for all ground-disturbing activities at this time. However, potential remains for encountering unanticipated discoveries during ground-disturbing activities at the Project Area and a paleontologist should be retained on an on-call basis in case an unanticipated discovery is made.

The protocols for unanticipated discoveries apply whether a paleontological resources monitor is present during the ground-disturbing activities or not, and at any phase of the activities. If paleontological materials or resources are discovered during ground-disturbing activities, all activities must cease until a qualified paleontologist can examine and document the discovery.

In the event of an unanticipated discovery, an evaluation of the paleontological resources must be conducted to determine the nature and areal extent of the deposit. Measures to restrict access to sensitive resource areas must be addressed. If paleontological materials or resources are discovered, all ground-disturbing activities within 50 feet of the resources must cease and the resources must be protected in place until a determination of their potential significance as a unique paleontological resource or site and disposition can be made. If paleontological resources are recovered from the site, up to 50 pounds of bulk sample of the material surrounding the resource will be collected for laboratory analysis, including microfossil investigation. The location and nature of the find will not be publicly disclosed. If it is determined that paleontological materials are to be removed from the Project Area, they will be described, cataloged, and curated at an appropriate facility.

5.8.3.5 Develop a Final Paleontological Resources Report

At the conclusion of the WRESC's construction, the PRS will prepare a final Paleontological Resources Report. If no paleontological resources are discovered during construction, the report will present documentation of monitoring activities and state that findings were negative. If fossils are discovered over the course of ground disturbance, the report will detail the nature of the finds, tentative identifications (if possible), and the name of the repository where the PRS will deposit the specimens. The Applicant will submit the final Paleontological Resources Report to the CEC as well as Kern County.

5.8.4 Laws, Ordinances, Regulations, and Standards

Paleontological resources are non-renewable scientific resources. Several federal, state, and local LORS govern their preservation and protection. Such LORS include the Antiquities Act of 1906 and CEQA Section 15064.5 (see Appendix G) (California Office of Historic Preservation 1983; Scott and Sprinter 2003; Fisk and Spencer 1994). In addition to legislative actions, the SVP has established professional standards for assessment and mitigation of adverse impacts to paleontological resources.

The Applicant will design, construct, and operate the WRESC in accordance with all LORS applicable to paleontological resources. **Table 5.8-4** summarizes the federal, state, and local LORS applicable to paleontological resources. The following subsections discuss each of the identified LORS and professional standards for paleontological resource assessment and impact mitigation.

Table 5.8-4: Consistency with Law, Ordinances, Regulations, and Standards

Policy/Goal/Objective	Project Component	Consistency / Justification
Antiquities Act	*Any portion of the Project occurring on federally managed lands*	*Applicable. Portions of the Project's gen-tie line will impact federally managed lands.*
National Environmental Policy Act	*Any portion of the Project occurring on federally managed lands*	*Not Applicable. No portion of the Project would impact federally managed lands.*
Federal Land Policy and Management Act	*Any portion of the Project occurring on federally managed lands*	*Not Applicable. No portion of the Project would impact federally managed lands.*

Policy/Goal/Objective	Project Component	Consistency / Justification
Paleontological Resources Preservation Act	*Any portion of the Project occurring on federally managed lands*	*Applicable for portions of project that intersect BLM-managed lands.*
California Public Resources Code §5097.5	*Any Project components located on State of California public lands*	*Applicable for portions of project that intersect State-owned lands.*
California Environmental Quality Act (CEQA)	*All Project components*	*Consistent. This analysis addresses potential impacts to paleontological resources in compliance with the CEQA Guidelines.*
Kern County General Plan Archaeological, Paleontological, Cultural, and Historic Preservation Policy	*All portions occurring on non-federal or state lands in the unincorporated portion of Kern County*	*Consistent. Project mitigation measures would ensure the preservation of any significant paleontological resources inadvertently discovered during Project construction.*
Society for Vertebrate Paleontology (SVP) Standard Procedures	*All Project components*	*Consistent. This analysis, namely the assessment of paleontological sensitivity of geologic units in the Study Area, has been conducted in compliance with SVP Standard Procedures.*

5.8.4.1 Federal

The Antiquities Act of 1906 (Pub. L. 59–209, 34 Stat. 225, 54 U.S.C.), the National Environmental Policy Act of 1969 (NEPA) (Pub. L. 91–190, 83 Stat. 852), the Federal Land Policy and Management Act of 1976 (FLPMA) (Pub. L. 94–579, 90 Stat. 2743), and the Paleontological Resources Preservation Act of 2009 (PRPA) (Pub. L. 111–011, Title VI, Subtitle D) serve as the primary federal legislation that requires addressing potential impacts to paleontological resources on federally administered lands. The federal Antiquities Act of 1906 (16 U.S. Code [U.S.C.] 431-433) protects both historic and prehistoric items on federal lands. NEPA (42 U.S.C. 4321-4347) directs federal agencies to fully assess impacts (adverse or not) on the environment. FLPMA (43 U.S.C.) provides for management and mitigation of adverse impacts on federally managed lands by protecting the quality of scientific, scenic, historical, ecological, environmental, air quality, water, and cultural resources. Paleontological resources are viewed as having scientific value, thus requiring protection under FLPMA. PRPA was enacted as part of the 2009 Omnibus Public Land Management Act and codified protections specifically for vertebrate fossils resources and scientifically significant plant and invertebrate fossil resources on federal lands. PRPA created criteria to ensure that paleontological resources on federal lands are properly collected and curated at approved repositories.

5.8.4.2 State

California Environmental Quality Act

The current CEQA Guidelines (Appendix G) have separated paleontological resources from cultural and tribal resources and grouped their assessment under Geology and Soils with the following checklist assessment question.

- Would the project directly or indirectly destroy a unique paleontological resource or site or unique geological feature?

The impact assessment described above answers the CEQA Guideline question in the negative.

California Public Resources Code §5097.5

The California Public Resources Code (PRC) §5097.5 includes language relevant to the protection of paleontological resources on public lands:

> *A person shall not knowingly and willfully excavate upon, or remove, destroy, injury, or deface, any historic prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or*

historic feature, situated on public lands, except with the express permission of the public agency having jurisdiction over the lands.

This section of the PRC only applies to state lands managed by state agencies.

5.8.4.3 Local

The Kern County General Plan governs land use and development within the unincorporated portion of Kern County, including the Study Area (Kern County Planning Department 2009). With regard to paleontological resources, the County's General Plan's Land Use, Open Space, and Conservation Element includes, within its General Provisions, an Archaeological, Paleontological, Cultural, and Historic Preservation (Section 1.10.3) policy; which reads:

The County will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors.

Of the five measures identified to implement this policy, only one relates to paleontological resources:

M. In areas of known paleontological resources, the County should address the preservation of these resources where feasible.

5.8.4.4 Professional Standards

The SVP, in cooperation with federal agencies, has established best practices for vertebrate paleontologists, along with more specific guidelines for the assessment and mitigation of adverse impacts to significant non-renewable paleontological resources. Both academic and consulting paleontologists follow these guidelines. The SVP Code of Ethics (Article 12 of the Society Bylaws) governing fossil collection state:

Section 1. Professional standards in collection of fossils: It is the responsibility of vertebrate paleontologists to strive to ensure that vertebrate fossils are collected in a professional manner, which includes the detailed recording of pertinent contextual data, such as geographic, stratigraphic, sedimentologic, and taphonomic information.

Section 2. Adherence to regulations and property rights: It is the responsibility of vertebrate paleontologists to assist government agencies in the development of management policies and regulations pertinent to the collection of vertebrate fossils, and shall comply with those policies and regulations during and after collection. The necessary permits on all lands administered by federal, state, and local governments, whether domestic or foreign, must be obtained from the appropriate agency(ies) before fossil vertebrates are collected. Collecting fossils on private lands must be done only with the landowner's consent.

Section 4. Deposition of fossil specimens: Scientifically significant fossil vertebrate specimens, along with ancillary data, should be curated and accessioned in the collections of repositories charged in perpetuity with conserving fossil resources for scientific study and education (e.g., accredited museums, universities, colleges, and other educational institutions).

The SVP Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources (1995, amended 2010) summarizes its expectations for professional paleontologists operating on assessment and mitigation projects as follows:

Vertebrate fossils are significant non-renewable paleontological resources that are afforded protection by federal, state, and local environmental laws and guidelines. The potential for destruction or degradation by construction impacts to paleontological resources on public lands (federal, state, county, or municipal) and land selected for development under the jurisdiction of various governmental planning agencies is recognized. Protection of paleontological resources includes: (a) assessment of the potential property to contain significant non-renewable paleontological resources which might be directly or indirectly impacted, damaged, or destroyed by development, and (b) formulation and implementation of measures to mitigate adverse impacts, including permanent preservation of the site and/or permanent preservation of salvaged materials in established institutions.

Agencies and Agency Contacts

Paleontological resources are not managed by any single agency, but their management is governed by resource management agencies having specific jurisdiction over any specific property on which the proposed Project will occur (e.g., BLM for BLM-managed lands versus Kern County for private lands in the unincorporated portion of Kern County). Beyond resource management agencies, a local museum, Buena Vista Museum in Bakersfield, was contacted by WSP paleontologist Michael Amorelli on November 8, 2023, regarding any known paleontological localities from the Study Area. As of February 21, 2024, no response has been received from Buena Vista Museum.

5.8.5 Permits and Permit Schedule

With regard to paleontological resources, no additional permits beyond the Commission's certification are required for the authorization of the proposed Project. However, because the proposed Project components cross BLM-managed and State-owned lands, the qualified paleontologist preparing the PRMMP will include stipulations requiring a BLM Paleontology Permit as required by Section 6304 of the PRPA (43 CFR §49.110) as well as the appropriate permit from the State agency whose lands will be crossed by the proposed Project be obtained by the qualified paleontologist responsible for responding to unanticipated discoveries.

5.8.6 References

Bureau of Land Management. 2023. Bureau of Land Management National Potential Fossil Yield Classification Geodatabase. https://www.arcgis.com/home/webmap/viewer.html?url=https%3A%2F%2Fgis.blm.gov%2Farcgis%2Frest%2Fservices%2Fgeophysical%2FBLM_Natl_PFYC%2FMapServer&source=sd

California Department of Conservation, California Geological Survey. 2002. California Geomorphic Provinces. Note 36. Sacramento.

Dibblee, T. W. 1963. Geology of the Willow Springs and Rosamond Quadrangles, California. U.S. Geological Survey Bulletin 1089-C, Geologic Investigations of Southern California Deserts. Scale: 1:62,500. U.S. Government Printing Office, Washington, DC.

Dibblee, T. W. 1967. Areal Geology of Western Mojave Desert, California. US Geological Survey Professional Paper 522. U.S. Government Printing Office, Washington, DC.

Dibblee, T. W., and J. A. Minch. 2008a. Geologic Map of the Neenach & Willow Springs 15 Minute Quadrangles, Kern & Los Angeles Counties, California. U.S. Geological Survey, Washington, DC.

Dibblee, T.W., and J. A. Minch. 2008b. Geologic Map of the Rosamond & Rogers Lake 15-Minute Quadrangles, Kern & Los Angeles Counties, California. U.S. Geological Survey, Washington, DC.

Kern County Planning Department. 2009. Kern County General Plan. Bakersfield, California, September 22. https://psbweb.kerncounty.com/planning/pdfs/kcgp/KCGP_Complete.pdf

Paleobiology Database. 2023. Search Parameters – Continent: North America; County: United States of America, State: California, County: Kern. https://paleobiodb.org/#/

Science Applications International Corporation. 1994. Paleontology Resources: A Key to Unlocking the Past. Task Directive #S2R0602 Document # A0011-037-01R2. Prepared for Edwards Air Force Base, June 3. Reston, Virginia.

Society of Vertebrate Paleontology. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. McLean, Virginia. http://vertpaleo.org/Membership/Member-Ethics/SVP_Impact_Mitigation_Guidelines.aspx

University of California Museum of Paleontology. 2023. Search Parameters – Continent: North America; Country: United States; State/Prov: California. Berkeley. https://ucmpdb.berkeley.edu/loc.html

Woodburne, M.O., 2004. Later Cretaceous and Cenozoic Mammals of North America – Biostratigraphy and Geochronology. Edited by M.O. Woodburne. Columbia University Press, New York.

5.9 Public Health

This section discusses activities that could potentially affect public health as they relate to the construction and operation of the Willow Rock Energy Storage Center (WRESC or Willow Rock). A Health Risk Assessment (HRA) was performed to assess potential effects and public exposure associated with airborne emissions from the WRESC and include the architectural berm and no-architectural berm options for both operations and construction. Section 5.9.1 describes the affected environment. Section 5.9.2 presents an environmental analysis of the operation of the power facility and associated facilities. Section 5.9.3 discusses cumulative effects. Section 5.9.4 discusses mitigation measures. Section 5.9.5 presents applicable laws, ordinances, regulations, and standards (LORS), permit requirements, schedules, and agency contacts. Section 5.9.6 contains references cited or consulted in preparing this section. Appendices 5.9A to 5.9E contain the HRA support data.

the WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan. A detailed description of the WRESC is presented in Chapter 2, Project Description.

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way (ROW) associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH.

Air will be the dominant pathway for public exposure to chemical substances released by the WRESC. Emissions to the air will consist primarily of combustion by-products produced by four internal combustion engines driving emergency generators and a fire pump. Potential health risks from combustion emissions will occur almost entirely by direct inhalation. To be conservative, additional pathways were included in the health risk modeling. The HRA was conducted following the guidelines established by the California Office of Environmental Health Hazard Assessment (OEHHA) and the California Air Resources Board (CARB).

Combustion byproducts with established California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS), including nitrogen oxides, carbon monoxide (CO), and fine particulate matter (PM) (i.e., PM less than 10 microns [PM_{10}] and PM less than 2.5 microns [$PM_{2.5}$]) are addressed in Section 5.1, Air Quality. However, some discussion of the potential health risks associated with these substances is presented in this section. Human health risks associated with the potential accidental release of stored acutely hazardous materials, if applicable, are discussed in Section 5.5, Hazardous Materials.

5.9.1 Affected Environment

The WRESC will be located in Kern County within the Eastern Kern Air Pollution Control District (EKAPCD). The Willow Rock site is located approximately 0.22 miles due east of the State Route 14 interchange at Dawn Road approximately 3.5 miles north of Rosamond, California.

The Willow Rock site is situated in Kern County census tract 5514, which has a population value of 5964 individuals per the 2020 estimate from the United States Census Bureau. Section 2, Project Description, contains a detailed project description, location maps, and other related technical data.

The Draft 2022 Annual AB 2588 Air Toxics Report for EKAPCD dated September 12, 2022, identifies that there is only one Category 1 (high-level risk) facility in the EKAPCD that has a cancer risk exceeding 10 per million or a total hazard index exceeding 1.0. Twelve facilities are listed as Category 2 (intermediate level risk) and 12 facilities are listed as Category 3 (low-level risk). No facilities pursuant to the 2022 draft report have been required to prepare risk reduction and audit plans.

The EKAPCD 2022-2023 Information Report (EKAPCD) indicates that the number of days above the state 1-hour ozone standard has decreased since the 2001–2003 timeframe. Average concentrations of PM_{10} and $PM_{2.5}$ remain relatively unchanged in recent years, except for those years in which the airshed is impacted by pollutant transport during wildfire events.

The 2018–2019 Kern County Community Health Assessment and Improvement Plan (Kern County Public Health Services Department 2018) was reviewed for public health concerns as they relate to the WRESC Project. Air quality is reported to be a health concern caused by the unique geography of Kern County and is listed as one of the top challenges for the county. The overall trend is reported to be improving, however, and policies including "no burn" days and the promotion of carpooling are cited as contributing to the improving air quality. Asthma is also noted as being a problem in Kern County due to poor air quality.

No additional public health studies related to respiratory illnesses, cancers, or related diseases within a 6-mile radius of the WRESC site were identified within the last 5 years.

5.9.1.1 Receptors

For purposes of the construction and operational HRA evaluations the following four types of receptors were identified:

- Point of maximum impact (PMI). This receptor represents the highest concentration and risk point on the receptor grid for the analysis under consideration.
- Maximum exposed individual resident (MEIR). This receptor represents the maximum impacted actual residential location on the grid for the analysis under consideration.
- Maximum exposed individual worker (MEIW). This receptor represents the maximum impacted actual worker location on the grid for the analysis under consideration.
- Maximum exposed individual sensitive (MEIS). This receptor represents the maximum impacted actual sensitive location on the grid for the analysis under consideration. This location is a non-residential sensitive receptor, i.e., school, hospital, daycare center, or convalescent home.

The nested modeling grids as described in Section 5.1, Air Quality, were used for the HRA modeling. These grids covered the receptor types noted above and was expanded to include sensitive receptors within 5 miles of the WRESC Site.

Table 5.9-1 shows the sensitive receptors within the Project Area.

Table 5.9-1: Nearfield Sensitive Receptors

Receptor ID	UTM East (meters)	UTM North (meters)	Distance from the Project Fence Line (miles)
Nearest Residence	*393,427*	*3,865,201*	*0.80*
Nearest School	*392,025*	*3,858,690*	*3.48*
Nearest Daycare	*391,989*	*3,859,516*	*3.03*
Nearest Airport	*389,771*	*3,859,248*	*4.02*
Nearest Hospital	*None*	*None*	*Not applicable*
Nearest Convalescent Care Facility	*None*	*None*	*Not applicable*

UTM = Universal Transverse Mercator

The nearest residential receptor is located approximately 0.80 miles from the property fence line of the WRESC. The nearest worker receptor is approximately 1.49 miles north-northeast from the property line of the WRESC. The nearest sensitive receptor (residential daycare facility) is approximately 3.03 miles from the WRESC site. It should be noted the nearfield sensitive receptors provided in **Table 5.9-1** may not be the maximum impacted sensitive receptors on the grid, i.e., residential, worker, school, daycare, etc.

5.9.2 Environmental Analysis

The environmental effects on public health from the construction and operation of the WRESC Project Area presented in the following sections.

5.9.2.1 Significant Criteria

Significant criteria for cancer and non-cancer risk are described in the sections below.

5.9.2.1.1 Cancer Risk

Cancer risk is the probability or chance of contracting cancer over a human lifetime. Any exposure to a carcinogen is assumed to have some probability of causing cancer; the lower the exposure, the lower the cancer risk (i.e., a linear, no-threshold model). Under various state and local regulations, an incremental cancer risk greater than 10 per million due to a project's emissions has been established as a threshold for potentially significant effect on public health.

5.9.2.1.2 Non-Cancer Risk

Non-cancer health effects can be classified as either chronic or acute. In determining the potential health risks of non-cancerous air toxics, it is assumed that there is a dose of the chemical of concern below which there would be no effect on human health. The air concentration corresponding to this dose is called the Reference Exposure Level (REL). Non-cancer health risks are measured in terms of a hazard quotient, which is the calculated exposure of each contaminant divided by its REL. Hazard quotients for pollutants affecting the same target organ are typically summed, with the resulting totals expressed as hazard indices for each organ system. A hazard index of less than 1.0 is generally an insignificant health risk. RELs used in the hazard index calculations were those published in the Consolidated Table of OEHHA/CARB Approved Risk Assessment Health Values dated October 16, 2023 (OEHHA/CARB 2023).

Chronic toxicity is defined as adverse health effects from prolonged chemical exposure caused by chemicals accumulating in the body. Because chemical accumulation to toxic levels typically occurs slowly, symptoms of chronic effects usually do not appear until long after exposure commences. The lowest no-effect chronic exposure level for a non-carcinogenic air toxic is the chronic REL. Below this threshold, the body can eliminate or detoxify the chemical rapidly enough to prevent its accumulation. The chronic hazard index was calculated using the hazard quotients calculated with annual concentrations.

Acute toxicity is defined as adverse health effects caused by brief chemical exposure of no more than 24 hours. For most chemicals, the air concentration required to produce acute effects is higher than the level required to produce chronic effects because the exposure duration is shorter. Because acute toxicity is predominantly manifested in the upper respiratory system at threshold exposures, all hazard quotients are typically summed to calculate the acute hazard index. One-hour average concentrations are divided by the acute RELs to obtain a hazard index for health effects caused by relatively high, short-term exposures to air toxics.

5.9.2.2 Construction and Commissioning Phase Effects

The construction phase of the WRESC Project is expected to take approximately 60 months, followed by several months of startup and commissioning. Strict construction practices that incorporate safety and compliance with applicable LORS will be followed (see Section 5.9.5). Additionally, mitigation measures to reduce air emissions from construction effects will be implemented as described in Section 5.1, Air Quality. Temporary emissions from construction-related activities are discussed in Appendix 5.1B. Construction-related emissions are temporary and localized, resulting in no long-term effects to the public.

Small quantities of hazardous waste may be generated during the construction phase of the WRESC. Hazardous waste management plans will be in place so the potential for public exposure will be minimal (see Section 5.14, Waste Management). No acutely hazardous materials will be used or stored onsite during construction (see Section 5.5, Hazardous Materials). To ensure worker safety during construction, safe work practices will be followed (see Section 5.17, Worker Health and Safety).

A screening HRA was conducted for the construction period due to emissions of diesel particulate matter. Diesel engines emit a complex mixture of air pollutants, including both gaseous and solid material. The solid material in diesel exhaust is known as diesel particulate matter (DPM). More than 90% of DPM is less than 1 µm in diameter and, thus, is a subset of both PM10 and PM2.5. Most of the engine emitted PM10 and PM2.5 derive from combustion, such as in diesel fuels by motor vehicles. DPM is considered by CARB as the approved surrogate toxic for all diesel exhaust constituents for purposes of cancer and chronic health risk analyses. By assuming that all combustion based PM10 is in the form of DPM, which has a size of less than 1 µm, using combustion based PM10 to represent DPM would provide overestimates of the emissions of DPM. The analysis indicates that no significant public health effects are expected during the construction phase. The results of this analysis show no significant impact on public health and are presented in Appendix 5.9B.

Commissioning activity will include the operation of the emergency generators and fire pump; however, the effects from commissioning the generators and fire pump are not anticipated to be different than the operational phase effects.

5.9.2.3 Operational Phase Effects

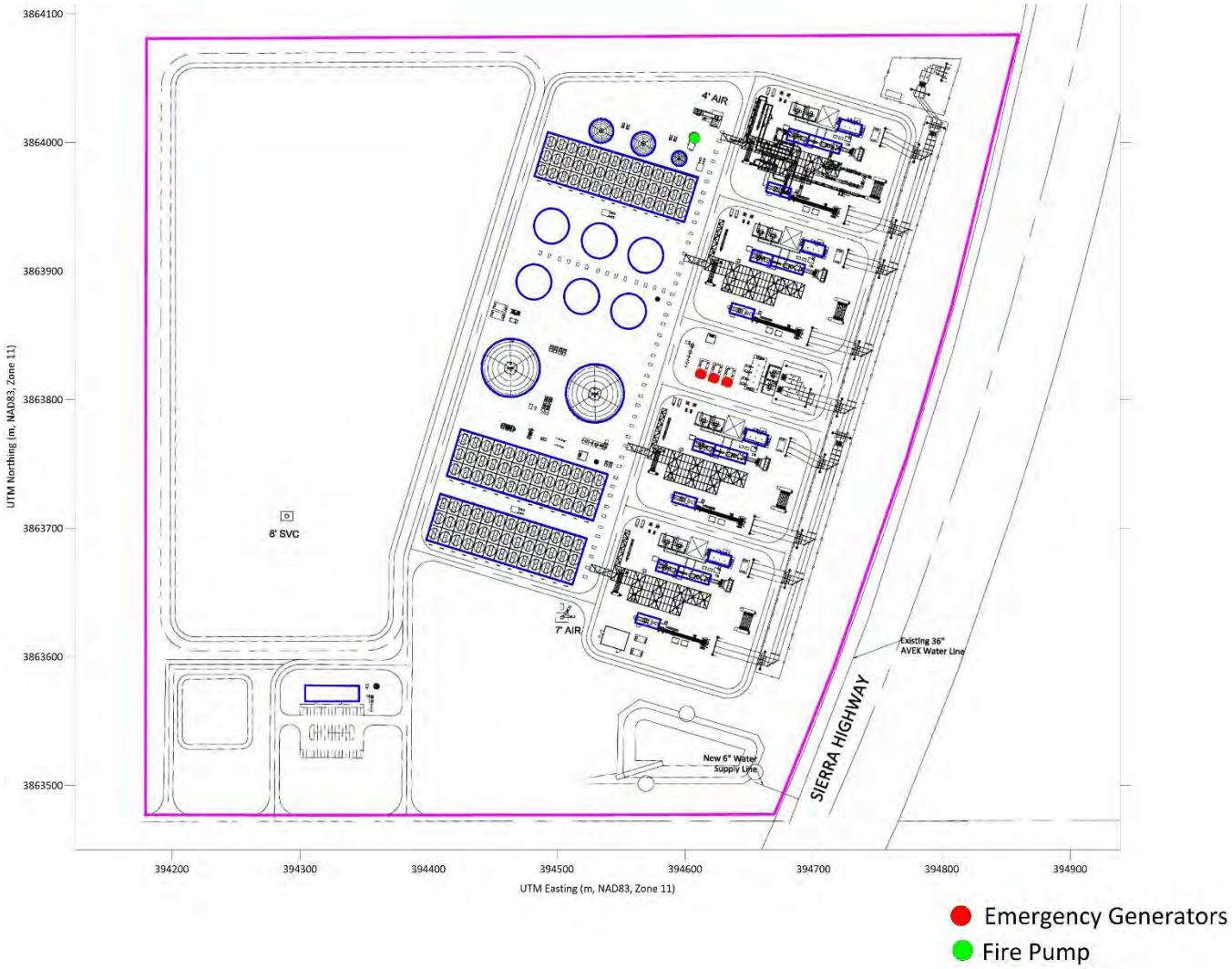
During the operational phase, three diesel generators will supply emergency power for critical loads. The generating capacity for the final design is to be no more than 2.5 MW per generator. Additionally, a single diesel fire pump will be located onsite to provide fire water pumping in critical situations. These engines are the only stationary sources that will combust fossil fuel and are anticipated to operate for up to 50 hours each per year for testing and maintenance. The EKAPCD requires the annual emissions of emergency equipment to be based on 200 hours per year which assumes that each year has up to 150 hours of emergency operation. Since HRA's are based on routine operation and typically do not include emergency operation, basing the health risk on a 30 year exposure values where each year has 150 hours of emergency operation was deemed to be too conservative. Thus, the HRA presented below reflects up to 50 hours per year of operation for each engine. This HRA includes emissions from the operation of the three emergency diesel generators and the fire pump engine. **Table 5.9-2** provides the location and source characteristics for each engine stacks. **Figure 5.9-1** shows the site property boundary (no-architectural berm option) and location of the four emission sources that are evaluated for this HRA. The architectural berm option source locations will be identical to the no-architectural berm option.

Table 5.9-2: Willow Rock Emission Sources for Operation Phase

Source ID	Description	UTM Easting Coordinate (meters)	UTM Northing Coordinate (meters)	Stack Height above grade (feet)	Stack Inside Diameter (feet)	Stack Elevation AMSL (feet)	Exhaust Gas Temperature (°F)	Exhaust Gas Flowrate (actual cfm)	Exhaust Velocity (ft/s)
EGEN 1	*Emergency Diesel Generator 2.5 MW*	*394,612.1*	*3,863,819.9*	*22.93*	*1.033*	*~2,554*	*914*	*19,468*	*193.5*
EGEN 2	*Emergency Diesel Generator 2.5 MW*	*394,622.3*	*3,863,816.8*	*22.93*	*1.033*	*~2,554*	*914*	*19,468*	*193.5*
EGEN 3	*Emergency Diesel Generator 2.5 MW*	*394,632.4*	*386,3813.7*	*22.93*	*1.033*	*~2,554*	*914*	*19,468*	*193.5*
FP	*Diesel Fire Pump 460 bhp*	*394,606.4*	*3,864,004.4*	*15*	*0.5*	*~2,554*	*1025*	*2,881*	*245*

Source: Kohler KD2500-4 and Cummins CFP15EVS-F10 Specifications
Note: Coordinate datum = UTM Zone 11, NAD83 North.
°F = Fahrenheit; AMSL= above mean sea level; bhp = brake horsepower, cfm = cubic feet minute; ft/s = feet per second; MW = megawatts

Figure 5.9-1: Location of Willow Rock Emission Sources during Operation Phase



The human health risks associated with the chemical substances potentially emitted into the air through the operation of the WRESC were evaluated in an HRA. The chemical substances potentially emitted into the air from the WRESC emission units are listed in **Table 5.9-3**.

Table 5.9-3: Chemical Substances Potentially Emitted to the Air from Willow Rock

Criteria Pollutants	Greenhouse Gasses	Toxic Air Pollutants
Particulate Matter (PM)	*Carbon Dioxide (CO2)*	*Diesel Particulate Matter (DPM) is considered the approved surrogate toxic for all diesel exhaust constituents for purposes of the cancer and chronic health risk analysis.*
PM less than 10 microns (PM10)	*Methane (CH4)*	
PM less than 2.5 microns (PM2.5)	*Nitrous Oxide (N2O)*	
Carbon Monoxide (CO)	*Not Applicable*	
Nitrogen Oxides (NOX)	*Not Applicable*	
Volatile Organic Compounds (VOC)	*Not Applicable*	

Source: Appendix 5.9C and Section 5.1, Air Quality

Estimated toxic pollutant emissions from the facility processes are provided in **Table 5.9-4**. Appendix 5.9C shows detailed emission calculations.

Table 5.9-4: Toxic Pollutant Emissions Estimates for Operation Phase

CAS	Pollutant	Each 2.5 MW Generator, lbs/hr	3-2.5 MW Generators, TPY	Fire Pump, lbs/hr	Fire Pump, TPY
9901	*DPM*	*0.16*	*0.012*	*0.152*	*0.0038*

Source: Section 5.9, Public Health, Appendix 5.9C
Notes: Lbs/hr values are for maintenance and readiness testing, no two engines will be tested concurrently.
CAS = Chemical Abstracts Service number
DPM = diesel particulate matter (in the form of PM_{10}.) For purposes of the health risk assessment, diesel particulate matter is assumed to equal PM10.lbs/hr = pounds per hour
MW = megawatts
TPY = tons per year; values are for the 50 hours per year runtime scenario per the CARB Air Toxics Control Measure

Ambient air concentrations due to emissions of criteria pollutants will adhere to NAAQS and CAAQS (see Section 5.1, Air Quality). Offsets will not be required because the WRESC Project will not be a major source under new source review. Air dispersion modeling results (see Section 5.1, Air Quality) show that emissions will not result in ambient concentrations of criteria pollutants that exceed ambient air quality standards (NAAQS or CAAQS). These standards are intended to protect the general public. Therefore, the WRESC Project is not anticipated to have a significant effect on public health from emissions of criteria pollutants.

The HRA was prepared using guidelines developed by OEHHA and CARB, as implemented in the latest version of the Hotspots Analysis and Reporting Program (HARP2) model (ADMRT Ver. 22118). Appendix 5.9D summarizes the HRA methodology followed, HARP2, and American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) model options and parameters.

5.9.2.4 Public Health Effect Study Methods

Emissions of toxic pollutants potentially associated with the WRESC calculated by assuming the PM_{10} emissions were all in the form of diesel particulate matter (DPM). The PM_{10} emission factors were based on the Tier 4 PM_{10} compliance limits. Each source of emissions was modeled with AERMOD using the methods previously described in Section 5.1, Air Quality. AERMOD allows the estimation of both short-term and long-term average concentrations in air for use in an HRA, accounting for site-specific terrain and meteorological conditions. The

emission rates and AERMOD model output were entered into HARP2, which calculates estimated ground level concentration for each pollutant. HARP2 then compares the ground level concentrations to cancer and non-cancer benchmarks to estimate health risk. Health risks potentially associated with the estimated concentrations of pollutants in the air were characterized in terms of excess lifetime cancer risks (for carcinogenic substances), or comparison with RELs for non-cancer health effects (for non-carcinogenic substances). Health risks were evaluated for the PMI, MEIR, MEIW, and MEIS receptor types.

Health risks potentially associated with concentrations of carcinogenic air pollutants were calculated as estimated excess lifetime cancer risks. The excess lifetime cancer risk for a pollutant is estimated as the product of the concentration in the air and a unit risk value. The unit risk value is defined as the estimated probability of a person contracting cancer because of constant exposure to an ambient concentration of 1 microgram per cubic meter over a 30-year lifetime. Evaluation of potential non-cancer health effects from exposure to short-term and long-term concentrations in the air was performed by comparing modeled concentrations in the air with the RELs. A REL is a concentration in the air at or below which no adverse health effects are anticipated. RELs are based on the most sensitive adverse effects reported in medical and toxicological literature. Potential non-cancer effects were evaluated by calculating a ratio of the modeled concentration in the air and the REL. This ratio is referred to as a hazard quotient. The unit risk values and RELs used to characterize health risks associated with modeled concentrations in the air were obtained from the Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values (OEHHA/CARB 2023) and are presented in **Table 5.9-5**.

Table 5.9-5: Toxicity Values Used to Characterize Health Risks (Inhalation)

CAS	Pollutant	Unit Risk Factor ($\mu g/m^3)^{-1}$	Chronic REL ($\mu g/m^3$)	Acute REL ($\mu g/m^3$)	8-hour Chronic REL ($\mu g/m^3$)
9901	*Diesel Particulate Matter*	*3.0E-04*	*5*	*none*	*none-*

Source: CARB/OEHHA 2022.
$\mu g/m^3$ = microgram per cubic meter; CAS=Chemical Abstracts Service number; REL = Reference Exposure Level

5.9.2.5 Characterization of Risks from Toxic Air Pollutants

Based on the HARP2 modeling results for routine operations, the excess lifetime cancer risks and chronic hazard index are all less than the health risk significance thresholds presented in **Table 5.9-6**, with the exception of the PMI, where the cancer risk was exceeded. The PMI is located on the eastern Project fence line boundary and is not a residential receptor. Excess lifetime cancer risks less than 10×10^{-6}, for sources with Best Available Control Technology for Toxics (TBACT) (use of a DPF), are unlikely to represent significant public health impacts that require additional controls of facility emissions. Cancer risks higher than 1×10^{-6} may or may not be of concern, depending upon several factors. These include the conservatism of assumptions used in risk estimation, the size of the potentially exposed population, and the toxicity of the risk-driving chemicals. Cancer risks higher than 10×10^{-6} from sources trigger public notice requirements. Non-cancer risks less than 1.0 are generally not a concern.

Table 5.9-6: Health Effects Significant Threshold Levels for Eastern Kern Air Pollution Control District

	Significance Thresholds	
Risk Category	EKAPCD Net Project Risk	State of California
Cancer Risk	*<=1 in one million without TBACT* *<=10 in one million with TBACT*	*<= 1 in a million without TBACT* *<=10 in a million with TBACT*
Chronic Hazard Index	*1.0* *1.0*	*1.0*
Acute Hazard Index	*1.0* *1.0*	*1.0*
Cancer (TBACT required)	*>1 in a million* *Chronic HI > 1.0*	*See above.*
Cancer Burden	*NA*	*1.0*

Source: EKAPCD 2021
EKAPCD = Eastern Kern Air Pollution Control District; NA = not applicable; TBACT = Best Available Control Technology for Toxics

Facilities with elevated risks are required to provide public notice, and if the risks are considered significant, the facility must work to reduce emissions to acceptable levels within 5 years.

The risks predicted in the HRA are compared to the following EKAPCD levels:

- Public Notification Threshold: Required to notify the public if:
  - The cancer risk is greater than or equal to 10 in 1 million.
  - The non-cancer chronic or acute hazard index is greater than 1.0.
- Significant Risk Threshold: Required to notify the public and prepare a risk reduction audit plan if:
  - The cancer risk is greater than or equal to 100 in 1 million.
  - The non-cancer chronic or acute hazard index is greater than 5.0.

5.9.2.5.1 HRA Results

A summary of the risks associated with operational DPM emitted from the WRESC sources are presented in **Table 5.9-7** and **Table 5.9-8**. The electronic files provided to the California Energy Commission (CEC) present more detailed tables of the HARP2 modeling results for each health risk, at each receptor type, broken down by pollutant and source based on the exposure durations.

Table 5.9-7: Health Risk Assessment Summary for the Operations Phase

Architectural berm Option							
Type of Risk	Receptor Type	Exposure Duration	Risk[a,b]	Above Significance Thresholds?	Receptor ID	UTM E (meters)	UTM N (meters)
Cancer	*PMI*	*30 Years*	*3.16*	*No*	*61*	*394,832.36*	*3,863,973.48*
	MEIR		*0.0177*	*No*	*4,494*	*393,510.00*	*3,865,110.00*
	MEIS		*0.00884*	*No*	*1,911*	*393,160.00*	*3,858,860.00*
	MEIW	*25 Years*	*5.20E-09*	*No*	*4,494*	*393,510.00*	*3,865,110.00*

Architectural berm Option							
Type of Risk	Receptor Type	Exposure Duration	Risk[a,b]	Above Significance Thresholds?	Receptor ID	UTM E (meters)	UTM N (meters)
Chronic HI	*PMI*	*Annual*	*7.14E-04*	*No*	*61*	*394,832.36*	*3,863,973.48*
	MEIR		*4.00E-06*	*No*	*4,494*	*393,510.00*	*3,865,060.00*
	MEIS		*2.00E-06*	*No*	*1,911*	*393,160.00*	*3,858,860.00*
	MEIW		*4.00E-06*	*No*	*4494*	*393,510.00*	*3,865,110.00*

[a] Cancer risk values are expressed in in chances per 1 million to allow direct comparison with EKAPCD public notification and significant risk levels. For example, 3.16 in a 1 million risk at the PMI receptor is less than the public notification threshold of 10 in 1 million and less than the significant risk threshold of 100 in 1 million. Values less than 0.001 in 1 million are expressed in scientific notation. For example, 5.20E-09 is equivalent to 0.0000000052

[b] Chronic HI values are expressed in scientific notation, since all values are less than 0.001 and well below the EKAPCD significance threshold of 1.

MEIR = maximum exposed individual residential; MEIS = maximum exposed individual sensitive; MEIW = maximum exposed individual worker; PMI = point of maximum impact; UTM = Universal Transverse Mercator

Table 5.9-8: Health Risk Assessment Summary for the Operations Phase

No-Architectural berm Option							
Type of Risk	Receptor Type	Exposure Duration	Risk[a,b]	Above Significance Thresholds?	Receptor ID	UTM E (meters)	UTM N (meters)
Cancer	*PMI*	*30 Years*	*3.16*	*No*	*40*	*394,833.27*	*3,863,977.23*
	MEIR		*0.0177*	*No*	*4,388*	*393,480.00*	*3,865,110.00*
	MEIS		*0.00884*	*No*	*1,848*	*393,160.00*	*3,858,860.00*
	MEIW	*25 Years*	*5.20E-09*	*No*	*4,388*	*393,480.00*	*3,865,110.00*
Chronic HI	*PMI*	*Annual*	*7.14E-04*	*No*	*40*	*394,833.27*	*3,863,977.23*
	MEIR		*4.00E-06*	*No*	*4,388*	*393,480.00*	*3,865,110.00*
	MEIS		*2.00E-06*	*No*	*1,848*	*393,160.00*	*3,858,860.00*
	MEIW		*4.00E-06*	*No*	*4,388*	*393,480.00*	*3,865,110.00*

[a] Cancer risk values are expressed in in chances per 1 million to allow direct comparison with EKAPCD public notification and significant risk levels. For example, 3.16 in a 1 million risk at the PMI receptor is less than the public notification threshold of 10 in 1 million and less than the significant risk threshold of 100 in 1 million. Values less than 0.001 in 1 million are expressed in scientific notation. For example, 5.20E-09 is equivalent to 0.0000000052

[b] Chronic HI values are expressed in scientific notation, since all values are less than 0.001 and well below the EKAPCD significance threshold of 1.

Source: HARP2 (ADMRT 22118) model run by ADI, December 2023

The PMI in both scenarios is located on the eastern fence line and is not a residential receptor.

The MEIS in both scenarios is the Rosamond Elementary School.

MEIR = maximum exposed individual residential; MEIS = maximum exposed individual sensitive; MEIW = maximum exposed individual worker; PMI = point of maximum impact; UTM = Universal Transverse Mercator

All calculated health risk impacts to sensitive receptors are far below the significance criteria of one in one million at the residential worker and sensitive receptor locations. A detailed description of the HARP modeling assumptions used to calculate health risks associated with emissions to the air is presented in Appendix 5.9D.

Results of the HRA indicate that cancer and chronic (non-cancer) risk levels associated with emissions from the four sources that will be operated during the operational phase of the WRESC are well below the Assembly Bill

2588 levels that trigger public notice or risk reduction. DPM has no acute REL values; therefore, an acute analysis was not performed.

5.9.2.5.2 Cancer Risk

As noted, the PMI (for both the architectural berm and no-architectural berm scenarios) for cancer risk is predicted to occur on the fence line receptors 61 and 40, at the east side of the property boundary fenceline where no sensitive receptors are located and there is no significant risk of extended exposure by a sensitive receptor and no risk o continuous exposure for 30 years. All of the risk is based on DPM, which is a surrogate toxic for diesel combustion. The pathway for maximum exposure and contribution is inhalation.

The MEIR (for both scenarios) for cancer risk is predicted to occur at receptors 4494 and 4388. This risk assumes 30 years of continuous exposure. The pathway for maximum exposure and contribution is inhalation.

The location of the MEIS receptors (for both scenarios) with maximum cancer risk is predicted to occur at Rosamond Elementary School (1911 and 1848).

The MEIW (for both scenarios) for 25-year cancer risk is predicted to occur at receptors 4494 and 4388.

The Project cancer risk impacts are considered insignificant.

5.9.2.5.3 Chronic Hazard Index

The PMI (for both scenarios) for chronic risk is predicted to occur on the fence line receptors 61 and 40, at the east side of the property boundary. This risk assumes 30 years of continuous exposure. The pathway for maximum exposure and contribution is inhalation.

The MEIR (for both scenarios) for chronic risk is predicted to occur at receptors 4494 and 4388. This risk assumes 30 years of continuous exposure. The pathway for maximum exposure and contribution is inhalation.

The location of the MEIS receptors (for both scenarios) with maximum chronic risk is predicted to occur at Rosamond Elementary School (1911 and 1848).

The MEIW (for both scenarios) for 25-year chronic risk is predicted to occur at receptors 4494 and 4388.

The Project chronic hazard impacts are considered insignificant.

5.9.2.5.4 Acute Hazard Index

DPM is considered by CARB and the U.S. Environmental Protection Agency to be the approved surrogate toxic for whole diesel exhaust. DPM does not, at this time, have an approved acute hazard index (HI) REL value; therefore, an acute HI risk analysis was not performed.

The chronic hazard quotients associated with concentrations in air are shown in **Table 5.9-7**. The chronic hazard quotients for all target organs are below 1.0. As described previously, a hazard quotient less than 1.0 is unlikely to represent a significant effect on public health. Further description of the methodology used to calculate health risks associated with emissions to the air is presented in the HARP2 Users Guides (HARP2 2015) and in the OEHHA 2015 Air Toxics Hot Spots Health Risk Assessment Guidance document (OEHHA/CARB 2015).

Detailed risk and hazard values are provided in the HARP2 output presented in Appendix 5.9E (electronic modeling files on CD-ROM).

The estimates of excess lifetime cancer risks and non-cancer risks associated with chronic exposures are below thresholds used for regulating emissions of toxic pollutants to the air. Historically, exposure to any level of a carcinogen has been considered to have a finite risk of inducing cancer. In other words, there is no threshold for carcinogenicity. Since risks at low levels of exposure cannot be quantified directly by either animal or epidemiological studies, mathematical models have estimated such risks by extrapolation from high to low doses. This modeling procedure is designed to provide a conservative estimate of cancer risks based on the most sensitive species of laboratory animal for extrapolation to humans.

An excess lifetime cancer risk of 1×10^{-6} is typically used as a screening threshold for insignificant risk from potential exposure to carcinogenic substances in the air. The excess cancer risk level of 1×10^{-6}, which has historically been judged to be an acceptable risk, originates from efforts by the Food and Drug Administration to use quantitative HRA for regulating carcinogens in food additives in light of the zero-tolerance provision of the Delany Amendment (Hutt 1985). The associated dose, known as a "virtually safe dose," has become a standard used by many policymakers and the public for evaluating cancer risks. However, a study of regulatory actions about carcinogens found that an acceptable risk level can often be determined on a case-by-case basis. This analysis of 132 regulatory decisions found that regulatory action was not taken to control estimated risks below 1×10^{-6} (one in a million), which are called de minimis risks. De minimis risks are historically considered risks of no regulatory concern. Chemical exposures with risks above 4×10^{-3} (four in 10 thousand), called de manifestis risks, were consistently regulated. De manifestis risks are typical risks of regulatory concern. Risks falling between these two extremes were regulated in some cases, but not in others (Travis et al. 1987). In EKAPCD, an excess cancer risk above 10×10^{-6} requires public notification, and an excess cancer risk above 100×10^{-6} is considered significant and requires risk reduction. The WRESC Project would be below these thresholds.

5.9.2.5.5 Cancer Burden

To evaluate population risk, regulatory agencies have used the cancer burden as a method to account for the number of excess cancer cases that could potentially occur in a population. The cancer burden can be calculated by multiplying the cancer risk at a census block centroid by the number of people who live in the census block, and adding the estimated cancer cases across the zone of impact. A census block is defined as the smallest entity for which the Census Bureau collects and tabulates decennial census information. A centroid is defined as the central location within a specified geographic area.

The cancer burden for an operational site is calculated based on OEHHA (70 years) risk assumptions. It is independent of how many people move in or out of the vicinity of an individual facility. The number of cancer cases is considered independent of the number of people exposed, within some lower limits of exposed population size, and the length of exposure (within reason). For example, if 10,000 people are exposed to a carcinogen at a concentration with a $1x10^{-5}$ cancer risk for a lifetime, the cancer burden is 0.1, and if 100,000 people are exposed to a 1×10^{-5} risk the cancer burden is 1.

Different methods can be used as a measure of population burden. The number of individuals residing within a 1×10^{-6}, 1×10^{-5}, and/or 1×10^{-4} isopleth is another potential measure of population burden.

A cancer burden threshold of significance value could not be identified for the EKAPCD. However, a cancer burden analysis based on a 70-year cancer risk analysis using an isopleth of 1×10^{-6} and the estimated population within this isopleth area (<50 individuals) showed a burden value or 0.00005. In Appendix 5.9D, **Figure 5.9D-1** and **Figure 5.9D-2** show the actual architectural berm and no-architectural berm $1x10^{-6}$ risk isopleths, and **Figure 5.9D-3** shows the extended circular area based on these isopleths, which was used to determine the estimated exposed population.

5.9.2.5.6 Construction HRA Results

Construction health risk was analyzed for DPM onsite emissions only. Health risks were calculated for an exposure period of 5 years. The construction HRAs were run for the architectural berm and no-architectural berm options with identical receptor grids but different fence lines. **Table 5.9-9 and Table 5.9-10** summarize the results of these analyses. The results of the HRA for the architectural berm and no-architectural berm options demonstrate that at all residential and worker receptor locations, the Project will be less than the 10 in one-million risk significance thresholds. It should be noted that the PMI locations were all along the immediate eastern fence line and do not represent either worker or residential receptor locations. All chronic risk exposures are less than the significance criteria of 1.0 at all receptors for both the architectural berm and no-architectural berm options and thus, the Project will not contribute to any type of chronic impact on human health. The electronic input and output files for all of the operations and construction health risk analyses have been provided to the CEC.

Table 5.9-9: Health Risk Assessment Summary for the Construction Phase

Architectural berm Option							
Type of Risk	Receptor Type	Exposure Duration	Risk[a,b]	Above Significance Thresholds?	Receptor ID	UTM E (meters)	UTM N (meters)
Cancer	*PMI*	*5 Years*	*225*	*Yes*	*47*	*394752.77*	*3863698.79*
	MEIR		*1.99*	*No*	*5973*	*393510.00*	*3865110.00*
	MEIS		*0.436*	*No*	*3301*	*393160.00*	*3858860.00*
	MEIW	*5 Years*	*0.235*	*No*	*5973*	*393510.00*	*3865110.00*
Chronic HI	*PMI*	*Annual*	*0.0981*	*No*	*47*	*394752.77*	*3863698.79*
	MEIR		*0.000868*	*No*	*5973*	*393510.00*	*3865110.00*
	MEIS		*0.00019*	*No*	*3301*	*393160.00*	*3858860.00*
	MEIW		*0.000868*	*No*	*5973*	*393510.00*	*3865110.00*

[a] Cancer risk values are expressed in in chances per 1 million to allow direct comparison with EKAPCD public notification and significant risk levels. Although, 225 in a 1 million risk at the PMI receptor is greater than the public notification threshold of 10 in 1 million and the significant risk threshold of 100 in 1 million, the PMI location is along the immediate eastern fence line and does not represent either actual worker or actual residential receptor locations.
[b] Chronic HI values are all less than 0.1 and well below the EKAPCD significance threshold of 1.
MEIR = maximum exposed individual residential; MEIS = maximum exposed individual sensitive; MEIW = maximum exposed individual worker; PMI = point of maximum impact; UTM = Universal Transverse Mercator

Table 5.9-10: Health Risk Assessment Summary for the Construction Phase

No-Architectural berm Option							
Type of Risk	Receptor Type	Exposure Duration	Risk[a,b]	Above Significance Thresholds?	Receptor ID	UTM E (meters)	UTM N (meters)
Cancer	*PMI*	*5 Years*	*273*	*Yes*	*10*	*394735.08*	*3863647.43*
	MEIR		*3.05*	*No*	*5815*	*393510.00*	*3865110.00*
	MEIS		*0.711*	*No*	*3232*	*393,160.00*	*3,858,860.00*
	MEIW	*5 Years*	*0.360*	*No*	*5815*	*393510.00*	*3865110.00*
Chronic HI	*PMI*	*Annual*	*0.1192*	*No*	*10*	*394735.08*	*3863647.43*
	MEIR		*0.00133*	*No*	*5815*	*393510.00*	*3865110.00*
	MEIS		*0.00031*	*No*	*3232*	*393,160.00*	*3,858,860.00*
	MEIW		*0.00133*	*No*	*5815*	*393510.00*	*3865110.00*

Source: HARP2 (ADMRT 22118) model run by ADI, December 2023
[a] Cancer risk values are expressed in in chances per 1 million to allow direct comparison with EKAPCD public notification and significant risk levels. Although, 273 in a 1 million risk at the PMI receptor is greater than the public notification threshold of 10 in 1 million and the significant risk threshold of 100 in 1 million, the PMI location is along the immediate eastern fence line and does not represent either actual worker or actual residential receptor locations.
[b] Chronic HI values are all less than 0.1 and well below the EKAPCD significance threshold of 1.
MEIR = maximum exposed individual residential; MEIS = maximum exposed individual sensitive; MEIW = maximum exposed individual worker; PMI = point of maximum impact; UTM = Universal Transverse Mercator

5.9.2.6 Hazardous Materials

Hazardous materials may be used and stored at the WRESC site. The hazardous materials stored onsite and descriptions of their uses are presented in the Hazardous Materials Handling section. The use of chemicals at the WRESC site will be following standard practices for the storage and management of hazardous materials. The normal use of hazardous materials, therefore, will not pose significant effects on public health. While mitigation measures will be in place to prevent releases, accidental releases that migrate offsite could result in potential effects to the public.

5.9.2.7 Odors

The WRESC is not expected to emit or cause to be emitted any substances that could cause nuisance odors.

5.9.2.8 Electromagnetic Field Exposure

Electromagnetic fields (EMFs) are composed of electric and magnetic fields and occur independently of one another. EMFs will exist at the WRESC created by electric charges at the 60-Hertz frequency used in transmission lines. Electric fields exist when these charges are not moving. Magnetic fields are created when the electric charges are moving. The magnitude of both electric and magnetic fields falls off rapidly as the distance from the source increases (proportional to the inverse of the square of distance).

Because the electric gen-tie lines do not typically travel through residential areas, and based on findings of the National Institute of Environmental Health Sciences (NIEHS) (1999), EMF exposures are not expected to result in a significant effect on public health. The NIEHS report to the U.S. Congress found that “the probability that EMF exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal scientific support that exposure to this agent is causing any degree of harm” (NIEHS 1999).

California does not currently have a regulatory level for magnetic fields. However, the values estimated for transmission lines similar to the gen-tie lines proposed for the WRESC are well below those established by states that do have limits. Other states have established regulations for magnetic field strengths that have limits ranging from 150 milligauss to 250 milligauss at the edge of the ROW, depending on voltage. The CEC does not currently specify limits on magnetic fields for standard types and sizes of transmission lines.

5.9.2.9 Legionella

Legionella is a bacterium that is ubiquitous in natural aquatic environments and is also widely distributed in human-made water systems. It is the principal cause of legionellosis, otherwise known as Legionnaires’ disease, which is similar to pneumonia. Transmission to people results mainly from inhalation or aspiration of aerosolized contaminated water. Untreated or inadequately treated cooling systems, such as industrial cooling tower cells and building heating, ventilating, and air conditioning systems, have been correlated with outbreaks of legionellosis.

The WRESC will not have a cooling tower or wet surface air cooler. As such, there is no requirement to prepare and implement a water treatment program designed to reduce the potential for Legionella.

5.9.2.10 Summary of Effects

Results from the air toxics HRA based on emissions modeling indicate that there will be no significant incremental public health risks from the construction or operation of the WRESC. Results from criteria pollutant modeling for routine operations indicate that potential ambient concentrations of nitrogen dioxide, CO, sulfur dioxide, and PM_{10} will not significantly affect air quality (Section 5.1, Air Quality). Modeled concentrations are below the federal and California standards established to protect public health, including the more sensitive members of the population.

5.9.3 Cumulative Effects

An analysis of the cumulative impacts of the WRESC, per CEC practice, based on modeling studies conducted by staff, is typically only required if the proposed facility is generally within less than 0.5 miles of another existing major or large toxics emissions source. No such sources were identified within the default distance of 0.5 miles. A

search of the CARB Pollution Mapping Tool shows that the closest tracked source is a cement plant (CalPortland) located approximately 12 miles to the north-northwest of the WRESC.

It is not anticipated that a cumulative impact assessment is justified based on the proposed emission units for the operation of the WRESC, and the proximity to the nearest CARB-tracked air emissions source.

Additionally, mapping provided by CalEnviroScreen 4.0 indicated the following for the WRESC Site and surrounding regional area:

- The Rosamond urban area is classified as a 70 to 80 percentile region, and as such is considered an overburdened community area (see Appendix 5.9D, **Figure 5.9D-4**).
- The Rosamond urban area lies within 2010 census tract 6029005802 (2020 census tract numbers are 58.03 and 58.04), which have a population of approximately 9,479 individuals (see Appendix 5.9D, **Figure 5.9D-5** and **Figure 5.9D-6**).
- The WRESC Site lies approximately 1.6 miles (8,400 feet) north of the Rosamond overburdened area northern boundary.
- The WRESC Site lies in 2010 census tract 6029005506 (2020 census tract number is 55.14), which is classified as a 56 percentile area and has a population of approximately 5,964 individuals.

Based on the HRA results presented above, the proposed facility will not significantly impact the Rosamond overburdened designated area.

5.9.4 Best Practices, Design Features, and Mitigation Measures

Any mitigation measures (if applicable) are described in the sections below.

5.9.4.1 Criteria Pollutants

Emissions of criteria pollutants will be minimized by applying Best Available Control Technology (BACT) to the WRESC. BACT for the engines driving the emergency generators (see Section 5.1, Air Quality).

The WRESC is not proposed to be a major source under nonattainment new source review and thus is not expected to trigger the offset requirements of EKAPCD Rule 210.1A IV(A). Therefore, further mitigation of emissions is not required to protect public health.

5.9.4.1.1 Toxic Pollutants

Emissions of toxic pollutants to the air will be minimized using BACT/TBACT at the WRESC, (i.e., the use of best management practices for the control of CO, volatile organic compounds, and gaseous toxic constituents).

5.9.4.1.2 Legionella Mitigation Measure

The WRESC Project will not include cooling towers or wet surface air coolers; therefore, a Legionella mitigation plan is not required.

5.9.4.2 Hazardous Materials

Mitigation measures for hazardous materials are presented below and discussed in more detail in the Hazardous Materials Handling section. Potential public health effects from the use of hazardous materials are only expected to occur because of an accidental release. The facility has many safety features designed to prevent and minimize effects from the use and accidental release of hazardous materials. The WRESC will include the following design features:

Curbs, an architectural berm, and/or secondary containment structures will be provided where the accidental release of chemicals may occur.

- A fire-protection system will be included to detect, alarm, and in some areas suppress a fire, following applicable LORS.
- Construction of all storage systems will be following applicable construction standards, seismic standards, and LORS.

A Risk Management Plan is not required for operations.

A safety program will be implemented and will include safety training programs for contractors and operations personnel, including instructions on the following:

- Proper use of personal protective equipment
- Safety operating procedures
- Fire safety
- Emergency response actions

The safety program will also include programs on safely operating and maintaining systems that use hazardous materials. Emergency procedures for WRESC personnel include power facility evacuation, hazardous material spill cleanup, fire prevention, and emergency response.

Areas subject to potential leaks of hazardous materials will be paved and architectural bermed. Incompatible materials will be stored in separate containment areas. Containment areas will be drained to either a collection sump or to holding or neutralization tanks. Piping and tanks exposed to potential traffic hazards will be additionally protected by traffic barriers.

5.9.5 Laws, Ordinances, Regulations, and Standards

The relevant LORS that affect public health and apply to the WRESC and the conformity of the WRESC to each of the LORS are presented in this section.

5.9.5.1 Federal Laws, Ordinances, Regulations, and Standards

- 40 Code of Federal Regulations (CFR) Part 50 (National Primary and Secondary Ambient Air Quality Standards): WRESC operations will comply with the NAAQS using air dispersion models.
- 40 CFR Part 63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants [NESHAP] – Reciprocating Internal Combustion Engines): The WRESC will comply with this rule by demonstrating compliance with 40 CFR Part 60 Subpart IIII (see Section 5.1, Air Quality).

5.9.5.2 State Laws, Ordinances, Regulations, and Standards

- California Health and Safety Code (CHSC) Part 6 Sections 44360 to 44366 (Air Toxics “Hot Spots” Information and Assessment): The WRESC will be subject to Part 6 because it will release substances listed in the rule from the combustion of diesel fuel from the emergency generators. GEM A-CAES LLC (GEM, the Applicant) will participate in the requirement to prepare an inventory and health risk analysis (if applicable). Analysis shows that emissions from the WRESC will be below the public notification and risk reduction levels of 10×10^{-6} and 100×10^{-6}, respectively, for operation and that the cancer burden is reasonable for risk due to construction activities.
- CHSC Chapter 6.6, Sections 25249.5 to 25249.14 (Safe Drinking Water and Toxic Enforcement Act of 1986): The WRESC is not anticipated to release chemicals known to cause cancer or reproductive toxicity to a source of drinking water. Air emissions will comply with an air permit that must be obtained from EKAPCD. The results of the HRA show that air emissions do not exceed public notice thresholds.
- CHSC Sections 25500 to 25542 (Hazmat Inventory): As applicable, GEM will prepare required hazardous materials plans and inventories and submit them to the proper authorities (see Section 5.5, Hazardous Materials.)
- California Code of Regulations Title 17 Section 70200 (CAAQS): Emissions from Willow Rock operations shows compliance with the CAAQS using air dispersion models.

5.9.5.3 Eastern Kern Air Pollution Control District Laws, Ordinances, Regulations, and Standards

- EKAPCD Regulation II, Rule 201.2 (synthetic minor sources): Emissions of hazardous air pollutants (HAPs) from the operational WRESC will be less than 10 tons per year of an individual HAP and 25 tons per year total HAP and will therefore be classified as a minor source of HAP.

- EKAPCD Regulation II, Rule 208.1 (disclosure of air toxics information): All issued air permits will contain a requirement to comply with CHSC Sections 44300 through 44384, known as the Air Toxics "Hot Spots" Information and Assessment Act. The WRESC will comply with the issued air permit condition.
- EKAPCD Regulation II, Rule 208.2.II.F (finding of no significant impact): This rule establishes that any increase in cancer risk less than one per million and total HI less than 0.2 justifies that the activity is not subject to the California Environmental Quality Act. The HRA shows that risks from WRESC operations will be less than these values.
- EKAPCD Regulation II, Rule 210.9 (construction of major stationary source of HAP): The WRESC will not be a major stationary source of HAP; therefore, this rule will not apply.
- EKAPCD Regulation IV, Rule 423 (NESHAP): This rule incorporates by reference the federal NESHAP under 40 CFR Parts 61 and 63; applicability is discussed under federal LORS.

5.9.5.4 Permits Required and Schedule

Agency-required permits or plans related to public health include a hazardous materials management plan and EKAPCD Permits to Construct/Permits to Operate air emission units. These requirements are discussed in detail in the Hazardous Materials Handling section and Section 5.1, Air Quality, respectively.

5.9.5.5 Agencies Involved and Agency Contacts

Table 5.9-11 provides contact information for agencies involved with Public Health.

Table 5.9-11: Agency Contacts for Public Health

Public Health Concern	Regulatory Agency	Regulatory Contact
Public exposure to air pollutants	*U.S. Environmental Protection Agency Region 9*	*Deborah Jordan, Acting Regional Administrator U.S. EPA Region 9 75 Hawthorne St. San Francisco, CA 94105 (415) 947-8000*
Public exposure to air pollutants	*California Air Resources Board*	*LinYing Li 1001 I Street, 19th Floor Sacramento, CA 95814 (916) 322 1721*
Public exposure to air pollutants	*Eastern Kern Air Pollution Control District*	*Glen Stephens, P.E., Air Pollution Control Officer 2700 M Street, Suite 302 Bakersfield, CA 93301 (661) 862-5250*
Public exposure to chemicals known to cause cancer or reproductive toxicity	*Office of Environmental Health Hazard Assessment*	*Martha Sandy, Ph.D., Branch Chief 1001 I Street, 19th Floor Sacramento, CA 95814 (916) 324-7572*
Public exposure to acutely hazardous materials	*Kern County Public Health Services Department of Toxic Substance Control*	*Brynn Carrigan, Director 2700 M Street, Suite 300 Bakersfield, CA 93301-2370 (661) 862-8740*

5.9.6 References

Eastern Kern Air Pollution Control District (EKAPCD). 2018-2019 Information Report.

Hotspots Analysis and Reporting Program (HARP2). 2015. User Guide, Version 2.0.3. Cal-EPA Air Resources Board, ADMRT Version 21081.

Hutt, P.B. 1985. “Use of Quantitative Risk Assessment in Regulatory Decision Making Under Federal Health and Safety Statutes.” Risk Quantitation and Regulatory Policy. Eds. D.G. Hoel, R.A. Merrill and F.P. Perera. Banbury Report 19, Cold Springs Laboratory.

Kern County Public Health Services Department. 2018. Kern County Community Health Assessment and Improvement Plan: 2018-2019. https://kernpublichealth.com/wp-content/uploads/2019/12/KCPHSD-Community-Health-Assessment-and-Improvement-Plan-2018.2019.pdf. Accessed February 19, 2024.

National Institute of Environmental Health Sciences (NIEHS). 1999. Environmental Health Institute report concludes evidence is ‘weak’ that EMFs cause cancer. Press release. National Institute of Environmental Health Sciences, National Institutes of Health.

California Office of Environmental Health Hazard Assessment and California Air Resources Board (OEHHA/CARB). 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines, Cal-EPA. February 2015.

California Office of Environmental Health Hazard Assessment and California Air Resources Board (OEHHA/CARB). 2023. Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values. October 16, 2023.

Travis, C. C., E. A. C. Crouch, R. Wilson, and E.D. Klema. 1987. “Cancer Risk Management: A Review of 132 Federal Regulatory Cases.” Environ. Sci. Technol. 21: 415-420.

5.10 Socioeconomics

5.10.1 Introduction

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California. The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's (SCE's) Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line.

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH.

This section describes the potential social and economic effects within the Project vicinity and region that are expected to result from construction and operation of the WRESC. This discussion considers Project-related effects on population, housing, public services and utilities, and county tax revenue, and evaluates the economic benefits that will arise from the Project. This evaluation of socioeconomics includes the following elements:

- Section 5.10.1 describes the socioeconomic environment that might be affected by the WRESC.
- Section 5.10.2 provides an environmental analysis of the construction and operation of the WRESC.
- Section 5.10.3 discusses whether there will be any potential cumulative effects from the Project.
- Section 5.10.4 describes mitigation measures that will be implemented to avoid and minimize potential impacts.
- Section 5.10.5 discusses the applicable laws, ordinances, regulations, and standards (LORS).
- Section 5.10.6 lists the agencies involved and agency contacts.
- Section 5.10.7 discusses permits and permit schedules.
- Section 5.10.8 lists reference materials used in preparing this section.
- Appendix 5.10A (herein) presents a screening-level environmental justice analysis.

5.10.2 Affected Environment

The WRESC Site is located in a relatively undeveloped area of unincorporated Kern County, California. The WRESC Site is approximately 3.5 miles north of Rosamond and 7 miles northeast of the community of Willow Springs, California. Neither the communities of Willow Springs nor Rosamond is an incorporated town or city. The nearest incorporated community is Lancaster, California. Lancaster is located in Los Angeles County and is more than 15 miles south of the WRESC Site. As such, the region of influence for purposes of evaluating the socioeconomic impacts associated with the Project will be the surrounding unincorporated communities, neighboring incorporated communities (e.g., Lancaster, Palmdale, etc.), and Kern County.

5.10.2.1 Population

Land use and growth trends identified for the Socioeconomics Study Area (SSA) are based on population estimates, projections, and current land use plans. The California Department of Finance (CDOF) estimates that Kern County's 2023 population is 907,476. In 2020, the County's population was 909,235, according to the U.S. Census Bureau's American Community Survey (ACS). The CDOF estimates Kern County's population in 2030 will be 940,257 (CDOF 2023a). Based on Kern County population data for years 2010 and 2020, population growth within the county was 0.84 percent. This equates to a net increase in residents of 70,906 for the 10-year

period from 2010-2020. **Table 5.10-1** summarizes the historical population data for Kern County and the state of California. **Table 5.10-2** summarizes annual average population growth rates for Kern County and the State of California.

Table 5.10-1: Historical and Projected Populations

Area	2020	2021	2022	2023	2030 (projected)	2040 (projected)	2050 (projected)
Kern County	909,235	917,673	908,107	907,476	940,257	966,310	969,968
California	39,538,223	39,237,836	39,078,674	38,940,231	41,860,549	43,353,414	44,049,015

Source: CDOF 2023a, 2023b

Table 5.10-2: Historical and Projected Annual Population Growth by Percentage

Area	2010–2020	2020–2030 (projected)	2030–2040 (projected)	2040–2050 (projected)
Kern County	0.84%	0.38%	0.28%	0.04%
California	0.65%	0.02%	0.17%	0.01%

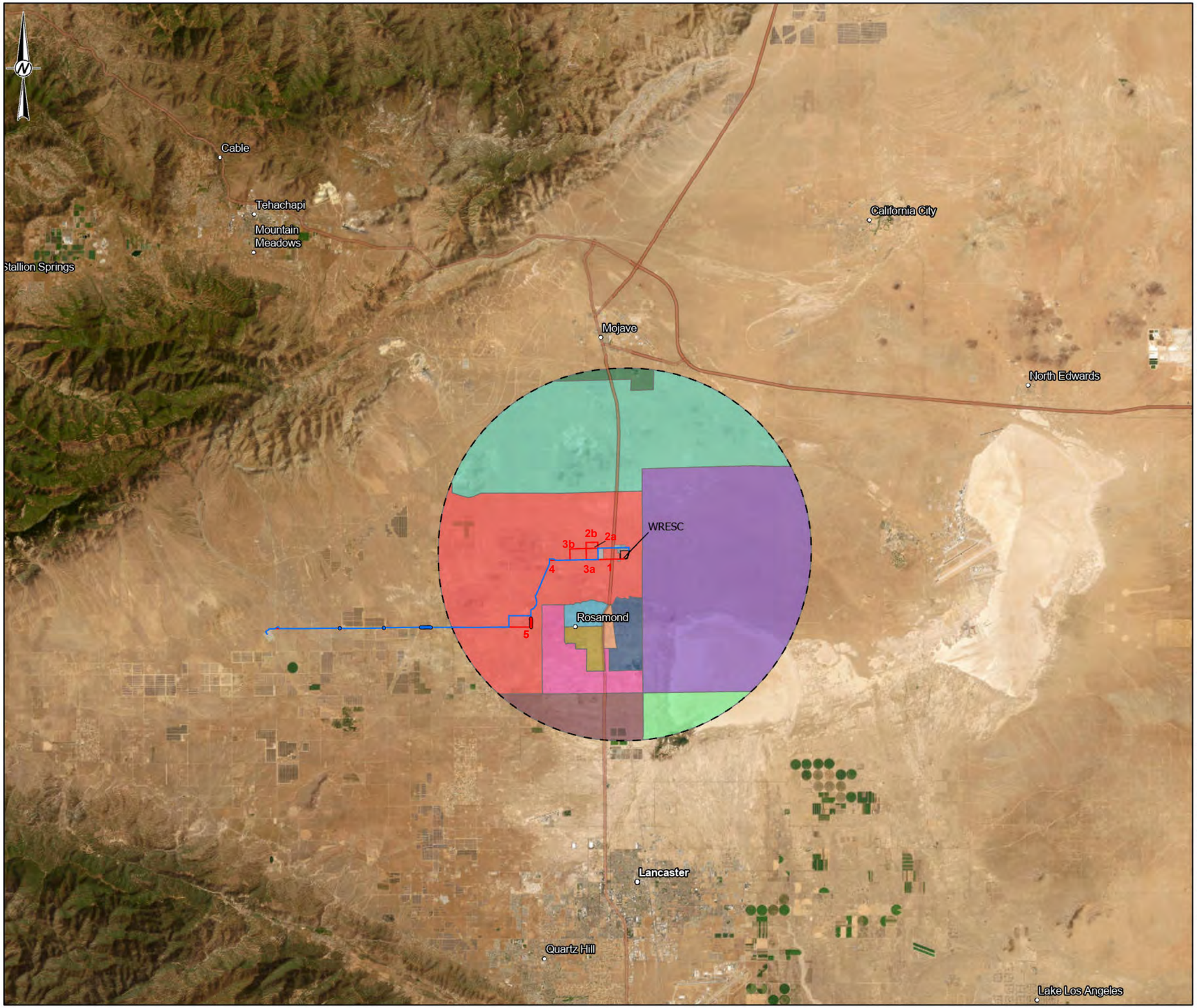
Source: CDOF 2023b

According to the U.S Environmental Protection Agency's (U.S. EPA) environmental justice screening tool, the 2018 population for the 10-mile area surrounding the WRESC was 24,376 (U.S. EPA n.d.). This equates to a population density of 74 people per square mile (U.S. EPA n.d.). The Willow Springs and Rosamond Specific Plans indicate that growth rates within the community are hard to predict, with projections ranging from stagnant to as high as 4 to 6 percent annually. The Willow Springs and Rosamond Specific Plans list the following key elements affecting population growth within the area:

- Population and housing demand within Willow Springs is affected by the proximity of Edwards Air Force Base to Willow Springs and Rosamond and the ever-changing number of civilian jobs and military personnel on the base.
- The desirability of living in Willow Springs and Rosamond is correlated to home prices and rental rates in Palmdale and Lancaster.
- The cost of traveling the added distance from Willow Springs and Rosamond to employment centers is greatly dependent on energy prices (Kern County 2008a, 2008b).

Appendix 5.10A presents a screening analysis of environmental justice for the SSA. Demographics data from the SSA is presented in **Tables 5.10A-1** and **5.10A-2** of **Appendix 5.10A**. **Figures 5.10-1** and **5.10-2**, below, illustrate the people of color (POC) and the low-income population distributions for the census tracts that are within a 10-mile radius of the WRESC Site. The POC population in the census tract groups within the 10-mile radius of the site make up 60 percent of this total population. However, the percentage of respondents that reported white alone as their ethnicity was also 60 percent. The percentage of respondents who noted their ethnicity as Hispanic within the 10-mile radius of the WRESC Site was 43 percent. The POC data and income data are from the 2017–2021 ACS 5-year estimates (U.S. EPA 2023).

The U.S. Census Bureau does not provide an official definition of "low income." The 2017–2021 ACS indicates that 35 percent of the respondents from the census tracts within a 10-mile radius of the WRESC Site reported income below the poverty level in the past 12 months. For a family of four in 2023, the U.S. Department of Health and Human Services lists the poverty threshold at $30,000. **Figure 5.10-1** and **Figure 5.10-2** show the percent distribution of POC population and the population below the poverty level by decennial census tracts within a 10-mile radius of the WRESC Site, respectively.



LEGEND

- PROJECT BOUNDARY
- OTHER PROJECT PARCELS
- 10 MILE BUFFER

PERCENT OF POPULATION WHOSE INCOME IN THE PAST 12 MONTHS IS BELOW POVERTY LEVEL

- 0
- 2.2
- 6.2
- 8.2
- 8.9
- 11.3
- 11.6
- 17.8
- 21
- 23
- 27.6

PREFERRED ROUTE

- ABOVEGROUND
- UNDERGROUND

ROUTE ALTERNATIVES (OPTIONS 1-6)

- ABOVEGROUND ROUTE OPTIONS 1-6
- UNDERGROUND ROUTE OPTIONS 1-6

1:340,822

0 3.5 7 14 Miles

REFERENCE(S)

AERIAL IMAGERY - ESRI PROVIDED BASEMAP SERVICE. IMAGERY COLLECTED 10/2/2021.
AMERICAN COMMUNITY SURVEY 2017-2021

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK AFC

TITLE
LOW INCOME COMMUNITY MAP

CONSULTANT

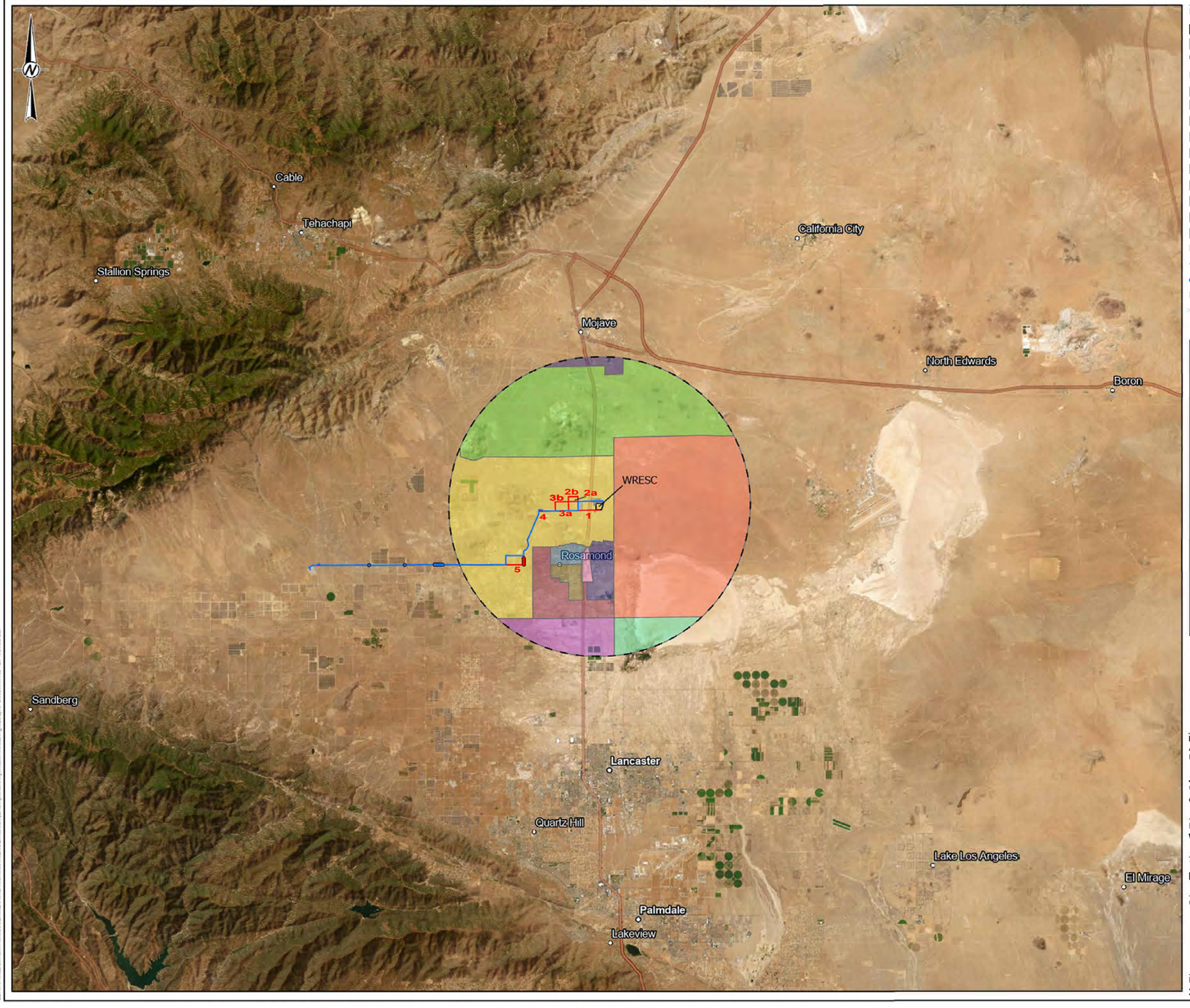
YYYY-MM-DD	2024-02-09
DESIGNED	JAM
PREPARED	KD
REVIEWED	SCH
APPROVED	VG/LL

PROJECT NO.
31406639.003

FIGURE
Figure 5.10-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

PATH: C:\Users\JSK07128\OneDrive - WSP O365\Documents\ArcGIS\Projects\HydrostorHydrostorSocooke\Figures.aprx PRINTED ON: AT 3:47:26 PM



LEGEND

- PROJECT BOUNDARY
- OTHER PROJECT PARCELS
- 10 MILE BUFFER

PERCENT PEOPLE OF COLOR

- 0
- 40
- 43
- 47
- 56
- 61
- 62
- 66
- 69
- 72

PREFERRED ROUTE

- ABOVEGROUND
- UNDERGROUND

ROUTE ALTERNATIVES (OPTIONS 1-6)

- ABOVEGROUND ROUTE OPTIONS 1-6
- UNDERGROUND ROUTE OPTIONS 1-6

KEY MAP

1:340,822

0 3.5 7 14 Miles

REFERENCE(S)
AERIAL IMAGERY - ESRI PROVIDED BASEMAP SERVICE. IMAGERY COLLECTED 10/2/2021.
UNITED STATES CENSUS 2020

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK AFC

TITLE
PEOPLE OF COLOR COMMUNITY MAP

CONSULTANT
wsp

YYYY-MM-DD	2024-02-09
DESIGNED	JAM
PREPARED	KD
REVIEWED	SCH
APPROVED	VGLL

PROJECT NO.
31406639.003

FIGURE
Figure 5.10-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

5.10.2.2 Housing

As shown in **Table 5.10-3**, housing stock for Kern County as of January 1, 2023, was 308,365 units and the vacancy rate was 6.5 percent. As of January 1, 2023, the vacancy rate for the state of California was 6.6 percent (CDOF 2023a). The U.S. Department of Housing and Urban Development (HUD) considers a vacancy rate below 5 percent as limiting. The housing stock In Kern County is therefore not considered to be limited according to HUD guidelines.

Table 5.10-3: Housing Estimates by County and State as of January 1, 2023

Area	Total Units	Single-Family	Multi-Family	Mobile Homes	Percent Vacant
Kern County	308,365	229,467	55,464	23,434	6.5%
California	14,707,698	9,477,572	4,691,166	538,960	6.6%

Source: CDOF 2023b

The existing zoning designations for the Rosamond and Willow Springs areas that constrain the number of housing units per parcel, as well as the lack of water and sewer facilities, will contribute to limiting large-scale residential development within the vicinity of the WRESC.

5.10.2.3 Economy and Employment

Between 2018 and 2022, employment in Kern County increased by 148,100 jobs, or about 7.3 percent average annual growth. This 1.8 percent annual average increase in employment is less than California's trend (3.1 percent) over the same period (CEDD 2023b). As shown in **Table 5.10-4**, on a percentage increase basis, transportation, warehousing, and utilities followed by professional, scientific, and technical services, experienced the largest increases in employment while information services had the highest reduction. The highest contributions to Kern County's employment were from wage and salary, nonfarm, and service-providing industries.

Table 5.10-4: Employment Distribution in Kern County, 2018–2022

Industry	2018 Number of Employees	2018 Employment Share Percent	2022 Number of Employees	2022 Employment Share Percent	2018–2022 Percent Change	2018–2022 Percent Annual Growth Rate
Transportation, Warehousing, and Utilities	13,200	0.65%	22,300	1.02%	68.94%	17.23%
Professional, Scientific, and Technical Services	9,500	0.47%	11,600	0.53%	22.11%	5.53%
Trade, Transportation, and Utilities	53,300	2.62%	63,200	2.90%	18.57%	4.64%
Private Educational Services	1,700	0.08%	2,000	0.09%	17.65%	4.41%
Private Education and Health Services	38,100	1.87%	44,500	2.04%	16.80%	4.20%
Mining and Logging	9,300	0.46%	7,800	0.36%	-16.13%	4.03%

Industry	2018 Number of Employees	2018 Employment Share Percent	2022 Number of Employees	2022 Employment Share Percent	2018–2022 Percent Change	2018–2022 Percent Annual Growth Rate
Information	2,000	0.10%	1,600	0.07%	-20.00%	-5.00%
Total Wage and Salary	327,900	16.13%	347,400	15.93%	5.95%	1.49%
Total Nonfarm	266,400	13.10%	286,600	13.14%	7.58%	1.90%
Service-Providing	228,000	11.21%	249,900	11.46%	9.61%	2.40%
Other	1,083,900	53.31%	1,146,519	52.46%	5.78%	1.44%
Total	2,033,300	100.00	2,181,400	100.00	7.28%	-1.82%

Source: CEDD 2023a

Table 5.10-5 provides details on the characteristics of the labor force. It shows 2022 annual average employment data for Kern County compared to the state of California as a whole. Kern County maintained a higher unemployment rate than the state of California. The California Employment Development Department (CEDD) does not project future unemployment rates.

Table 5.10-5: Employment Data, Annual Average 2022

Area	Year	Labor Force	Employment	Unemployment	Unemployment Rate
Kern County	2022	391,700	364,600	27,200	6.9%
State of California	2022	19,252,000	18,440,900	811,100	4.2%

Source: CEDD 2023b

5.10.2.4 Fiscal Resources

The local agency with taxing authority is Kern County. **Table 5.10-6** presents Kern County's general fund expenditures and revenues. As indicated in **Table 5.10-6**, Kern County shows that general fund revenues increased by about 5 percent from fiscal year (FY) 2019–2020 to FY 2020–2021 and again by about 7 percent from FY 2021–2022 to FY 2022–2023.

Table 5.10-6: Kern County Fund Revenues and Expenditures

Fund Type	Fiscal Year 2021–2022	Fiscal Year 2022–2023	Fiscal Year 2023–2024
Expenditures			
General Government	$797,034,179	$985,527,997	$732,555,364
Public Protection	$1,019,809,585	$1,089,055,999	$1,179,182,489
Public Ways and Facilities	$273,595,983	$339,893,644	$375,573,836
Health and Sanitation	$723,760,834	$766,097,955	$959,294,237
Public Assistance	$845,631,511	$909,802,255	$979,363,937
Education	$9,825,347	$10,004,911	$13,633,559
Recreation and Cultural Services	$1,445,723	$874,153	$721,238
Debt Service	$11,671,565	$14,798,626	$13,817,687
Appropriation for Contingencies	$6,354,658	$8,358,371	$22,081,412
Internal Service Fund	$27,634,139	$30,381,493	$0
Total Financing Requirements	$3,689,129,385	$4,124,413,911	$4,276,223,759

Fund Type	Fiscal Year 2021–2022	Fiscal Year 2022–2023	Fiscal Year 2023–2024
Revenues			
Taxes	$537,069,175	$638,447,474	$707,640,818
1991 Realignment	$30,371,664	$137,999,989	$142,712,715
2011 Realignment	$206,723,698	$231,737,527	$238,830,209
Proposition 172	$85,351,553	$97,684,746	$104,795,674
State, Federal, or Government Aid	$895,768,774	$872,139,757	$1,052,340,684
Fee/Rate	$545,782,484	$586,696,793	$608,532,632
Other Revenue	$95,863,544	$98,890,480	$90,240,815
Other Funding Sources	$1,332,897,657	$1,598,206,823	$1,446,347,002
Total Financing Sources	$3,829,828,549	$4,261,803,589	$4,391,440,549

Source: Kern County Administrative Office 2023.

In FY 2021–2022, taxes made up approximately 21.5 percent of Kern County's total general fund revenues. The contribution of taxes to the County's general funds increased to 24 percent of total general fund revenues during FY 2022–2023. For FY 2021–2022 and 2022–2023, intergovernmental revenues represented the largest source of revenue for Kern County's general fund. Intergovernmental revenue is funding received from another government, either in the form of a grant or as reimbursement for costs incurred.

5.10.2.5 Education

The Southern Kern Unified School District serves the area where the WRESC will be located for grades K through 12. **Table 5.10-7** provides current enrollment figures for the 2021–2022 and 2022–2023 school year for grades K through 12.

Table 5.10-7: Number of Students Enrolled in the Southern Kern Unified School District, by Grade for 2021-2022 and 2022-2023 Academic Years

Grade	K–8 (School Year 2021–2022)	K–8 (School Year 2021–2022)	High School (9–12) (School Year 2022–2023)	High School (9–12) (School Year 2022–2023)
Kindergarten	14,090	1,892	Not Applicable	Not Applicable
1st	14,871	1,521	Not Applicable	Not Applicable
2nd	14,916	1,591	Not Applicable	Not Applicable
3rd	14,922	1,561	Not Applicable	Not Applicable
4th	15,136	1,561	Not Applicable	Not Applicable
5th	15,222	1,588	Not Applicable	Not Applicable
6th	14,730	1,682	Not Applicable	Not Applicable
7th	15,395	1,739	Not Applicable	Not Applicable
8th	15,395	1,769	Not Applicable	Not Applicable
9th	Not Applicable	Not Applicable	14,923	227
10th	Not Applicable	Not Applicable	15,587	224
11th	Not Applicable	Not Applicable	15,002	214
12th	Not Applicable	Not Applicable	15,152	218

Enrollments include adult, private, or charter school enrollment
Source: CDE 2023a

5.10.2.6 Public Services and Facilities

This section describes public services and facilities in the WRESC area. Local governments with a large enough tax base provide public emergency services to their residents. In areas where the tax base is too small to create emergency service agencies, the responsibility for providing such services falls to the corresponding county. The three primary emergency service functions provided by local governments are police, fire, and emergency medical services. As their primary goal, these public service agencies share a role in protecting the safety of people and property.

5.10.2.6.1 Law Enforcement

The Kern County Sheriff's Office (KCSO) provides law enforcement services within unincorporated Kern County. The KCSO has four area substation sections: North Area, East Area, Northeast Area, and South Area. The East Area Substation includes the WRESC Site. The nearest substation to the WRESC Site within the East Area is Rosamond Substation. The response time to an emergency call from the WRESC Site depends on the availability and proximity of sheriff's deputies at the time that dispatch receives the emergency call. The Rosamond substation is located at 3179 35th Street W in Rosamond, which is 4.6 roadway miles from the WRESC Site. The California Highway Patrol (CHP) is the primary law enforcement agency for state highways and roads. Services include law enforcement, traffic control, accident investigation, and management of hazardous material spills. The CHP Bakersfield office serves all of Kern County, including the Project Area.

5.10.2.6.2 Fire Protection

The WRESC Site is within the jurisdiction of the Kern County Fire Department (KCFD). KCFD's services include fire suppression and prevention, emergency medical services, fire investigations, and public education presentations. The primary response station that would serve the WRESC is KCFD Station 15 at 3219 35th Street W, in Rosamond. Firefighters staff the station 24 hours per day, 7 days per week. KCFD Station 15 Rosamond maintains two fire engines. A response time from this fire station located 4.4 miles away from the WRESC Site is unavailable.

5.10.2.6.3 Hospitals

Antelope Valley Hospital (AVH) in Los Angeles County is the nearest hospital to the WRESC Site that has a trauma center. AVH is located at 1600 West Avenue J in Lancaster, California, approximately 16 roadway miles from the WRESC Site. AVH's trauma center is the only Level II trauma center within approximately 50 miles of the WRESC Site, and it maintains a helipad. The hospital staffs its trauma center with a trauma surgeon, neurosurgeon, orthopedic surgeon, anesthesiologist, nurses, and radiologists. AVH's trauma team is on duty and/or on call 24 hours per day, 365 days per year. Services offered at AVH include intensive care, neurosurgery, women's health, surgery, heart health, and digestive diseases.

5.10.2.7 Utilities

A public utility is an organization that maintains the infrastructure for a public service. An interruption of public utilities can adversely impact public health. A reduction in the reliability of public utility services impacts all aspects of daily life.

5.10.2.7.1 Electricity and Gas

The WRESC will be an all-electric facility that does not require combustion of fossil fuel to operate. For safety precautions, the facility will maintain a 460-horsepower diesel-fired emergency fire pump and three up to 2.5 MW diesel-fired emergency back generators to power essential plant equipment in the event of a loss of power. The Applicant will have the ability to draw power from the grid and provide electricity to the existing SCE Whirlwind Substation via an approximately 19-mile interconnection gen-tie line from the proposed 500-megawatt (net) A-CAES system.

5.10.2.7.2 Water

As described in Section 5.15, Water Resources, the WRESC will require water to support construction and the initial filling of the hydrostatic compensation surface reservoir. The Applicant will obtain the construction and operational water from the Antelope Valley East Kern (AVEK) Water Agency via a water supply pipeline located near the eastern boundary of the WRESC Site. The WRESC will require a minimal amount of operational water on an average annual basis. AVEK will deliver potable water to the site from a potable source. Potable water will be provided for drinking water, kitchen use, safety showers, and eye-wash stations. Water for sanitary use during operations will be sourced from the reservoir. As described in Section 5.15, workers during WRESC's operations phase are assumed to use up to 20 gallons of potable water per person per day.

The Applicant will collect and store any excess process water from the reservoir system in an onsite, lined evaporation basin. The Applicant will periodically contract with a vendor to collect any residual material from the basin and then transport it via truck to an appropriately licensed offsite disposal facility. Stormwater will be directed to a separate onsite evaporation-percolation basin.

5.10.3 Environmental Analysis

This section assesses the potential environmental impacts of the WRESC and its associated linear facilities.

5.10.3.1 Potential Environmental Impacts

Local environmental impacts were determined by comparing Project demands during construction and operation with the socioeconomic resources of the region of influence. Kern County is the region of influence for the WRESC Project. Construction and operation of the WRESC has the potential to impact employment, population, housing, public services, utilities, and/or schools. Impacts may be both local and regional but are likely to be more local; "local" is defined as occurring within the County, and "regional" refers to impacts that occur outside of the County's boundaries.

Significance Criteria

Factors used to evaluate the significance of project related socioeconomics are set forth in Appendix G of the California Environmental Quality Act (CEQA). Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

With respect to Socioeconomics, there is no Appendix G section titled "Socioeconomics," though some of the criteria are discussed in the sections titled "Population and Housing," and "Utilities and Service System." Accordingly, this evaluation of socioeconomic impacts is based on the criteria provided in CEQA Checklist (California Code of Regulations, Title 14, Section 15000 and following as well as certain Appendix G criteria). Impacts resulting from construction and operation of the WRESC may be potentially significant if they:

- Induce substantial growth or concentration of population.
- Displace a large number of people or impact existing housing.
- Result in substantial adverse impacts on the local economy and employment.
- Create adverse fiscal impacts on the community.
- Result in substantial adverse impacts on educational facilities.
- Result in substantial adverse impacts on the provision of utility services.
- Result in substantial adverse impacts associated with the provision of public services.

Other impacts may be potentially significant if they cause substantial change in community interaction patterns, social organization, social structures, or social institutions; substantial conflict with community attitudes, values, or perceptions; or substantial inequities in the relative costs and benefits of the project.

5.10.3.2 Construction Impacts

Construction of the WRESC will take approximately 60 months. Construction phases include three major categories:

- Cavern construction, including preparation, shafts, and excavation
- Transmission infrastructure
- Surface construction, starting approximately 12 months after cavern construction

5.10.3.2.1 Construction Workforce

The primary trades required for construction will include skilled labor such as heavy equipment operators, electricians, plumbers, welders, miners, mechanics, carpenters, and ironworkers. **Table 5.10-8** and **Table 5.10-9** provide an estimate of skilled labor personnel requirements for the WRESC's construction. Total construction personnel requirements are expected to be approximately 16,500 person-months. A person month is the amount of time that is equivalent to one person working full-time for one full calendar month. Construction personnel requirements are expected to peak at approximately 726 and 749 workers in months 33 and 34 of the construction period, respectively. The average workforce over the 60-month construction period is expected to be approximately will be 275 workers. The workforce needed to construct the WRESC is less than 0.74 percent of the total construction, mining, and utility workforce in Kern County as a whole, as shown in **Table 5.10-4**. Additionally, many of the applicable construction trades needed for the WRESC Project are projected to experience growth within Kern County (**Table 5.10-10**).

Construction of the cavern and shafts requires a specialized workforce that has received job-specific training for subsurface mining work under confined conditions. The Applicant anticipates that the workforce for the cavern and shafts will largely consist of out-of-town workers. The evaluation of skilled labor availability within the area of influence involved reviewing CEDD occupational databases for Kern County and the Bakersfield Metropolitan Area, as well as contacting the Kern, Inyo and Mono Counties Building & Construction Trades Council. **Table 5.10-10** presents the results of the CEDD skilled labor review, and **Table 5.10-11** provides the contact information for the Building and Construction Trades Council office in Kern County.

Based on the skilled labor requirements and the existing workforces in Kern County, local labor pools will be adequate to fulfill the WRESC's non-specialized construction labor requirements. Furthermore, the Los Angeles-Long Beach-Glendale Metropolitan Division and the Riverside-San Bernardino-Ontario Metropolitan Statistical Area maintain large construction workforces and are located within 2 hours of the WRESC. As a result, the WRESC will not cause a significant adverse impact on the construction workforce in the area. Rather, the Project is expected to result in a positive impact on County employment during the construction period.

Table 5.10-8: Construction Workforce Personnel for Months 1 to 24

Month/Skill	1–4	5–12	13	14	15	16	17	18	19	20	21	22	23	24
Cavern Works														
Mining														
Mechanic	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Electrician	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Hoistman	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Miner	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Equipment Operator	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Site Supervision	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Project Management	0	0	0	0	0	0	0	0	0	0	0	0	0	2

Month/Skill	1–4	5–12	13	14	15	16	17	18	19	20	21	22	23	24
Shaft Sinking (24-foot conventionally sunk)														
Miners	0	11	6	6	6	6	6	6	6	6	6	6	1	0
Nippers	0	15	8	8	8	8	8	8	8	8	8	8	1	0
Batch Plant Operators	0	11	6	6	6	6	6	6	6	6	6	6	1	0
Superintendent	0	4	2	2	2	2	2	2	2	2	2	2	0	0
Shift Boss	0	4	2	2	2	2	2	2	2	2	2	2	0	0
Mechanic	0	4	2	2	2	2	2	2	2	2	2	2	0	0
Electrician	0	4	2	2	2	2	2	2	2	2	2	2	0	0
Clerk	0	4	2	2	2	2	2	2	2	2	2	2	0	0
Equipment Operators	0	7	4	4	4	4	4	4	4	4	4	4	0	0
Hoistman	0	4	2	2	2	2	2	2	2	2	2	2	0	0
Rigger	0	4	2	2	2	2	2	2	2	2	2	2	0	0
Safety Professional	0	4	2	2	2	2	2	2	2	2	2	2	0	0
Drilling (Blind Bore Shafts)														
Project Management	0	8	3	3	3	3	3	3	3	3	3	3	3	3
Equipment Operator	0	25	9	9	9	9	9	9	9	9	9	9	9	9
Laborer	0	17	6	6	6	6	6	6	6	6	6	6	6	6
Welder	0	25	9	9	9	9	9	9	9	9	9	9	9	9
Site Prep														
Equipment Operator	0	30	0	0	0	0	0	0	1	6	6	6	6	0
Laborer	0	30	0	0	0	0	0	0	1	6	6	6	6	0
Plant Manager	0	5	0	0	0	0	0	0	0	1	1	1	1	0
Surface Works														
Staff	20	42	8	15	19	44	43	40	47	40	46	58	38	34
Craft Support	11	24	5	8	10	24	24	22	26	22	25	32	21	19
Tanks	0	0	0	0	0	0	0	32	32	32	32	32	32	32
Insulation	0	11	4	4	6	19	25	25	33	35	11	5	1	0
Instrumentation	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Steel Crew		0	0	0	2	0	0	0	0	5	1	5	4	3
Scaffold	0	0	0	0	0	0	0	0	0	0	8	11	10	12
Pipe Crew	0	0	0	0	0	0	0	0	0	0	5	10	6	10
Mechanical Crew	0	8	3	2	4	10	6	2	2	4	17	15	5	6
InEight Startup Resources	2	0	0	0	1	2	1	0	0	0	0	0	0	5
Electrical Crew	14	0	0	0	0	0	0	0	1	0	0	33	26	16
Concrete Crew	0	0	0	0	0	5	4	5	8	8	31	28	11	4
Civil Crew	28	125	17	37	44	97	91	84	93	65	68	68	47	40
Buildings	15	27	2	1	2	2	1	1	1	1	1	3	3	4

Month/Skill	1–4	5–12	13	14	15	16	17	18	19	20	21	22	23	24
Cavern Waste Rock Hauling	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Transmission - Aboveground Offsite	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transmission - Underground Offsite	0	0	0	0	0	0	0	0	0	0	0	0	0	19
Total	89	451	105	134	154	269	263	279	312	292	325	380	248	246

Source: Kiewit 2023

Table 5.10-9: Construction Workforce Personnel for Months 25 to 60

Month/Skill	25	26	27	28	29	30	31	32	33	34	35	36	37–60
Cavern Works													
Mining													
Mechanic	8	16	16	16	16	16	16	16	16	16	16	16	196
Electrician	3	6	6	6	6	6	6	6	6	6	6	6	76
Hoistman	4	8	8	8	8	8	8	8	8	8	8	8	96
Miner	22	44	44	44	44	44	44	44	44	44	44	44	528
Equipment Operator	2	4	4	4	4	4	4	4	4	4	4	4	60
Site Supervision	2	4	4	4	4	4	4	4	4	4	4	4	52
Project Management	6	8	8	8	8	8	8	8	8	8	8	8	100
Shaft Sinking (24-foot conventionally sunk)													
Miners	0	0	0	0	0	0	0	0	0	0	0	0	0
Nippers	0	0	0	0	0	0	0	0	0	0	0	0	0
Batch Plant operators	0	0	0	0	0	0	0	0	0	0	0	0	0
Superintendent	0	0	0	0	0	0	0	0	0	0	0	0	0
Shift Boss	0	0	0	0	0	0	0	0	0	0	0	0	0
Mechanic	0	0	0	0	0	0	0	0	0	0	0	0	0
Electrician	0	0	0	0	0	0	0	0	0	0	0	0	0
Clerk	0	0	0	0	0	0	0	0	0	0	0	0	0
Equipment Operators	0	0	0	0	0	0	0	0	0	0	0	0	0
Hoistman	0	0	0	0	0	0	0	0	0	0	0	0	0
Rigger	0	0	0	0	0	0	0	0	0	0	0	0	0
Safety Professional	0	0	0	0	0	0	0	0	0	0	0	0	0

Month/Skill	25	26	27	28	29	30	31	32	33	34	35	36	37–60
Drilling (Blind Bore Shafts)													
Project Management	1	1	1	1	1	1	1	1	1	1	0	0	0
Equipment Operator	3	3	3	3	3	3	3	3	3	3	0	0	0
Laborer	2	2	2	2	2	2	2	2	2	2	0	0	0
Welder	3	3	3	3	3	3	3	3	3	3	0	0	0
Site Prep	0	0	0	0	0	0	0	0	0	0	0	0	0
Equipment Operator	0	0	0	0	0	0	0	0	0	0	0	0	0
Laborer	0	0	0	0	0	0	0	0	0	0	0	0	0
Plant Manager	0	0	0	0	0	0	0	0	0	0	0	0	0
Surface Works													
Staff	35	30	43	55	68	60	87	121	121	125	102	107	1079
Craft Support	19	17	24	30	37	33	48	66	67	69	56	58	591
Tanks	32	32	32	32	32	32	32	32	32	32	32	32	128
Insulation	0	0	0	0	0	0	3	4	4	4	3	4	124
Instrumentation	1	1	1	1	1	0	0	1	0	3	1	2	138
Steel Crew	3	3	3	16	22	29	35	35	47	41	43	29	63
Scaffold	12	7	3	3	2	5	5	7	6	6	2	0	94
Pipe Crew	8	9	11	11	7	9	34	47	58	75	70	107	988
Mechanical Crew	5	4	2	17	27	38	50	81	92	108	104	104	501
InEight Startup Resources	4	1	1	2	0	0	3	8	3	3	1	1	331
Electrical Crew	6	4	1	41	63	48	52	93	78	78	38	42	890
Concrete Crew	24	24	76	51	65	48	64	56	53	40	34	15	36
Civil Crew	40	36	28	25	24	19	1	0	0	0	0	0	126
Buildings	1	1	1	1	1	1	0	0	0	0	0	0	0
Cavern Waste Rock Hauling	3	6	6	8	19	28	31	31	31	31	31	31	269
Transmission - Aboveground Offsite	0	0	0	0	0	20	20	20	20	20	20	20	60
Transmission - Underground Offsite	19	18	17	9	9	12	13	17	17	17	17	0	0
Total	268	292	348	401	476	480	577	718	726	749	646	642	6,524

Source: Kiewit 2023

Table 5.10-10: Available Labor Skill in Bakersfield Metropolitan Area, Kern County, 2020–2030

Occupation	2020	2030 (Projected)	Absolute Change	Percent Change
Administrative Services Managers	750	940	190	25.3
Electrical Engineers	500	570	70	14.0
Mechanical Engineers	620	700	80	12.9
Engineering Technicians, Except Drafters, All Other	720	770	50	6.9
Carpenters	1,430	1,580	150	10.5
Cement Masons and Concrete Finishers	540	580	40	7.4
Construction Laborers	3,140	3,670	530	16.9
Operating Engineers and Other Construction Equipment Operators	1,110	1,260	150	13.5
Electricians	1,190	1,420	230	19.3
Painters, Construction and Maintenance	520	570	50	9.6
Plumbers, Pipefitters, and Steamfitters	1,010	1,170	160	15.8
Helpers, Construction Trades	350	390	40	11.4
Metal Workers and Plastic Workers	1,950	2,280	330	16.9
Plant and System Operators	820	890	70	8.5
Industrial Truck and Tractor Operators	2,240	3,650	1,410	62.9

Source: CEDD 2023c

Table 5.10-11: Labor Union Contacts in Kern County

Union	Contact	Address
Kern, Inyo and Mono Counties Building & Construction Trades Council	Alissa Reed, Executive Secretary	200 W. Jeffrey St. Bakersfield, CA 93305

Source: Kern, Inyo and Mono Counties Central Labor Council, AFL-CIO 2023

5.10.3.2.2 Induce Substantial Growth or Concentration of Population

The Applicant estimates that cavern work will take place during months 12 through 60. As a result of the specialized requirements that cavern construction workers must maintain, the Applicant anticipates that most cavern workers will originate from out of town. For the 3-month period that shaft work will occur, workers will likely stay in local hotels while working and travel home on their days off. For the longer-duration excavation work that will take place during months 29 through 60, workers will likely need to relocate temporarily, either renting apartments or staying in local hotels or purchasing property.

5.10.3.2.3 Displace a Large Number of People or Impact Existing Housing

The Applicant anticipates that 28 percent of the skilled labor needed for surface construction activities will be drawn from local communities. The communities of Rosamond, Lancaster, and Palmdale contain potential sources of skilled labor. The Applicant expects that the remaining workers for the WRESC's surface construction will originate from out of town and will rent lodgings for the duration of their employment period. The FY 2023 Government Services Administration lodging per diem rates for Kern County are $123/day, and $64/day for meals and incidental expenses. There are many hotels, motels, and recreational vehicle parks in Kern County or within a 2-hour drive to accommodate workers who may choose to commute to the site on a workweek basis. As a result of the need for temporary and short-term skilled labor to construct the WRESC, construction of the WRESC is not expected to significantly increase the demand for long-term rentals or reduce the availability of permanent

housing. As for the limited number of construction workers whose trades require longer deployments to the WRESC Site, their need for long-term housing rentals is not expected to significantly increase the demand for long-term rentals or reduce the availability of permanent housing. The neighboring communities (e.g., Lancaster, Palmdale, and Bakersfield) and recreational vehicle parks within the region maintain sufficient capacity to serve the local populations as well as the limited number of long-term skilled workers.

5.10.3.2.4 Impacts on the Local Economy and Employment

Table 5.10-12 presents the estimated construction expenditures for the WRESC. The estimated total Project capital cost for construction is approximately $1.5 billion, where the cost of materials is approximately $1 billion, and construction payroll is approximately $434 million. The estimated value of materials that the Applicant will purchase locally during construction is approximately $85 million, and the estimated construction payroll for onsite labor is approximately $121.4 million. Total spending locally and onsite for materials and labor, used as input for the economic impact analysis (EIA) described below, is approximately $206.8 million over the 60-month construction period. These additional funds will cause a temporary beneficial impact by creating the potential for other employment opportunities for local workers in other service areas, such as transportation and retail. As such, the WRESC will not cause significant adverse impacts and will result in beneficial impacts to the local economy and employment.

Table 5.10-12: Summary of Approximate Construction Expenditures over 60-Month Period (2023 $)

Expenditure	Local Spending	Not Local	Total
Construction Materials	$85,402,000		
Onsite Labor Cost	$121,365,000		
Total Cost	$206,767,000	$1,293,233,000	$1,500,000,000

Indirect and Induced Economic Impacts from Construction. A regional EIA[1] was conducted to estimate the total impact of the WRESC Project on regional output, earnings, and employment. The EIA involved inputting planning level Project expenditures into the Regional Input-Output Modeling System (RIMS II). The U.S. Bureau of Economic Analysis (BEA) developed the RIMS II model to estimate the effect of direct expenditures on indirect expenditures and induced expenditures in the region (BEA 2023). The Project expenditures included both local and onsite direct expenditures.

Local direct expenditures are expenditures that are spent locally to implement a project during its construction and operational phases. Examples of direct expenditures include the materials and supplies purchased to construct the project, as well as the payrolls for a project's construction and operation. Indirect expenditures represent the additional economic impact of increases in the demand for goods and services, such as from piping manufacturers or excavation companies. Finally, induced expenditures represent the additional economic impact of increased demand of consumer goods and services attributable to labor earnings.

The EIA applied RIMS II final demand and direct multipliers to local WRESC expenditures and estimates the economic changes in regional output, value added, employment earnings, and jobs. RIMS II multipliers for this analysis are specific to Kern County, California, the Project's region of influence. As shown in **Table 5.10-13**, construction industry multipliers were used for construction spending and utility industry multipliers for operations spending. In October 2023, the BEA supplied the current RIMSII Type II multipliers for Kern County in 2021 dollars (see the note below **Table 5.10-13**). The multipliers for Kern County are associated with the cities of Rosamond, Lancaster, and Palmdale.

This analysis estimates that the construction workforce for onsite labor will reside locally within Kern County while they are working on the WRESC Project. As noted, the Applicant estimates a peak workforce of 749 employees at any given time during construction. The estimated total construction payroll spent for onsite labor during the

[1] An economic impact analysis estimates the effects of change in the economy from a new project or event. New investments affect the economy by creating jobs and new business activity as business expenditures and household disposable income flow through the local economy. Thus, economic impact analysis shows the total number of jobs, income, and business revenue generated by the project (United States Army Corps of Engineers 2001).

WRESC construction is approximately $121.4 million. The estimated spending for purchase of materials and supplies bought locally during construction is approximately $85.4 million. In this regard, the WRESC Project will increase "local investment" by a one-time total amount of $206.8 million. This is based on the materials purchased locally plus payroll spent for onsite labor.

Table 5.10-13: Total Multipliers – Industry Aggregations RIMSII Multipliers Used in Economic Impact Analysis

	Region: Kern County, California (Type II) Series: 2012 U.S. Benchmark I-O data and 2021 Regional Data					
	Final Demand Multiplier				Direct Multiplier	
Industry	Output	Earnings	Employment	Value Added	Earnings	Employment
Construction	1.6128	0.5682	8.7221	0.8462	1.4386	1.5585
Utilities	1.4953	0.2859	3.2374	0.8676	2.0348	3.4639

Source: Regional Input-Output Modeling System (RIMSII), BEA Regional Product Division
Note: To utilize the RIMSII multipliers (2021$) for this analysis, Project costs were adjusted (using the U.S. Bureau of Labor Statistics' Consumer Price Index) to deflate the costs/expenditures to 2021 dollars), then the RIMSII impact results were inflated to 2023 dollars. All inputs and outputs are displayed in year 2023 dollars.

Based on an assumed total local construction direct expenditure of $206.8 million, over the duration of the Project's construction, the results of the EIA indicate that the WRESC Project will generate a change in regional output of approximately $2.9 billion, as shown in **Table 5.10-14**. This EIA estimates that the WRESC will result in indirect and induced employment benefits of 2,129 and 2,788 jobs, respectively. Finally, the EIA estimates that the indirect income impact of the WRESC Project will be approximately $168.2 million and the induced income impact will be approximately $176.4 million, as shown in **Table 5.10-15**.

Table 5.10-14: Total Final Demand Multipliers Impacts Local Project Construction Expenditures (2023$)

Final Demand	Total (over 60 months)
Final Demand Expenditure (Input)	$1,500,000,000
Change in Regional Output	$2,419,200,000
Change in Employment (number of jobs)	11,635
Change in Employee Earnings (incomes)	$852,300,000
Change in Value Added	$1,269,300,000

Source: WSP USA, Inc. 2023.

During construction, the local purchase of materials, equipment, and supplies, as well as payroll for employees, will have a beneficial impact on the local area. This local spending will also cause a temporary beneficial economic impact for the local area by creating the potential for other employment opportunities in other service areas, such as transportation, retail, lodging, and food services.

Table 5.10-15: Total Direct Multipliers Impacts Local Project Construction Expenditures (2023$)

Final Demand	Total (over 60 months)
Final Demand Jobs	11,635
Direct Jobs	7,465
Indirect Jobs	1,805
Induced Jobs	2,364

Final Demand	Total (over 60 months)
Final Demand Earnings	$852,300,000
Direct Earnings	$666,202,615
Indirect Earnings	$142,583,657
Induced Earnings	$149,612,810

Source: WSP USA, Inc. 2023.

5.10.3.2.5 Fiscal Impacts in the Community

A positive effect of the WRESC Project on fiscal resources during construction will result from sales taxes realized on equipment and materials purchased in the County, as well as other expenditures. The current sales tax rate for FY 2023 in Kern County is 8.25 percent. Of this, 6 percent goes to the state of California. The estimated value of materials and supplies that the Applicant will purchase locally from within Kern County during construction is approximately $85.4 million. The EIA estimates that Kern County will receive a ***beneficial economic impact*** from the Project's construction as WRESC will generate total local sales tax of approximately $7 million. As such, the WRESC Project will not result in a significant adverse fiscal impact.

5.10.3.2.6 Impacts on Educational Facilities

For the 2022 and 2023 school year, schools within the Southern Kern Unified School District are maintaining an open enrollment policy (South Kern Unified School District 2023). Additionally, the State of California has developed a curriculum for distance learning and online education. Online learning is becoming more common in California, which will reduce the need for relocation and assist in reducing overcrowding of classrooms (CDE 2023b).

Construction of the WRESC will not cause significant population changes or housing impacts on the region because most employees will commute to the WRESC from areas within the county or relocate temporarily for construction activities, as opposed to relocating to the area permanently. As a result, WRESC construction will not cause a significant increase in demand for school services.

5.10.3.2.7 Impacts on Provision of Utility Services

Construction of the WRESC will not make significant adverse demands on local water, sanitary sewer, electricity, or natural gas services. Changes in electricity demand levels are generally predictable and have daily, weekly, and seasonal patterns. As the intent of the WRESC is to store energy during off-peak hours, the Applicant will plan the facility's initiation and testing requirements accordingly.

Water requirements for construction will be satisfied by repurposing water produced during construction activities, as well as through cooperative agreements will local utilities. Given the number of workers and temporary duration of the construction period, the impacts on the local sanitary sewer system will not be significant.

5.10.3.2.8 Impact on the Provision of Public Services

Construction of the WRESC may have minor impacts on police, fire, or hazardous materials handling resources. However, the construction of the WRESC will not place an undue burden on public service providers because public services are located near the WRESC Site, as well as distributed throughout Kern County. As a result of the Applicant's safety policies, WRESC construction will not create significant adverse impacts on medical resources in the area. See Section 5.16, Worker Health and Safety, for additional information on the WRESC's health and safety program.

5.10.3.3 Operational Impacts

This section discusses the changes to the local economy as a result of bringing the WRESC online.

5.10.3.3.1 Operational Workforce

The Applicant is designing the WRESC for a lifespan in excess of 50 years. Once the facility is under operation, the Applicant will staff the facility with a team of full-time employees that includes the following:

- 30 operators, working on different shifts to cover operations 24 hours/day, 7 days/week
- Five maintenance staff, working 8 hours/day, 5 days per week
- Three supervisors, working 8 hours/day, 5 days per week
- One administrative person, working 8 hours/day, 5 days per week
- One plant manager, working 8 hours/day, 5 days per week

5.10.3.3.2 Induce Substantial Growth or Concentration of Population

The EIA assumed that the WRESC's staff will be local to the site and live within the nearby Kern County communities of Rosamond, Lancaster, and Palmdale. The Project will not cause an increase in population because a relatively small number of employees will operate the plant. As such, plant operations will not induce substantial growth or concentration of population.

5.10.3.3.3 Displace a Large Number of People or Impact Existing Housing

Because a relatively small team will operate the WRESC, there will be no significant impact on housing within the neighboring communities. Hence, operation of the WRESC will neither induce substantial growth or concentration of population, nor displace a large number of people or impact existing housing.

5.10.3.3.4 Local Economy and Employment

Project operations will generate other employment opportunities and spending in Kern County through local expenditures for materials, such as office supplies, and services. Currently, the Applicant has not estimated an annual maintenance budget outside of payroll (i.e., spending for WRESC upkeep, utilities, etc.). While not included in the impact analysis, any spending required for upkeep of the WRESC will have a positive economic impact on the local economy.

During operations, the WRESC will have a long-term beneficial impact on local employment opportunities for workers. Based on an operational staff of approximately 40, the Applicant anticipates payroll to be approximately $4.17 million annually.

Indirect and Induced Economic Impacts from Operations. Operation of the WRESC will result in indirect and induced economic impacts that will occur within Kern County and elsewhere. The indirect and induced impacts will result from annual expenditures on payroll and operations and maintenance. As noted, the Applicant has not generated a budget for O&M costs annually outside of payroll. **Table 5.10-16** and **Table 5.10-17** present the economic impacts based on the operational phase's payroll.

Table 5.10-16: Annual Final Demand Multipliers Impacts from Project Operations Payroll (2023$)

Final Demand	Annually
Total Expenditures (Input)	$4,167,973
Change in Regional Output	$6,232,371
Change in Employment (number of jobs)	12
Change in Employee Earnings (incomes)	$1,191,624
Change in Value Added	$3,616,134

Source: WSP USA Inc. 2023

Table 5.10-17: Annual Direct Multipliers Impacts from Project Operations Payroll (2023$)

Final Demand	Annually
Final Demand Jobs	12
Direct Jobs	3
Indirect Jobs	5
Induced Jobs	3
Final Demand Earnings	$1,191,624
Direct Earnings	$585,622
Indirect Earnings	$420,110
Induced Earnings	$185,892

Source: WSP USA Inc. 2023.

5.10.3.3.5 Fiscal Impacts on the Community

Willow Rock will result in increased property tax revenues to Kern County. With the Project's sizable capital cost, the resulting property tax contributions will be significant and provide an important new revenue stream for the County. These property tax revenues will be determined in consultation with Kern County and the California State Board of Equalization. To provide an approximate estimate, assuming a Project total capital cost of $1.5 billion and that the current property tax rate is 1.23 percent for FY 2023, the Project will generate approximately $18.45 million in property taxes annually.

5.10.3.3.6 Impacts on Educational Facilities

The Southern Kern Unified School District has indicated no change in their open enrollment policy (Southern Kern Unified School District 2023). The operation of the WRESC will require only a small workforce of approximately 40 employees. Furthermore, if employees were to construct new homes within the school district, the Southern Kern Unified School District charges a one-time residential development fee of $4.08 per square foot (South Kern Unified School District 2020). As such, operation of the WRESC will not cause a significant increase in demand for school services or significant adverse impact to school services.

5.10.3.3.7 Impacts on Provision of Utility Services

Operation of the WRESC will not make significant adverse demands on local water, sanitary sewer, electricity, or natural gas. Operational water from the AVEK Water Agency via a supply located near the eastern boundary of the WRESC.

5.10.3.3.8 Impacts on the Provision of Public Services

Operation of WRESC will not result in significant impacts to either the KCSO or the KCFD, as the agencies maintain stations near the WRESC, as well as throughout Kern County. Additionally, the Applicant does not anticipate an operational workforce of more than 40 employees. Due to the relatively small workforce, operation of the WRESC will not create significant adverse impacts to the area of influence's medical resources.

5.10.3.3.9 Environmental Justice

Federal Review of Environmental Justice

President Clinton's Executive Order 12898, "Federal Actions to Address Environmental Justice in POC Populations and Low-Income Populations," was signed on February 11, 1994. The purpose of this Executive Order is to consider whether a project may result in disproportionately high and adverse human health or environmental effects on any POC or low-income population.

The federal guidelines set forth the following three-step screening process:

1) Identify which impacts of the project, if any, are high and adverse.

2) Determine whether POC or low-income populations exist within the high and adverse impact zones.

3) Examine the spatial distribution of high and adverse impact areas to determine whether these impacts are likely to fall disproportionately on the POC and/or low-income population.

According to the guidelines established by the U.S. EPA to assist federal agencies to develop strategies to address this circumstance, a POC and/or low-income population exists if the POC and/or low-income population percentage of the affected area is 50 percent or more of the area's general population. The guidance suggests using two or three standard deviations above the mean as a quantitative measure of disproportional effects. **Appendix 5.10A** presents a screening-level analysis of environmental justice.

As indicated in this application, and as summarized in the environmental justice analysis, the WRESC will not create any significant or "high and adverse" impacts. Therefore, there are no high and adverse environmental impacts that are likely to fall disproportionately on POC and/or low-income members of the community.

State of California Review of Environmental Justice

State of California Code, § 65040.12, subd. (e) *Definition of Environmental Justice and the Designation of the California Office of Planning and Research as Coordinating Agency for Environmental Justice* discusses the State's responsibility in addressing environmental justice. This statute defines environmental justice as the following:

"Environmental justice" includes, but is not limited to, all of the following:

(A) The availability of a healthy environment for all people.

(B) The deterrence, reduction, and elimination of pollution burdens for populations and communities experiencing the adverse effects of that pollution, so that the effects of the pollution are not disproportionately borne by those populations and communities.

(C) Governmental entities engaging and providing technical assistance to populations and communities most impacted by pollution to promote their meaningful participation in all phases of the environmental and land use decision making process.

(D) At a minimum, the meaningful consideration of recommendations from populations and communities most impacted by pollution into environmental and land use decisions (State of California Code, § 65040.12, subd. (e)).

The California Energy Commission's siting process includes a public facing website that presents all non-confidential docketed filings and involves public hearings that allow affected communities the opportunity to comment on pending actions. As indicated in this application, and as summarized in the environmental justice analysis, the WRESC will not create any significant or "high and adverse" impacts. Therefore, there are no high and adverse environmental impacts that are likely to fall disproportionately on communities that have been burdened by the effects of pollution.

5.10.4 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects."

Cumulative impacts on socioeconomics could occur if the effects from the development of the WRESC and other past, present, and reasonably foreseeable probable projects impact the SSA's social cohesion. The spatial setting for the analysis of cumulative impacts is roughly equal to the western Antelope Valley portion of Kern County, and the temporal setting is defined as the time between the known past and the life of the Project (estimated 50 years). As referenced in **Table 5.0-1** in **Section 5.0**, types of foreseeable developments within the spatial setting include new industrial facilities such as the Mojave Micro Mill[2] project, Gem Hill Quary project,[3] new energy facilities, residential development, and various projects that require changes in zoning and land use designation.

The anticipated potential cumulative impacts of the WRESC in conjunction past, present, and reasonably foreseeable projects will affect the SSA's social cohesion through the introduction of temporary workers, construction traffic, and fugitive dust and noise. Additionally, cumulative impacts from the WRESC in conjunction with past, present, and reasonably foreseeable projects will result in urbanization and decrease in temporary and permanent housing availability.

While cumulative impacts to socioeconomics from the WRESC may occur when combined with past, present, and reasonably foreseeable projects, they are not anticipated to be significant. For instance, the surrounding communities maintain well established workforces and sufficient permanent and temporary housing to support the Project. This analysis of socioeconomics has demonstrated that the Project will represent an economic benefit for the SSA and that the SSA maintains adequate available housing and skilled workforces. For these reasons, the WRESC will not cause a significant cumulative impact on socioeconomics within the SSA.

5.10.5 Best Practices, Design Features, and Mitigation Measures

Because there are no significant adverse impacts caused by the WRESC, no additional socioeconomic-specific mitigation measures beyond those incorporated into the Project's design are proposed.

5.10.6 Laws, Ordinances, Regulations, and Standards

Table 5.10-18 presents a summary of the LORS, including the Project's conformance to them.

Table 5.10-18: Laws, Ordinances, Regulations, and Standards for Socioeconomics

LORS	Jurisdiction	Requirements/Applicability	Administering Agency	Application for Certification, Section Explaining Conformity
Civil Rights Act of 1964	Federal	Prohibits discrimination on the basis of race, color, or national origin. Applies to all federal agencies and agencies receiving federal funds.	Office of Civil Rights	Section 5.10.2
Executive Order 12898	Federal	Avoid disproportionately high and adverse impacts on people of color and low-income populations. Applies only to federal agencies.	U.S. Environmental Protection Agency	Section 5.10.2.4
Government Code Sections 65996-65997	State	Establishes that the levy of a fee for construction of an industrial facility be considered mitigating impacts on school facilities. School districts may charge a one-time assessment fee to mitigate potential school impacts.	Local School Districts	Section 5.10.2.4

[2] Mojave Micro Mill is intended to be a state-of-the-art steel micro mill. The mill's products would be used in major infrastructure projects and major commercial projects. The proposed project site is located in the unincorporated area of southeastern Kern County, approximately 5 miles northeast of the unincorporated community of Rosamond and approximately 8 miles southeast of the unincorporated community of Mojave (Kern County 2023).

[3] The Gem Hill Quarry project proponent (CalPortland Company) involves a surface mining operation and development of a reclamation plan on 82 acres of an approximately 210-acre reclamation plan boundary (CEQAnet Web Portal 2024).

LORS	Jurisdiction	Requirements/Applicability	Administering Agency	Application for Certification, Section Explaining Conformity
Education Code Section 17620	State	Allows a school district to levy a fee against any construction within the boundaries of the district for the purpose of funding construction of school facilities. Local school districts may charge a one-time assessment fee to mitigate potential school impacts	California Department of Education	Section 5.10.2.4
Chapter 19: Zoning	Kern County	"This title is adopted to promote and protect the public health, safety, and welfare through the orderly regulation of land uses throughout the unincorporated area of the county. This title shall apply, to the extent permitted by law, to all property in unincorporated Kern County whether owned by private persons, firms, corporations, or organizations."	Kern County Planning and Natural Resources Department	Section 5.10.5.3
Chapter 19.26.150 Development Standards and Conditions	Kern County	"Consistency With General Plan and/or Specific Plans. All development shall be consistent with the goals and policies of the County General Plan, with the uses and density/intensity standards of the applicable General Plan land use category, and with any applicable Specific Plan and its goals, policies, and standards."	Kern County Planning and Natural Resources Department	Section 5.10.5.3

LORS = laws, ordinances, regulations, and standards

5.10.6.1 Federal Laws, Ordinances, Regulations, and Standards

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires federal agencies to consider whether the project may result in disproportionately high and adverse human health or environmental effects on any POC or low-income population by performing an environmental justice analysis. Since the signing of the Executive Order 12898, the California Energy Commission has included this topic in its power plant siting decisions to ensure that the Applicant identifies and addresses any potential adverse impacts to socioeconomic resources.

5.10.6.2 State Federal Laws, Ordinances, Regulations, and Standards

California Government Code Sections 65996 and 65997 provide the exclusive methods of considering and mitigating impacts on school facilities that might occur because of the development of real property. Education Code Section 17620, listed in California Government Code Section 65997 as an approved mitigation method, allows school districts to levy a fee or other requirement against construction within the boundaries of the school district for the purpose of funding construction of school facilities.

5.10.6.3 Local Laws, Ordinances, Rules, and Standards

5.10.6.3.1 Kern County

The Kern County General Plan, Policy 9, states that new development should pay its pro rata share of the local cost of expansions in services, facilities, and infrastructure which it generates and upon which it is dependent (Kern County 2009). Willow Springs Specific Plan Policy 2 states that in evaluating a development application, Kern County will consider both its physical and fiscal impact on the local school district and other public facilities. If it is found that the district or facilities involved will, as a result, require additional facilities or incur costs requiring additional local revenues, the development project will be required as a condition of approval to contribute funds to the district for the costs directly attributable to the project (Kern County 2008a).

5.10.7 Agencies and Agency Contacts

Table 5.10-19 provides a list of agencies and contacts of potentially responsible agencies.

Table 5.10-19: Agency Contacts for Socioeconomics

Issue	Agency	Contact
Property Valuation	State Board of Equalization	Margie Wing Senior Property Appraiser Taxpayers' Rights Advocate Office, MIC: 120 PO Box 942879 Sacramento, CA 94279-0120 (916)- 274-3400
County Tax Collector, Treasurer	Kern County Treasurer – Tax Collector	Jordan Kaufman KCTTC Taxpayer Service Center P.O. Box 579 Bakersfield, CA 93302-0580
Kern County Auditor's Office	Kern County Auditor-Controller-County Clerk	Aimee X. Espinoza 1115 Truxtun Avenue Bakersfield, CA 93301-4639
County Assessor	Kern County Assessor-Recorder	Jon Lifqust – Assessor-Recorder 1115 Truxtun Avenue Bakersfield CA 93301
School Impact Fees and Enrollment Issue Impacts	Southern Kern Unified School District	Leanne Hargus Associate Superintendent (661) 256-5000 x 1118 2601 Rosamond Blvd., Rosamond, CA 93560
Available Resources, Potential Impacts on Resources on Resources and Average Response Times	Kern County Sheriff's Department	Public Administrator Kern County Sheriff's Office 1350 Norris Road Bakersfield, CA 93308-2231 (661) 635-1330
Available Resources, Potential Impacts on Resources on Resources and Average Response Times,	Kern County Fire Department	Public Information Officer 5642 Victor Street Bakersfield, CA 93308 (661) 330-0133
Public Health Service	Kern County Public Health Services Department	1800 Mt. Vernon Avenue Bakersfield, CA 93306 General Information: (661) 321-3000 / publichealth@kerncounty.com
Emergency Services	Kern County Public Health Services Department	1800 Mt. Vernon Avenue Bakersfield, CA 93306 General Information: (661) 321-3000 / publichealth@kerncounty.com

5.10.8 Permits and Permit Schedule

The Commission is the state lead agency for approval of WRESC. Kern County collects school development fees when the Applicant pays in-lieu building permit fees to the County. No additional permits related to socioeconomics are required for the construction and operation of the WRESC.

5.10.9 References

California Department of Education (CDE). 2023a. Annual Enrollment. https://www.cde.ca.gov/ds/ad/downloadabledata.asp. Website accessed August 16, 2023.

California Department of Education (CDE). 2023b. Distance Learning. https://www.cde.ca.gov/ci/cr/dl/index.asp Accessed August 16, 2023.

California Department of Finance (CDOF). 2023a. Population and Housing Estimates for Cities, Counties, and the State — January 1, 2022 and 2023. January 2023. https://dof.ca.gov/forecasting/demographics/estimates/e-5-population-and-housing-estimates-for-cities-counties-and-the-state-2020-2023/. Accessed January 29, 2023.

California Department of Finance (CDOF). 2023b. Projections. July 2023. https://www.dof.ca.gov/Forecasting/Demographics/Projections/. Accessed August 16, 2023.

California Employment Development Department (CEDD). 2023a. Labor Market Information Division. Current Employment Statistics (CES), Annual Average: 1990 – 2022 Industry Information (updated July 24, 2023). https://data.edd.ca.gov/Industry-Information-/Current-Employment-Statistics-CES-Annual-Average-1/pwx8-ztk5. Website accessed: August 16, 2023.

California Employment Development Department (CEDD). 2023b. Labor Market Information Division. Local Area Unemployment Statistics (LAUS), Annual Average Labor Force And Unemployment Rates. https://lab.data.ca.gov/dataset/local-area-unemployment-statistics-laus-annual-average. Accessed January 29, 2024.

California Employment Development Department (CEDD). 2023c. Labor Market Information Division Long-Term Occupational Employment Projections, Employment Projections. https://labormarketinfo.edd.ca.gov/data/employment-projections.html. Accessed January 29, 2024.

Kern County Administrative Office. 2023. Recommended Budget Fiscal Year 2023–24. https://www.kerncounty.com/home/showpublisheddocument/10316/638278766545730000 . Accessed September 6, 2023.

Kern County. 2008a. Willow Springs Specific Plan. https://psbweb.co.kern.ca.us/planning/pdfs/SPs/WillowSprings_SP.pdf. Accessed July 20, 2021.

Kern County. 2008b. Rosamond Specific Plan. https://psbweb.kerncounty.com/planning/pdfs/SPs/RosamondSP_102610.pdf. Accessed August 31, 2023.

Kern County. 2009. Kern County General Plan. https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_Complete.pdf. Accessed September 6, 2023.

Kern County. 2023. Draft Environmental Impact Report. Mojave Micro Mill Project. Volume 1. November 2023.

Kern, Inyo and Mono Counties Central Labor Council, AFL-CIO. 2023. Home page. https://unionhall.aflcio.org/kimclc. Accessed August 16, 2023.

Kiewit. 2023. Willow Rock Construction Staffing Schedule and Skill Set. Submitted via email communications.

Southern Kern Unified School District. 2020. Resolution #19-20-12. Resolution of the Governing Board of the Southern Kern Unified School District Regarding School Facilities Fees. https://www.skusd.k12.ca.us/site/handlers/filedownload.ashx?moduleinstanceid=2400&dataid=3859&FileName=Reso%2019-20-12%20Increase%20Dev%20Fees.pdf. Accessed September 26, 2023.

Southern Kern Unified School District. 2023. Online Enrollment for the 2023–2023 School Year is now OPEN. https://www.skusd.k12.ca.us/site/Default.aspx?PageID=529. Accessed August 16, 2023.

U.S. Army Corps of Engineers. 2001. Glossary of Economic Impact Terms. https://corpslakes.erdc.dren.mil/employees/economic/glossary.cfm. Accessed January 23, 2024.

U.S. Bureau of Economic Analysis. 2023. Welcome to the RIMS II Online Order and Delivery System. https://apps.bea.gov/regional/rims/rimsii/. Accessed September 12, 2023.

U.S. Environmental Protection Agency (U.S. EPA). 2023. 2017-2021 ACS 5-year Estimates. https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2021/5-year.html. Website Accessed September 20, 2023.

U.S. Environmental Protection Agency (U.S. EPA). Not dated. EJScreen Mapper. EPA's Environmental Justice Screening and Mapping Tool (Version2.2). https://ejscreen.epa.gov/mapper/. Accessed September 12, 2023.

5.11 Soils

5.11.1 Introduction

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California. The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH.

This section describes the potential effects that construction and operation of the proposed A-CAES project at WRESC may have on soil resources at and in the vicinity of the Project Area. The information presented herein is based on readily available online resources that is limited to surficial soils only and a geotechnical data report prepared by Yeh and Associates, Inc. (Yeh) (2023). The Yeh (2023) report summarizes a geotechnical exploration that was performed in 2023 to characterize the subsurface conditions within the boundary of the WRESC Site. The exploration included the following:

- A desktop study to review previous studies and pertinent data
- Site reconnaissance
- 11 borings that were advanced to depths of 51 to 71 feet below the existing ground surface (bgs) using a combination 4-inch-diameter mud rotary and HQ rock coring methods
- Installation of two monitoring wells
- Six infiltration borings advanced to depths of 4 to 6.5 feet bgs using a 12-inch auger mounted on a Bobcat S630
- In-situ infiltration testing
- Laboratory testing of select representative samples of soil and rock core

The Yeh (2023) report indicates a supplementary *Preliminary Geotechnical Report* is forthcoming, but said report was not available at the time this document was prepared. The Yeh (2023) report is provided as Appendix 5.11-A for reference and can be referred to for additional information regarding the details of the geotechnical exploration that was completed.

Construction of the proposed WRESC will involve the excavation of deep vertical shafts on the order of 8 to 24 feet wide and 2,000 to 2,500 feet bgs, the excavation of an underground cavern, and the construction and filling of a hydrostatic compensation surface reservoir. Options for managing the rock extracted during construction of the cavern that may be implemented alone or in any combination that include onsite re-use in the form of an architectural berm around portions of the WRESC or off-taker transport for either commercial use or off-site re-use. Chapter 2.0, Project Description, provides more detailed Project information. **Figures 5.11-1a** and **5.11-1b** show the proposed Project Boundary without and with the architectural berm, respectively, as well as the Project Boundary, WRESC Site, and staging areas.

The best practices, Project design features and mitigation measures proposed as part of this application will avoid or minimize potentially significant effects (see Section 5.11.5, below). The following sections address potential construction and operation impacts to surficial soils only.

5.11.2 Affected Environment

The proposed WRESC Project would be located on the north of Rosamond in Kern County, California. The land surrounding the Project Area consists of a mix of mostly undeveloped land, land developed with single-family residences, and land that is zoned for agricultural purposes.

A description of the surficial soils within the proposed WRESC Project Area was developed using the Natural Resources Conservation Service (NRCS) Web Soil Survey for Antelope Valley Area and Kern County, California, Southeastern Part (NRCS 2019) and the Yeh (2023) report. The following paragraphs provide an overview of the NRCS Web Soil Survey and Sections 5.11.2.3 and 5.11.2.4 describe the current understanding of the surficial soils within the WRESC Site and/or staging areas based on the information provided by NRCS and Yeh (2023), respectively.

Descriptions of the soil map units were developed from the soil survey information and the NRCS Official Soil Series Descriptions database (NRCS 2015). The NRCS Web Soil Survey identifies soil map units for the proposed Project Area, including staging areas and the proposed footprint of the potential architectural berm, and also includes soil map unit characteristics for the area that may potentially be affected by the construction and operation of the WRESC. The proposed Project Boundary in relation to the NRCS soil map units are shown in **Figures 5.11-1a and 5.11-1b**. **Table 5.11-1** summarizes the depth, texture, drainage, permeability, runoff, and other characteristics of the NRCS soil map units within the WRESC Site and staging areas.

Table 5.11-1: NRCS Soil Map Unit Descriptions

Map Unit	Description	
113	Cajon Sand, 5 to 15 percent slopes	
	Landform:	*Floodplains, alluvial fans*
	Parent material:	*Alluvium derived from granite*
	Typical profile:	*4 inches of sand over stratified sand to loamy fine sand*
	Depths:	*More than 80 inches to restrictive feature*
	Drainage:	*Somewhat excessively drained*
	Permeability:	*High to very high*
	Runoff class:	*Negligible to low* [a]
	Capability class:	*7e (non-irrigated)* [b]
	Taxonomic class:	*Mixed, thermic Typic Torripsamments* [a]
147	Hi Vista Sandy Loam, 2 to 9 percent slopes	
	Landform:	*Rock pediments*
	Parent material:	*Residuum weathered from granite*
	Typical profile:	*4 inches of sandy loam over 26 inches of gravelly sandy clay loam over unweathered bedrock*
	Depths:	*20 to 40 inches to lithic bedrock*
	Drainage:	*Well drained*
	Permeability:	*Moderately high*
	Runoff class:	*Medium, high, or very high* [a]
	Capability class:	*7e (non-irrigated)* [b]
	Taxonomic class:	*Fine-loamy, mixed, superactive, thermic Typic Haplargids* [a]

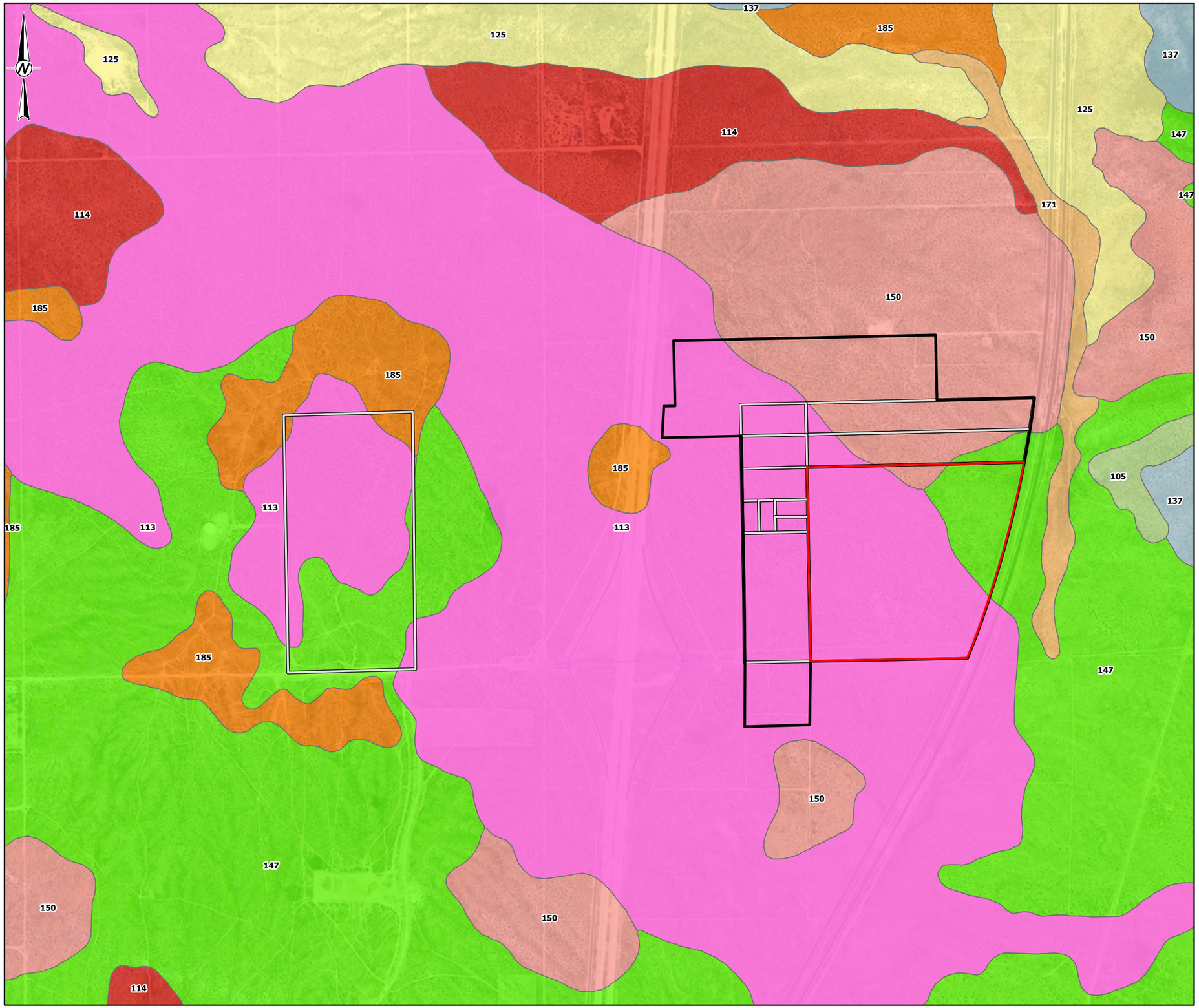
Map Unit	Description	
150	Muroc Sandy Loam, 2 to 9 percent slopes	
	Landform:	*Rock pediments*
	Parent material:	*Residuum weathered from granite*
	Typical profile:	*15 inches of sandy loam over 12 inches of indurated soil over weathered bedrock*
	Depths:	*8 to 20 inches to duripan; 20 to 30 inches to paralithic bedrock*
	Drainage:	*Well drained*
	Permeability:	*High*
	Runoff class:	*Low to medium* [a]
	Capability class:	*7e (non-irrigated)* [b]
	Taxonomic class:	*Loamy, mixed, superactive, thermic, shallow Typic Haplodurids* [a]
185	Torriorthents – Rock Outcrop Complex, Very Steep	
	Landform:	*Mountains, hills*
	Parent material:	*Residuum weathered from basalt, granite, and sandstone*
	Typical profile:	*20 inches variable material over 4 inches unweathered bedrock*
	Depths:	*10 to 20 inches to lithic bedrock*
	Drainage:	*Well drained*
	Permeability:	*--* [c]
	Runoff class:	*--* [c]
	Capability class:	*8e (non-irrigated)* [b]
	Taxonomic class:	*--* [c]

Notes:

[a] *The taxonomic class was not specified by the NRCS Web Soil Survey, but instead was determined using the NRCS Official Soil Series descriptions (NRCS 2015).*

[b] *The capability class was not specified for irrigated soils, only for non-irrigated.*

[c] *No information is available.*



LEGEND

- WRESC SITE
- PROJECT BOUNDARY
- TEMPORARY IMPACT PARCEL

SOILS

- 105 - ARUJO SANDY LOAM, 9 TO 15 PERCENT SLOPES (0%)
- 113- CAJON SAND, 5 TO 15 PERCENT SLOPES
- 114 - CAJON LOAMY SAND, 0 TO 5 PERCENT SLOPES (0%)
- 125 - DESTAZO SANDY LOAM, 0 TO 2 PERCENT SLOPES (0%)
- 137 - GARLOCK LOAMY SAND, 2 TO 9 PERCENT SLOPES (0%)
- 147 - HI VISTA SANDY LOAM, 2 TO 9 PERCENT SLOPES (0%)
- 150 - MUROC SANDY LOAM, 2 TO 9 PERCENT SLOPES (0%)
- 171 - ROSAMOND CLAY LOAM (0%)
- 185 - TORRIORTHENTS-ROCK OUTCROP COMPLEX, VERY STEEP (0%)

1:12,000

0 500 1,000 2,000 Feet

REFERENCE(S)

1. AERIAL IMAGERY - ESRI PROVIDED BASEMAP SERVICE. IMAGERY COLLECTED 10/2/2021.
2. SOURCE DATA: TTPS://W EBSOILSURVEY.N RCS.USDA.GOV/APP/W EBSOILSURVEY.ASPX , EDW ARDS AIR FORCE BASE, CALIFORN IA, PARTS OF KERN , LOS AN GELES, AN D SAN BERN ARDIN O COUN TIES (CA669)"
3. SOURCE DATA: TTPS://W EBSOILSURVEY.N RCS.USDA.GOV/APP/W EBSOILSURVEY.ASPX , KERN COUN TY, CALIFORN IA, SOUTHEASTERN PART (CA670

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

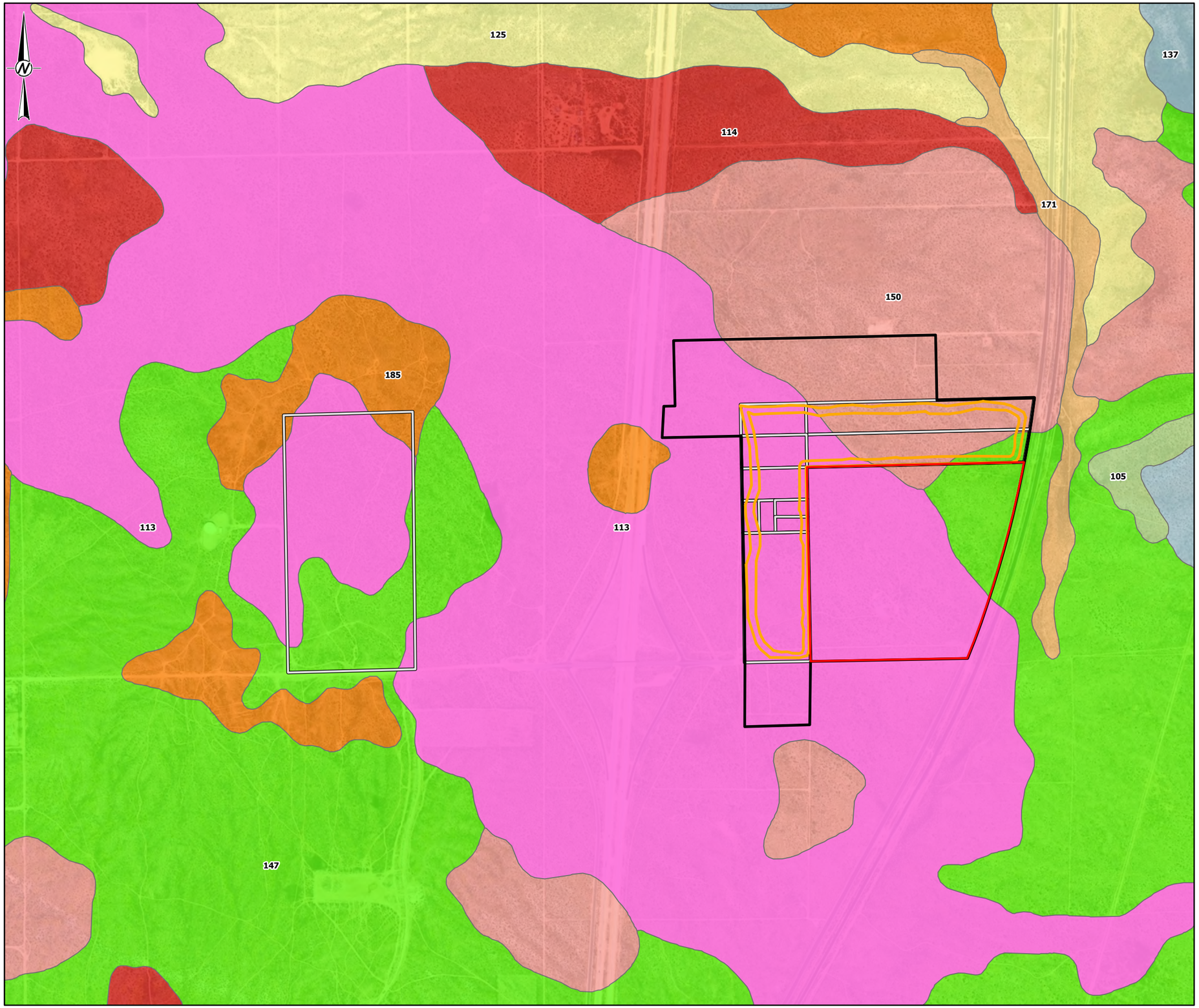
TITLE
NRCS SOILS MAP WITHOUT ARCHITECTURAL BERM

CONSULTANT

YYYY-MM-DD	2024-02-29
DESIGNED	JAM
PREPARED	JAM
REVIEWED	RPCE
APPROVED	VG/LL

PROJECT NO.
31406639.003

FIGURE
5.11-1a



LEGEND

- WRESC SITE
- PROJECT BOUNDARY
- ARCHITECTURAL BERM
- TEMPORARY IMPACT PARCEL

SOILS

- 105 - ARUJO SANDY LOAM, 9 TO 15 PERCENT SLOPES (0%)
- 113- CAJON SAND, 5 TO 15 PERCENT SLOPES
- 114 - CAJON LOAMY SAND, 0 TO 5 PERCENT SLOPES (0%)
- 125 - DESTAZO SANDY LOAM, 0 TO 2 PERCENT SLOPES (0%)
- 137 - GARLOCK LOAMY SAND, 2 TO 9 PERCENT SLOPES (0%)
- 147 - HI VISTA SANDY LOAM, 2 TO 9 PERCENT SLOPES (0%)
- 150 - MUROC SANDY LOAM, 2 TO 9 PERCENT SLOPES (0%)
- 171 - ROSAMOND CLAY LOAM (0%)
- 185 - TORRIORTHENTS-ROCK OUTCROP COMPLEX, VERY STEEP (0%)

1:12,000

0 500 1,000 2,000 Feet

REFERENCE(S)

1. AERIAL IMAGERY - ESRI PROVIDED BASEMAP SERVICE. IMAGERY COLLECTED 10/2/2021.
2. SOURCE DATA: TTPS://W EBSOILSURVEY.N RCS.USDA.GOV/APP/W EBSOILSURVEY.ASPX , EDW ARDS AIR FORCE BASE, CALIFORN IA, PARTS OF KERN , LOS AN GELES, AN D SAN BERN ARDIN O COUN TIES (CA669)"
3. SOURCE DATA: TTPS://W EBSOILSURVEY.N RCS.USDA.GOV/APP/W EBSOILSURVEY.ASPX , KERN COUN TY, CALIFORN IA, SOUTHEASTERN PART (CA670

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
NRCS SOILS MAP WITH ARCHITECTURAL BERM

CONSULTANT

YYYY-MM-DD	2024-02-29
DESIGNED	JAM
PREPARED	JAM
REVIEWED	RPCE
APPROVED	VG/LL

PROJECT NO.
31406639.003

FIGURE
5.11-1b

5.11.2.1 Agricultural Use

The proposed WRESC facility site is located in a rural area in Kern County, California. As identified by the NRCS Web Soil Survey, soils within the WRESC Site consist of Muroc sandy loam, Cajon sand, and Hi Vista sandy loam, which are classified with a land capability class of 7e when non-irrigated. This would indicate that the soil has very severe limitations due to erosion susceptibility or past erosion damage that make it unsuited to cultivation.

Additionally, as identified by the NRCS Web Soil Survey, soils within a parcel west of the WRESC site boundary that may be utilized and subject to temporary impacts consist of Torriorthents (rock outcrops) in addition to the Muroc sandy loam and Hi Vista sandy loam. Torriorthents are classified with a land capability class of 8e when non-irrigated, indicating that the soil has limitations due to erosion susceptibility that precludes its use for commercial agricultural production.

Additionally, as described in Section 5.6, Land Use, the California Department of Conservation has designated the proposed Project Area, including temporary impact parcels, largely as Nonagricultural and Natural Vegetation. Land zoned for agriculture has had problems that make agricultural use either impractical or uneconomical. Refer to Section 5.6 for additional information.

5.11.2.2 Wetlands

As described below, there are no known wetlands within the WRESC Site.

A site-specific survey confirmed that there are no surface water habitats or wetlands present on the Project Area in the WRESC Site or staging areas. The results of that survey are discussed in Section 5.02.

5.11.2.3 National Resources Conservation Service Soil Map Units

As shown in **Figures 5.11-1a** and **5.11-1b** and in **Table 5.11-1**: above, the WRESC Site of the WRESC Site is associated with three soil map units: Muroc sandy loam (150), Hi Vista sandy loam (147), and Cajon sand (113). Muroc soils are mapped in a limited area in the northern portion of the WRESC Site and proposed footprint of the potential architectural berm and are formed from weathering of sloping granitic rock in hills in the Mojave Desert of California (NRCS 2015). Hi Vista soils are mapped in the northeastern portion of the WRESC Site and proposed footprint of the potential architectural berm and are formed from weathering of granitic rock in hills in the high desert of southern California (NRCS 2015). The Cajon soils are mapped across the remainder (and the majority of) the WRESC Site and proposed footprint of the potential architectural berm and are formed in recent fans, fan skirts, fan aprons, inset fans, and river terraces in Southeastern California, southern Nevada, and Arizona (NRCS 2015).

As shown in **Figures 5.11-1a** and **5.11-1b** and in **Table 5.11-1**: above, the parcel west of the WRESC site boundary that may be utilized and subject to temporary impacts is associated with one additional soil unit: Torriorthents (rock outcrops) (185). The Torriorthents are mapped in the north portion of this possible temporary impact parcel and are formed by rock outcrops on side slopes of mountains and hills (NRCS 2019).

The Cajon sand, Muroc sandy loam, and Hi Vista sandy lam are also mapped in the temporary impact parcel.

The proposed water reservoir and the majority of other proposed site facilities will likely be within the Cajon sand soil unit.

5.11.2.4 Subsurface Conditions Encountered

The Yeh (2023) report describes the subsurface conditions encountered during the 2023 exploration of the WRESC Site as alluvium underlain by igneous rock, specifically, quartz monzonite. The conditions encountered indicate the alluvium is between 0.5 and 7.5 feet thick and was interpreted to be derived from the underlying quartz monzonite. The split-spoon drive samples that were collected indicate the alluvium consisted of sand with varying amounts of silt and clay and was classified as well-graded sand (SW), silty sand (SM), and/or clayey sand (SC) according to the Unified Soil Classification System. Additionally, the relative density of the encountered alluvium varied from loose to very dense. However, two of the 17 total borings advanced did not encounter alluvium and, instead, encountered quartz monzonite at the existing ground surface.

The quartz monzonite that was encountered was discretized into an upper and lower subunit based on weathering and drilling conditions. The upper subunit was encountered either beneath the alluvium or at the existing ground surface to depths of 25 to 50 feet bgs and consisted of decomposed to intensely weathered, very soft to moderately hard, very slightly fractured to moderately fractured quartz monzonite. The lower subunit was encountered below the upper subunit and persisted to the maximum depth of the respective borings. The upper subunit consisted of intensely weathered to fresh, very soft to hard, intensely to slight fractured quartz monzonite.

Two of the mud rotary borings were converted to monitoring wells and recorded groundwater at elevation 2,506 feet and 2,527 feet, which corresponds to depths of 41 and 40.3 feet bgs, respectively.

5.11.2.5 Potential for Soil Loss and Erosion

Soil loss and erosion potential are greatly affected by the presence of vegetation, slope grades, soil composition and gradation, and weather patterns. Regions with sparse to no vegetation exhibit erosion more readily than areas with grasses, shrubbery, and other plants as they help in slowing the overland flow and holding the soil together. Areas with steeper slopes typically experience higher rates of erosion and soil loss than level slopes due to the higher flow velocity at which the stormwater runoff will travel.

The existing grades in the WRESC Site and the adjacent temporary impact parcels in the Project Area gently slope to the southeast. The westernmost temporary impact parcel gently slopes to the southeast and contains a ridge with a height of approximately 20 feet near the southern edge of its shown boundary. Areas around the proposed Project have sparse vegetation and no tree coverage.

The Muroc, Cajon, and Hi Vista soils likely have moderate potential for soil loss and erosion due to their typically sandy texture. Additionally, all three soil types have a land capability class of 7e, as discussed in Section 5.11.2, above, indicating that they may be susceptible to erosion or have existing damage from erosion, making them unsuited to cultivation. Furthermore, the surficial alluvium described in Yeh (2023) would likely be susceptible to erosion.

The additional soils mapped in the temporary impact parcels, Torriorthents (rock outcrops), may also have erosion potential. The Torriorthents is reported to consist of variable material at the surface; therefore, it is not clear whether the surficial soils consist of erodible soil. In lieu of additional information, it assumed the Torriorthents have at least low potential for soil loss and erosion. Additionally, the Torriorthents are assigned a land capability class of 8e, as discussed in Section 5.11.2, above, indicating that the soil is susceptible to erosion that precludes its use for commercial agricultural production.

Although the proposed Project Area is fairly flat, the completed construction in the WRESC Site will likely include concrete and asphalt paved finished grades that will not be susceptible to erosion. Unpaved areas, including those in the temporary impact parcels, can be graded, revegetated, or armored to mitigate erosion potential to less than significant. Outboard slopes of the reservoir will be stabilized with rock or vegetated to reduce erosion potential.

5.11.2.6 Other Notable Soil Characteristics

Other notable soil characteristics that could affect the Project Area include shrink-swell potential, liquefaction risk, the potential for shallow groundwater, organic soils potential, and the risk of soil contamination.

5.11.2.6.1 Expansive Soils

Expansive soils have the potential to shrink and swell with variations in moisture, which could cause ground instability in the form of differential settlement. Expansive soils are typically clay-rich or clay-dominant soils. Table 18-1-B of the 1994 Uniform Building Code (International Code Council 1994) describes the standards for classifying expansive soils based on expansion index, determined using ASTM D4829.

Information gathered from the NRCS Web Soil Survey was cross-referenced with the NRCS Soil Texture Triangle to evaluate the shrink and swell potential for the mapped soils within the WRESC Site. The information available indicates that the Muroc and Hi Vista series soils are dominated by sand, but possibly contain up to 20 percent clay. The Muroc and Hi Vista series soils likely have low to negligible shrink-swell potential due to their expected clay fractions. The information available indicates that the Cajon soils are also dominated by sand and could

contain up to 10 percent clay. The Cajon soils likely have negligible shrink-swell potential due to their expected clay fractions. Based on the information provided in the Yeh (2023) report, laboratory testing results on select samples of the surficial alluvium classified as SM consist of 16 to 25% fines. Therefore, based on the information that was available at the time this document was prepared, and primarily the Yeh (2023) report, the soils within the WRESC Site are considered to have negligible shrink-swell potential.

The temporary impact parcels contain Torriorthents (rock outcrops) in addition to the Muroc, Hi Vista, and Cajon soils. The NRCS does not provide a clay fraction for Torriorthents, and NRCS describes its profile as consisting of variable material over rock, so it is unknown what its clay content and shrink-swell potential are. Thus, it is assumed that this unit has at least low shrink-swell potential. Actual expansive soil susceptibility will depend on the actual characteristics of the materials onsite.

For the proposed WRESC and its features, the presence of expansive soils would only be a potential concern to buildings and foundations. A site-specific geotechnical exploration was conducted within the WRESC Site (Yeh 2023), but site-specific conditions have not been explored or confirmed across the entirety of the Project Boundary and VH to the west. However, based on the conditions encountered in the WRESC Site (Yeh 2023) and review of the geologic map shown in Section 5.4, Geological Hazards, Figure 5.4-2, it is unlikely that the staging areas harbor expansive soils. Furthermore, neither buildings nor foundations are proposed within the staging areas, so regardless of possible shrink/swell potential, the presence of any expansive soils in those areas would be inconsequential.

5.11.2.6.2 Potential for Shallow Groundwater

The closest identified U.S. Geological Survey monitoring well to the WRESC Site is Well No. 009N012W23N001S, located approximately 4.2 miles to the southeast of the site at a ground surface elevation of 2,292.4 feet above mean sea level. The most recent reported groundwater depth measurement was 68.2 feet bgs on March 17, 2023 (USGS 2023). Additionally, according to the data from the Dawn Road Overcrossing project approximately 0.2 miles southwest from the WRESC Site, no groundwater was encountered within borings drilled to depths up to 30 feet bgs (CalTrans GeoDOG 2021). Furthermore, reports from cleanup Site 280, which is located approximately 2.6 miles southeast of the WRESC Site within the Edwards Air Force Base, indicate that groundwater is approximately 50 feet bgs (Department of the Air Force 2018).

In addition to the publicly available information from other nearby sites, the Yeh (2023) report measured groundwater at a depth of approximately 40 feet bgs within the WRESC Site as explained in Section 5.11.2.4.

Based on these sources of information, it is unlikely that there is shallow groundwater at the proposed WRESC site, particularly where recent site-specific information is available. However, the groundwater elevation should be expected to fluctuate seasonally and/or change over time.

5.11.2.6.3 Liquefaction Risk

Liquefaction is a phenomenon in which the strength and stiffness of a typically loose, cohesionless (i.e., sand), saturated soil are reduced by earthquake shaking or other rapid or cyclic loading. Liquefaction is also a function of the presence of groundwater. As explained in Section 5.11.2.6.2, groundwater at the proposed WRESC site is likely at least 30 feet bgs. Liquefaction generally occurs in the upper 50 to 60 feet of soil. If groundwater is deeper than 60 feet, the possible impacts imposed by liquefaction are typically less than significant. If groundwater is present at shallower depths, the effects of liquefaction may be significant if not mitigated.

The California Geological Service Seismic Hazards Program: Liquefaction Zones map shows that mapping has not been performed within the proposed WRESC Project Area (CGS 2023). This does not preclude the possibility of liquefaction potential within the proposed Project Area.

According to the NRCS, the Muroc soil and the Hi Vista soil are dominated by sandy loam, whereas the Cajon soil is dominated by sand. Based on the available information regarding the soils' grain size provided by NRCS Official Soil Series descriptions, all three soil types may be susceptible to liquefaction. However, the NRCS data is very limited and cannot be solely relied on to determine liquefaction susceptibility.

Based on the conditions encountered described in the Yeh (2023) report, most of the WRESC Site has a surficial layer of alluvium that is up to 7.5-feet-thick and portions of which have a loose relative density as described in

Section 5.11.2.4. Theoretically, the loose zones of the alluvium may be susceptible to liquefaction. However, considering the current understanding of the depth to groundwater described in Section 5.11.2.6.2, the alluvium would not have the potential for liquefaction unless the groundwater elevation increased significantly. To conduct a quantitative liquefaction analysis, the historic highest groundwater elevation is typically applied and at the time this document was prepared, the historic highest groundwater elevation was unknown. The quartz monzonite encountered per the Yeh (2023) report is considered not susceptible to liquefaction.

Based on the information presented in Yeh (2023), the risk of liquefaction within the WRESC Site is considered low to negligible depending on the historic highest groundwater elevation and fluctuations in the groundwater seasonally or over time. Based on the NRCS data, some of the surficial soils may be susceptible to liquefaction, but additional information is needed to evaluate the risk of liquefaction in the staging areas. Regardless of susceptibility, the consequences of liquefaction within the staging areas may be of little or no importance depending on the use of those areas. Section 5.4, Geological Hazards and Resources, provides additional information on liquefaction potential and mitigation measures.

5.11.2.6.4 Potential for Organic Soils

Generally, alluvial fans and rock pediments are not associated with organic soils. However, according to the NRCS Official Soil Series Descriptions, the Muroc soils contain very fine and coarse organic roots from a depth of 3 inches to a depth of 54 inches, the Cajon soils contain fine and very fine roots from the surface to a depth of 60 inches, and the Hi Vista soils contain very fine roots from the surface to a depth of 29 inches, which was the full extent of the samples taken during the investigation. Based on the information presented in the Yeh (2023) report, one of the total 17 borings encountered trace organic material.

In the staging areas, no information is available regarding the presence of roots or organic matter in the Torriorthents (rock outcrop) unit.

Even if very fine to coarse organic roots are present in the Project Area, they would present a less-than-significant impact on soils. A site-specific geotechnical exploration has not been performed at the time of this writing to determine organic matter concentrations at the Project location.

5.11.2.6.5 Potential for Soil Contamination

Existing site conditions were captured in a Phase 1 Environmental Site Assessment which revealed no evidence of recognized environmental conditions in connection with the WRESC site. Section 5.14, Waste Management provides further information.

The State Water Resources Control Board (SWRCB) GeoTracker database was searched for evidence of known contamination within the vicinity of the WRESC Project. The closest identified cleanup site is located approximately 2.6 miles southeast of the Project Boundary near the intersection of Lode Starr Road and Willow Springs Road, within Edwards Air Force Base. The cleanup site status is open for verification monitoring (SWRCB 2023). The SWRCB assigns the status of open for verification monitoring to sites in which “remediation phases are essentially complete, and a monitoring/sampling program is occurring to confirm successful completion of cleanup at the site” (SWRCB 2023).

5.11.3 Environmental Analysis

The following sections describe the potential environmental effects on soils near the Project Area during the construction and operation of the proposed WRESC.

5.11.3.1 Significance Criteria

Factors used to evaluate the significance of project related Soils are set forth in Appendix G of the California Environmental Quality Act (CEQA). Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor’s Office of Planning and Research stated, “Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances.” The answers to

the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential soils impacts associated with the construction and operations of the project, Appendix G, asks if the project would:

- Result in substantial soil erosion or the loss of topsoil.
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (International Code Council 1994), creating substantial direct or indirect risks to life or property.

The following subsections describe the anticipated environmental impacts on agricultural production and soils during Project construction and operation.

5.11.3.2 Soil Erosion during Construction

Possible impacts on soil resources during Project construction can include an increase in soil erosion due to both water and wind. Soil erosion can cause the loss of topsoil and can impact the amount of sediment received by nearby bodies of water downstream of the WRESC Site. The magnitude of construction impacts on soil resources depends on the soil erodibility, construction methods and schedule, weather, and construction proximity to nearby sensitive receptors.

5.11.3.2.1 Water Erosion

For the duration of construction, best management practices (BMPs) will be implemented following a site-specific stormwater pollution prevention plan (SWPPP). The California Energy Commission also often requires that Project owners implement a drainage, erosion, and sediment control plan (DESCP) to reduce the impact of runoff from construction sites. Site monitoring will involve inspections to ensure that the BMPs in the SWPPP and DESCP are properly maintained. Therefore, impacts related to water erosion can be mitigated to less than significant.

5.11.3.2.2 Wind Erosion

Soils with sandy textures, such as the sandy loam and sand textures of the WRESC site soils, have at least low potential for wind erosion. Wind erosion potential is greatest when dry, fine sandy material is left exposed.

The potential for wind erosion will be mitigated to less than significant by implementing the soil BMPs during construction following the Eastern Kern County Air Pollution Control District's suggested air pollution mitigation measures (EKAPCD 2012). Section 5.11.5, below, describes possible mitigation measures.

5.11.3.3 Other Significant Soil Properties

As described in Section 5.11.2.6, above, the soil units within the proposed Project Area are expected to:

- Have a low to negligible shrink-swell potential, so expansive soils are not likely a concern at the WRESC Site.
- Have a low to negligible risk of liquefaction within the WRESC Site, in lieu of site-specific information the staging areas may be susceptible to liquefaction.
- Have groundwater that is at least 30 feet bgs.
- Have very fine to coarse-sized roots at and near the surface.
- Are free of contamination.

5.11.3.4 Compaction during Construction and Operation

Construction of the WRESC and the use of heavy equipment around the site will result in soil compaction. Compacting the soil will increase the soil density, as well as reduce the ability of the soil to absorb precipitation. Surface water runoff, erosion, and sedimentation could increase as a result. The use of BMPs in both the WRESC Site and staging areas during the construction phase, following the SWPPP and DESCP guidelines, will mitigate the effects of soil compaction.

Because the WRESC will be constructed in a rural, previously undeveloped area that will be graded and/or paved during and after construction, the expected effects of compaction during construction are considered less than significant.

The operation of the WRESC is not expected to cause compaction-related impacts on the soil. Routine vehicle traffic will be limited to designated roads, and standard operational activities will not involve disruption of the soil. Therefore, impacts on soil from project operations are expected to be less than significant.

5.11.3.5 Effects of Emissions on Soil-Vegetation Systems

Emissions from a generating facility could adversely affect soil-vegetation systems. This is principally a concern where environments that are highly sensitive to nutrients or salts are downwind of the Project. There are no habitats in or surrounding the Project Area that are known to be especially sensitive to the effects of nitrogen deposition. The potential addition of small amounts of nitrogen to the area would result in a less-than-significant impact on soil-vegetation systems. Additional discussion regarding nitrogen deposition and impacts to biological resources in the area can be found in Section 5.2, Biological Resources.

5.11.4 Cumulative Effects

Section 15355 of the CEQA Guidelines defines “cumulative impacts” as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.” Subsection b of Section 15355 states, in part, that “The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects.” Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project’s incremental effect is “cumulatively considerable.” Section 15065(a)(3) then defines “cumulatively considerable” as meaning “that the incremental effects of an individual project are significant when viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects.”

Types of foreseeable developments within the spatial setting include new industrial facilities such as the Mojave Micro Mill[1] project, Gem Hill Quary project,[2] new energy facilities, residential development, and various projects that require changes in zoning and land use designation. The potential effects that construction and operation of the proposed A-CAES Project at WRESC may have on soil resources at and in the vicinity of the Project Area are expected to be less than, or mitigated to less than, significant.

5.11.5 Best Practices, Project Design Features, and Mitigation Measures

The following best practices, design features, and mitigation measures will reduce potential impacts related to soils to less than significant during construction and operation of the proposed WRESC:

- Furnish a geotechnical report that augments the Yeh (2023) data report and is applicable to the Project.
- Verify the recommendations provided in the geotechnical report are followed during the construction and operation of the proposed WRESC.
- Have a qualified engineer or geologist observe earthworks including excavations and grading to verify the conditions encountered during construction are consistent with those described in the geotechnical report.
- Develop and implement a SWPPP and DESCP that follow BMPs to mitigate water and wind erosion.
- Implement BMPs described in the SWPPP and DESCP.
- Time construction activities, as best as practicable to reduce water and wind erosion.

[1] Mojave Micro Mill is intended to be a state-of-the-art steel micro mill. The mill’s products would be used in major infrastructure projects and major commercial projects. The proposed project site is in the unincorporated area of southeastern Kern County, approximately 5 miles northeast from the unincorporated community of Rosamond and approximately 8 miles southeast from the unincorporated community of Mojave (Kern County 2023).

[2] The Gem Hill Quarry project proponent (CalPortland Company) involves a surface mining operation and development of a reclamation plan on 82 acres of an approximately 210-acre reclamation plan boundary (CEQAnet Web Portal 2024).

- Design finished grades to maintain positive drainage to control surface water runoff to the desired collection and/or discharge locations.
- Pave or hardscape frequently used roads and areas to prevent water and wind erosion.
- Grade and/or revegetate unpaved areas to reduce water and wind erosion.
- Temporarily cease clearing, grading, earthmoving, and excavation activities when winds generate excess fugitive dust.
- Implement dust suppression measures (e.g., spraying with water, applying a tackifier) to control dust generation and minimize wind-blown soil loss.
- Revegetate and/or armor permanent slope faces and channels to reduce water and wind erosion.
- Use sediment barriers (e.g., straw wattles, silt fences) to slow runoff.
- Water or cover stockpiles of soil or other fine loose material to prevent wind-blown fugitive dust.
- Use soil amendments to stabilize expansive soil or over-excavate and replace it with engineered fill.
- Where and if applicable, over-excavate and replace liquefiable soils or implement a ground improvement technique (e.g., compaction grouting, deep soil mixing) if more practical.
- Rip any unpaved areas that become over-compacted during construction.

5.11.6 Laws, Ordinances, Regulations, and Standards

Federal, state, county, and local laws, ordinances, regulations, and standards (LORS) applicable to soils are discussed and summarized in **Table 5.11-2**.

Table 5.11-2: Laws, Ordinances, Regulations, and Standards for Soils

LORS	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Federal			
Clean Water Act/Water Pollution Control Act. 1972, amended by Water Quality Act of 1987 P.L. 100-4	*Regulates stormwater and non-stormwater discharges from construction and industrial activities*	*RWQCB – Lahontan Region (6), SWRCB*	*Section 5.11.5.1*
NRCS (1983), National Engineering Handbook, Sections 2, and 3	*Standards for soil conservation*	*Natural Resources Conservation Service*	*Section 5.11.5.1*
State			
Porter-Cologne Water Quality Control Act	*Regulates discharges of waste to state waters and land*	*RWQCB – Lahontan Region (6), SWRCB*	*Section 5.11.5.2*
Table 18-1-B of the Uniform Building Code (International Code Council 1994)	*Sets standards for defining expansive soils*	*California Building Standards Commission*	*Section 5.11.5.2*
Local			
Kern County General Plan	*Requirements for Site Plan Reviews and Environmental Assessments, including requirements for building on native soils*	*Kern County, Building Inspection Division*	*Section 5.11.5.3*
Kern County Municipal Code	*Standards for grading and water quality, including permit requirements*	*Kern County, Building Inspection Division*	*Section 5.11.5.3*

5.11.6.1 Federal Laws, Ordinances, Regulations, and Standards

5.11.6.1.1 Federal Clean Water Act

Discharges of wastewater and stormwater into surface and ground waters are regulated by SWRCB and Regional Water Quality Control Boards (RWQCBs) under the Clean Water Act of 1987 and the Water Pollution Control Act of 1972. Relevant National Pollutant Discharge Elimination System (NPDES) permits for stormwater quality management are discussed in Section 5.15, Water Resources.

5.11.6.1.2 U.S. Department of Agriculture Engineering Standards

Sections 2 and 3 of the NRCS National Engineering Handbook provide standards for soil conservation during planning, design, and construction activities (NRCS 1983).

5.11.6.2 State Laws, Ordinances, Regulations, and Standards

5.11.6.2.1 California Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code, Division 7) is the state law governing the water quality of all state waters, including both surface water and groundwater. The SWRCB has the ultimate authority over water quality policy on a state-wide level, and the Lahontan RWQCB regulates water quality in the Project Area. See Section 5.15, Water Resources for further information.

5.11.6.2.2 Uniform Building Code

Table 18-1-B of the Uniform Building Code defines the criteria for classifying expansive soils based on the expansion index (International Code Council 1994).

5.11.6.3 Local Laws, Ordinances, Regulations, and Standards

The Kern County General Plan includes requirements for building on native soils, as required by state law. The General Plan, Chapter 4 requires a review of soils and geologic conditions for hazard identification (Kern County Planning Department 2009).

The Kern County Municipal Code requires that plans meet standards for grading and water quality. Municipal Code Sections 17.04.030 and 17.28.040 require the construction of new non-residential development projects to obtain a building or grading permit, respectively. Section 17.28.070 explains grading permit requirements. Municipal Code Section 17.28.140 provides additional details on erosion control and water quality (Kern County 2024).

5.11.7 Agencies and Agency Contacts

Applicable permits and agency contacts for soils are shown in **Table 5.11-3**.

Table 5.11-3: Permits and Agency Contacts for Soils

Permit or Approval	Agency Contact	Applicability
Kern County Grading and Building Permit	*Kern County Public Works Department Building Inspection Division 2700 M Street, Suite 570 Bakersfield, CA 93301 (661) 862-5100*	*Building and grading permits*
NPDES Permit	*Lahontan Regional Water Quality Control Board 15095 Amargosa Rd Building 2, Suite 210 Victorville, CA 92394 (760) 241-6583*	*Surface water and groundwater compliance*
NPDES Permit	*State Water Resources Control Board 1001 I Street Sacramento, CA 95814 (916) 341-5250*	*Surface water and groundwater compliance*

5.11.8 Permits and Permit Schedule

It is expected that all the required permits for grading and building can be secured, given that completed applications are provided to the appropriate agency before construction. The grading and building permit process will be initiated after receiving approval from the planning department for the Project. Other permits that relate to soils, such as the NPDES permit, are evaluated in other sections (see Section 5.15, Water Resources).

5.11.9 References

California Geological Survey (CGS). ND. *Seismic Hazards Program: Liquefaction Zones*. Available online: https://maps.conservation.ca.gov/cgs/informationwarehouse/regulatorymaps/. Accessed July 21, 2023.

California Department of Transportation Digital Archive of Geotechnical Data (CalTrans GeoDOG). 2021. *Dawn Road Overcrossing, Log of Test Borings.* Available online: https://geodog.dot.ca.gov/search_projects_results.php. Accessed August 15, 2023.

Department of the Air Force, September 18, 2018. *Feasibility Study Report Addendum Sites 272, 280, 293, and 339.* U.S. Air Force Civil Engineer Center, Environmental Restoration Program.

Eastern Kern Air Pollution Control District (EKAPCD). 2012. Suggested Air Pollutant Mitigation Measures For Construction Sites For Eastern Kern APCD. Available at: http://www.kernair.org/Documents/CEQA/Construction_Mitigation%2005-06.pdf. Accessed August-September 2021.

International Code Council. 1994. Uniform Building Code (International Building Code). International Conference of Building Officials. May 1, 1994.

Kern County Planning Department. 2009. Kern County General Plan. September 22, 2009.

Kern County. 2024. Kern County, California Municipal Code. January 16, 2024.

Natural Resources Conservation Service, United States Department of Agriculture (NRCS). 1993. *Soil Survey Manual, Agricultural Handbook No. 18*.

Natural Resources Conservation Service, United States Department of Agriculture (NRCS). 2015. Official Soil Series Descriptions. Available online. https://soilseries.sc.egov.usda.gov/osdname.aspx. Accessed July 24, 2023.

Natural Resources Conservation Service, United States Department of Agriculture (NRCS). 2019. Web Soil Survey. Available online: http://websoilsurvey.nrcs.usda.gov/. Accessed July 20, 2023.

State Water Resources Control Board (SWRCB). 2023. GeoTracker database. Available online: http://geotracker.waterboards.ca.gov/. Accessed July 24, 2023.

U.S. Fish and Wildlife Service (USFWS). 2012. National Wetlands Inventory. https://www.fws.gov/program/national-wetlands-inventory.

U.S. Geological Survey (USGS). 2023. National Ground-Water Monitoring Network. Available online: https://cida.usgs.gov/ngwmn/index.jsp. Accessed July 24, 2023.

Yeh and Associates, Inc. (Yeh). 2023. Geotechnical Data Report, Zevsar Energy Storage Project Sierra Highway and Dawn Road, Kern County, California. November 17, 2023.

5.12 Traffic and Transportation

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California. The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's (SCE's) Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way (ROW) associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH.

This section describes the potential effects of the WRESC on traffic and transportation. The analysis is organized into subsections as follows:

- Subsection 5.12.1 describes the transportation facilities in the vicinity of the Project that might be affected by the Project. This subsection includes descriptions of roads, public transportation, rail, air, bicycle, and pedestrian facilities.
- Subsection 5.12.2 describes the potential effects of the Project on local traffic conditions and conditions for nonauto modes. This subsection concentrates on the Project's impact during the month of peak construction activities when the Project will have its greatest impacts on traffic and transportation.
- Subsection 5.12.3 describes the cumulative transportation effects of the Project once construction is complete and the Project is in full operation.
- Subsection 5.12.4 describes measures that would mitigate the Project's transportation impacts.
- Subsection 5.12.5 describes applicable laws, ordinances, regulations, and standards (LORS).
- Subsection 5.12.6 provides a list of the applicable regulatory agencies and contacts.
- Subsection 5.12-7 discusses traffic and transportation permits required.
- Subsection 5.12.8 lists the references used to prepare this section.

5.12.1 Affected Environment

The unincorporated community of Rosamond is about 4 miles to the south of the WRESC Site and the unincorporated community of Mojave is about 10 miles north of the WRESC Site. The nearest incorporated city is Lancaster, the center of which is about 17 miles from the WRESC Site.

The WRESC Site is currently an undeveloped desert. It is adjacent to an unpaved section of Dawn Road to the south, an undeveloped mesa to the north and west, and Sierra Highway to the east. The primary access to the WRESC Site will be from Dawn Road. There will be two entry/exit points from Dawn Road for heavy load traffic. Access at the west side will lead to the laydown area, and access at the east side will lead to the east end of the Power Block. Temporary access during construction will be crushed rock driveways from both Dawn Road and Sierra Highway. Personnel parking spaces, electric vehicle charging stations, and parking lot landscaping will be provided and will conform to Kern County requirements. Construction activities are expected to last approximately 60 months (refer to Chapter 2, Project Description Subsection 2.1.20.1).

5.12.1.1 Existing Regional and Local Transportation Facilities

The key transportation facilities in the vicinity of the Project are presented in the following subsections.

5.12.1.1.1 Roadways

SR 14 is a four-lane freeway (two lanes in each direction) in the vicinity of the Project with a grade-separated interchange at Dawn Road. SR 14 originates in Los Angeles County at an interchange with Interstate 5 (I-5) and travels north through Palmdale, Lancaster, and Rosamond to the south of the WRESC Site and through Mojave and other desert communities to the north of the WRESC Site. SR 14 terminates in the northern Mojave Desert at U.S. Route 395.

Sierra Highway is a two-lane highway in the vicinity of the Project. It originates near the I-5/SR 14 interchange in Los Angeles County and continues north as a four-lane highway (two lanes in each direction), generally along SR 14 through Santa Clarita, Palmdale, Lancaster, and Rosamond. North of Rosamond, Sierra Highway travels north as a two-lane facility terminating north of the WRESC Site near Silver Queen Mine Road.

Dawn Road is a two-lane local road running east–west between Mojave Tropico Road in the west and Sierra Highway in the east. Dawn Road has a grade-separated interchange with SR 14 near the WRESC Site.

Backus Road is a two-lane local road running east–west between Sierra Highway in the east and extending west of Tehachapi Willow-Spring Road in Rosamond. Backus Road also has a grade-separated interchange with SR 14 north of the WRESC Site.

5.12.1.1.2 Pedestrian

There are no existing or proposed pedestrian facilities in the immediate vicinity of the WRESC or along the surrounding roadways.

5.12.1.1.3 Bicycle Facilities

There are no dedicated bicycle facilities near the WRESC or along the surrounding roadways.

5.12.1.1.4 Public Transportation

Public transportation in Kern County is provided by Kern Transit, which offers 13 fixed routes and seven dial-a-ride service routes throughout the County. Route 100 that serves a fixed route scheduled bus service between Bakersfield and Lancaster travels through Rosamond. Although Route 100 runs on SR 14 in the vicinity of the Project, there are no bus stops near the WRESC Site.

5.12.1.1.5 Rail Traffic

The closest railway is operated by the Union Pacific Railroad, which runs parallel to Sierra Highway near the eastern border of the WRESC Site.

5.12.1.1.6 Air Traffic

The following airport facilities are located within 25 miles of the WRESC Site:

- **Rosamond Skypark** is a privately owned and operated residential airport that is open for public use and is located about 6 miles south of the WRESC Site. This airport has a 3,600-foot asphalt runway and exclusively serves general aviation aircraft. In operation since 1953, the facility serves an average of 29 flight operations per day.
- **Lloyd's Landing Airport** is a private airstrip, located approximately 14 miles to the west of the WRESC Site. Lloyd's Landing Airport is a private facility with an approximately 2,300-foot dirt runway. The facility receives no regular scheduled flights and is not publicly accessible.
- **General William J. Fox Airfield** is a public airfield located about 16 miles south of the WRESC Site. This airport has a 7,200-foot asphalt runway and serves general aviation aircraft, limited scheduled cargo service, and U.S. Forest Service aircraft. In operation since 1959, the airfield serves an average of 224 flight operations per day.
- **Mojave Air and Space Port** is a public airfield located about 12 miles north of the WRESC Site. This airport has three asphalt runways (with lengths of 3,946, 7,049, and 12,503 feet) and primarily serves general aviation aircraft, with some commercial, air taxi, and military flights also using the facility. In operation since

1940, the airport serves an average of 58 flight operations per day. In 2004 this facility was the first to be certified as a spaceport by the Federal Aviation Administration (FAA).

- **Mountain Valley Airport** is a private airport that allows public access, located approximately 27 miles to the northwest of the WRESC Site. The airport has two runways, each 4,890 feet long, and primarily serves general aviation aircraft, with some military flights also using the facility. In operation since 1968, the airport serves an average of 137 flight operations per day.
- **Edwards Air Force Base** is a military base and airstrip located approximately 20 miles east of the WRESC Site. The base is owned and operated by the U.S. Air Force (not open to public use) and includes three runways that range in length from 8,000 feet to 12,000 feet and that are paved with concrete or asphalt. The base covers more than 301,000 acres and also includes additional landing areas on the hardpacked surface of the Rogers Dry Lake and Rosamond Dry Lake. The base also supported the U.S. space shuttle program as a backup landing site.

5.12.1.2 Truck Routes – Weight and Load Limitations

The construction of the WRESC will involve several different types of cargo that will travel to or from the WRESC Site by truck:

- **Construction Material:** Large and heavy components for the WRESC will be transported to the WRESC Site by truck. These loads are expected to originate primarily (85 percent) from the greater Los Angeles area, including several shipments that will arrive at the Port of Long Beach. The path to be taken by these cargos would involve local street network and Interstate 15 and U.S. Route 395 (see **Figure 5.12-1**). A lesser amount (15 percent) is expected to be shipped from the Port of Hueneme in Oxnard, California. Their route would involve local street network, SR 126, and Sierra Highway (see **Figure 5.12-2**). These routes are Surface Transportation Assistance Act "green" routes, meaning that they are designed to accommodate large trucks.[1]
- **Excavated Rock:** Approximately 1.3 million cubic yards of rock will be excavated to construct the compressed air storage caverns. Some or all of this rock may be used onsite to construct the containment structure for the reservoir and an optional architectural berm. Alternatively, some or all of the rock may be transported to one or more off-takers for beneficial uses. These off-takers include Vulcan Materials, Robertson's Ready Mix, and Holliday Rock.
- **Gen-Tie Line Construction:** In addition to going to and from the main WRESC Site, some Project-related vehicles will travel to additional sites (individual pole locations and tensioning, pull, and laydown sites) along the gen-tie line between the WRESC and the SCE Whirlwind Substation. Construction crews will presumably use existing service roads to install a new line, with the exception of approximately 1.75 miles of unpaved construction road that will be constructed at the eastern end of Dawn Road where there is no existing road access to the proposed gen-tie route.

California Vehicle Code (CVC) Sections 35550–35559 regulate the use of trucks on state facilities (see Section 5.12.5.2). Transportation permits will be obtained for all heavy and oversize loads, as required by law.

[1] See https://dot.ca.gov/programs/traffic-operations/legal-truck-access/truck-network-map.

Figure 5.12-1: Truck Route from Port of Long Beach

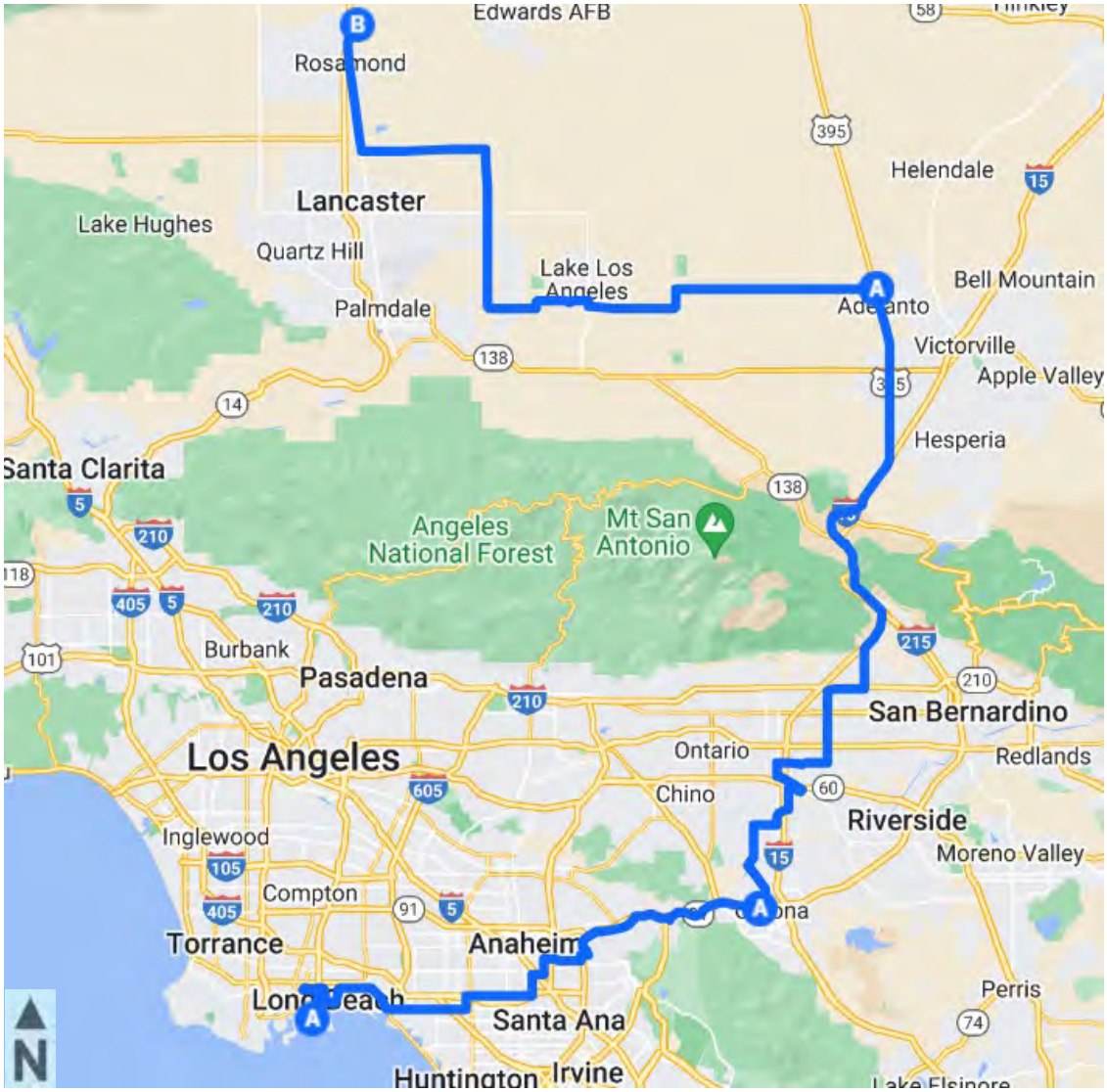
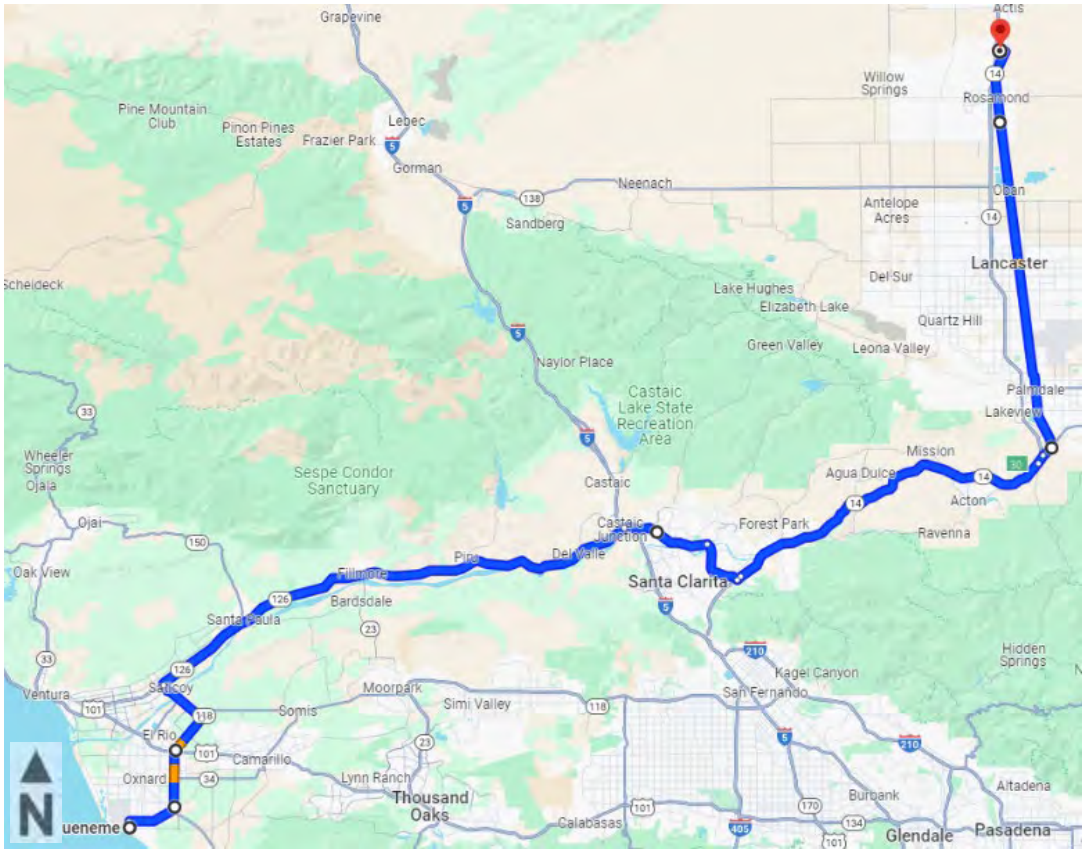


Figure 5.12-2: Truck Route from Port of Hueneme



5.12.1.3 Other Projects

5.12.1.3.1 Future Plans and Projects

The current Regional Transportation Plan (RTP) adopted by Kern Council of Governments (COG) in 2022 (Kern COG 2022) was reviewed and determined that there were no future roadway projects relevant to WRESC Project traffic.

5.12.1.3.2 Pedestrian/Bicycle Facilities

Bicycle facilities are typically categorized into four classes as follows:

- Class I facilities are bicycle paths or trails with an ROW for bicycles separate from vehicles.
- Class II facilities are bicycle lanes with an exclusive ROW for bicycles designated by roadway striping and signs. Buffered bicycle lanes include a designated space between the bicycle lane and the automobile lanes.
- Class III facilities are bicycle routes signed for shared travel with motorized vehicles without any striping. A shared lane marking (or sharrow) is a street marking placed in the center of a travel lane to indicate that a bicyclist may use the full travel lane. Bicycle boulevards are a subgroup of Class III bicycle facilities usually consisting of low-volume residential streets that parallel major streets. Bicycle boulevards are designed to give priority to bicyclists through various design techniques that reduce through traffic volumes and provide crossing enhancements for bicyclists at major intersections.
- Class IV facilities, also known as cycle tracks or separated bikeways, are bikeways for the exclusive use of bicycles and includes a separation required between the separated bikeway and the through vehicular traffic. The separation may include but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

The 2022 RTP listed 33 potential bicycle facilities in the vicinity of Rosamond. These are listed in **Table 5.12-1**.

Table 5.12-1: Bicycle Facilities Planned for the Rosamond Area

Street	Section	Planned Bicycle Facility	Length (miles)
Rosamond Boulevard	60th Street W–County Line	Class II Buffered Bicycle Lane	5.6
20th Street	W Avenue A–Rosamond Boulevard	Class II Buffered Bicycle Lane	3
Sierra Highway	W Avenue A–Hook Road	Class II Buffered Bicycle Lane	3.6
35th Street W	Felsite Avenue–Holiday Avenue	Class II Buffered Bicycle Lane	1.5
40th Street	Rosamond Boulevard–Holiday Avenue	Class II Buffered Bicycle Lane	1.1
30th Street W	Patti Rose Avenue–Felsite Avenue	Class II Buffered Bicycle Lane	1.4
Felsite Avenue	35th Street W–Frontage Road	Class II Buffered Bicycle Lane	1.2
15th Street W	Rosamond Boulevard–Hook Avenue	Class II Bicycle Lane	0.6
Frontage Road	Felsite Avenue–Rosamond Boulevard	Class II Bicycle Lane	0.6
Rosamond Boulevard	90th Street–60th Street	Class II Bicycle Lane	3
25th Street	Rosamond Boulevard–Holiday Avenue	Class II Bicycle Lane	1.1
60th Street	Rosamond Boulevard–Avenue A	Class II Bicycle Lane	3
80th Street	Rosamond Boulevard–Avenue A	Class II Bicycle Lane	3
90th Street	Rosamond Boulevard–Avenue A	Class II Bicycle Lane	3
Avenue A	90th Street–Sierra Highway	Class II Bicycle Lane	7.6
Hook Avenue	15th Street W–United Street	Class II Bicycle Lane	0.5
Tehachapi-Willow Springs Road	Favorito Avenue	Class II Bicycle Lane	2.6

Street	Section	Planned Bicycle Facility	Length (miles)
Glendower Street	Rosamond Boulevard–Hillcrest Avenue	Class III Bicycle Boulevard	0.5
Hillcrest Avenue	Haven Street–Sierra Highway	Class III Bicycle Boulevard	0.4
Holiday Avenue	40th Street–35th Street	Class III Bicycle Boulevard	0.2
Desert Cloud Avenue	35th Street–Howard Street	Class III Bicycle Boulevard	0.2
Marie Avenue	Highway 14–Sierra Highway	Class III Bicycle Boulevard	0.4
Orange Street	Granite Street–Sierra Highway	Class III Bicycle Boulevard	0.3
Buss Street	Janine Avenue–Summer Breeze Avenue	Class III Bicycle Boulevard	0.1
Howard Street	Summer Breeze Avenue–Desert Cloud Avenue	Class III Bicycle Boulevard	0.1
Janine Avenue	Buss Street–30th Street	Class III Bicycle Boulevard	0.2
Summer Breeze Avenue	Howard Street–Buss Street	Class III Bicycle Boulevard	0.1
Backus Road	Lone Butte Road–Mojave–Tropico Road	Class III Bicycle Route	3.6
Sierra Highway	Felsite Avenue–Backus Road	Class III Bicycle Route	5.6
Mojave-Tropico Road	Backus Road–Rosamond Boulevard	Class III Bicycle Route	6.3
Elder Avenue	80th Street–60th Street	Class III Bicycle Route	2
Holiday Avenue	80th Street–60th Street	Class III Bicycle Route	2

5.12.1.3.3 Public Transportation

The RTP does not suggest that there are any public transportation projects planned for Rosamond or Willow Springs.

5.12.1.3.4 Rail Traffic

The RTP includes two rail projects planned for the Project vicinity:

- **Extension of the Metrolink from Palmdale/Lancaster to Rosamond:** This project is identified in the 2022 RTP as a Constrained Capital Improvement Project.
- **California High-Speed Rail (HSR)**: This megaproject is expected to pass within a few miles of the proposed WRESC site, which suggests several possibilities for synergies between the projects:
  - This section of HSR will be elevated on embankments that will pass over local roads. The construction of the embankments will require large amounts of fill material. It is possible that excavated rock from the WRESC's cavern construction could be used to satisfy part of this need. However, given that the WRESC is likely to be constructed earlier than HSR would be, the material may need to be stored temporarily on the HSR site before use.
  - HSR will require a series of electric substations at intervals along its alignment. Each of these substations will be connected to the regional power grid through transmission lines. One of these substations will be located somewhere near the WRESC (exact location not yet known). Since both the WRESC and HSR need a set of transmission lines to a substation of the regional power grid, it is possible that they could share use of a set of lines or at a minimum share a ROW to the substation on the grid.

Both of these possibilities would reduce the environmental impacts of the WRESC. However, since agreements have not been worked out with HSR, neither of these beneficial synergies was assumed in this analysis.

5.12.1.3.5 Air Traffic

The RTP states that there is approximately $211 million worth of potential capital improvement projects in Kern County, including $102 million in projects at Mojave Air and Space Port, 12 miles north of the WRESC. However, these projects are not funded and would not be possibly implemented until after the horizon year of the RTP (2046), nor would they likely have any potentially affects that could combine with the effects of WRESC construction and operations, given the 12 miles distance, among other factors.

5.12.2 Environmental Analysis

This subsection analyzes the potential effects of the WRESC on transportation in the study area. This subsection will concentrate on the construction period when traffic to and from the Project will peak. A later subsection will analyze the effects of the Project post-construction.

5.12.2.1 Significance Criteria

Factors used to evaluate the significance of Project-related traffic and transportation are set forth in Appendix G of the California Environmental Quality Act (CEQA). Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential Traffic and Transportation impacts associated with the construction and operations of the project, Appendix G and recent amendments to the CEQA Guidelines asks if the project would:

Conflict with a program, plan, ordinance, or policy addressing the circulation system including transit, roadway, bicycle, and pedestrian facilities.

- Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)[2]
- Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)
- Result in inadequate emergency access

CEQA Guidelines Section 15064.3 establishes Vehicle Miles Traveled (VMT) as the appropriate measure to identify transportation impacts. CEQA guidelines were updated in 2018 following the implementation of Senate Bill (SB) 743, moving from level of service (LOS) analysis to VMT metrics. VMT calculates transportation impacts by measuring the change in overall automobile travel miles that would result from a proposed project. The goal of SB 743 is to ensure new development projects support the reduction of car use and thus reduce greenhouse gas (GHG) emissions and combat climate change.

VMT is a measure of total travel that accounts for the number and length of trips in a region over a period. The guidelines issued by the California Governor's Office of Planning and Research (OPR) state that VMT associated with heavy-duty truck trips should not be included in the evaluation of transportation impacts. Therefore, the VMT analysis conducted for this project includes only worker (employee) trips and does not include construction equipment and haul truck trips. VMT for this project is calculated by multiplying the number of Project trips by the travel length of each trip. The Project would have a significant transportation impact if the VMT per employee from the Project is greater than the average VMT per capita for the region in which it is located.

According to the latest California Public Road Data published by the Highway Performance Monitoring System, the average regional daily VMT in Kern County is 25,366,210 (State of California 2024). According to the U.S.

[2] CEQA Guidelines § 15064.3, subdivision (b) is the Criteria for Analyzing Transportation Impacts.

Census Bureau (2024), Kern County had a population of 916,108 in year 2022. The VMT per capita was calculated to be 27.7, which is therefore the threshold for examining of a potentially significant VMT impact.

5.12.2.2 Project Specific Impacts

5.12.2.2.1 Construction Traffic Generation

The construction of the facility from site preparation and grading to full-scale operation is expected to take approximately 60 months. Construction traffic to the WRESC Site has been estimated based on the schedule of construction activities, the number of workers, and the type and number of construction-related trucks that will be required at each stage of construction. The estimated number of construction trips per day for each month in the construction schedule are illustrated in **Figure 5.12-3**. Truck volumes have been converted to passenger car equivalents (PCE) using a factor of 2.0, which is appropriate for heavy trucks on surface streets according to the Highway Capacity Manual. The peak Project-related trips are expected to occur in month 34 with an estimated construction traffic of 1,630 PCE per day. **Table 5.12-2** summarizes the construction-related trip generation during the peak of construction. The following assumptions were made in calculating the peak hour trips during construction:

- Fifteen percent of workers will be recruited locally and drive alone to the site.
- Eighty-five percent of the workers, particularly those with special skills, will be recruited from areas outside of the county and will reside in hotels during the period when they work on the WRESC. They will drive alone to work in personal vehicles.
- All workers arrive during the AM peak hour and depart during the PM peak hour.
- Ten percent of the truck trips entering or leaving the site in a day will travel during the AM peak hour and another 10 percent will travel during the PM peak hour. Half of the peak hour trips will be entering the site, and the other half will be leaving the site.

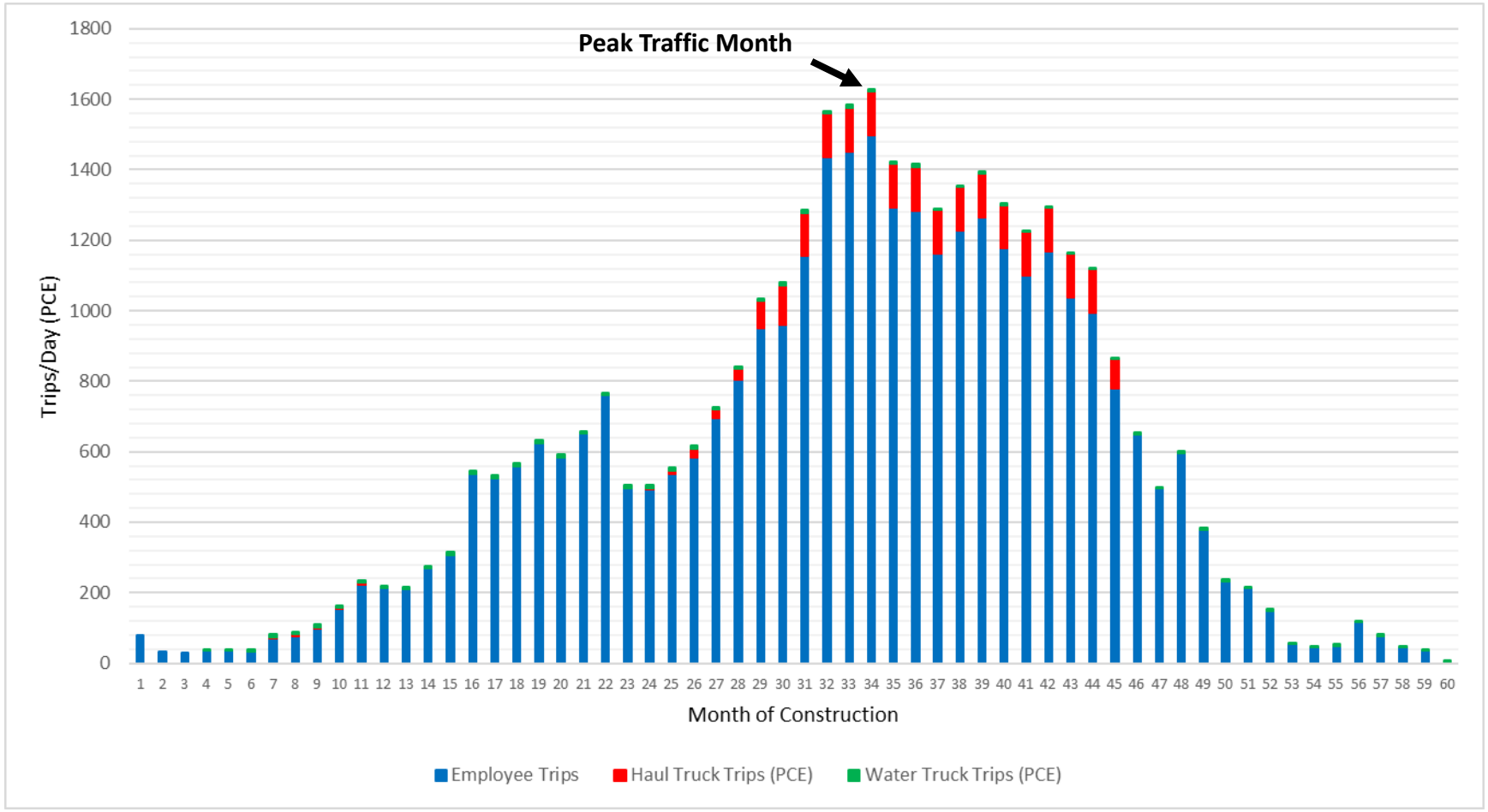
These are considered conservative assumptions, given that locally recruited construction workers may carpool, and truck drivers prefer to avoid periods of heavy traffic when possible.

Table 5.12-2: Project Trip Generation during Peak Construction

Vehicle Type	AM Peak Hour		PM Peak Hour		Daily
	Entry	Exit	Entry	Exit	Entry and Exit
Workers (cars)	749	0	0	749	1,498
Trucks (in vehicles)	7	7	7	7	66
Total Construction Traffic (in PCE)	763	14	14	763	1,630

PCE = passenger car equivalent

Figure 5.12-3: Construction Traffic by Month



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5.12.2.2.2 VMT Impacts

As noted previously, an anticipated 15 percent of the workers (total 225 out of 1,498) in the construction phase would be considered nonspecialized workers and would be recruited locally. The remaining 85 percent (total 1,274 out of 1,498), considered specialized workers, would be recruited from outside the area and would stay in hotels in nearby cities.

The residences of the nonspecialized workers are assumed to follow the residential distribution of persons currently employed in the Rosamond Census Designated Place (CDP). U.S. census data was used to determine the residential locations of workers in the Rosamond area and are summarized in **Table 5.12-3.**

Table 5.12-3: Residential Locations of Nonspecialized Workers

Residential Location	Percentage of Workers)
Rosamond CDP, CA	36%
Lancaster, CA	17%
Palmdale, CA	8%
Los Angeles, CA	3%
Mojave CDP, CA	2%
Santa Clarita, CA	2%
California City, CA	2%
Golden Hills CDP, CA	1%
Quartz Hill CDP, CA	1%
Tehachapi, CA	1%
Other Locations	27%
Total	100%

Source: U.S. Census Bureau, OnTheMap Application: https://onthemap.ces.census.gov/
CA = California; CDP = census-designated place

The specialized workforce would presumably stay in hotels in nearby Rosamond, Mojave, Lancaster, and Palmdale. Since it is unknown in which hotels the specialized workers would be lodged, an assumption of their spatial distribution was made based on the spatial distribution of hotels in the area. **Table 5.12-4** summarizes the distribution of specialized workers based on the information obtained from Google Maps.

Table 5.12-4: Residential Distribution of Specialized Workers

Hotel Location	Number of Hotels (approximate)	Distribution of Workers
Rosamond CDP, CA	4	8%
Lancaster, CA	21	41%
Palmdale, CA	16	31%
Mojave CDP, CA	10	20%

CA = California; CDP = census-designated place

As mentioned previously, VMT is calculated by multiplying the number of Project trips by the average length of each trip. **Table 5.12-5** summarizes the daily VMT calculation for the nonspecialized worker trips and **Table 5.12-6** summarizes the daily VMT calculation for the specialized worker trips.

Table 5.12-5: Daily Vehicle Miles Traveled Calculations of Nonspecialized Workers

Residential Location	Share	Nonspecialized Workers	Average Distance (miles)	Vehicle Miles Traveled
Rosamond CDP, CA	36%	81	4	324
Lancaster, CA	17%	38	17	646
Palmdale, CA	8%	18	25	450
Los Angeles, CA	3%	7	85	595
Mojave CDP, CA	2%	5	10	50
Santa Clarita, CA	2%	5	59	295
California City, CA	2%	5	25	125
Golden Hills CDP, CA	1%	2	33	66
Quartz Hill CDP, CA	1%	2	23	46
Tehachapi, CA	1%	2	30	60
Other Locations	27%	61	100	6,100
Total	100%	226		8,757

CA = California; CDP = census-designated place

Table 5.12-6: Daily Vehicle Miles Traveled Calculations of Specialized Workers

Hotel Location	Share	Specialized Workers	Average Distance (miles)	Vehicle Miles Traveled
Rosamond CDP, CA	8%	100	4	400
Lancaster, CA	41%	525	17	8,925
Palmdale, CA	31%	400	25	10,000
Mojave CDP, CA	20%	250	10	2,500
Total		1,275		21,825

CA = California; CDP = census-designated place

The total daily VMT for construction workers was calculated to be 30,582 (8,757+21,825) and VMT per employee was calculated to be 20.4. This figure is below the threshold of 27.7 VMT per capita (as defined in Subsection 5.12.2.1). Therefore, the proposed Project would have a less-than-significant impact during construction.

Note that the determination of VMT impacts does not include VMT from Project trucks. As mentioned previously, truck VMT is excluded from consideration under SB 743.

5.12.2.3 Linear Facility Construction Impacts

Construction of the gen-tie lines would involve small crews using fewer than 10 cars per day and a few trucks delivering construction materials. Tower sites would be accessed via the network of small secondary roads or new site access roads. The exact alignment and location of the transmission towers is not known at this time. Nevertheless, the few vehicles involved indicate that the transportation impact would be less than significant.

5.12.2.4 Transport of Hazardous Materials

The construction and operation of the WRESC would involve transportation of the following hazardous materials (see Chapter 5.5, Hazardous Materials):

- During construction: Explosives and detonators used for cavern construction, and oil for mechanized equipment
- During operation: Water treatment chemicals, lubricant oil, propane for utilities, and diesel fuel for backup generators

Division 13, Section 31303 of the CVC stipulates that the transportation of regulated substances and hazardous materials are required to be carried out via the most direct route, using state or interstate highways whenever possible. In accordance with this policy, subject to California Department of Transportation (Caltrans) approval, the recommended route for delivery of regulated or hazardous materials to the WRESC is via SR 99, SR 58, and SR 14.

Transporters of hazardous or explosive materials must contact the California Highway Patrol (CHP) and apply for a Hazardous Material Transportation License. Instructions are available in Section 9 of the California Commercial Driver Handbook. The exact route of the hazardous material shipment will not be determined until the shipper contacts the CHP and applies for a license.

Standards for the transport of hazardous materials are contained in Title 49 of the Code of Federal Regulations (CFR) and are enforced by the U.S. Department of Transportation. The state of California has also promulgated rules for hazardous waste transport that can be found in CCR, Title 26. Additional regulations for the transportation of hazardous materials are outlined in the CVC Sections 2500-505, 12804-804.5, 31300, 3400, and 34500-501 (California Law 2021). The state agencies with primary responsibility for enforcing federal and state regulations governing the transportation of hazardous wastes are the CHP, Caltrans, and the Department of Toxic Substances Control. Transport of hazardous materials associated with the WRESC will comply with all applicable requirements.

5.12.2.5 Public Safety

The WRESC Project is not expected to pose any unusual safety hazard to the public, except for the transportation of hazardous materials, where the transporter will be required to obtain a Hazardous Material Transportation License in accordance with CVC Section 32105 (California Law 2021) and follow proper safety procedures.

There are no schools, day care centers, retail centers, or other generators of pedestrian traffic near the WRESC Site.

5.12.2.6 Air Traffic

The Project is approximately 3.75 miles from the nearest airport, Rosamond Skypark. See Section 5.6.2.2.5 for a discussion of compatibility with the Kern County Airport Land Use Compatibility Plan (ALUCP) and the possible need to file FAA Form 7460-1 Notice of Construction for a small number of transmission line poles that may be located approximately 0.9 miles west of the closest runway. The WRESC is not expected to have any effect on the operations of any air facility.

5.12.2.7 Emergency Vehicle Access

The main driveway on Dawn Road would provide emergency access to the WRESC. Construction and operation of the WRESC will not involve any road closures and will have no effect on the operations of emergency vehicles.

5.12.2.8 Parking

The approximate 88.6-acre WRESC Site will allow all Project-related parking to be on site.

5.12.3 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects."

During operation, the WRESC will be staffed with a team of full time employees that includes the following:

- 30 operators, working on different shifts to cover operations 24 hours per day, 7 days per week
  - 10 operators per shift, assuming three shifts per day
- 5 maintenance staff working 5 days per week and 8 hours per day
- 3 supervisors working 5 days per week and 8 hours per day
- 1 administrative professional working 5 days per week and 8 hours per day
- 1 plant manager working 5 days per week and 8 hours per day

Shift changes will likely occur during peak hours and all WRESC workers will likely drive alone to the facility. **Table 5.12-7** summarizes the trip generation during operation of the proposed Project.

Table 5.12-7: Project Trip Generation During Operation

Vehicle Type	AM Peak Hour		PM Peak Hour		Daily
	Entry	Exit	Entry	Exit	Entry and Exit
Workers (cars)	20	10	10	20	80

The operation and maintenance of the proposed WRESC facility is estimated to generate approximately 80 worker trips per day (40 inbound and 40 outbound). Facility employees during operational phase are expected to be commuting from nearby communities. Based on the technical guidance provided by the OPR, projects that generate fewer than 110 trips per day generally may be assumed to cause a less-than-significant transportation impact. Therefore, the proposed Project would have a less-than-significant impact during operational phase.

5.12.4 Best Practices, Project Design Features and Mitigation Measures

As demonstrated in this section, construction and operation of the proposed WRESC would result in a less-than-significant impact related to transportation. Therefore, no mitigation is required under CEQA.

5.12.5 Laws, Ordinances, Regulations, and Standards

GEM would ensure compliance with LORS of all applicable federal, state, local, and administering agencies pertaining to traffic and transportation issues.

5.12.5.1 Federal Laws, Ordinances, Regulations, and Standards

- Title 49 CFR 172, 173, and 173 provide standards for labels, placards, and markings on hazardous materials shipments by truck (Part 172), standards for packaging hazardous materials (Parts 173), and for transporting

hazardous materials in tank cars (Part 179). The administering agencies for the above authority are the CHP and U.S. Department of Transportation.

- 49 CFR 350-399 and Appendices A-G, Federal Motor Carrier Safety Regulations, address safety considerations for the transport of goods, materials, and substances over public highways.
- 14 CFR 77.13(2) (i) requires an applicant to notify the FAA of the construction of structures within 20,000 feet of the nearest point of the nearest runway of an airport with at least one runway longer than 3,200 feet.

5.12.5.2 State Laws, Ordinances, Regulations, and Standards

- CVC Sections 13369, 15275, and 15278 (California Law 2021) address the licensing of drivers and classifications of licenses required to operate particular types of vehicles.
- CVC Sections 32100.5 addresses the transportation of hazardous materials that pose an inhalation hazard.
- CVC, 13 CCR 1160, et seq. provides the CHP with authority to adopt regulations for the transportation of hazardous materials in California. The CHP can issue permits and specify the route for hazardous material delivery.
- California Streets and Highway Code (S&HC), Sections 660, 670, 1450, 1460 et seq. 1470, and 1480, regulate ROW encroachment and granting of permits for encroachments on state and county roads.
- S&HC Sections 117 and 660–711 and CVC Sections 35780 et seq., require permits to transport oversized loads on county roads. S&HC Sections 117 and 660 to 711 require permits for any construction, maintenance, or repair involving encroachment on state highway ROWs. CVC Section 35780 requires approval for a permit to transport oversized or excessive loads over state highways.
- Caltrans weight and load limitations for state highways apply to all state and local roadways. The weight and load limitations are specified in CVC Sections 35550 to 35559. The following provisions, from the CVC, apply to all roadways and are therefore applicable to this Project.
- General provisions: The gross weight imposed upon the highway by the wheels on any axle of a vehicle shall not exceed 20,000 pounds and the gross weight upon any one wheel, or wheels, supporting one end of an axle, and resting upon the roadway, shall not exceed 10,500 pounds.
- The maximum wheel load is the lesser of the following: (a) the load limit established by the tire manufacturer, or (b) a load of 620 pounds per lateral inch of tire width, as determined by the manufacturer's rated tire width.
- Vehicles with trailers or semi-trailers: The gross weight imposed upon the highway by the wheels on any one axle of a vehicle shall not exceed 18,000 pounds and the gross weight upon any one wheel, or wheels, supporting one end of an axle and resting upon the roadway, shall not exceed 9,500 pounds, except that the gross weight imposed upon the highway by the wheels on any front steering axle of a motor vehicle shall not exceed 12,500 pounds.

5.12.5.3 Local State Laws, Ordinances, Regulations, and Standards

This section reviews compliance with all relevant local LORS without regard to their applicability as a matter of law. These LORS include the following:

- No stopping zones: There are no stopping zones on the north side of Rosamond Boulevard, beginning at the northwest curb return with Eagle Way, thence westerly for a distance of 425 feet; on the north side of Rosamond Boulevard, beginning at the northwest curb return with Eagle Way, thence westerly for a distance of 547 feet to the true point of beginning, thence westerly for a distance of 861 feet; and on the north side of Rosamond Boulevard, beginning at the northeast curb return with 30th Street West, thence easterly for a distance of 215 feet (Kern County 2021).
- Parking limitations: In the absence of the posting of a stricter limitation, it shall be unlawful for any vehicle, as defined in the CVC, to remain parked or standing upon any public street or alley within the unincorporated area of the county, with the exception of state highways, for a period of 72 or more consecutive hours.
- The Kern County General Plan contains policies, goals, and implementation measures that are more general in nature and are not specific to development such as the Project. Therefore, they are not listed below, but

all policies, goals, and implementation measures in the Kern County General Plan are incorporated by reference. The design LOS for Kern County is LOS C. The minimum LOS for conformance with the Kern County General Plan is LOS D.

Circulation Element:

- To satisfy the trip reduction and travel demand requirements of the Kern Council of Government's Congestion Management Program
- To coordinate congestion management and air quality requirements and avoid multiple and conflicting requirements
- Kern County will plan for a reduction of environmental effects without accepting a lower quality of life in the process
- Maintain a minimum LOS D for all roads throughout the county
- Provide for Kern County's heavy truck transportation in the safest way possible
- Reduce potential overweight trucks
- Use state Highway System improvements to prevent truck traffic in neighborhoods

- The Project is subject to the provisions of the Willow Springs Specific Plan. The Willow Springs Specific Plan was adopted in April 2008 and contains goals, policies, and standards that are compatible with those in the Kern County General Plan but are unique to the specific needs of the Willow Springs Area. The transportation-related policies and measures contained in the Willow Springs Specific Plan that are applicable to the Project are outlined below (Kern County 2008). Note that only applicable goals, policies, and standards are included here; those goals, policies, and standards that are not applicable are not included.

  Circulation Element:

  Goals

  - Goal 5 To maintain public safety within the plan area by providing a more direct and efficient circulation system for law enforcement and fire protection vehicles.
  - Goal 7 To provide an adequate circulation system which will support the proposed land uses.

  Policies

  - Policy 7 Require the widening of impacted roadways to handle increased traffic generated by new development.
  - Policy 8 Encourage resourceful air quality improvement and reduction methods.

  Mitigation/Implementation Measures

  - Measure 9 A traffic study in accordance with the requirements of Kern County and Caltrans, as appropriate, shall be submitted for all discretionary Projects. Study shall demonstrate consistency with the Willow Springs Specific Plan.
  - Measure 13 The Traffic Impact Fee Program implements Mitigation Measure 10 of the Willow Springs Final Environmental Impact Report.

- Regional Transportation Plan: The latest RTP was prepared by the Kern COG and was adopted on July 21, 2022. The 2022 RTP is a long-term blueprint that establishes a set of regional transportation goals, policies, and actions intended to guide development of the planned multimodal transportation systems in Kern County for the next 20 years or more. The plan was developed through a continuing, comprehensive, and cooperative planning process, and provides for effective coordination between local, regional, state, and federal agencies. Included in the 2022 RTP is the Sustainable Communities Strategy (SCS), which is required by California's Sustainable Communities and Climate Protection Act of SB 375.
- The intent of the SCS is to achieve the state's emissions reduction targets for automobiles and light trucks. The SCS will also provide opportunities for a stronger economy, healthier environment, and improved quality of life for community members in Kern County. The RTP and SCS seek to improve economic vitality, improve air quality, improve the health of communities, improve transportation and public safety, promote the

conservation of natural resources and undeveloped land, increase access to community services, increase regional and local energy independence, and increase opportunities to help shape community's future.

- The 2018 RTP and SCS financial plan identifies how much money is available to support the region's transportation investments. The plan includes a core revenue forecast of existing local, state, and federal sources along with funding sources that may be considered reasonably available over the time horizon of the RTP and SCS. These new sources include adjustments to state and federal gas tax rates based on historical trends and recommendations from two national commissions (National Surface Transportation Policy and Revenue Study Commission and National Surface Transportation Infrastructure Financing Commission), leveraging of local sales tax measures, local transportation impact fees, potential national freight program/freight fees, future state bonding programs, and mileage-based user fees (Kern COG 2022).
- The Kern County ALUCP establishes procedures and criteria to assist Kern County and affected incorporated cities in addressing compatibility issues between airports and surrounding land uses.

5.12.6 Agencies and Agency Contacts

Table 5.12-8 lists the agency contacts related to traffic and transportation.

Table 5.12-8: Agency Contacts for Traffic and Transportation

Permit	Agency	Contact
Transportation Permit for Oversized Loads	Caltrans	Caltrans Transportation Permits Issuance Branch 1120 N Street Sacramento, CA 95814 (916) 322-1297 https://dot.ca.gov/programs/traffic-operations/transportation-permits
Hazardous Material Transportation License	California Highway Patrol	Hazardous Material Licensing P.O. Box 942898 Sacramento, CA 942898-0001 (916) 843-3400 https://www.chp.ca.gov/CommercialVehicleSectionSite/Documents/chp361m.pdf
Transportation Permit for Oversized or Overweight Loads	Los Angeles County	Los Angeles County Department of Public Works Transportation Permitting Desk 900 South Fremont Avenue, 8th Floor Alhambra, CA 91803 (626) 458-3129 Complete form available at: https://dpw.lacounty.gov/spats/public/tpap.cfm
Transportation Permit	Kern County	Kern County Department of Public Works 2700 M Street Bakersfield, CA 93301 (661) 862-8827 Form available at: https://www.kernpublicworks.com/home/showpublisheddocument/10946/638315523075400000
Safety Permits	Federal Motor Carrier Safety Administration	California Division Office 501 I Street Suite 9-300 Sacramento, CA 95814-2941 (916) 930-2760

5.12.7 Permits and Permit Schedule

Table 5.12-9 lists the permits related to traffic and transportation and the permit schedule. The vehicles used to transport heavy equipment and construction materials will require transportation permits when they exceed the size, weight, width, or length thresholds set forth in Section 35780 of the CVC (California Law 2021), Sections 117 and 660-711 of the California S&HC, and Sections 1411.1 to 1411.6 of the CCR. Affected vehicles will be required to obtain transportation permits from Caltrans and Kern County, or from any other affected agency. Transport route arrangements would be required with Caltrans and CHP officials for permitting and escort, as applicable. Transportation of hazardous materials to and from the WRESC will be conducted in accordance with CVC Section 31303 (California Law 2021).

Table 5.12-9: Permits and Permit Schedule for Traffic and Transportation

Permit	Agency Contact	Schedule
Single/annual trip transportation permit for oversized loads and oversized vehicles	Permit Officer on Duty Caltrans, Transportation Permits Issuance Branch (916) 322-1297	Obtain when necessary; 2-hour processing time (single trip) to 2 weeks (annual trip)
Hazardous Material Transportation License	California Highway Patrol Hazardous Material Licensing Program (916) 327-5039	Obtain when necessary; approximately 2-week processing time
Single/annual transportation permit for oversize and overweight loads through Kern County	Kern County Department of Public Works 2700 M Street Bakersfield, CA 93301 (661) 862-8987 Email form available at: https://kernpublicworks.com/wp-content/uploads/2017/06/transportation_singletrip_application.pdf	Obtain when necessary; applications can be processed in a single working day.

5.12.8 References

Kern Council of Governments (Kern COG). 2022 Regional Transportation Plan and Sustainable Communities Strategy. https://www.kerncog.org/wp-content/uploads/2022/12/2022_RTP.pdf. Accessed January 2024.

Kern County. (2021). *Municipal Code §10.16.058.*

Kern County Department of Planning and Development Services. (Kern County 2008). *Willow Springs Specific Plan.* https://psbweb.co.kern.ca.us/planning/pdfs/SPs/WillowSprings_SP.pdf.Accessed January 2024.

Office of Planning and Research (OPR). (2018). *Technical Advisory on Evaluating Transportation Impacts in CEQA.* https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf. Accessed January 2024.

State of California. (2024). Highway Performance Monitoring System (HPMS) Data. *Caltrans*. https://dot.ca.gov/programs/research-innovation-system-information/highway-performance-monitoring-system. Accessed January 2024.

U.S. Census Bureau. (2024). QuickFacts: Kern County, California. https://www.census.gov/quickfacts/fact/table/kerncountycalifornia/PST045223. Accessed January 2024.

5.13 Visual Resources

5.13.1 Introduction

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California. The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's (SCE's) Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way (ROW) associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH.

This section of the Application for Certification (AFC) discusses the visual resources surrounding the proposed WRESC and the potential visual impacts associated with its construction and operation. For this study's purposes, visual resources refer to the natural and cultural landscape features surrounding the Project, as well as their qualities and contribution to landscape character. Natural landscape features include landforms, water features, and vegetation; cultural landscape features include buildings, roadways, structures, and artificial lighting related to human land uses. The quality of the visual environment has value to individuals, society, and the economy of a region, particularly in areas where scenic landscapes provide the backdrop for tourism and recreation activities.

This section evaluates whether there is potential for the visibility and visual characteristics of Project components and activities to significantly change the visual quality of the existing landscape setting surrounding the Project. Land clearing, landform modifications, and the installation of structures (i.e., WRESC Site facilities, reservoir, and an overhead gen-tie line) that may result in visual disturbance and alterations during construction and operation are evaluated to determine whether they are inconsistent with the current character of the landscape setting.

This chapter was prepared following California Energy Commission (CEC) guidelines for preparing visual impact assessments for Applications for Certification (CEC 2022). The analysis also conforms with the documentation requirements of the California Environmental Quality Act (CEQA) (CEQA 2019).

Section 5.13.2 introduces the regional setting and describes existing visual quality in the Project Area. Section 5.13.3 documents the methods used to prepare this visual assessment and potential environmental effects relating to visual resources. Section 5.13.4 discusses the potential cumulative impacts of this and other projects in the area. Section 5.13.5 summarizes the mitigation measures proposed to address potential Project impacts on visual resources. Section 5.13.6 describes the applicable laws, ordinances, regulations, and standards relevant to visual resources. Section 5.13.7 lists agencies involved and agency contacts. Section 5.13.8 discusses permits. Section 5.13.9 lists the references used in preparation of this section.

Figure 5.13-1 provides a map showing the general Project location within a regional landscape context. **Figure 5.13-2** illustrates the results of viewshed analysis. **Figure 5.13-3** shows the locations of selected key observation points (KOPs) and light receptor locations representative of sensitive public viewing areas. The existing and simulated viewing conditions of the Project Area from the selected KOPs are presented in Appendix 5.13A - Landscape Photographs and Simulations.

Soledad Mountain

WRESC SITE

Willow Springs Butte

Tropico Hill

TEHACHAPI MOUNTAINS

ROSAMOND HILLS

Oak Creek

Cottonwood Creek

Los Angeles Aqueduct

Pacific Crest National Scenic Trail

Second Los Angeles Aq

Mojave Air and Space Port

Rosamond Skypark

MOJAVE-BARSTOW HWY

SIERRA HWY

ANTELOPE VALLEY FWY

W AVE D

W AVE D

Antelope Valley

General Wm J Fox Airfield

Piute Ponds

58

14

138

LEGEND

PROJECT BOUNDARY

NATURAL FEATURES

TRANSMISSION LINE PREFERRED ROUTE

- PREFERRED ROUTE
- PREFERRED ROUTE ALTERNATIVE,1
- PREFERRED ROUTE ALTERNATIVE,2A
- PREFERRED ROUTE ALTERNATIVE,2B
- PREFERRED ROUTE ALTERNATIVE,3A
- PREFERRED ROUTE ALTERNATIVE,3B
- PREFERRED ROUTE ALTERNATIVE,4
- PREFERRED ROUTE ALTERNATIVE,5
- PREFERRED ROUTE ALTERNATIVE,6

KEY MAP

Salt Lake City

GREAT BASIN

NEVADA

Sacramento

San Francisco

CALIFORNIA

Fresno

Las Vegas

SITE LOCATION

Los Angeles

San Diego

Tijuana

1:158,400

0 1.25 2.5 5 Miles

REFERENCE(S)

BASEMAP - ESRI PROVIDED BASEMAP SERVICE.

CLIENT

GEM A-CAES LLC

PROJECT

WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE

PROJECT LOCATION MAP

CONSULTANT

wsp

YYYY-MM-DD	2024-01-16
DESIGNED	JAM
PREPARED	JAM
REVIEWED	SCH
APPROVED	VG/LL

PROJECT NO.
31406639.003

FIGURE
5.13-1

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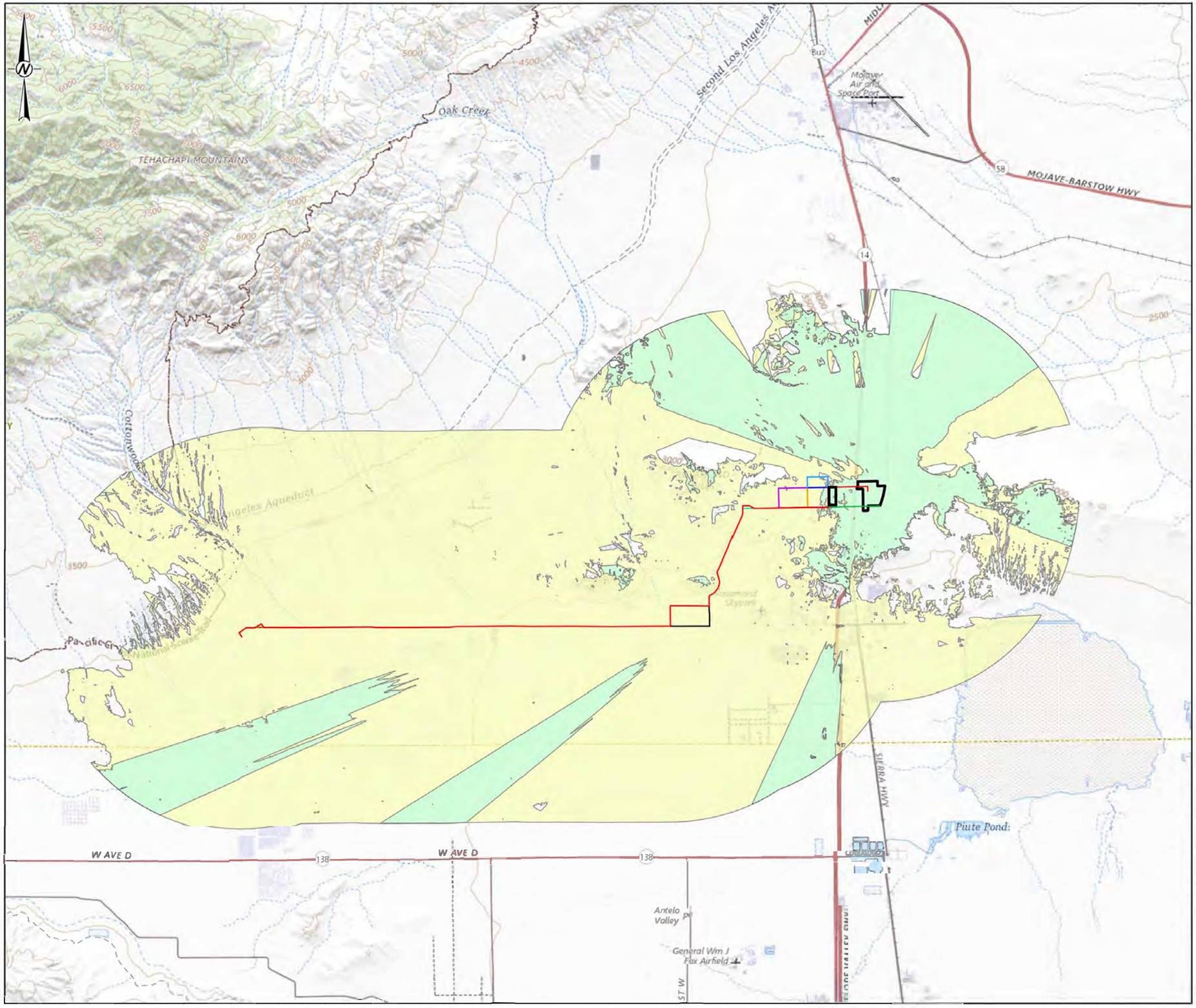


LEGEND

- PROJECT BOUNDARY
- TRANSMISSION LINE VISIBILITY
- WRESC VISIBILITY

TRANSMISSION LINE PREFERRED ROUTE

- PREFERRED ROUTE
- PREFERRED ROUTE ALTERNATIVE,1
- PREFERRED ROUTE ALTERNATIVE,2A
- PREFERRED ROUTE ALTERNATIVE,2B
- PREFERRED ROUTE ALTERNATIVE,3A
- PREFERRED ROUTE ALTERNATIVE,3B
- PREFERRED ROUTE ALTERNATIVE,4
- PREFERRED ROUTE ALTERNATIVE,5
- PREFERRED ROUTE ALTERNATIVE,6

1:158,400

0 1.25 2.5 5 Miles

REFERENCE(S)
BASEMAP - ESRI PROVIDED BASEMAP SERVICE.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

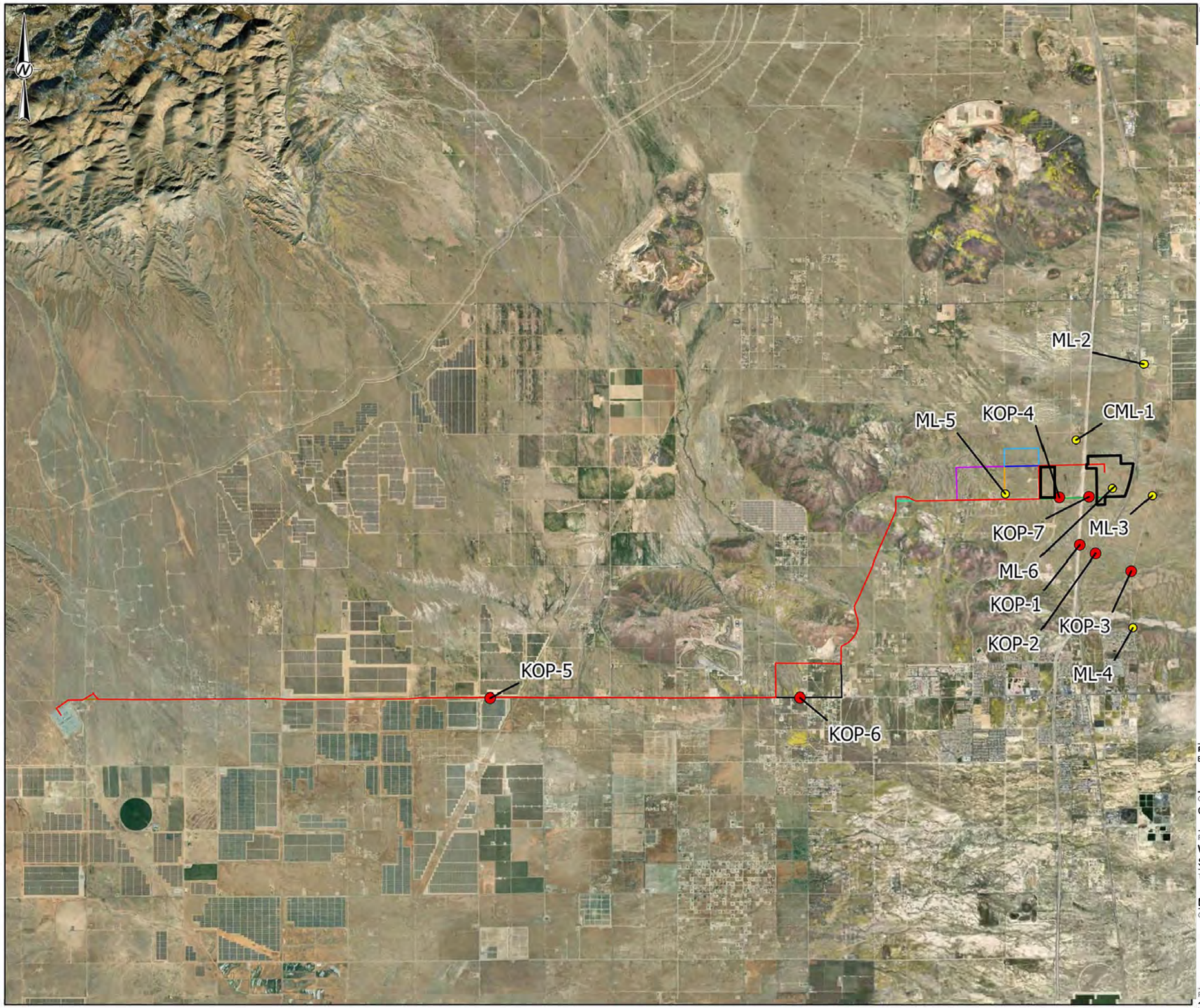
TITLE
VISIBILITY ANALYSIS MAP

CONSULTANT
wsp

YYYY-MM-DD	2024-01-16
DESIGNED	JAM
PREPARED	JAM
REVIEWED	SCH
APPROVED	VG/LL

PROJECT NO.
31406639.003

FIGURE
5.13-2



LEGEND

- PROJECT BOUNDARY
- KOP
- LIGHT RECEPTOR POINT

TRANSMISSION LINE PREFERRED ROUTE

- PREFERRED ROUTE
- PREFERRED ROUTE ALTERNATIVE,1
- PREFERRED ROUTE ALTERNATIVE,2A
- PREFERRED ROUTE ALTERNATIVE,2B
- PREFERRED ROUTE ALTERNATIVE,3A
- PREFERRED ROUTE ALTERNATIVE,3B
- PREFERRED ROUTE ALTERNATIVE,4
- PREFERRED ROUTE ALTERNATIVE,5
- PREFERRED ROUTE ALTERNATIVE,6

1:95,040

0 0.75 1.5 3 Miles

REFERENCE(S)
BASEMAP - ESRI PROVIDED BASEMAP SERVICE.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
KEY OBSERVATION POINT AND LIGHT RECEPTOR LOCATIONS MAP

CONSULTANT

wsp

YYYY-MM-DD	2024-01-16
DESIGNED	JAM
PREPARED	JAM
REVIEWED	SCH
APPROVED	VG/LL

PROJECT NO.
31406639.003

FIGURE
5.13-3

5.13.2 Affected Environment

5.13.2.1 Regional Setting

The Project will be located in unincorporated Kern County approximately 3.5 miles north of Rosamond, California. The regional landscape is characterized by the flat and gently sloping upper desert terrain of the Antelope Valley region of the western Mojave Desert, bounded by the Tehachapi Mountains to the northwest and the Liebre-Sawmill Mountains to the southwest. Regional topographical features include several small hills in proximity to the Project (i.e., Rosamond Hills, Tropico Hill, and Soledad Mountain), including Willow Springs Butte (700-foot prominence) located approximately 6 miles to the west of the proposed WRESC Site. Vegetation in the area is dominated by a mixture of grasses, cacti and desert scrub habitats. The location of the WRESC Site is illustrated in **Figure 5.13-1**.

Land use patterns in the region are primarily rural residential, commercial, and industrial land uses (e.g., renewable energy production) in addition to large areas of open space and agricultural land uses. The area to the east of the WRESC Site is public land administered by the U.S. Department of the Interior (USDI) Bureau of Land Management (BLM). Wind and solar facilities are common in the region west of the Project. Wind turbines and related infrastructure are located in hilly terrain west of the WRESC Site. Numerous solar facilities are located west of the WRESC Site, especially in the area around Rosamond Boulevard West.

The region is traversed by a network of paved and unpaved roads, as well as informal trails, that accommodate off-road vehicle use. Major transportation routes in the region include State Route 14 (SR 14), a four-lane highway immediately west of the WRESC Site. SR 14 is part of the California Freeway and Expressway System and is part of the National Highway System.

Communities within the region include Willow Springs, Rosamond, Lancaster, and Mojave. No eligible or designated scenic highways have been identified within the vicinity of the Project. The closest eligible scenic highway is SR 14 from near the city of Mojave to the city of Barstow, which is more than 10 miles north of the Project. From this viewing distance, the Project would not be visible within the landscape setting from SR 14. The region also includes a number of 500 kilovolt (kV) and 250 kV transmission lines and substations, including the existing Los Angeles Department of Water and Power transmission corridor.

No designated scenic vistas or scenic resources have been identified surrounding the Project. Tourism locations, such as remote recreational areas, may provide relatively uninterrupted and expansive viewing opportunities over the natural desert landscape. A portion of the Pacific Crest Trail is located approximately 17 miles west of the WRESC Site and would provide users with viewing opportunities where the WRESC Site would not be evident within the landscape setting.

The landscape surrounding the Project is primarily natural or agricultural land use and, therefore, has limited sources of artificial light at nighttime. The nighttime viewing conditions are influenced by existing lighting from rural residences, industrial facilities, and ambient lighting from nearby communities (i.e., Rosamond). No street lighting exists along local roadways, although cars and trucks on SR 14 are a potential source of temporary light.

5.13.2.2 Project

The WRESC Site covers approximately 86 acres, situated at an elevation of approximately 2,578 feet above sea level at the highest point, with terrain sloping to the southeast. The WRESC site is bounded on the south by Dawn Road and to the east by the Sierra Highway. The WRESC Site is currently undeveloped with vegetated landcover consisting of scrub and grassland species.

The preferred option for the 230 kV gen-tie line route would extend from the WRESC Site and interconnect at the SCE's Whirlwind Substation to the southwest. This would involve an approximately 19-mile gen-tie line route (Preferred Gen-Tie Route). Alternative gen-tie line route segments have been identified between the WRESC Site and the Whirlwind Substation. WRESC Site and gen-tie line route options considered in this visual assessment are illustrated in **Figure 5.13-1**.

Potential viewing opportunities near the WRESC Site include rural residential properties and views from SR 14 and local roads. Existing views for affected receptors would consist largely of expansive views over the natural

desert landscape and would include evident roadways, transmission lines, rural residences, and the background views of surrounding hills and mountains.

5.13.2.3 Construction Laydown Area

Temporary construction facilities will include a number of smaller parcels (ranging in size from <1 acre to approximately 20 acres) immediately adjacent to the WRESC Site on the west and north, as well as approximately 80 acres of land on APN 431-022-08 immediately north of Dawn Road and approximately 0.4 miles west of SR 14. The general location of the construction laydown areas is illustrated in **Figure 5.13-1**. An option has been presented where Project waste rock would be used on parcels adjacent to the WRESC Site in the form of an approximately 10-foot-high and 500-foot-wide engineered architectural berm. The architectural berm will be located adjacent to the WRESC facility (Chapter 2, Project Description, Figures 2-1 and 2-2).

5.13.2.4 Project Assessment Area

Spatial boundaries used for this visual assessment are based on the extent of area anticipated to experience direct and indirect visual effects from the Project. The assessment area boundaries considered the results of visibility analysis and viewing distances, which affect the level of visible detail in the landscape, that may be perceived by viewers where visual elements of the landscape are more discernible and prominent the closer they are to the observer.

5.13.2.4.1 Project Viewshed and Visibility

Visibility analysis identifies areas across a landscape that can be seen from one or more observation point(s), also known as a "viewshed." A direct line of sight exists between each location within the viewshed and the viewpoint from which the viewshed was generated. Visibility analysis was performed using a geographic information system and digital data to model the physical terrain surrounding the Project to define the general area from which the Project would be theoretically visible. The result of the visibility analysis is illustrated in **Figure 5.13-2**.

Viewing distance zones were measured outward from the WRESC Site and include foreground, middle-ground, and background distance zones (FHWA 2015). The foreground viewing zone is defined as the distance of within 0.5 miles from the Project, and the middle-ground viewing zone is defined as the distance of 0.5 to 3 miles from the Project. The assessment of Project effects was generally focused on the middle-ground distance zone. "The middleground provides enough distance for the viewer to relate individual elements to a larger visual landscape, to understand the context in which the foreground lies. Therefore, the middleground is considered to be the visual context where discernible elements of project alternatives would be most visible in the landscape and understood by viewers." (FHWA 2015)

As viewing distance from the Project increases, visible detail and sensitivity to alteration generally decreases. The background viewing zone is defined as the distance beyond 5 miles from the Project where details in the landscape are generally less discernable to the viewer and objects begin to blend with the existing setting.

5.13.3 Environmental Analysis

5.13.3.1 Significance Criteria

Factors used to evaluate the significance of project related visual resources are set forth in Appendix G of CEQA. Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report [EIR], a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential impacts to Visual Resources associated with the construction and operations of the project, Appendix G, asks if the project would:

- Have a substantial adverse effect on a scenic vista?
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?
- Substantially degrade the existing visual character or quality of the site and its surroundings?
- Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

5.13.3.2 Analysis Procedure and Methodology

5.13.3.2.1 Regulatory Setting

A review of existing relevant laws, ordinances, regulations, and standards was conducted to understand the regulatory context for visual resource management surrounding the Project. This review included applicable federal, state, and local policies and regulations, such as CEQA, California Scenic Highways Program, Kern County's General Plan and Kern County Code of Ordinances, and the Willow Springs Specific Plan. These are detailed in Section 5.13.6.

5.13.3.2.2 Photographic Survey

Potential representative viewing locations were identified from the results of the visibility analysis (Section 5.13.2.4.1) and the overlay of datasets detailing the location of communities and residential property, roadways, recreational resources (e.g., recreation sites and trails), and other land uses. The identification of potential viewing locations was used to support the gathering of photographs of the landscape during a photographic field survey.

A photographic field survey was used to gain an on-the-ground familiarity with the visible area of the Project from an observer's perspective, to confirm the validity of potential viewpoints from initial visibility analysis, and to gather photographic images and related geographic data for each viewpoint. Photographs showing daytime viewing conditions were taken by field staff during field surveys conducted on July 24, 2023 and October 16, 2023.

Photographic survey locations were visited that represent public viewing opportunities related to tourism and recreational users, as well as local residents. At each surveyed viewpoint location, landscape photographs were captured, and observational information describing viewing conditions was recorded. Photographs were taken using a digital SLR camera with a focal length of 50 millimeters, which is consistent with the view perceived by the human eye (Landscape Institute 2019). For each surveyed viewpoint, field staff also completed an observation log describing geographic information gathered, camera settings, time, and details about viewing conditions. Landscape photographs and observation log details are provided in Appendix 5.13A.

5.13.3.2.3 Key Observation Points

Because it is not feasible to analyze all potential viewing opportunities surrounding the Project, it is necessary to select a at least two KOPs to represent the range of viewers and viewing conditions that would potentially be affected by the Project (CEC 2022). In accordance with guidelines from the CEC (2022), the presence of landforms of aesthetic significance in the view was a primary consideration in the selection of KOPs. Other criteria were also used to identify representative KOPs, including:

- Proximity to features that provide publicly accessible viewing, including highways, local roads, recreation amenities, and locations near residential areas
- Ease of access and use by a range of viewer/user groups, including tourists, motorists, and local residents
- Representation of a range of viewing angles and distances
- Potential for visibility of the Project within the broader landscape setting

Seven KOPs were selected for evaluation of existing visual quality and analysis of the Project's potential visual effects. Views to natural features of aesthetic significance (landforms) were identified as a primary factor in the

selection of KOPs. Though no designated scenic vistas are present, public views to notable landforms in proximity to the WRESC Site were identified and considered in the visual resources inventory and assessment.

KOPs and the rationale for their selection are summarized in **Table 5.13-1**. The locations of KOPs are illustrated in **Figure 5.13-3**.

Table 5.13-1: Key Observation Points

Key Observation Point	Rationale for KOP Selection
KOP1 – SR 14 Northbound	▪ Object of aesthetic significance in the view: Soledad Mountain ▪ Represents sustained, dynamic view from highway motorists (large number of potential viewers) ▪ Within middle-ground viewing distance of the WRESC Site (~0.8 miles) ▪ View from the south (5º)
KOP2 – Sierra Highway	▪ Represents dynamic view of local motorists on frontage road with focal view to WRESC Site ▪ Within middle-ground viewing distance of the WRESC Site (~0.8 miles) ▪ View from the south (20º)
KOP3 – 10th Street West	▪ Objects of aesthetic significance in the view: Soledad Mountain and background mountains ▪ Represents unobstructed observer-superior view from elevated, remote dirt road ▪ Within middle-ground viewing distance of the WRESC Site (~1 mile) ▪ View from the southwest (250º)
KOP4 – Dawn Road	▪ Objects of aesthetic significance in the view: Rosamond Hills landforms ▪ Represents view of local motorists and residents approaching SR 14 on Dawn Road ▪ Within middle-ground viewing distance of the WRESC Site (~0.7 miles) ▪ View from the west (90º)
KOP5 – Rosamond Boulevard West	▪ Object of aesthetic significance in the view: Tehachapi Mountains ▪ Represents foreground view of proposed gen-tie line along Rosamond Boulevard West (~0.1 miles) ▪ View from the east (280º)
KOP6 – Rosamond Boulevard East (NE view)	▪ Object of aesthetic significance in the view: Tropico Hill ▪ Represents foreground view of proposed gen-tie line (~0.6 miles) ▪ View from the southwest (30º)
KOP6a- Rosamond Boulevard East (NW view)	▪ Object of aesthetic significance in the view: Willow Springs Butte ▪ Represents foreground view of proposed gen-tie line along 65th Street (~0.5 miles) ▪ View from the southeast (300º)
KOP7 – Dawn Road East at SR 14	▪ Object of aesthetic significance in the view: Rosamond Hills ▪ Represents foreground view of the WRESC Site (~0.3 miles) and the gen-tie line ▪ View from the southwest (60º)

º = viewing angle toward the Project component; ~ = approximately; WRESC = Willow Rock Energy Storage Center. KOP 6 and KOP 6a are at the same spatial location but represent different viewing angles. KOPs representing views from background viewing distances beyond 5 miles were not selected due to consideration of the scale of Project features where distant viewing of the WRESC Site is likely to be obscured. The selection of KOPs focused on more sensitive viewing locations at closer viewing distances.

5.13.3.2.4 Viewers and Exposure

The range of potential viewers that may be affected by a proposed project can be described by the distinct types of viewers and the conditions they experience within the landscape. Understanding the types of viewers and their exposure to potential project-related visual effects helps to predict sensitivity and responses to visual changes. The term exposure describes the degree to which viewers are subjected to views of the landscape. Viewer exposure considers dimensions of viewing distance (proximity of viewers to the project), frequency (the number of

times the project may be seen), and the duration (the length of time the project may be seen) of the viewing opportunities.[1] The primary groups of potential viewers of the project and description of their exposure are based on definitions provided by the FHWA (2015).

Three types of viewers were identified in the Project assessment area that will be potentially affected by the Project. These consist of the following:

- **Motorists:** Motorists experience views from the roadway. By necessity, the driver of a motor vehicle focuses less on the view outside the vehicle while passengers are free to view the adjacent landscape. Motorists move at higher speeds than other groups and have dynamic and/or intermittent viewing opportunities. Within the Project assessment area this includes local motorists and travelers passing through the region, especially on SR 14. Local motorists will experience more frequent viewing than travelers, although travelers may be more aware of the landscape if they take a particular route for its scenic qualities.
- **Residential Viewers**: Residential viewers can be owners or renters of a residential property or settlement area. Residential viewers generally have a higher sense of ownership of views and a desire to maintain the existing landscape as it contributes to their quality of life. Residential viewers tend to experience frequent and continual viewing opportunities. Within the Project assessment area these include rural residential properties with potential views to Project gen-tie line towers.
- **Tourists/Recreational Viewers**: Tourists/recreational viewers provide or participate in tourism or recreational uses, such as sporting events, cultural attractions, or outdoor recreation. Tourists/recreational viewers are often focused on their activity and tend to be sensitive to visual disturbance that would adversely affect the setting of their activity. Tourism and recreational services provided for visitors can present permanent viewing opportunities, while visitors are more transitory may experience somewhat frequent and sustained viewing opportunities relative to the type and popularity of the activity. Within the Project assessment area this includes recreational users on public land.

5.13.3.2.5 Visual Impact Analysis

The assessment of visual impacts is based on the potential for Project-related visual disturbance to change the existing visual character of an area. For many established visual assessment methods, the level of visual impact is determined by combining factors related to the sensitivity of viewers to visual change with a predicted measure of the degree of visual change (USDI BLM 1986a; FHWA 2015). This section describes the approach used in this analysis to characterize and combine factors of viewer sensitivity and visual change to determine the visual impact of the Project from representative KOPs.

Visual Resources Inventory

The Project will be located within an area that includes established BLM Visual Resources Inventory (VRI) polygons and respective ratings for visual resource values. The VRI process applies the technical approach of the USDI BLM Visual Inventory Rating system to characterize dimensions of scenic quality and viewer sensitivity and spatially delineate the distribution of these ratings (USDI BLM 1986a). The dimension of scenic quality is assessed through an evaluation of the overall scenic appeal of the landscape determined by the visual characteristics and relationship of its natural and cultural features. The analysis of scenic quality is based on established research in perceptual psychology and the premise that all landscapes have some scenic value, but those with visual diversity, harmonious composition, and/or containing distinct features have the greatest potential for high scenic quality (USDI BLM 1986a). Scenic quality is rated by High, Medium, and Low categories (i.e., Class A, B, or C). The dimension of viewer sensitivity is assessed through the identification of typical viewers and the associated potential for public concern related to change in visual quality. The analysis of viewer sensitivity is

[1] Generally, the greater the exposure (i.e., closer, longer, or more frequent viewing), the more viewers will be concerned about visual impacts.

based on factors related to viewing conditions (e.g., type of users and amount of use) and an understanding of general public interest[2]. Viewer sensitivity is rated by High, Medium, and Low categories.

One VRI polygon (VRICAD050000002) is located immediately east of the WRESC Site. The VRI designates the lands surrounding the Project as Scenic Quality Class C, indicating a Low value for the scenic quality of the landscape seen within the rating unit; and a Viewer Sensitivity Rating of Low, indicating that the maintenance of visual quality has low value to the public (USDI BLM 2020).

BLM-administered lands are also assigned to one of four VRI management classes (i.e., Class I, II, III, or IV), which establish planned objectives to manage lands in a manner that will protect the quality of scenic values. The VRI designates lands immediately adjacent to the WRESC Site as VRI Class IV (USDI BLM 2020). Class IV designates areas with the objective to manage activities that require major modifications of the existing character of the landscape and where the level of change to the characteristic landscape can be high (i.e., may dominate the view and be the major focus of viewer attention). Management objectives also specify that attempts should be made to minimize the visual impact of development activities (USDI BLM 1986a).

Landscape Modeling

To determine potential visual effects of the Project components and activities, a three-dimensional landscape model was developed in advanced three-dimensional landscape modeling software (Autodesk 3D Studio MAX), based on available spatial data describing the terrain and Project components (i.e., the Project disturbance area, facilities and earthworks, and gen-tie line components). This modeling allowed for the rendering of ground-based perspective images that include modeled WRESC Site clearing and built features to be located accurately on the terrain. Simulation images rendered for KOPs were combined with site photography to create photo-composite images of the predicted arrangement and visual character of Project components. These images were used to support the visual effects assessment and are presented in Appendix 5.13A.

Visual Contrast Rating

The physical characteristics of Project components were evaluated by visual design elements (i.e., color, form, line, texture, scale, and spatial dominance) and compared to the existing landscape conditions. The overall contrast created by the visual design elements of Project components was characterized using the following descriptive categories (USDI BLM 1986b):

- **Negligible:** The disturbance is barely perceptible without any noticeable contrast within the existing landscape character.
- **Weak:** The disturbance is evident, but the contrast does not attract the attention of the viewer.
- **Moderate:** The disturbance provides a noticeable contrast that begins to attract attention but is subordinate to the existing landscape character.
- **Strong:** The disturbance contrasts with the surrounding landscape elements in such a way that it attracts attention and is a dominant feature of the landscape.
- **Severe:** The disturbance highly modifies the surrounding landscape elements in such a way that the disturbance is a dominant element of the landscape with a high degree of contrast to the existing landscape character.

Visual Impact Assessment

A visual impact assessment was completed for each KOP to determine how the predicted level of visual contrast from the Project is related to anticipated viewer sensitivity. This was conducted as a qualitative assessment of the level of visual impact that the Project-related disturbances are predicted to have on the existing visual quality and landscape character. This assessment considered the exposure and sensitivity of viewers to change (Section 0 and Section 0) and the Contrast Rating (Section 0), which describes the predicted level of visual contrast of the Project components.

[2] A key assumption of this technical approach to determining viewer sensitivity is that it relates to typical, or known or likely values viewers place on the existing level of visual quality and is not related to potential viewer preferences or concepts of beauty.

Viewing duration was also considered in the visual impact assessment. Notably, all the KOPs represent a dynamic view from a moving vehicle, on routes ranging from a major highway (SR 14) to a remote dirt road (10th Street West). The impact analysis is not based exclusively on the simulated condition; it represents a potential viewing location while also considering how the Project may be perceived within the landscape over a limited viewing duration.

The resulting ratings of visual impacts are defined as follows:

- **Negligible:** a very minor loss or alteration to one or more key elements/features of the existing landscape.
- **Low:** minor loss or alteration to one or more key elements/features of the existing landscape and/or introduction of elements that may be characteristic within the existing landscape.
- **Moderate:** partial loss or alteration to one or more key elements/features of the existing landscape and/or introduction of elements that may be prominent and may partially change the existing landscape character.
- **High:** a loss of or major alteration to key elements/features of the existing landscape and/or introduction of elements considered to change the existing landscape.

5.13.3.2.6 Lighting Assessment

The assessment of the existing nighttime visual character is based on the current perceived lighting conditions experienced by viewers during the nighttime. To establish a baseline of pre-Project lighting conditions, existing skyglow light levels were measured at selected receptor locations. Skyglow is stray light scattering in the atmosphere, brightening the natural sky background level, and reducing star visibility. Skyglow effects are often associated with light pollution that can have a regional effect on perceived lighting conditions.

Receptor locations were selected to represent a range of sites that experience use during the nighttime and that could potentially be affected by the presence of Project-related exterior lighting, including locations related to residences or motorists. The light receptor locations are shown in **Figure 5.13-3**.

Lighting conditions were evaluated in terms of percentage brightness above natural dark sky background and were classified based on definitions and descriptions from established international lighting guidelines, which consist of a set of established Environmental Lighting Zones for classifying exterior light levels. Environmental Lighting Zones and related quantitative thresholds are shown in **Table 5.13-2**.

Table 5.13-2: Environmental Lighting Zone Classification for Skyglow

Environmental Lighting Zone [a]	Description of the Environmental Lighting Zone	Skyglow (% brightness above natural dark sky)
E1	Intrinsically dark natural (e.g., national parks or protected sites, roads usually unlit)	0 % < x ≤ 20 %
E2	Areas of low district brightness (e.g., agricultural, industrial, or outer urban/rural residential areas)	20 % < x ≤ 100 %
E3	Areas of medium district brightness (e.g., industrial, or small-town centers/residential suburbs)	100 % < x ≤ 200 %
E4	Areas of high district brightness (e.g., town/city centers and commercial areas urban areas, residential and commercial with high levels of nighttime activity)	x > 200 %

Notes: (a) from the Commission Internationale de l'Eclairage (CIE 1997, 2003)
%: percentage;<: less than; ≤: less than or equal to; >: greater than

The assessment of Project-related lighting involved a review of available information of the Project lighting layout, luminaires, and illumination levels required for safe operations. This information provided an estimate of the potential incremental increase in lighting that may result from the Project and would influence the current skyglow level. This incremental change was combined with the measured percentage brightness above natural dark sky background at light receptors to determine if anticipated light levels with the Project would exceed thresholds for Environmental Lighting Zones classes. A change in an Environmental Lighting Zone class would signal a noticeable change in the perceived lighting conditions experienced by viewers during the nighttime.

A determination of existing light pollution, which is light or illuminance that strays from its intended purpose and potentially becomes an annoyance to nearby receptors, was quantified by comparing the amount of skyglow measured in the 90° angle with that of the horizontal (0°) angle. This serves as an indicator of the light that may be experienced by viewers that could affect perceived lighting conditions at adjacent locations.

5.13.3.3 Impact Evaluation Criteria

Factors used to evaluate the significance of project related "Aesthetics" are set forth in Appendix G of CEQA. Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an EIR, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential Aesthetics or Visual Resources impacts associated with the construction and operations of the project, Appendix G, asks if the project would:

- Have a substantial, adverse effect on a scenic vista.
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.
- In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings.
- Create a new source of substantial light or glare, which will adversely affect day or nighttime views in the area.

5.13.3.4 Project Appearance

5.13.3.4.1 Project Structures, Dimensions, and Materials

The Project components are described in detail in Chapter 2.0, Project Description. Figures 2-2 to 2-5 show the general arrangement, layout, and various elevation views of the proposed Project components.

Table 5.13-3 identifies the WRESC Site's main aboveground components and their dimensions, materials, and finishes.

Table 5.13-3: WRESC Site Components Approximate Dimension, Materials, and Finishes

Project Component	Dimensions	Materials	Finishes
Admin/Control Room and Maintenance Building	Approximately 6,600 square feet	metal siding	light beige/tan
Series of Heat Exchangers and Thermal Storage Equipment	20 feet high	prefabricated metal material	light beige/tan
Four Low Pressure Compressor Enclosures	20 feet high by 30 feet wide by 85 feet long on an elevated (20-foothigh) concrete pedestal	insulated metal panels	light beige/tan
Four High Pressure Compressor Enclosures	20 feet high by 30 feet wide by 55 feet long on an elevated (20-foot-high) concrete pedestal	insulated metal panels	light beige/tan
Four Air Turbine Enclosures	20 feet high by 30 feet wide by 60 feet long on an elevated (20-foot-high) concrete pedestal	insulated metal panels	light beige/tan
Four Compressor/Turbine Electrical Enclosures	20 feet high by 30 feet wide by 60 feet long	metal siding	light beige/tan

Project Component	Dimensions	Materials	Finishes
Four Low Pressure Exhaust Stacks	100 feet high	prefabricated metal material	primarily light to dark gray
Two Cold Water Tanks	150 feet diameter and 50 feet high	insulated metal plates	light beige/tan
Six Hot Water Tanks (spherical)	87.5 feet diameter and 100 feet high	insulated metal plates	light beige/tan
Two Closed Cooling Water Tanks	60 feet diameter and 75 feet high	insulated metal plates	light beige/tan
One Fire Water Tank	37 feet diameter and 36 feet high	insulated metal plates	light beige/tan
Two Air Cooled Heat Exchangers	60 feet high by 100 feet wide by 395 feet long	prefabricated metal material	primarily light to dark gray
One Closed Cooling Water Air Cooled Heat Exchanger	60 feet high by 100 feet wide by 430 feet long	prefabricated metal material	primarily light to dark gray
One Stormwater Pond	270 feet long by 195 feet wide	excavated soil and mined rock	similar to existing exposed soil and rock
Surface Water Reservoir	covering 26 acres with 8-foot-high earth berms	excavated soil and mined rock berms; non-reflective cover	similar to existing exposed soil and rock
230 kV Onsite Electrical Switchyard	20 to 40 feet high	prefabricated metal material	primarily light to dark gray
4.16 kV Electrical Enclosure	30 feet wide by 75 feet long by 20 feet high	metal siding	light beige/tan
Insulated Piping	Varies	metal lagging/jacketing	Low-reflective embossed aluminum
Waste Rock Berm (Option)	10 feet high by 500 feet wide	mined rock	similar to existing exposed soil and rock

kV = kilovolt

Finishes for materials and surface treatments will be predominately flat and non-reflective to minimize the potential for glare. The terrain around buildings and equipment will be graded and have gravel surfacing where not paved or concreted. The WRESC Site will also be surrounded by a 6- to 8-foot-tall chain link security fencing with access gates at the main entrance on Dawn Road.

The Preferred Gen-Tie Route is an approximately 19-mile 230 kV gen-tie line interconnected at SCE's Whirlwind substation. **Table 5.13-4** identifies the gen-tie line components and their dimensions, materials, and finishes.

Table 5.13-4: Gen-tie Line Components Approximate Dimension, Materials, and Finishes

Project Component	Dimensions	Materials	Finishes
Tapered metal monopole towers	100 feet high by 6 feet diameter (at base) and approximately 850-foot span between poles[1]	steel	light to dark gray

Note:
[1]The proposed design of the gen-tie line includes installation of approximately 90-foot steel transmission poles. The poles are expected to be spaced approximately 600 to 900 feet from each other.

The ROW width for the 230 kV gen-tie line routes is expected to be up to 150 feet where limited clearing may be required. The majority of the preferred gen-tie line route will follow existing County Road ROW that is paved and with road shoulders that have been previously disturbed.

5.13.3.4.2 Construction Laydown Areas

Temporary construction facilities will include a laydown area on several smaller parcels (that range in size from <1 acre to approximately 20 acres) adjacent and to west and north of the WRESC Site and if necessary, an

approximately 80-acre parcel located approximately 0.4 mile west of SR 14 and immediately north of Dawn Road (431-022-08). During the construction period, materials, large equipment, trucks, and parked vehicles will be present in these areas.

5.13.3.4.3 Lighting

Nighttime construction is anticipated primarily for the cavern excavation process and some intermittent localized 24-hour construction activities. When nighttime construction activity is required, all necessary temporary lighting will be directed on work areas and away from sensitive receptors, such as nearby residences.

Operation of the Project will require onsite lighting for safety and security and approach lighting for the substation, control equipment enclosures, and operator interface locations. This will include a combination of pole-mounted LED lighting ranging in height from 11 feet to 40 feet and wall-mounted fixtures on buildings mounted between 23 feet and 30 feet. All new lighting will include shielding and will be directed downward to minimize the potential for glare, light pollution, and skyglow. Project lighting will use dimmable motion-sensitive and scheduling controls to minimize the use of the lights. Light level will comply with recommendations of the Illuminating Engineering Society, as well as CEC and local jurisdictions' ordinances or codes, to ensure lighting is no brighter than necessary.

The Project Lighting Plan is shown in Appendix 5.13B. The luminaire used at the WRESC will be Maxlite-led Slim Series: AR140HT3-50BK. Each luminaire includes a side shield for Dark Sky compliance, but currently does not have International Dark-Sky Association Fixture Seal of Approval.

5.13.3.4.4 Landscaping

No specific landscaping is required in the current A-1 zone except where required in conjunction with the approval of a discretionary permit pursuant to Chapter 19.104 (Kern County Code 19.14.120) or the A Zone, except where the proposed use is subject to a plot plan review (Kern County Code 19.12.120). Nevertheless, the Applicant will collaborate with Kern County to on landscaping, consistent with the sparsely vegetated upper desert environment and scarcity of water.

5.13.3.4.5 Water Vapor Plumes

During operations, compressed air that has been routed through the power turbines and expanded during the power generation cycle will be discharged to the environment through the low-pressure exhaust stacks. During the power generation cycle, as the compressed air expands and cools, water vapor is condensed and recovered for process use. The condensation and removal of water will result in a relatively dry air discharge that has very low absolute humidity. As a result, when the ambient temperature is low, there is not sufficient water vapor in the discharge from the exhaust stack to form a visible water vapor plume in the environment.

The psychrometric analysis provided in Appendix 5.13C demonstrates that the conditions for visible steam plume are unlikely to occur. In the unlikely event that plumes are present, they would be relatively small and temporary, and would not likely result in a noticeable impact to visual resources.

5.13.3.5 Assessment of Visual Effects

This section provides an assessment of visual effects provided for daytime viewing from KOPs and lighting effects from light receptor locations.

5.13.3.5.1 Key Observation Points

Photo-composite images presented in Appendix 5.13A, representing the viewing conditions at 1-year post-construction at KOPs, were evaluated using the methods detailed in Section 5.13.3.2.5. Ratings of visual contrast defined in Section 5.13.3.2.5 were assigned for each KOP considering the characteristics of Project components within the existing landscape conditions. Ratings of level of visual impact defined in Section 5.13.3.2.5 were assigned for each KOP considering the sensitivity of viewers to change, and the predicted level of visual contrast of the Project components.

Table 5.13-5 summarizes the viewers and conditions associated with each KOP, as well as the assessed Contrast Rating and Visual Impact Rating and a rationale for each.

Table 5.13-5: Visual Contrast and Visual Impact for Key Observation Points

Key Observation Point	Viewers	Visual Contrast	Visual Impact
KOP1 – SR 14 Northbound	▪ Represents dynamic view of local motorists and tourists travelling at high speed on heavily trafficked highway ▪ Within middle-ground viewing distance of the WRESC Site (~0.8 miles) ▪ Anticipated to be a high number of potential viewers	▪ Contrast Rating: Moderate ▪ Smooth surface of built structures, spherical forms, and light colour provides contrast. ▪ Relative scale of structures is subordinate to landform features ▪ Overall horizontal orientation of structures aligns with landscape ▪ Structures are located at the extreme edge of drivers' field of view ▪ Overall level of contrast from the Project is evident and is a distinct feature in the existing landscape	▪ Visual Impact Rating: Moderate ▪ Alteration to the existing landscape through the introduction of Project components that are evident and may partially change the existing landscape character for viewers at this location. ▪ Viewing duration: brief ▪ Viewer sensitivity: low to moderate (commuters, tourists)
KOP2 – Sierra Highway	▪ Represents view of local motorists on paved route within middle-ground viewing distance of the WRESC Site (~0.8 miles)	▪ Contrast Rating: Moderate to Strong ▪ Project is directly visible in focal area of sustained view ▪ Perceived scale of structures varies with motorist viewing distance ▪ Overall horizontal orientation of site layout (with some vertical elements) is aligned with open landscape ▪ Overall level of contrast that would attract attention and is prominent in the landscape	▪ Visual Impact Rating: Moderate ▪ Alteration to the existing landscape through the introduction of Project components that are evident and may partially change the existing landscape character for viewers at this location. ▪ Viewing duration: brief ▪ Viewer sensitivity: moderate (local residents)
KOP3 – 10th Street West	▪ Represents unobstructed observer-superior view of local motorists and recreation users ▪ Within middle-ground viewing distance of the WRESC Site (~1 mile) ▪ Anticipated to be a low number of potential viewers	▪ Contrast Rating: Strong ▪ Scale of site development is large yet subordinate to backdrop of Mount Soledad and the Tehachapi Mountains ▪ Site development does not obstruct views to mountains ▪ Spherical forms create contrast ▪ Colors contrast with vegetation ▪ Overall level of contrast that would attract attention and is prominent in the landscape	▪ Visual Impact Rating: Moderate ▪ Alteration to the existing landscape through the introduction of Project components that are evident and may change the existing landscape character for viewers at this location. ▪ Viewing duration: brief to sustained ▪ Viewer sensitivity: moderate to high (motorized recreationists)

Key Observation Point	Viewers	Visual Contrast	Visual Impact
KOP4 – Dawn Road	▪ Represents view of local motorists on dirt road near SR 14 access ▪ Within middle-ground viewing distance of the WRESC Site (~0.7 miles) ▪ View includes proposed gen-tie line ▪ Anticipated to be a low number of potential viewers	▪ Contrast Rating: Moderate ▪ Vertically oriented, angular industrial structures contrast with natural landforms ▪ Relatively tall structures seen against a backdrop of low hills in focal area of view ▪ Structural colors contrast with dark background vegetation ▪ Overall level of contrast from the Project is evident and is a distinct feature in the existing landscape	▪ Visual Impact Rating: Moderate ▪ Alteration to the existing landscape through the introduction of Project components that are evident and may partially change the existing landscape character for viewers at this location. ▪ Viewing duration: brief ▪ Viewer sensitivity: moderate (local residents)
KOP5 - Rosamond Boulevard West	▪ Represents motorists' view to proposed gen-tie line along Rosamond Blvd. ▪ Utility towers are visible in the immediate foreground view ● Anticipated to be a moderate number of viewers	▪ Contrast Rating: Strong ▪ Relatively tall and wide utility structures in existing roadside utility corridor, seen in immediate foreground against a background of mountains ▪ Overall level of contrast from the Project is evident and is a distinct feature in the existing landscape	▪ Visual Impact Rating: Moderate ▪ Alteration to the existing landscape through the introduction of Project components that are evident and may partially change the existing landscape character for viewers at this location. ▪ Viewing duration: sustained Viewer sensitivity: low to moderate (local motorists)
KOP6 - Rosamond Boulevard East (NE View)	▪ Represents view of proposed gen-tie line ▪ Anticipated to be a moderate number of viewers	▪ Contrast Rating: Negligible ▪ Visible Project components are very small in scale and are indistinct features in the landscape. ▪ Overall level of contrast from the Project is inconspicuous and would not attract the attention of viewers	▪ Visual Impact Rating: Negligible ▪ Very minor alteration to the existing landscape through the introduction of Project components that are inconspicuous and do not change the existing overall landscape character for viewers at this location. ▪ Viewing duration: brief to sustained ▪ Viewer sensitivity: moderate to high (local motorists and residents)
KOP6a- Rosamond Boulevard East (NW View)	▪ Represents view of proposed gen-tie line ▪ Anticipated to be a moderate number of viewers	▪ Contrast Rating: Weak ▪ Utility structures are small in scale ▪ Overall level of contrast from the Project is noticeable but would not attract the attention of viewers	▪ Visual Impact Rating: Low ▪ Minor alteration to the existing landscape through the introduction of Project components that are evident but compatible with the existing visual character for viewers at this location. ▪ Viewing duration: brief to sustained ▪ Viewer sensitivity: moderate to high (local motorists and residents)

Key Observation Point	Viewers	Visual Contrast	Visual Impact
KOP 7 – Dawn Road East at SR 14 Offramp	▪ Represents motorists' dynamic view to proposed WRESC Site and gen-tie line from Dawn Road at offramp from SR 14	▪ Contrast Rating: Moderate to Strong ▪ Vertically oriented, angular industrial structures contrast with natural landforms ▪ Relatively tall structures seen against a backdrop of low hills in focal area of view ▪ Structural colors contrast with dark background vegetation ▪ Overall level of contrast from the Project is evident and is a distinct feature in the existing landscape ▪ Overall level of contrast from the Project is evident and is a distinct feature in the existing landscape	▪ Visual Impact Rating: Moderate ▪ Alteration to the existing landscape through the introduction of Project components that are evident and may partially change the existing landscape character for viewers at this location. ▪ Viewing duration: briefViewer sensitivity: low to moderate (workers, local motorists)

Notes: º = viewing angle toward the Project component

For KOPs 1 to 4 and KOP 7, which have a line of sight to the WRESC Site, the contrast rating of the Project ranges from "Strong" to "Moderate." Alterations to the existing landscape may partially change the existing landscape character for viewers at these locations. Due to its elevated position, viewers at KOP 3 may experience moderate to strong visual contrast where the Project components may attract attention within the landscape setting. At all other KOPs surrounding the WRESC Site, the WRESC Site is not visible and contrast ratings are based on the gen-tie line only. At these KOPs visual contrast ranges from "Moderate" to "Negligible."

Overall visual impact, which considers not only contrast but viewer sensitivity and viewing duration, was rated "Moderate" at the majority of viewpoints. At KOP 3, the visual impact was rated " High" due to the elevated, observer-superior view of the WRESC Site; however, it is anticipated that the number of viewers at this remote KOP will be low. At KOPs 6 and 6a, which represent different views of the gen-tie line from the same point, the visual impact is rated Low and Negligible, respectively.

5.13.3.5.2 Visual Ratings: Engineered Waste Rock Architectural Berm at WRESC Site (Option)

The waste rock architectural berm is expected to be visible from two KOPs only: KOP 3 (10th Street West) and KOP 7 (Dawn Road East at SR 14 Offramp). From the other KOPs, the combination of viewing distance and viewing angle obscures the visibility of the architectural berm completely.

At KOP 3, the presence of the architectural berm extends the visible area of the site in the western portion of the view. From the elevated vantage point, the inclusion of the architectural berm has the effect of increasing the visible scale of the facility substantially. The strong linear form of the architectural berm contrasts with the surrounding context of natural landforms and subtly undulating desert landscape. The color of the berm contrasts with the desert vegetation and the architectural berm's texture appears coarser than the desert vegetation in proximity to the site.

At KOP 7, the inclusion of the architectural berm visibly increases the horizontal scale of the WRESC Site. The developed area appears to expand both toward the viewer and to the north portion of the ground plane. However, the height of the architectural berm is low relative to the vertical Project elements, and the overall change in visual contrast is relatively minor. The linear form of the architectural berm contrasts with the surrounding context of subtly undulating desert terrain and natural vegetation. The uniform color of the berm contrasts with the varied desert vegetation.

In summary, the inclusion of the architectural berm results in an increase in Project visual contrast from both viewpoints. The factors viewing duration and viewer sensitivity do not change. Inclusion of the waste rock berm substantially increases the visible scale of the Project and results in an overall increase in visual impact at KOP 3. The overall visual impact is rated the same for both the no-berm and architectural berm options at KOP 7. The visual contrast and visual impact ratings of both options (no-berm and berm) are summarized below in **Table 5.13-6**.

Table 5.13-6: Visual Contrast and Visual Impact Ratings for Berm Option

Key Observation Point	Visual Contrast (No Berm)	Visual Contrast with Berm	Visual Impact (No Berm)	Visual Impact with Berm
KOP 3 (10th Street West)	Strong	Severe	Moderate	High
KOP 7 (Dawn Road East at SR 14)	Moderate to Strong	Strong	Moderate	Moderate

5.13.3.5.3 Lighting Effects

New light sources will be introduced by the Project into the existing nighttime environment, which presently has a range of direct light sources and ambient lighting. Existing sources of lighting are localized and associated with exterior lighting from rural residents, roadways, and nearby communities.

Table 5.13-7 summarizes the measured skyglow levels for selected light receptor locations near the WRESC Site. These values range from 18.79 to 20.69 in mag/arcsec^2 for a measurement of percent brightness above natural dark sky. This indicates nighttime light levels are generally representative of an E2 to E3 Environmental Lighting Zones; E2 - an area of low district brightness, such as a rural residential environment and E3 – an area of medium district brightness, such as residential suburbs. During the study, a crescent moon was visible in the western sky for Sites 1 and 4. Vehicle traffic and light pollution from surrounding towns/cities resulted in increased skyglow in the 0° and 45° measurements that were pointed toward the WRESC Site.

Table 5.13-7: Environmental Light Classification for Light Receptors

	Skyglow (% brightness above natural dark sky)						
Light Receptors	0º pointing toward site	45º pointing toward site	90º pointing vertically	45º pointing away from site	0º pointing toward site	Environmental Lighting Zone for 90º	Description
Light Receptor 1 – NW Residence (20th St West)	18.89	19.90	20.50	20.10	17.98	E2	Areas of low district brightness
Light Receptor 2 – Sopp Road	18.79	19.80	20.69	20.38	19.01	E2	Areas of low district brightness
Light Receptor 3 – United Street	19.70	20.20	20.21	18.80	15.50	E3	Areas of medium district brightness
Light Receptor 4 – 30th St West	20.17	20.27	20.57	19.38	18.75	E2	Areas of low district brightness

Notes: º = degrees; % - percentage

Construction-related lighting is anticipated to be limited to the period of the cavern excavation process, which is estimated to last for 41 months during which there will be intermittent localized 24-hour construction activities. This would result in a temporary increase in perceivable light sources and light levels at viewing locations adjacent to the Project. It is anticipated that there will be a short-term impact to skyglow and light pollution.

The changes to light sources during Project operations will include new lighting of Project facilities for safety and security purposes. This will include a combination of pole-mounted LED lighting and wall-mounted fixtures on

buildings, as well as the application of best practices to minimize the effects of obtrusive exterior lighting (e.g., shielding light fixtures directed downward, scheduling controls).

Based on a review of the Project lighting design information, light levels are anticipated to increase by a minor amount. Typical new LEED certified building exterior lighting can account for a vertical and horizontal illuminance value no greater than 0.1 lux (15.1 as a skyglow measurement[3]) at the property boundary. A recent study completed for the U.S. Department of Energy about the effect of luminescence of LED streetlights indicated they can increase skyglow between 0.2 and 1.6 times the baseline skyglow for nearby receptors (U.S. Department of Energy 2017). Conservatively using an increase of 1.6 times the measured skyglow light levels, the (90° angle) skyglow measurements would decrease by 0.51 as a percent brightness above natural dark sky[4]. This would cause the Environmental Lighting Zone designation to be E3 at all sites, representing an area of medium district brightness.

To estimate existing light pollution, the skyglow measurements were converted to foot-candles. Foot-candles are the most common unit of measure used by lighting professionals to calculate light levels in businesses and outdoor spaces; therefore, the skyglow measurements have been converted to foot-candles and presented in **Table 5.13-8**. A foot-candle is defined as the illuminance on a 1-square-foot surface from a uniform source of light. Unlike skyglow, foot-candles measures illumination and have the inverse relationship to mag/arcsec^2 as foot-candles increase with increase in illumination.

Table 5.13-8: Receptor Illumination, Foot-candles

	Illumination (fc)				
	Toward Plant		Upward	Toward Residence	
Monitoring	0 °	45 °	90 °	45 °	0 °
Site 1	0.0003	0.0001	0.0001	0.0001	0.0006
Site 2	0.0003	0.0001	0.0001	0.0001	0.0002
Site 3	0.0001	0.0001	0.0001	0.0003	0.0063
Site 4	0.0001	0.0001	0.0001	0.0002	0.0003

Notes: º = degrees; % - percentage
Fc = foot-candles

These results indicate that there is currently less light pollution from the direction of the WRESC Site than there is from the opposite direction.

A comparison of existing skyglow levels to the predicted skyglow levels for the light receptors suggests that using the most conservative increase, there will be a minor change to the existing level of skyglow due to Project-related lighting. The Environmental Lighting Zone for all light receptors are conservatively predicted to be within the E3 classification at all sites. As such, lighting from Project during operations will be a minor contributor to light levels and is not anticipated to change the overall existing light environment during nighttime viewing.

5.13.3.6 Impact Significance

There are no federal, state, or locally designated scenic vistas identified in the Project assessment area. Therefore, scenic vistas would not be affected by the Project during construction and operation.

There are no eligible or designated scenic highways identified in the Project assessment area. The closest eligible scenic highway is more than 10 miles from the Project. Project components would not be discernible from state scenic highways and will not affect scenic resources during construction and operation.

[3] Luminance measurements in units of mag/arcsec^2 (magnitudes per square arcsecond), a logarithmic astronomical unit used commonly for measuring skyglow.

[4] In relation to measurements for sky quality, the greater the value the darker the environment.

As described in Section 5.13.3.2.5, the BLM VRI designates the lands surrounding the Project as Scenic Quality Class C, indicating a Low value for the scenic quality of the landscape seen within the rating unit; and a Viewer Sensitivity Rating of Low, indicating that the maintenance of visual quality has low value to the public (USDI BLM 2020).

As assessed in Section 5.13.3.5.1, visual impacts from KOPs are expected to range from a High to Negligible degree of effect. For the view from KOP 1 (SR 14), where the highest number of potential viewers is anticipated, the rating of visual contrast of the Project is Moderate. Viewers at KOPs 2, 3, 5, and 7 are anticipated to experience more substantial visual impacts where the Project components will attract attention and will be dominant features of the landscape setting. Notably, all KOPs represent dynamic views from travel routes, so views will be intermittent and short in duration. KOPs 4 and 6 will experience more modest visual effects where the Project will result in a minor alteration to the existing landscape that does not change the existing landscape character for viewers.

For the no-berm option, the overall visual impact ratings of the Project range from Moderate to Negligible at nearly all KOP locations. This indicates that, while temporarily visually evident to potential viewers travelling in vehicles, the Project would not substantially degrade the existing visual character or quality of the landscape setting for most viewing locations. Therefore, Project effects on the existing visual character of the site and its surroundings would be less than significant.

For the architectural berm option, visual impact ratings at two KOPs (3 and 7) are predicted to increase to High. The other KOPs are not affected by the presence of the berm. As such, at the majority of KOPs, the Project would not substantially degrade the existing visual character or quality of the landscape setting for most viewing locations. Therefore, Project effects on the existing visual character of the site and its surroundings would be less than significant.

The limited lighting required during Project construction will be temporary and short term and is not expected to substantially affect nighttime viewing. The lighting required during Project operation would follow best practices to minimize obtrusive lighting effects while meeting requirements for safety and security. It is anticipated that Project-related light sources will be evident to nearby viewers but would not increase the overall perceived light levels, thereby maintaining current nighttime viewing conditions anticipated for a rural setting. While lighting required during Project operations would create new sources of light, Project effects from light and glare on day or nighttime views would be less than significant.

5.13.4 Cumulative Effects

Section 15355 of the CEQA Guidelines defines “cumulative impacts” as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.” Subsection b of Section 15355 states, in part, that “The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects.” Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an EIR is required to discuss cumulative impacts when the project’s incremental effect is “cumulatively considerable.” Section 15065(a)(3) then defines “cumulatively considerable” as meaning “that the incremental effects of an individual project are significant when viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects.”

The landscape in the region surrounding the Project demonstrates evidence of past and present visible disturbances related to agriculture, industrial land uses (i.e., renewable energy production), transmission and transportation infrastructure, and rural residential development. The Project effects on the existing visual character are predicted to be a minor or partial alteration to the existing landscape that would not degrade the existing visual character.

The Gem Hill Quarry Project proposed by CalPortland Company is located approximately 3 miles west of the WRESC Site. No cumulative impacts are anticipated as the Gem Hill Quarry site is not predicted to be visually prominent from any of the Project KOP’s.

Mojave Micro Mill is a proposed steel mill about 1 mile north of the WRESC Site on the east side of Sierra Highway. Mojave Micro Mill will be visible in the middle-ground at approximately 2.5 miles from KOP 3 but will not be visible from any of the other KOPs. It is anticipated that the Project, in combination with Mojave Micro Mill, will result in cumulative visual impacts from KOP 3 only. Because the majority of Project KOPs will be unaffected by the proposed Mojave Micro Mill, the Project will not cause significant cumulative effects to visual resources.

5.13.5 Best Practices, Project Design Features and Mitigation Measures

As no significant adverse impacts to visual resources were identified, no mitigation measures beyond those incorporated into the Project design are necessary.

5.13.6 Laws, Ordinances, Regulations, and Standards

This section lists and discusses relevant laws, ordinances, regulations, and standards to understand the regional and local context for management of visual resource or lighting that apply to the Project assessment area.

Federal Policies and Regulations

No federal visual resource related laws, ordinances, regulations, and standards exist relevant to the Project assessment area.

State Policies and Regulations

California Environmental Quality Act

CEQA requires an evaluation of scenic resources when considering project effects on the environment. In accordance with CEQA requirements (Appendix G), an evaluation also considers site-specific history, context, and area sensitivity, such as whether light and glare, demolition, and new development could potentially change visual character and affect scenic views and natural and manmade visual resources (CEQA 2019). CEQA guidance is also identified as it provides guidance for determination of significance for the Project's potential effects.

California Scenic Highways Program

The California Scenic Highways Program helps to preserve and protect the state's scenic highway corridors from changes that would diminish the aesthetic value of lands adjacent to highways. The program identifies portions of the state highway system that require special conservation treatments through land use regulations, design guidelines, and site planning measures. This applies to highways that are either eligible for designation as scenic highways or have been so designated. Any project that may affect the scenic value of an identified scenic corridor is required to consider the provisions of the program.

Review of the California Scenic Highway Mapping System (Caltrans 2018) indicates there are no officially Eligible or Designated state scenic highways within the Project assessment area. The closest eligible state scenic highways are the portion of SR 14 extending north from near the city of Mojave; and the SR 58 corridor extending east from the city of Mojave to the city of Barstow. Both are more than 10 miles from the Project. From this background viewing distance, the Project would not be evident within the landscape setting. Therefore, the Project is not required to consider the state scenic highway program.

Local Policies and Regulations

Kern County General Plan

The current Kern County General Plan (Kern County 2009) consists of goals and policies pertaining to a number of elements that guide the long-term outlook for development in Kern County.

The Land Use, Open Space, and Conservation Element, Section 1.10.7 Light and Glare focused on ensuring that light and glare from new development projects are minimized in urban and rural areas and encourages the use of low-glare lighting to minimize nighttime effects on neighboring properties. The implementation uses CEQA guidelines and the provisions of the Kern County Zoning Ordinance light and glare standards. The Project will

comply with local ordinance for lighting and apply best practices to minimize the effects of obtrusive exterior lighting.

The Land Use, Open Space, and Conservation Element, Section 1.8 includes the policies related to visual character. Policy 6 encourages upgrading the visual character of existing industrial areas through the use of landscaping, screening, or buffering. Policy 7 require that industrial uses provide design features such as screen walls, landscaping, increased heights and/or setbacks, and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences.

The Circulation Element, Section 2.3.9 Scenic Route Corridors details that while the County's Scenic Highway Element was rescinded in 1992, Kern County has the discretion to designate local scenic routes if circumstances warrant such designation. No local scenic routes are designated in relation to the Project assessment area.

Kern County Code of Ordinance

The Kern County Zoning Ordinance implements the Kern County General Plan through regulations and specific standards on how land may be developed. Title 19 of the Kern County Code of Ordinance describes permitted uses and design standards within various zones of the County (Kern County 2021). This includes the following chapters that pertain to visual resources or lighting.

Chapter 19.74, Scenic Corridor Combining District establishes a Scenic Corridor Combining District intended to protect areas with unique visual and scenic resources from disturbance as viewed from major highways or freeways and to safeguard the scenic qualities of the natural environment of primary entranceways into the county. The WRESC Site is not located in or near a designated Scenic Corridor.

Chapter 19.81, Dark Skies Ordinance (Outdoor Lighting) is established to maintain the natural dark skies of Kern County by requiring a minimal approach to outdoor lighting to avoid excessive illumination that may obscure the night sky and or may constitute a nuisance. The ordinance provides requirements for outdoor lighting within specified unincorporated areas of Kern County. The Project will comply with local ordinance for lighting including requirements for lighting plans, light fixtures, maintenance, and hours of operation.

Willow Springs Specific Plan

The Project is located within the Willow Springs Specific Plan area (Kern County 2008). The policies of the Willow Springs Specific Plan encourage the visual aesthetics of new commercial, industrial, and residential construction. Implementation measure for commercial development highlight the screening of outdoor storage of materials from public view.

5.13.7 Agencies and Agency Contacts

Agencies and contacts related to visual resources are provided in **Table 5.13-9**.

Table 5.13-9: Agency Contacts for Visual Resources

Issue	Agency	Contact
Visual Resources	Kern County Planning and Natural Resources Department	Lorelei H. Oviatt AICP, Director Phone: (661) 862-8600 Public Services Building 2700 "M" Street., Suite 100 Bakersfield, CA 93301-2370

5.13.8 Permits and Permit Schedule

There are no permits related to visual resources that are required to construct the Project. The CEC will work with the Kern County Planning Commission on review of the AFC to ensure compliance with Kern County land use policy and ordinance related to visual resources.

5.13.9 References

California Department of Transportation (Caltrans). 2018 – California State Scenic Highway System Map. Available at: https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. Accessed July 2023.

California Energy Commission (CEC) 2022. California Code of Regulations Title 20. Public Utilities and Energy. Available at: https://www.energy.ca.gov/sites/default/files/2021-07/Title%2020%20Updated%20July%2023%2C%202021.pdf. Accessed July 2023.

Commission Internationale de l'Eclairage (CIE). 2003. Technical Report: Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Installations. Vienna, Austria: Commission Internationale de l'Eclairage Report No.: CIE 150: 2003, ISBN 9788 3 901906 19 0.

CIE. 1997. Technical Report: Guidelines for Minimizing Sky Glow. Vienna, Austria: Commission Internationale de l'Eclairage Report No.: CIE 126: 1997, ISBN 978 3 900734 83 1.

Kern County. 2008. Willow Springs Specific Plan. https://psbweb.co.kern.ca.us/planning/pdfs/SPs/WillowSprings_SP.pdf. Website accessed July 2023.

Kern County. 2009. Kern County General Plan. Available at: https://kernplanning.com/planning/planning-documents/general-plans-elements/. Accessed July 2023.

Landscape Institute. 2019. Visual Representation (Technical Guidance Note 06/19). Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf. Accessed July 2023.

U.S. Department of Energy. 2017. An Investigation of LED Street Lighting's Impact on Sky Glow. Available at:https://www.energy.gov/sites/prod/files/2017/05/f34/2017_led-impact-sky-glow.pdf.April . Accessed July 2023.

U.S. Department of Transportation Federal Highway Administration (FHWA). 2015. Guidelines for the Visual Impact Assessment of Highway Projects. Available at: https://www.environment.fhwa.dot.gov/env_topics/other_topics/VIA_Guidelines_for_Highway_Projects.aspxA ccessed July 2023.

U.S. Department of the Interior Bureau of Land Management (USDI BLM). 1986a. *Visual Resource Inventory*. Bureau of Land Management Manual Handbook H-8410-1, Rel. 8-28. Washington, DC.

USDI BLM. 1986b. *Visual Resource Contrast Rating*. Bureau of Land Management Manual Handbook H-8431-1, Rel. 8-30. Washington, DC.

USDI BLM. 2020. BLM National Data Web Map - Landscape Approach Data Portal. Available at: https://www.landscape.blm.gov/geoportal/catalog/BLMNational/BLMNational.page. Accessed July 2023.

5.14 Waste Management

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California. The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's (SCE's) Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH.

This section is designed to communicate the expected potential effects on human health and the environment from nonhazardous and hazardous waste generated at the Willow Rock Energy Storage Center (Willow Rock, or WRESC). Willow Rock will incorporate an Environmental and Sustainability Policy that will reflect the best economical available practices through the life cycle of the Project.

Section 5.14.1 describes site investigations and the waste and waste streams that the WRESC will generate. Section 5.14.2 provides environmental analysis of the waste and waste disposal sites associated with the WRESC. Section 5.14.3 discusses potential cumulative effects. Section 5.14.4 describes mitigation measures. Section 5.14.5 presents laws, ordinances, regulations, and standards (LORS) that apply to the generated waste. Section 5.14.6 lists the agencies that have jurisdiction over the generated waste and specifies whom to contact at those agencies. Section 5.14.7 describes permits required for generated waste and a schedule for obtaining those permits, and Section 5.14.8 provides the references used to prepare this subsection.

5.14.1 Affected Environment

This subsection discusses the condition of the WRESC site and the potential need to remove or otherwise treat contaminated soil or groundwater at the site. Additionally, this section identifies the various hazardous and nonhazardous waste streams for the Project's construction, operation, and decommissioning phases. The pre-construction and construction phases include mobilization, site preparation, construction, and facility testing and start up activities.

5.14.1.1 Site Investigations

Existing site conditions were captured in a Phase I Environmental Site Assessment conducted in February 2023 by WSP USA for the WRESC, Assessor Parcel Number (APN) 431-022-13 (WSP 2023). Appendix 5.14A contains the Phase I ESA for the WRESC Site. The ESA was conducted in accordance with methods prescribed by the American Society for Testing and Materials (ASTM) document entitled "*Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process (Designation: E 1527-21)*."

The Phase I ESA conforms with the scope and limitations of ASTM Practice E1527-21 for the proposed WRESC location. The Phase I ESA report concluded that *the assessment revealed no evidence of recognized environmental conditions in connection with the Project location or property* (WSP 2023).

5.14.1.2 Project Waste Generation

This section identifies nonhazardous waste, hazardous waste, and wastewater that the Project will generate during the pre-construction, construction, operation, and decommissioning phases.

5.14.1.2.1 Construction Waste Streams

During the construction phases, the WRESC will generate nonhazardous and hazardous waste. As discussed in Chapter 2, Project Description, the construction of the facility from site preparation and grading to full-scale operation will require approximately 60 months. **Table 5.14-1** summarizes the waste streams anticipated to result from construction activities. The quantities listed in **Table 5.14-1** are estimates and are subject to change based on minor design modifications or market conditions. Section 5.14.4 discusses mitigation measures that detail methods for managing the waste streams associated with the construction phase.

Nonhazardous Solid Waste: Based on initial design estimates, the following nonhazardous solid wastes are anticipated to be generated during the construction phases of the WRESC:

- **Paper, Wood, Glass, Insulation, and Plastics:** Design estimates indicate that construction of the WRESC will generate approximately 5,500 tons of scrap wood, steel, glass, plastic, paper, calcium silicate, insulation, and mineral wool insulation waste per year. This category includes packing materials, waste lumber, insulation, and empty nonhazardous chemical containers used during construction activities.
- **Concrete:** Construction activities are anticipated to generate approximately 700 tons of excess concrete. GEM A-CAES LLC (GEM, the Applicant) will attempt to recycle concrete onsite or offsite as clean fill.
- **Metal:** Construction will generate approximately 600 tons of metal from welding/cutting operations, packing materials, and empty nonhazardous chemical containers. Copper, aluminum, and special alloy waste also falls within this category.
- **Soil and Bedrock:** The WRESC will require various excavation activities to create underground caverns, a reservoir, and one or more stormwater retention ponds. The cavern will include four 8-foot-diameter shafts and one 4-foot-diameter shaft, all approximately 2,000 feet deep.
  - GEM estimates that, collectively, the 8-foot-diameter shaft drillings leading to the cavern will require 19,000 cubic yards of cuttings to be removed. The estimated cuttings will be in the form of a dewatered slurry sludge.
  - GEM estimates that 1,300,000 cubic yards of waste rock will be excavated from construction of the underground cavern. The storage cavern will be constructed at a target depth of 1,970 feet, or 600 meters, below ground surface.
- **Wastewater:** Waste streams from wastewater will be generated from sanitary waste, excavation water, stormwater, hydrotest water, equipment washdown water, and dewatering activities from general construction activities. Approximately 1,350,000 gallons of used water will be generated from testing equipment and piping integrity. The water used to test equipment and piping is referred to as hydrotest water.
- **Hazardous Waste:** GEM anticipates that construction of the WRESC will generate the following hazardous waste streams:
  - 950 empty hazardous packaging materials and containers of various sizes
  - 4,700 pounds of used oil filters from various machines and heavy equipment
  - 39,000 gallons of used oil
  - 4,200 pounds of oily rags and sorbents used to clean small spills or wipe down oily equipment
  - 6,200 gallons of solvents, detergents, glycols, and refrigerants including paint and adhesives for construction and startup activities
  - Approximately 600 spent lead acid batteries and 1,500 pounds of spent alkaline batteries used for various pieces of equipment
  - Pipe cleaning and flushing will generate approximately 20,000 gallons of passivating and chemical cleaning waste

Table 5.14-1: Potential Wastes Generated during Construction

Waste	Origin	Composition	Classification	Disposal	Estimated Quantity Surface	Estimated Quantity Cavern	Estimated Quantity Total
Nonhazardous Solid Waste							
Scrap wood, steel, glass, plastic, paper, calcium silicate, insulation mineral wool	*Construction waste*	*Normal refuse*	*Nonhazardous*	*Recycle and/or dispose of at Class II or III landfill.*	*4,000 tons*	*1,500 tons*	*5,500 tons*
Concrete waste	*Construction*	*Solids*	*Nonhazardous*	*Recycle and/or dispose of at Class II or III landfill.*	*400 tons*	*300 tons*	*700 tons*
Scrap metals	*Construction*	*Parts, wire, and containers*	*Nonhazardous*	*Recycle and/or dispose of at Class II or III landfill.*	*500 tons*	*100 tons*	*600 tons*
Soil and bedrock	*Excavation and grading cuttings*	*Subsurface soil and bedrock*	*Nonhazardous*	*See Section 5.14.2.3.1.*	*0 ton*	*1,300,000 cubic yards*	*1,300,000 cubic yards*
Wastewater							
Sanitary waste	*Portable toilet holding tanks*	*Liquid and solids*	*Nonhazardous liquid*	*Remove by contracted sanitary service.*	*2,125 gallons/day*	*N/A*	*139,440 gallons total*
Hydrotest water	*Testing equipment and piping integrity*	*Water*	*Hazardous or nonhazardous liquid*	*Sample and characterize; manage accordingly and dispose of appropriately offsite.*	*1,350,000 gallons*	*0*	*1,350,000 gallons*

Waste	Origin	Composition	Classification	Disposal	Estimated Quantity Surface	Estimated Quantity Cavern	Estimated Quantity Total
Hazardous Waste							
Empty hazardous material containers	*Construction*	*Drums, containers, totes*	*Hazardous and nonhazardous solids*	*Ensure containers are empty. Dispose of containers < 5 gallons as normal refuse. Return containers >5 gallons to vendors for recycling or reconditioning.*	*650 each*	*300 each*	*950 each*
Spent welding materials (welding rods, wire and grinding wheels, etc.)	*Construction*	*Solids*	*Hazardous*	*Recycle as scrap metal or dispose of at Class I landfill.*	*16,000 lbs.*	*4,000 lbs.*	*20,000 lbs.*
Used oil	*Construction equipment and vehicles, lubricating oil, and flushes*	*Liquids with hydrocarbons*	*Non-RCRA hazardous liquid*	*Recycle or dispose of at a permitted TSD facility.*	*30,000 gallons*	*9,000 gallons*	*39,000 gallons*
Used oil filters	*Construction equipment and vehicles*	*Solids*	*Once drained, used oil filters may be recycled as scrap metal. Used oil collected during draining is a non-RCRA hazardous waste liquid*	*Empty filters may be recycled at scrap metal facilities. Collected used oil recycled or disposed at a permitted TSD facility.*	*3,200 lbs.*	*1,500 lbs.*	*4,700 lbs.*
Oily rags, oil sorbent excluding lube oil flushes	*Cleanup of small spills*	*Solids containing hydrocarbons*	*Hazardous*	*Recycle or dispose of at a permitted TSD facility.*	*3,200 lbs.*	*1000 lbs.*	*4,200 lbs.*
Solvents, detergents, glycols, and refrigerants, paint, and adhesives	*Maintenance*	*Liquids*	*Hazardous*	*Recycle at a permitted TSD facility.*	*4,000 gallons*	*2,200 gallons*	*6,200 gallons*

Waste	Origin	Composition	Classification	Disposal	Estimated Quantity Surface	Estimated Quantity Cavern	Estimated Quantity Total
Spent lead acid batteries and electrical fuses	*Equipment*	*Solids with heavy metals*	*Hazardous*	*Store no more than 10 batteries (up to 1 year), recycle offsite.*	*100 each*	*500 each*	*600 each*
Spent alkaline batteries	*Equipment*	*Solids with metals*	*Universal waste solids*	*Recycle or dispose of offsite at a Universal Waste Destination Facility.*	*500 lbs.*	*1,000 lbs.*	*1,500 lbs.*
Passivating and chemical cleaning waste	*Pipe cleaning and flushing*	*Water*	*Hazardous or nonhazardous liquid*	*Sample and characterize; manage accordingly and dispose of appropriately offsite.*	*17,000 gallons*	*3,000 gallons*	*20,000 gallons*
Controlled waste streams	*Inerts/explosives packaging*	*Controlled substances*	*Hazardous*	*Recycled or disposed of by a certified waste hauler.*	*20 lbs.*	*180 lbs.*	*200 lbs.*

Source: Hydrostor 2024
lbs = pounds; RCRA = Resource Conservation and Recovery Act; TSD = treatment, storage, and disposal

5.14.1.2.2 Operation Waste Streams

Chapter 2, Project Description includes a detailed description of the design, construction, and operations of the WRESC. The proposed project will be a 500-megawatt A-CAES facility and will function as follows:

1) Use off-peak or surplus electricity from the grid to operate air compressors to create high-pressured compressed air.
2) Collect heat from compressed air and store it in a thermal management system.
3) Store air in purpose-built underground storage caverns where hydrostatic compensation is used to maintain the system at a near-constant air pressure during operation.
4) Force air back to the surface via hydrostatic pressure, where the air is recombined with the stored heat and expanded through turbine generators to generate electricity on demand.

The operation of the WRESC is anticipated to generate nonhazardous and hazardous waste. Although the primary waste stream will be nonhazardous, the potential exists for varying quantities of hazardous waste to be generated on a periodic basis. **Table 5.14-2** presents a summary of potential wastes generated during operation. Section 5.14.4 discusses the mitigation measures that detail methods for managing the waste associated with the WRESC's operational phase.

Table 5.14-2: Potential Wastes Generated during Operation

Waste	Origin	Composition	Classification	Disposal	Estimated Quantity
Nonhazardous Solid Waste					
Air-stream filters	*Compressor inlet filters, turbine inlet filters*	*Paper, dust, particulate atmospheric pollution*	*Nonhazardous*	*Disposed of by a certified waste hauler*	*5,775 lbs. per quarter*
Spent activated carbon filters	*Water treatment system*	*Spent carbon, plastic, water contaminants*	*Nonhazardous*	*Disposed of by a certified waste hauler*	*250 lbs. per quarter*
Ultrafiltration membrane	*Water treatment system*	*Composite polyamide, plastic, water contaminants*	*Nonhazardous*	*Disposed of by a certified waste hauler*	*1,000 lbs. per year*
Reverse osmosis membrane	*Water treatment system*	*Composite polyamide, plastic, water contaminants*	*Nonhazardous*	*Disposed of by a certified waste hauler*	*1,200 lbs. per year*
Gas contact membrane	*Water treatment system*	*Polypropylene fiber, plastic*	*Nonhazardous*	*Disposed of by a certified waste hauler*	*20 lbs. per year*
Cartridge filters	*Water treatment system and HVAC systems*	*Polypropylene, plastic*	*Nonhazardous*	*Disposed of by a certified waste hauler*	*500 lbs. per year*
Small office operations	*Incidental office waste*	*Paper, plastics, misc. solid waste*	*Nonhazardous*	*Disposed of via a waste hauler*	*8 cubic yards per week*
Wastewater					
Industrial wastewater	*Oily water waste tanks, interceptor tank solids, process floor drains, maintenance activities*	*Compressor wash water waste, oily wastewater from equipment leaks*	*Nonhazardous*	*Wastewater placed in holding tank and trucked offsite by a privately owned industrial wastewater processor*	*5,000 gallons per week*
Sanitary	*Facility bathrooms*	*Solid and liquid sanitary waste*	*Nonhazardous*	*Septic tank and leach field*	*788,400 gallons per year*

Waste	Origin	Composition	Classification	Disposal	Estimated Quantity
Hazardous Waste					
Lubricating and insulating oil	*Maintenance from turbomachinery, lubricating-oil systems and oil-filled transformers; small leaks and spills*	*Hydrocarbons*	*Hazardous*	*Cleaned up using sorbent and rags; disposed of by a certified oil recycler*	*13,500 gallons per year*
Lubricating-oil filters	*Turbomachinery lubricating-oil filters*	*Paper, metal, and hydrocarbons*	*Once drained, used oil filters may be recycled as scrap metal. Used oil collected during draining is a non-RCRA hazardous waste liquid.*	*Recycled or disposed of by a certified oil recycler*	*2,000 lbs. per year*
Oily rags	*Maintenance, wipe-down of equipment, etc.*	*Hydrocarbons and cloth*	*Hazardous*	*Recycled or disposed of by a certified oil recycler*	*3,000 lbs. per year*
Oil sorbents	*Cleanup of small spills*	*Hydrocarbons*	*Hazardous*	*Recycled or disposed of by a certified oil recycler*	*400 lbs. per year*
Controlled waste streams	*Smoke detectors, instrumentation, fire extinguishers*	*Controlled substance*	*Hazardous*	*Recycled or disposed of by a certified waste hauler*	*1,000 lbs. over the life of the Project*

Source: Hydrostor 2024
lbs = pounds; HVAC = heating, ventilation, and air conditioning; RCRA = Resource Conservation and Recovery Act

Nonhazardous Solid Waste: Waste streams generated during operation were estimated by the Applicant and consist of the following:

- **Compressor and Turbine Inlets:** Operation of the compressor and turbine inlets is estimated to collectively generate 23,100 pounds of air-stream filters per year.
- **Water Treatment System:** Operation of the water treatment system will generate several solid waste streams, including 1,000 pounds of spent activated carbon filters per year, 1,000 pounds of ultrafiltration per year, 1,200 pounds of reverse osmosis membranes per year, 20 pounds of gas contact membrane per year, and 15 pounds of cartridge filters per year.
- **Small Office Operations:** This waste stream will generally consist of empty containers, packaging from shipments, refuse from small office operations consisting of paper, packaging and lunchroom-type refuse, and other miscellaneous solid wastes. The Applicant estimates that approximately 8 cubic yards of small office waste will be generated per week.
- **Maintenance:** Periodic maintenance operations may result in the generation of small metal or electrical materials that require disposal.

Nonhazardous Wastewater: Chapter 2, Project Description, Appendix D includes a water mass balance diagram that illustrates the expected waste streams and describes waste stream flow rates. The proposed Project has been engineered for maximum collection of wastewater streams to be recycled onsite by water treatment systems or collected in tanks for ultimate disposal by third-party vendors. Section 5.15, Water Resources, discusses water use and storage in greater detail.

- **Water Treatment:** Water required for semi closed-loop process systems will be made up by reservoir water undergoing additional filtration and water treatment during the first filling. As part of this treatment, a form of brine will be discharged into the evaporation pond and evaporated.
- **Potable Water:** Potable water will be piped to the WRESC. Potable water will be used for bathrooms, showers, and kitchen facilities. Bottle drinking water will be provided for construction and operation.
- **Equipment Washing:** General equipment will require washing / dust removal. The WRESC facility will not have a practice of washing down any equipment with oily residues.
- **Stormwater:** The WRESC Site will be developed so that no industrial stormwater is discharged offsite. Stormwater produced on the WRESC Site will be collected and directed to onsite, unlined stormwater pond. Oil water separators will be provided to prevent oil from entering the stormwater pond. Section 5.15, Water Resources discusses anticipated stormwater and stormwater management in greater detail.
- **Occasional Wastewater Streams:** Equipment leaks within the building, as well as other miscellaneous wastewater streams, will occur. Mitigation measures for handling these types of wastewater streams are presented in Section 5.14.4.2.1.
  - The maintenance shop will primarily be operated as a dry shop. Wastewater from the shop will be collected in a holding tank. Once full, a third-party vendor will be responsible for transportation and offsite water disposal at a permitted facility.

Hazardous Waste: Waste streams generated during operation were estimated by the Applicant to consist of the following:

- **Lubricating and Insulating Oil:** Maintenance from turbomachinery and lubricating activities for oil systems and oil-filled transformers will all generate used lubricating and insulating oil. On occasion, small leaks or spills may also generate lubricating or insulating oil waste. The Applicant estimates that 13,500 gallons of oil will be generated during operation.
- **Lubricating-Oil Filters:** Approximately 2,000 pounds of lubricating-oil filter waste will be generated from operation of the lubricating turbomachinery per year.
- **Oily Rags:** General maintenance around the WRESC will generate oily rags. Depending on the maintenance activities that occur in one year, it is estimated that 3,000 pounds of oily rag waste will be generated.
- **Oil Sorbents:** If a spill or leak were to occur, oil sorbents would be used and would require proper disposal. The Applicant estimates that up to 400 pounds a year of oil sorbents waste could be generated from operations.

5.14.2 Environmental Analysis

This section provides environmental analysis of the waste and waste disposal sites associated with the WRESC.

5.14.2.1 Significance Criteria

Factors used to evaluate the significance of Project-related Waste Management are set forth in Appendix G of the California Environmental Quality Act (CEQA). Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential waste management impacts associated with the construction and operations of the project, there is no Appendix G section on Waste Management. However, other resources with criteria in Appendix G, ask if the project would:

- Located on a site that is included on a list of hazardous materials sites (Cortese List) compiled pursuant to Government Code Section §65962.5 and, as a result, will create a significant hazard to the public or the environment.
- Have solid waste disposal needs beyond the capacity of appropriate landfills to accommodate them. The risks or hazards posed by the transportation of hazardous materials, including hazardous wastes, are described, and analyzed in Section 5.5, Hazardous Materials Handling.

5.14.2.2 Cortese List

Government Code §65962.5 was originally enacted in 1985 and established a list of contaminated sites; a site's presence on the list may have bearing on the local permitting process, as well as on compliance with CEQA. Although originally just a single list, the term now refers to a group of lists that can be accessed in various locations. For those requesting a copy of the Cortese List, the California Environmental Protection Agency (CalEPA) now refers users to the following data resources:

- *List of Hazardous Waste and Substances sites from the Department of Toxic Substances Control (DTSC) EnviroStor database*
- *List of Leaking Underground Storage Tanks from the State Water Board's GeoTracker database*
- *List of solid waste disposal sites identified by Water Board with waste constituents above hazardous waste levels outside the waste management unit*
- *List of "active" Cease and Desist Orders and Cleanup Abatement Orders*
- *List of hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of Health and Safety Code, identified by DTSC.* (CalEPA 2023a)

A review of these sources determined that there are no sites currently on the Cortese List within 1,000 feet of the WRESC site. The closest listed site is Osage Industries, 60th Street West Site. Although there is no mailing address, the location is described on the Envirostor DTSC website as WEST T9N, R13W, S10 SE CORNER, Rosamond CA 93560, with approximate coordinates of 34°52'59.57"N, 118°14'0.07"W. The Osage Industries site is approximately 3.04 miles west from the center of the proposed Willow Rock site. Thus, it is highly unlikely that any impacts will result from Cortese-listed properties or that the Willow Rock site will present a significant hazard to the public or the environment.

5.14.2.3 Solid Waste Disposal

The following subsections assess the capacity of identified landfills for recycling and disposing of both nonhazardous and hazardous waste produced by the WRESC. Section 5.12, Traffic and Transportation discusses the handling and transportation of hazardous materials and waste.

5.14.2.3.1 Nonhazardous Waste Disposal

GEM will dispose of nonhazardous waste, including construction waste, municipal waste, and operational garbage, at a Class III landfill. When practical, nonhazardous waste will be recycled to the extent possible. What cannot be recycled will be disposed of at any of the permitted landfills discussed below. Information about solid waste facilities, operations, and disposal sites was obtained from the CalRecycle Solid Waste Information System (CalRecycle 2023a).

Solid Waste Disposal

The Applicant has indicated that during operation the WRESC will not rely on municipal resources and will instead employ third parties to properly recycle and dispose of solid waste. There are four facilities within a 50-mile radius of the proposed Project location. **Table 5.14-3** summarizes solid waste disposal facilities near WRESC.

Table 5.14-3: Solid Waste Disposal Facilities in the Vicinity of the Willow Rock Energy Storage Center

Landfill/ Transfer Station	Location	Class	Permitted Capacity (cubic yards)	Remaining Capacity (cubic yards)	Permitted Throughput (tons per day)	Estimated Closure Date	Violation of Minimum State Standards Noted
Tehachapi Sanitary Landfill	*12001 Tehachapi Blvd, Tehachapi, CA 93561*	*III*	*4,000,000*	*522,298*	*1,000*	*June 1, 2020[1]*	*None*
Mojave-Rosamond Sanitary Landfill	*400 Silver Queen Road, Mojave, CA 93501*	*III*	*78,000,000*	*76,310.30*	*3,000*	*December 31, 2123*	*None*
Boron Sanitary Landfill	*11400 Boron Ave, Boron, CA 93516*	*III*	*1,057,000*	*191,380*	*200*	*January 1, 2048*	*Yes (May 1989, June 1992)*
Tehachapi Recycling, Inc	*416 North Dennison Road Tehachapi, CA 93561*	*NA*	*NA*	*NA*	*850*	*NA*	*Yes (September 2015)*

Source: CalRecycle SWIS Database
NA = not applicable
[1] Ceased Operation Date noted on SWIS Facility/Site Activity Details, but Landfill is still in operation.

Excavated Soil and Bedrock

Construction of the cavern will result in the excavation of approximately 1.3 million cubic yards of rock that is expected to be of aggregate quality. Where feasible, subsurface material will be used for grading the WRESC Site. The proposed Project includes options for disposing and managing the extracted rock, including (a) the complete or partial permanent storage of the material surrounding portions of the WRESC in the form of an architectural berm; (b) the complete or partial transport of the material to a regional off-taker for commercial use; and/or (c) the complete or partial transport of the material to a regional off-taker for permanent storage or potential reuse. One or any combination of the three proposed options may be implemented.

The dimensions of the potential architectural berm and quantities of material that may be transported to an off-taker would depend on the feasibility and limitations of the architectural berm option which are under review, as well as the selection of one or more suitable off-taker(s) and their capacity limits. Therefore, the total use of the anticipated rock volume under each option is proposed for the purposes of environmental review.

An evaluation was conducted and included reviewing online data and aerial imagery to identify offsite disposal facilities within a 60-mile radius of the WRESC. There may be unknown permitting restrictions, environmental impact concerns, or political concerns that will prevent identified sites from agreeing to accept the waste rock. This evaluation did not include non-commercial private landowners. *Please note that the sites and owners noted in this application have not provided their consent for the Applicant to list them on permit applications or other formal, external Project documents*.

Table 5.14-4 lists two potentially viable options for disposing of the estimated volume of waste rock. Acceptance of the waste rock for all of the viable sites will depend on the waste rock being suitable for processing into a marketable aggregate product.

Table 5.14-4: Viable Excavated Soil and Bedrock Disposal Locations in the Vicinity of the Willow Rock Energy Storage Center

Disposal Facility	Location	Activity
Vulcan Materials – Big Rock Creek	*Palmdale, CA*	*Active*
Robertson's Ready Mix	*Palmdale, CA*	*Active*
Holliday Rock	*Kern County, CA*	*Active*

The following describes the facility characteristics for the preferred locations identified in **Table 5.14-4**:

- **Vulcan Materials – Big Rock Creek.** This quarry is located in Palmdale, CA south of the WRESC site, and the waste rock would be repurposed for beneficial uses.
- **Robertson's Ready Mix.** This quarry is located in Palmdale, CA south of the WRESC site, and the waste rock would be repurposed for beneficial uses.
- **Holliday Rock.** This quarry is located in Kern County northwest of the WRESC Site and the waste rock would be repurposed for beneficial uses.

Additional recycling or disposal alternatives for excavated rock are discussed in Chapter 6, Alternatives.

5.14.2.3.2 Hazardous Waste Disposal

Hazardous waste, including both construction and operational waste, will be recycled or disposed of at a permitted treatment, storage, and disposal facility. Hazardous waste generated at the WRESC facility will not be stored onsite for more than 90 days following its generation date and will be transported offsite by a permitted hazardous waste transporter. Depending on the waste determination and characteristics of the waste, hydrotest water, wastewater, and excavated soil will be disposed of at a facility appropriately licensed to accept the waste product.

California has two active Class I landfill facilities that accept hazardous waste: Waste Management Kettleman Hills Landfill and Clean Harbor's Buttonwillow Landfill (DTSC 2023a). Class I landfill facilities vary considerably in what they can do with the hazardous waste they receive. Some waste disposal facilities can only store waste, some can treat the waste to recover usable products, and others can dispose of the waste by incineration, deep-well injection, or landfilling. The state of California does not permit incineration or deep-well injection disposal of these materials. The two Class I landfills are described below:

- **Waste Management Kettleman Hills Landfill.** This landfill is on a 1,600-acre parcel that has 499 acres of permitted land for management of federal and state-listed hazardous wastes and municipal solid wastes. According to the 2003 Final Combination Permit, this landfill accepts Class I and II waste, including all hazardous waste except radioactive, medical, and unexploded ordnance. A comprehensive list of all hazardous waste accepted is included in Appendix A of the Kettleman Hills Landfill Part B permit. Based on this list, the landfill would accept all anticipated hazardous waste generated by the WRESC (DTSC 2023b). A total of 17 landfill units and 16 surface impoundments are currently operational. The Kettleman Hills facility currently has three operational landfills:
  - B-17 is permitted to have a 17.8 million cubic yard capacity as Class II/III landfill.
  - B-18 is permitted to have a 15.6 million cubic yard capacity as a Class I/II landfill.
  - B-19 is permitted to have 7.7 million cubic yard capacity classified as a Class II/III landfill.

  According to a 2021 Statement of Qualifications for Kettleman Hills Landfill, 14.5 million cubic yards is available at B-17, 3.45 million cubic yards is available at B-18, and 375,000 cubic yards is available at B-19 (Verdin 2021). A permit renewal for the facility is currently being reviewed by the DTSC, and the landfill is expected to have an updated closure date of January 2055.
- **Clean Harbors Buttonwillow Landfill.** This landfill is permitted for 13.25 million cubic yards and can accept 10,500 tons per day (CalRecycle 2023a). The landfill is permitted to accept waste until 2040 (CalRecycle

2023a). Buttonwillow has been permitted to manage a wide range of hazardous wastes, including Resource Conservation and Recovery Act (RCRA) hazardous wastes, California hazardous waste, and nonhazardous waste for stabilization treatment, solidification, and landfill. The landfill can handle waste in bulk (solids and liquids) and in containers. Typical waste streams include nonhazardous soil, California hazardous soil, hazardous soil for direct landfill, hazardous waste for treatment of metals, plating waste, hazardous and nonhazardous liquid, and debris for microencapsulation (CalRecycle 2023a).

5.14.2.4 Waste Disposal Summary

The WRESC will generate nonhazardous and hazardous waste during its construction, facility start up, testing, and operation. Multiple locations will accept the anticipated waste streams generated by the WRESC facility. The solid waste Class III landfills listed in **Table 5.14-3** have a collective remaining capacity of over 83,000,000 cubic yards. Similarly, waste disposal needs for permitted hazardous waste and soil/bedrock are within the thresholds that accepting facilities can accommodate without altering or impacting their structure. Waste generated during construction and operation of the WRESC is not expected to generate quantities of waste such that the surrounding accepting facilities cannot accommodate the additional materials. Therefore, the impact of the Project on solid waste recycling, disposal capacity, and hazardous waste capacity will not be significant.

5.14.3 Cumulative Effects

Section 15355 of the CEQA Guidelines defines “cumulative impacts” as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.” Subsection b of Section 15355 states, in part, that “The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects.” Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an EIR Environmental Impact Report is required to discuss cumulative impacts when the project’s incremental effect is “cumulatively considerable.” Section 15065(a)(3) then defines “cumulatively considerable” as meaning “that the incremental effects of an individual project are significant when viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects.”

According to CalRecycle (2023b), approximately 1,560,746 tons of waste was landfilled within Kern County in 2019. This number represents waste that is landfilled specifically—not recycled, transformed, or exported for outside disposal, or total waste generation for the county. Prior to disposal, source reduction and recycling efforts will be prioritized in operation of the WRESC, as discussed in Section 5.14.4. In the worst-case scenario, if no waste can be recycled, transformed, or disposed of by other means, it is estimated that 16.4 tons of nonhazardous solid waste can be landfilled per year during operation, which would only represent approximately 0.00001 percent of Kern County’s total waste landfilled. Likewise, it is estimated that 6,800 tons of non-rock solid waste will be generated during construction and will only represent approximately 0.004 percent of Kern County’s total waste landfilled. All nonhazardous and hazardous landfills within the general vicinity have sufficient landfill capacity. Therefore, anticipated waste generated by the WRESC will not result in a direct or indirect minor cumulative waste management impact on Kern County.

5.14.4 Best Practices, Project Design Features, and Mitigation Measures

This section discusses methods for managing nonhazardous and hazardous waste generated by the WRESC. The removal of all recycled and waste streams will be managed to minimize traffic impacts, inventory on site, impact of odor, and rodent/pest infestation. The WRESC will adhere to the following hierarchical approach for both nonhazardous and hazardous waste management:

1) **Source Reduction:** Reducing quantity of waste generated is one of the first approaches to managing waste. This could be accomplished by adopting pollution prevention methods and high-efficiency cleaning methods for all tasks conducted at the WRESC.
2) **Recycling:** If waste cannot be reduced, recycling options will be explored. Where applicable, wastes will be sent to facilities for recycling, neutralization, or reconditioning.
3) **Offsite Disposal:** If source reduction or recycling options are not available, offsite disposal will be used.

5.14.4.1 Construction Phase Mitigation Measures

Requirements and mitigation measures for handling waste generated during the construction phase are presented below. Waste streams for nonhazardous and hazardous wastes generated at the WRESC facility during construction are presented in Section 5.14.1.2.1

5.14.4.1.1 Nonhazardous Wastes Mitigation Measures

Prior to construction, best management practices to reduce waste production will be developed. The following mitigations measures have been identified:

- Nonhazardous Solid Waste: Nonhazardous wastes such as concrete, metal, and paper, wood, glass insulation and plastics, will be collected onsite in collection bins to limit pollution and pest infestation prior to recycling or disposal offsite. Where applicable, waste will be recycled at licensed facilities or sent back to the vendor for reconditioning. Product streams that cannot be recycled will be taken to a Class I, II or III landfill as discussed in Section 5.14.2.3.1.
- Soil and Bedrock: Soil and bedrock from excavation activities to create the berm, reservoir, stormwater retention ponds and cavern with associated shafts will temporarily be placed on site and recycled on site for Project leveling and grading activities. Prior to disposal, it will be bulk tested and categorized accordingly. Based on the results of the Phase I ESA, WRESC anticipates that the quality of the excavated soil will be nonhazardous. For excavation material that cannot be used on site or recycled, aggregate quality excavation waste will be hauled offsite as discussed in Section 5.14.2.3.1.
- Wastewater: Wastewater generated during construction will include sanitary waste and hydrotest water. Excavation wastewater and stormwater would also fall into this category. Depending on water quality, wastewater could be considered nonhazardous or hazardous. Prior to disposal, wastewater will be collected in bulk tanks or bins and sampled, then classified and disposed of in accordance with appropriate legislation. Sampling and analysis of materials and waste for identification purposes shall be performed in accordance with the applicable U.S. Environmental Protection Agency (U.S. EPA) test method. Hazardous wastewater mitigation is discussed in Section 5.14.4.1.2. The Applicant will manage the following categories of nonhazardous wastewater as described:
  - **Sanitary Waste:** Portable toilets will be housed onsite during the construction phase. Sanitary wastewater from portable toilets will be collected in the self-contained toilets. The vendor of the portable toilets will be responsible for proper handling and transporting portable toilets offsite for disposal.
  - **Excavation Wastewater:** Groundwater for shaft and cavern drilling will be recycled through an aboveground settling pond to allow settlement of solids. Once settled, water from the settling pond will be re-used for the drilling process to the extent possible or left to evaporate. All excess wastewater that cannot be evaporated will be disposed offsite by a licensed third-party contractor. Prior to disposal, excavation wastewater will be tested for chemical constituents and characteristics.
  - **Stormwater:** Prior to the start of construction, a stormwater management permit will be obtained to outline best management practices for managing stormwater. Additional details regarding stormwater management and mitigation measures are outlined in Section 5.15 Water Resources.
  - **Nonhazardous Wastewater:** All other wastewater generated will be managed by source reduction techniques, water conservation, and reuse measures.

5.14.4.1.2 Hazardous Wastes Management Practices and Mitigation Measures

As mentioned previously, prior to disposal, wastewater will be tested with the applicable U.S. EPA method to determine chemical constituents and characteristics. If wastewater is determined to be hazardous, it will be disposed of in accordance with the Clean Water Act and RCRA. Hazardous solid waste or wastewater will be placed in certified U.S. Department of Transportation (USDOT) containers and disposed of offsite at a permitted and accepting facility.

The following waste management practices will be adopted:

- Nonhazardous materials will be used whenever possible to minimize the quantity of hazardous waste generated.
- Hazardous waste will be collected in satellite accumulation containers near the points of generation.
- Before the end of each workday, hazardous waste deposited in satellite accumulation containers will be moved to a designated central accumulation area located onsite.
- All hazardous waste will be contained in certified USDOT containers and labeled appropriately.
- The waste will be delivered to an authorized hazardous waste management facility before expiration of the 90-day storage limit.
- The construction contractor will be the generator of hazardous construction waste and will be responsible for proper handling in compliance with all applicable federal, state, and local laws and regulations. The construction contractor will be responsible for licensing, training of personnel, meeting waste accumulation limits and times, and record keeping.
- **Energetic Waste.** According to the U.S. EPA, energetic waste includes wastes that have potential to denotate and bulk military propellants that cannot safely be disposed of through other modes of treatment and can include explosives, munitions, consumer and commercial fireworks, signal flares, hobby rocket propellants, and automobile airbag propellants (U.S. EPA 2023). The safe storage and transport of energetic wastes will be conducted in accordance with the Military Munitions Rule found in Title 40 CFR Part 266, Subpart M.

5.14.4.2 Operation Phase Management Practices and Mitigation Measures

Mitigation measures and requirements for handling hazardous waste during operation are described in the following sections. Section 5.14.1.2.2 presents waste streams for nonhazardous and hazardous wastes generated from the WRESC's operations.

5.14.4.2.1 Nonhazardous Waste Management Practices and Mitigation Measures

The following management practices and mitigation measures for waste streams generated during operations have been identified:

- Nonhazardous Solid Waste: Nonhazardous solid waste will be collected and processed for potential material recycling. All waste that cannot be recycled will be deposited at a local landfill.
- Wastewater: Wastewater generated during operation will include portable water use, stormwater, and equipment washing. Other occasional wastewater streams, such as small equipment leaks, will occur. Depending on water quality, wastewater could be considered nonhazardous or hazardous. Prior to disposal, wastewater will be collected in bulk tanks or bins and sampled, then classified and disposed of in accordance with appropriate legislation. Sampling and analysis of materials and waste for identification purposes shall be in accordance with the applicable U.S. EPA test method. Hazardous wastewater mitigation is discussed in Section 5.14.5.2.2. The Applicant will manage the following categories of nonhazardous wastewater as described below:
- **Sanitary:** Wastewater from portable use will be collected in a septic tank. Sanitary discharges will be hauled offsite by an approved waste hauler.
- **Stormwater:** As discussed in Section 5.15, Water Resources, the WRESC site will be developed so that no industrial stormwater is discharged offsite. All treatment systems, with the exception of the cooling and thermal management system loops, will be indoors and will not likely be point sources for stormwater runoff. Outside, industrial stormwater will be collected by perimeter culverts and directed to the onsite retention ponds to be retained for future site use or evaporated.
- **Industrial Water:** Wastewater generated from washing activities will be processed through an oil/water separator and collected in holding tanks, one for each compression train. Once full, a licensed third-party vendor will be responsible for transportation and water disposal at a permitted facility. The WRESC facility will not have a practice of washing down any equipment with oily residues. Equipment that has oily residues will be cleaned with rags and sorbents. After the cleaning, the oily rags and sorbents will be properly stored,

manifested, and disposed of by licensed disposal companies in the regulatory-required time frames. Wastewater from reverse osmosis backwash system will be in the form of a brine and will be discharged into the evaporation pond, where it will be evaporated.

- **Occasional wastewater streams:** Wastewater (or other wastes) from occasional small equipment leaks within the building will be retained in the building and collected for testing and disposal.

5.14.4.2.2 Hazardous Waste Best Practices and Mitigation Measures

To avoid potential effects on human health and the environment from handling and disposing of hazardous wastes, approved disposal procedures will be followed, including proper recording, labeling, storage, and packaging. The Applicant estimates that the WRESC will not generate hazardous wastes (including RCRA and non-RCRA wastes) in excess of 1,000 kilograms per month. As such, the WRESC will be considered a small quantity generator of hazardous waste (SQG), as defined in part 261 of title 40 of the Code of Federal Regulations and Title 22 California Code of Regulations Section 66260.10. An SQG is subject to the requirements of parts 124, 262 through 268, and 270 and the corresponding California Code of Regulations for these parts. The following will apply to the WRESC facility:

- The Applicant will obtain a site-specific U.S EPA identification number that will be used to manifest all hazardous waste originating from WRESC. All hazardous waste will be stored on site within proper containers. Waste generated will be stored on site for 180 days or less and will be transported to a facility for disposal, treatment, or recycling.
- Hazardous wastes will be accumulated at the generating facility according to the Title 22 California Code of Regulations requirements for satellite accumulation.
- Hazardous waste will be stored in designated storage areas surrounded by berms to contain leaks or spills. The bermed areas will be sized to hold the full contents of the largest single container. If outdoors and not roofed, the bermed areas will be sized with additional volume for the rainfall associated with a 25-year, 24-hour storm event. If indoors, the containment shall be sized with an additional volume equivalent to 20 minutes of the design flow of any fire protection water. These areas will be inspected weekly.
- For each disposal, hazardous waste will be collected by a licensed hazardous waste hauler using a hazardous waste manifest. Wastes will only be transported to a permitted and authorized waste management facility. Copies of manifests, reports, waste analyses and other documents will be maintained on site and readily accessible for inspections.
- Employees will be trained in hazardous waste procedures, spill contingencies, and waste minimization. Appropriate USDOT training will be provided to employees, who will sign hazardous waste manifests.
- Procedures will be developed to reduce the quantity of hazardous waste generated. Nonhazardous materials will be used instead of hazardous materials whenever practical, and wastes will be recycled whenever practical.
- Specifically, hazardous waste handling will include the following practices to minimize quantity:
- Spent oil filters will be drained and managed as scrap metal. Oily rags will not be laundered and will be sent offsite for disposal.

5.14.4.3 Facility Closure

Facility closure includes temporary or permanent closure that could occur for a variety of reasons. Temporary closure is considered any period of closure longer than the time required for normal maintenance, including overhaul or replacement of small system equipment. Causes for temporary closure may include disruption of off-peak power lines; flooding of a site; damage to a site from natural disasters, such as earthquakes, floods, or storms; labor disruptions; and other traditional force majeure events. Permanent closure is characterized as a complete cessation of operations with no intention of restarting operations. Permanent closure could be caused by damage to a plant beyond repair, economic conditions, or other unforeseen reasons. Handling of facility temporary and permanent closure for the WRESC are outline below.

5.14.4.3.1 Temporary Closure

If a release of hazardous materials does occur prior to or during a temporary closure, the WRESC will maintain facility security and electronic monitoring of key components on a 24-hour basis. Furthermore, WRESC personnel will notify the California Energy Commission Compliance Manager in accordance with the facility's reporting requirements. Depending on the length of shutdown necessary, as part of the best practices program that will be implemented, procedures will be developed for the orderly shutdown and lay up of the facility. The Temporary Closure Plan, discussed more in Section 2.3 Facility Closure, of Chapter 2, Project Description will be prepared to ensure conformance with all applicable LORS and the protection of public health and safety and the environment.

The Temporary Closure Plan, depending on the expected duration of the shutdown, could include draining all chemicals from storage tanks and other equipment, and implementing the safe shutdown of all equipment. All wastes will be disposed of according to applicable LORS, as discussed in Section 5.14.5 of Section 5.14, Waste Management.

If a temporary closure is in response to a facility upset, including, but not limited to, damage, and where there is a release or threatened release of regulated substances or other hazardous materials into the environment, procedures will be followed as set forth in the facility's Hazardous Materials Business Plan (HMBP) and Emergency Action Plan (EAP).

To minimize impacts on the facility personnel, environment, and surrounding communities, the HMBP and EAP will outline risk mitigation strategies, identified through a risk and hazard operability assessment. The HMBP and EAP will include methods to control releases, set forth procedures for notifying applicable authorities, and identify critical response equipment, training, and investigation requirements. Applicable training records for emergency events responding to and controlling releases of hazardous materials will also be included.

Once an immediate problem involving hazardous waste is contained, temporary closure will proceed. Systems and operations will recommence only after the immediate emergency has been safely handled, investigation and root cause analysis has been conducted, and working conditions are within U.S. Occupational Safety and Health Administration (OSHA) and California OSHA standards. In all cases, the appropriate level of insurance will be maintained for the WRESC.

5.14.4.3.2 Permanent Closure

The lifespan of WRESC is anticipated to be at least 50 years. When the facility is permanently closed, nonhazardous waste and hazardous waste materials will be removed from the site as part of the general closure plan.

All equipment will be depressurized, shut down, and isolated to protect public health and safety and the environment. The cavern will be isolated and deadheaded, and it is anticipated that the rain collection systems will be re-piped and the reservoirs drained and decommissioned.

The closure plan will attempt to maximize recycling of facility components through the decommissioning of all critical equipment - specifically, through the draining of all systems, including, but not limited to, chemical storage tanks, oil reservoirs, transformer oils, hot water, cooling water, and septic systems. All underground tanks, if any, will be drained, capped, or removed in accordance with regulatory requirements.

All nonhazardous wastes will be collected and disposed of in appropriate landfills or waste collection facilities. All hazardous wastes will be disposed of according to applicable LORS. The site will be secured 24 hours per day during decommissioning.

5.14.4.3.3 Monitoring

Because the environmental impacts caused by construction and operation of the facility are expected to be minimal, extensive monitoring programs for hazardous wastes will not be required. Generated waste, both hazardous and nonhazardous, will be monitored during construction and operation of the WRESC, in accordance with the monitoring and reporting requirements mandated by the Project's regulatory permits.

5.14.5 Laws, Ordinances, Regulations, and Standards

Hazardous and nonhazardous waste handling at the WRESC will be governed by federal, state, and local laws. Applicable laws and regulations address proper waste handling, storage, and disposal practices to protect the environment from contamination and to protect facility workers and the surrounding community from exposure to nonhazardous and hazardous waste. **Table 5.14-5** summarizes the LORS applicable to waste handling at the WRESC.

Table 5.14-5: Laws, Ordinances, Regulations, and Standards for Waste Management

Laws, Ordinances, Regulations and Standards	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Federal			
RCRA Subtitle D	*Regulates design and operation of nonhazardous solid waste landfills. WRESC solid waste will be collected and disposed of by a collection company in conformance with Subtitle D.*	*CalRecycle*	*Sections 5.14.5.1, 5.14.4.1, 5.14.4.2.1, 5.14.1.2.2*
RCRA Subtitle C	*Controls storage, treatment, and disposal of hazardous waste. WRESC hazardous waste will be handled by contractors in conformance with Subtitle C.*	*DTSC*	*Sections 5.14.5.1, 5.14.4.1, 5.14.4.2.2, 5.14.1.2.2*
Clean Water Act	*Controls discharge of wastewater to the surface waters of the United States.*	*RWQCB*	*Sections 5.14.5.1, 5.14.4.1.1, 5.14.4.2.1*
RCRA Military Munitions Rule 40 CFR Part 266, Subpart M	*Safe storage and transport of energetic hazardous waste is covered under RCRA.*	*U.S. EPA*	*Section 5.14.4.1.2*
Transportation/Transporter 49 CFR	*Regulates all forms of surface transportation and transportation security, including transporting hazardous wastes using the manifest system and the use of USDOT-certified containers for storing hazardous wastes onsite.*	*USDOT*	*Sections 5.14.4.1.1 and 5.14.4.2.2; Section 5.12*
State			
California Integrated Waste Management Act (CIWMA)	*Controls solid waste collectors, recyclers, and depositors. WRESC solid waste will be collected and disposed of by a collection company, in conformance with the CIWMA.*	*CalRecycle*	*Sections 5.14.5.2, 5.14.4.1, 5 14.4.2.1, 5.14.1.2.2*
Assembly Bill 341 / State Bill 1018 — Mandatory Commercial Recycling	*Requires commercial businesses generating 4 cubic yards per week or more of solid waste to adopt recycling practices.*	*CalRecycle*	*Sections 5.14.1.2,5.14.2.3, 5.14.3, 5.14.4.1, 5.14.4.2, 5.14.4.3*
California Hazardous Waste Control Law (HWCL)	*California's HWCL is the equivalent of federal RCRA laws. California's HWCL regulates storage, treatment, and disposal of hazardous waste in California. WRESC hazardous waste will be handled by contractors in conformance with the HWCL.*	*DTSC*	*Sections 5.14.5.2, 5.14.4.1, 5 14.4.2.2, 5.14.1.2.2*

Laws, Ordinances, Regulations and Standards	Requirements/Applicability	Administering Agency	Application for Certification Section Explaining Conformance
Local			
Kern County General Plan — Policies for Transportation of Hazardous Materials	*The commercial transportation of hazardous material, and identification and designation of appropriate shipping routes, will be performed in conformance with the adopted Kern County and Incorporated Cities Hazardous Waste Management Plan. Kern County and affected cities should reduce use of county-maintained roads and city-maintained streets for transportation of hazardous materials.*	*Kern County Public Health Services Department – Environmental Health Services Division*	*5.14.5.3.1 and Section 5.12 Traffic Management*
Kern County Public Health Services – Environmental Health Services Department, Hazardous Materials Program—CUPA and various programs	*Kern County Public Health Services Department – Environmental Health Services Division is the CUPA for Kern County that regulates and conducts inspections of businesses that handle hazardous materials, hazardous wastes and/or have underground storage tanks. GEM will comply with Kern County's Hazardous Materials Program requirements concerning storage and handling of hazardous materials and wastes and will also cooperate with the agency on resolution of any environmental issues at the site.*	*Kern County Public Health Services Department – Environmental Health Services Division*	*Sections 5.14.6, 5.14.7*

CalRecycle = California Department of Resources Recycling and Recovery; CFR = Code of Federal Regulations; CIWMA = California Integrated Waste Management Act; CUPA = Certified Unified Program Agency; DTSC = Department of Toxic Substances Control; HWCL = California Hazardous Waste Control Law; RCRA = Resource Conservation and Recovery Act; RWQCB = Regional Water Quality Control Board; USDOT = U.S. Department of Transportation; U.S. EPA = U.S. Environmental Protection Agency; WRESC = Willow Rock Energy Storage Center

5.14.5.1 Federal Laws, Ordinances, Regulations, and Standards

There are five federal mandates that apply to WRESC for proper waste handling, storage, and disposal practices, described below:

- **Nonhazardous Solid Waste:** Federal involvement is limited to establishing minimum criteria that prescribe the best practicable controls and monitoring requirements for solid waste disposal facilities. RCRA 42 United States Code (USC) 6901 Subtitle D assigns responsibility for the regulation of nonhazardous waste to the states.
- **Hazardous Waste:** RCRA 42 USC 6901 Subtitle C establishes a "cradle to grave" system of hazardous waste management by instituting controls for generation, transportation, treatment, storage, and disposal of hazardous waste. Above certain levels of waste produced, Subtitle C applies to all states and all hazardous waste generators. RCRA also establishes waste regulations for energetic wastes (explosives) in 40 CFR Part 266, Subpart M.
- **Wastewater:** The U.S. EPA regulates wastewater under the Federal Water Pollution Control Act (Clean Water Act), amended in 1972.
- **Military Munitions:** The U.S. EPA regulates the safe storage and transport of energetic hazardous waste and is covered under RCRA Subtitle C.
- **Transportation:** The USDOT regulates the transportation of hazardous materials and hazardous waste, and the regulations found in 49 CFR include requirements for handlers and shippers of hazardous wastes (see also Section 5.12).

5.14.5.2 State Laws, Ordinances, Regulations, and Statutes

There are three state mandates that apply to the WRESC facility for proper waste handling, storage, and disposal practices.

- **Nonhazardous Solid Waste.** The California Integrated Waste Management Act (CIWMA), found in Public Resources Code Sections 40000 et seq, regulates a statewide system of solid waste management. It coordinates state and local efforts in source reduction, recycling, and land disposal safety. Counties are required to submit Integrated Waste Management Plans to the state. The CIWMA also explicitly states that hazardous waste will not be disposed of along with solid waste. The WRESC facility's solid waste will be collected by a company in conformance with the CIWMA. If the WRESC generates 4 cubic yards or more of commercial solid waste per week, then Assembly Bill 841 / State Bill 1018 requires a recycling program. The Applicant will seek opportunities provided by the franchised waste hauler and disposal companies to divert as much waste as possible from landfills and recycle the materials instead.
- **Hazardous Waste.** Within the Health and Safety Code Section 25100 et seq, California outlined the HWCL to develop its own hazardous waste materials management program. The HWCL includes RCRA mandates instituted in Subtitle C and D and performs essentially the same functions. The HWCL is more stringent than RCRA guidelines and classifies additional materials and liquids as hazardous. The WRESC will adhere to the storage, record keeping, reporting, and training requirements mandated by HWCL. Additionally, the storage, use, and management of waste flammable/combustible liquids will be performed in accordance with the California Fire Code.
- **Wastewater.** Under the Porter-Cologne Water Quality Control Act, the Regional Water Quality Control Boards regulate wastewater management. This act focuses on controlling discharge to surface and groundwaters of California.

5.14.5.3 Local Laws, Ordinances, Rules, and Standards

Local agency requirements will be identified before the construction and operation of the Willow Rock facility, which will conform to all local requirements. The Willow Rock site is located within the jurisdiction of the Kern County General Plan and the Willow Springs Specific Plan.

5.14.5.3.1 Kern County General Plan

Solid Nonhazardous Waste: Kern County has laws regarding solid nonhazardous waste as indicated by the Kern County Public Works Department, Waste and Recycling Division (KCPW 2023).

Hazardous Waste: GEM will comply with the Hazardous Materials Program administered by Kern County Public Health Services, Environmental Health Division. Gem will comply with Kern County's Hazardous Materials Program requirements concerning storage and handling of hazardous materials and wastes and will also cooperate with the agency to resolve any environmental issues at the site (KCEHD 2023). As stated above, ministerial permits for aboveground storage tanks, as well as other storage containers, will be obtained from the Kern County Fire Prevention Office. The Kern County General Plan has specific goals to reduce risk to public health from transportation of hazardous materials (KCPD 2009). The commercial transportation of hazardous material, and identification and designation of appropriate shipping routes, will be performed in conformance with the adopted Kern County and Incorporated Cities Hazardous Waste Management Plan. Kern County and affected cities should reduce use of county-maintained roads and city-maintained streets for transportation of hazardous materials. Roads and highways utilized for commercial shipping of hazardous waste destined for disposal will be designated as such pursuant to Vehicle Code Sections 31303 et seq. Permit applications shall identify commercial shipping routes an applicant proposes to utilize for particular waste streams (KCPD 2009).

For emergency spills, the closest fire station to the WRESC site is Kern County Fire Station No. 15, located at 3219 35th Street W in Rosamond, California. The fire station is 8.1 miles southwest of the site and will provide first response to fire at the site.

5.14.5.3.2 The Willow Springs Site-Specific Plan

The Willow Springs Site-Specific Plan Safety Element Chapter has outlined general safety goals to protect human life and health and promote a safe and healthful living environment. Policy 12, mitigation measure 24 includes source control mitigation measures to prevent stormwater pollution (wastewater runoff). For facilities handling or storing hazardous or toxic chemicals, control surveys for all industrial facilities are required in order to determine point sources of stormwater pollution.

5.14.5.4 Codes

Design, engineering, and construction of hazardous waste storage and handling systems will be done in accordance with all applicable codes and standards, as follows:

- California Building Code
- California Fire Code
- Kern County Fire Code

5.14.6 Agencies and Agency Contacts

Federal and some state-level agencies discussed in this section will all be involved in the regulation of waste generated by the Willow Rock Project. However, the regulations are administered and enforced primarily by CalEPA's designated Certified Unified Program Agency, which for this project is the Kern County Environmental Health Services Department (CalEPA 2023b). Agency contact information for nonhazardous and hazardous waste management is presented in **Table 5.14-6**.

Table 5.14-6: Agency Contacts for Waste Management

Issue	Agency
Solid Waste and Recycling	*Kern County Public Works* *Waste Management Division* *2700 M Street, Suite 400* *Bakersfield, CA 93301*
Hazardous Waste	*Kern County Public Health Services* *Environmental Health Division – Hazardous Materials Program* *2700 M Street, Suite 300* *Bakersfield, CA 93301*

5.14.7 Permits and Permit Schedule

The WRESC facility will be required to obtain the following permits/registrations:

- A U.S. EPA Identification number as a generator of hazardous waste.
- A facility identification number in the California Environmental Reporting System as a hazardous materials handler and hazardous waste generator. The facility's HMBP will be submitted to the Kern County Environmental Health Services Department, as described in Section 5.5, Hazardous Materials.

5.14.8 References

California Environmental Protection Agency (CalEPA). 2023a. Cortese List Data Resources. Available at: https://calepa.ca.gov/sitecleanup/corteselist/. Accessed September 14, 2023.

California Environmental Protection Agency (CalEPA). 2023b. Unified Program Regulator Directory. Available at: https://cersapps.calepa.ca.gov/public/directory/. Accessed September 14, 2023.

California Department of Resources Recycling and Recovery (CalRecycle). 2023a. 2015 Landfill Summary Tonnage Report. Available at: https://www2.calrecycle.ca.gov/LandfillTipFees. Accessed J September 14, 2023.

California Department of Resources Recycling and Recovery (CalRecycle). 2023b. Solid Waste Information System (SWIS) Database, Ventura County. Available at: https://www2.calrecycle.ca.gov/SolidWaste/Site/Search. Accessed September 14, 2023.

California Department of Toxic Substances Control (DTSC). 2023a. California Commercial Offsite Hazardous Waste Permitted Facilities. Available at: http://www.envirostor.dtsc.ca.gov/public/commercial_offsite.asp. Accessed September 14, 2023.

California Department of Toxic Substances Control (DTSC). 2023b. EnviroStor – Chemical Waste Management Inc Kettleman. Available at: https://www.envirostor.dtsc.ca.gov/public/hwmp_profile_report?global_id=CAT000646117. Accessed September 14, 2023.

Environmental Protection Agency. 2023. Energetic Hazardous Wastes. Available at: https://www.epa.gov/hwpermitting/energetic-hazardous-wastes. Accessed September 14, 2023.

Hydrostor 2024. E-Mail Record. February 9, 2024.

Kern County Planning and Natural Resources Department (KCPD). 2009. Kern County General Plan. Available at: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_Complete.pdf. Accessed September 14, 2023.

Kern County Public Works (KCPW). 2023. Disposal Sites. Available at: https://kernpublicworks.com/waste-management/disposal-sites/. Accessed September 14, 2023.

Kern County Public Health Services, Environmental Health Division – Hazardous Waste Program (KCEHD). 2023. Hazardous Materials Business Plan/California Environmental Reporting System (CERS). Available at: https://kernpublichealth.com/hazardous-materials-business-plan-california-environmental-reporting-system-cers/. Accessed September 14, 2023.

U.S. Environmental Protection Agency (U.S. EPA). 2023. Energetic Hazardous Wastes. Available at: https://www.epa.gov/hwpermitting/energetic-hazardous-wastes. Accessed September 14, 2023.

Verdin, Reyna. Chemical Waste Management Kettleman Hills Facility. July 20, 2021. Personal communication, email to Reyna Verdin (Environmental Protection Manager at Kettleman Hills Facility) requesting Statement of Qualifications.

WSP USA (WSP). 2023. Zevsar Phase I Environmental Site Assessment. APN 431-022-13. Rosamond, Kern County, California. August 4, 2023.

5.15 Water Resources

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California (Assessor's Parcel Number 431-022-13). The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH.

This section discusses the existing water resources near the WRESC, assesses the potential effects of construction and operations on water resources, and provides mitigation strategies to address the potential effects. Chapter 2, Project Description of this Supplemental Application for Certification provides the overall description of the Project.

The final site boundary and potential construction laydown areas will depend on whether the facility will include onsite re-use of excavated cavern rock in an architectural berm on the west and north sides of the facility. Figure 2-1 and Figure 2-2 in Chapter 2 show the WRESC Site and potential construction laydown areas with and without the architectural berm option.

This section discusses the potential effects related to the following areas:

- Water supply
- Wastewater management
- Stormwater discharge
- Flooding

Section 5.15.1 discusses the existing hydrologic environment. Section 5.15.2 presents the potential environmental effects of the WRESC construction and operation on water resources. Section 5.15.3 discusses cumulative Project effects. Section 5.15.4 discusses proposed mitigation measures that will prevent significant impacts. Section 5.15.5 presents applicable laws, ordinances, regulations, and standards (LORS) related to water resources. Section 5.15.6 describes permits that relate to water resources, lists contacts with relevant regulatory agencies, and presents a schedule for obtaining permits. Section 5.15.7 provides the references used to prepare this subsection.

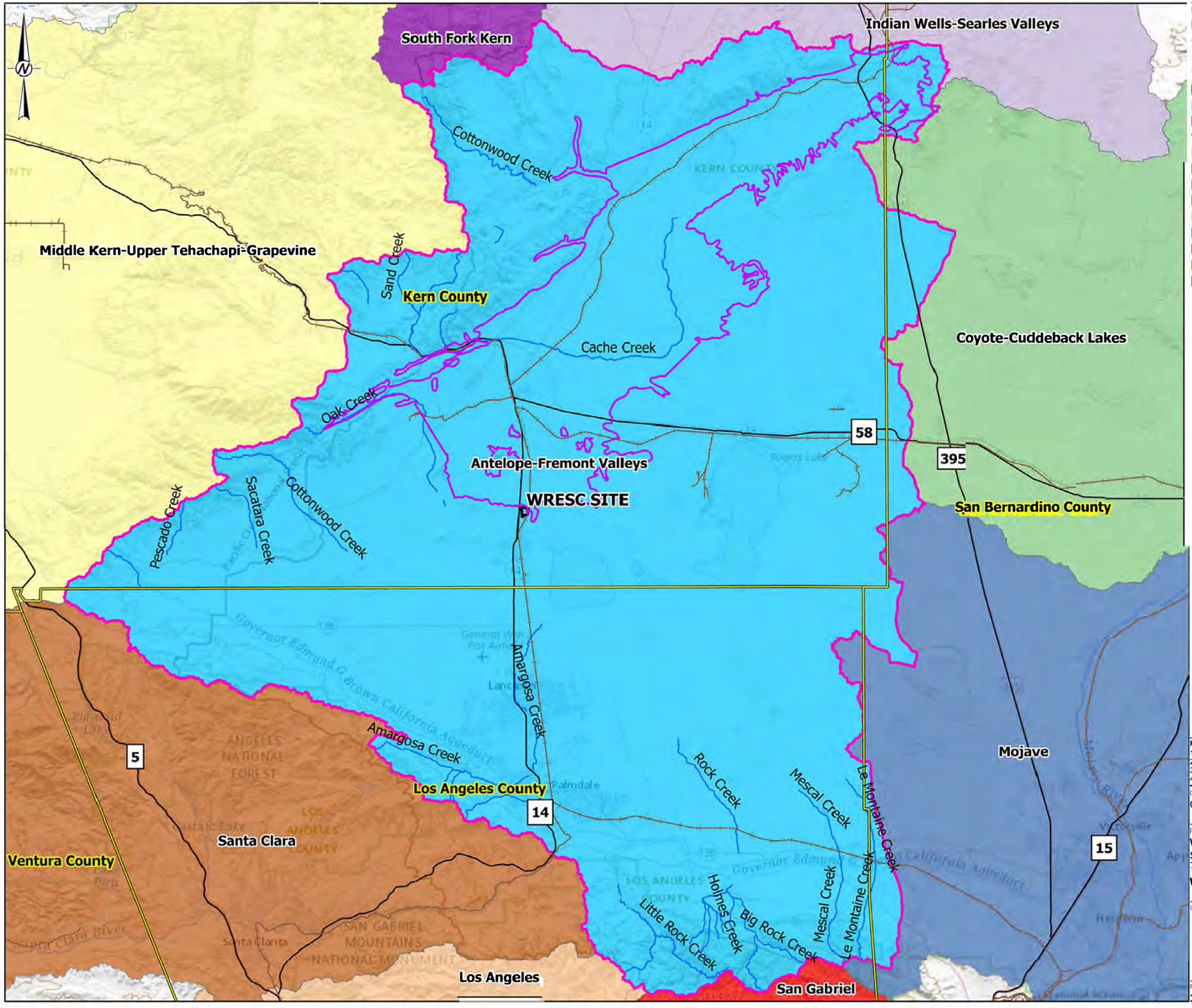
5.15.1 Affected Environment

This subsection discusses the water features, groundwater, water quality, and water demand and supply for the WRESC.

5.15.1.1 Water Features, Climate, and Drainage

The Project parcel is at an elevation of approximately 2,540 to 2,600 feet above mean sea level (amsl) and slopes to the southeast (United States Geological Survey (USGS) Soledad Mountain Quadrangle, California – Kern County 7.5-minute Series). The WRESC Site is within the Mojave Desert geomorphic province of California (CGS 2002). The Mojave Desert province is a broad region of isolated mountain ranges that is separated by desert plains. The western edge of this geomorphic province is wedged between the Garlock Fault and the San Andreas Fault. The WRESC Site is located within the Gloster subwatershed of the Antelope Valley Watershed, which is

part of the larger Antelope-Fremont Valleys watershed **(Figure 5.15-1**). The Antelope-Fremont Valleys watershed (Hydrologic Unit Code 18090206) is a closed basin with no discharge to the Pacific Ocean. Runoff from storm events primarily feed ephemeral streams that discharge to dry lake beds or playas, where it either infiltrates or evaporates. The closest streams to the WRESC Site are Oak Creek located approximately 9 miles to the west and Cache Creek located approximately 13 miles to the north. Surface water does not provide a direct drinking water source within the Gloster subwatershed.



LEGEND

- PROJECT BOUNDARY
- CREEK
- RAILROAD
- HIGHWAY
- US COUNTIES
- FREEMONT BASIN IRWM REGION
- FREMONT VALLEY GROUNDWATER SUBBASIN

WATERSHEDS

- ANTELOPE-FREMONT VALLEYS
- COYOTE-CUDDEBACK LAKES
- INDIAN WELLS-SEARLES VALLEYS
- LOS ANGELES
- MIDDLE KERN-UPPER TEHACHAPI-GRAPEVINE
- MOJAVE
- SAN GABRIEL
- SANTA CLARA
- SOUTH FORK KERN

1:506,880

0 4 8 16 Miles

REFERENCE(S)

1. BASEMAP - ESRI PROVIDED BASEMAP SERVICE.
2. HIGHWAYS AND RAILROADS - US CENSUS DATA
3. CREEK - NATIONAL HYDROLOGY DATASET, 2024.
4. WATERSHEDS - NATIONAL HYDROLOGY DATASET, 2024.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
WATERSHED LOCATION MAP

CONSULTANT
wsp

YYYY-MM-DD	2024-01-25
DESIGNED	JAM
PREPARED	JAM
REVIEWED	SCH
APPROVED	VG/LL

PROJECT NO.
31406639.003

FIGURE
5.15-1

The climate of the regional area is predominantly semiarid and is characterized by a warm-dry climate. The average annual precipitation is approximately 7 inches (Western Regional Climate Center Mojave Station 2023). Most of the annual precipitation occurs from November through April. The mean summer temperature is 78 degrees Fahrenheit (°F) and mean daily summer temperatures range from 63°F to 93°F. The mean winter temperature is 45°F and mean daily winter temperatures range from 34°F to 57°F.

5.15.1.2 Groundwater

The WRESC Site is within the southern portion of the Fremont Valley Groundwater Basin (FVGB) (**Figure 5.15-2**). The FVGB is designated Basin Number 6-46 and covers a surface area of approximately 523 square miles primarily in Kern County (California Department of Water Resources 2004). The FVGB is in the high desert at an elevation of 2,300 to 4,000 feet amsl with the lowest elevation of about 1,880 feet amsl at the Koehn Lakebed. The FVGB is bounded on the northwest by the El Paso Mountains and the Sierra Nevada Mountains; on the east by crystalline rocks of the Summit Range, Red Mountains, Castle Butte, Bissell Hills, and Rosamond Hills; and on the southwest by the Antelope Valley Groundwater Basin.

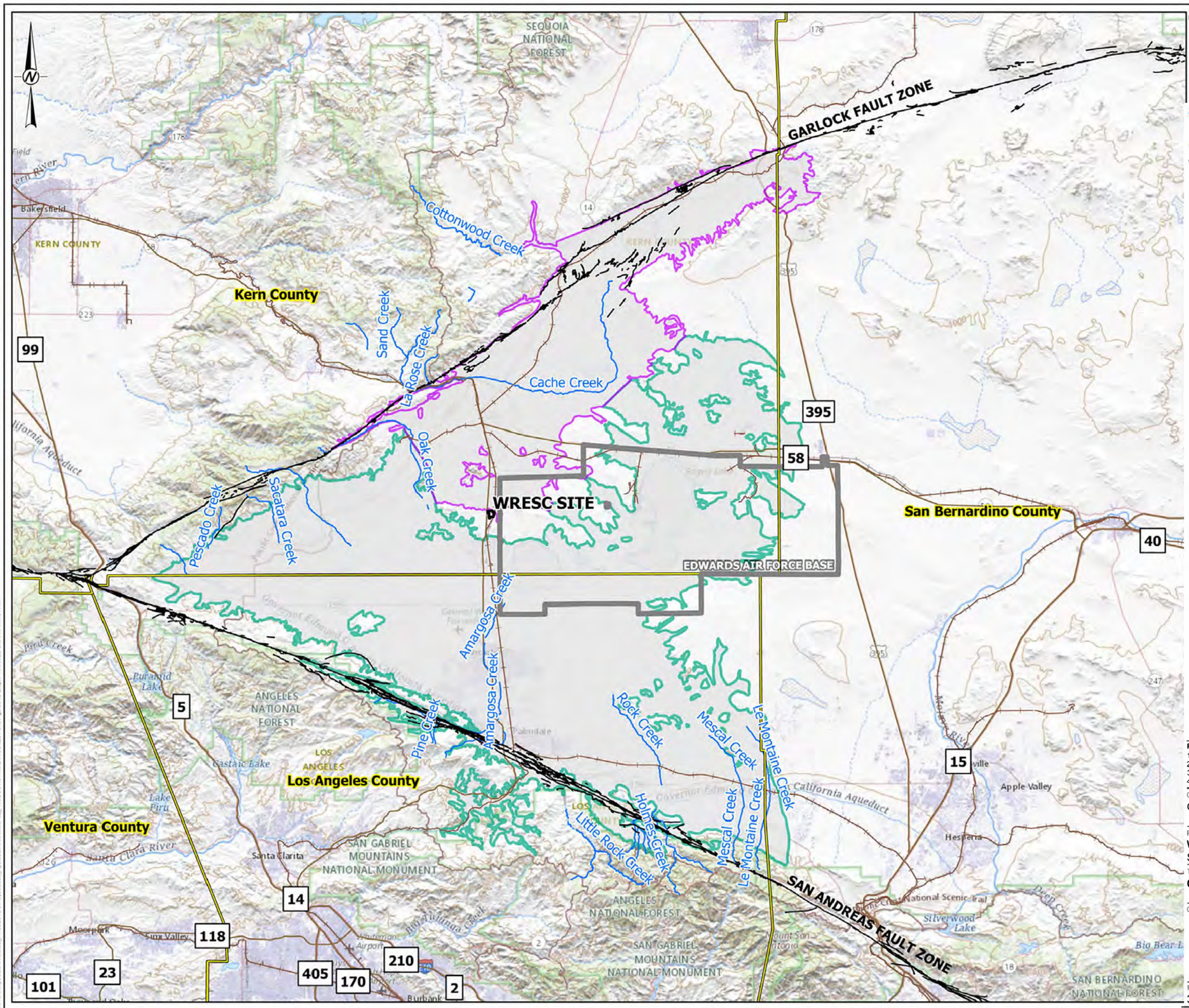
The geologic formations of the FVGB are divided into two main units: consolidated rocks of Tertiary and pre-Tertiary age and unconsolidated deposits of Quaternary age. The consolidated rocks form the mountains and hills surrounding the valley area and the basement complex. The majority of the site is located within the Rosamond Hills upland area, which is outside the primary water-bearing aquifer. The consolidated material has little permeability and is not a viable source of groundwater. The primary water-bearing materials of FVGB are Quaternary age unconsolidated alluvial and lacustrine deposits that consist of compact gravels, sand, silt, and clay (California Department of Water Resources 2004, 2016). As shown on **Figure 5.15-2**, only the northeastern portion of the WRESC Site is within the southern extent of the FVGB; the remainder of the WRESC Site is within the upland, consolidated material (bedrock consisting of quartz monzonite). The FVGB is estimated to have 4.8 million acre-feet (AF) of storage capacity (DWR 2004).

The California Sustainable Groundwater Management Act (SGMA) 2019 Basin Prioritization program categorizes the FVGB as low priority (SGMA 2019). Precipitation to the valley floor and percolation of runoff from mountains and neighboring watersheds naturally recharges the FVGB (Woodard & Curran 2018). Surface water in the Fremont Valley drains mostly toward Koehn Lake. As the runoff migrates over the valley floor, losses occur by evaporation and transpiration. Because the lakebed is nearly impermeable, most of the water is ponded and lost to evaporation (USGS 1977). The FVGB also receives subsurface flow from the Antelope Valley Groundwater Basin.

5.15.1.2.1 Groundwater Use

Groundwater in the FVGB is primarily used for public and domestic water supply and irrigation purposes. The closest identified U.S. Geological Survey monitoring well to the WRESC Site is Well No. 009N012W23N001S, which is approximately 4.2 miles to the southeast of the site at a ground surface elevation of 2292.4 feet amsl.

DWR well records were reviewed online for wells within approximately 1 mile of the WRESC Site (DWR 2023). There were no well records for the site or the sections directly west and south of the site. Four well records were listed on the adjacent sections to the east (S10N12W34), northeast (S10N12W27), and north (S10N12W28) of the WRESC Site (**Figure 5.15-3**). The records indicate three domestic supply and one production well installed to depths between 200 and 500 feet below ground surface. The wells are more than 1/2 mile from the WRESC Site (**Figure 5.15-3)**. A review of the California Groundwater Ambient Monitoring and Assessment database was also conducted (SWRCB 2023). No wells are listed within 1/2 mile of the WRESC Site.



LEGEND

- PROJECT BOUNDARY
- ANTELOPE VALLEY GROUNDWATER SUBBASIN
- FREMONT VALLEY GROUNDWATER SUBBASIN
- US COUNTIES
- MILITARY INSTALLATION BOUNDARY
- CREEK
- RAILROAD
- HIGHWAY
- FAULT

1:633,600

0 5 10 20 Miles

REFERENCE(S)

1. BASEMAP - ESRI PROVIDED BASEMAP SERVICE.
2. HIGHWAYS AND RAILROADS - US CENSUS DATA
3. CREEK - NATIONAL HYDROLOGY DATASET, 2024.
4. BASINS- NATIONAL HYDROLOGY DATASET, 2024.

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

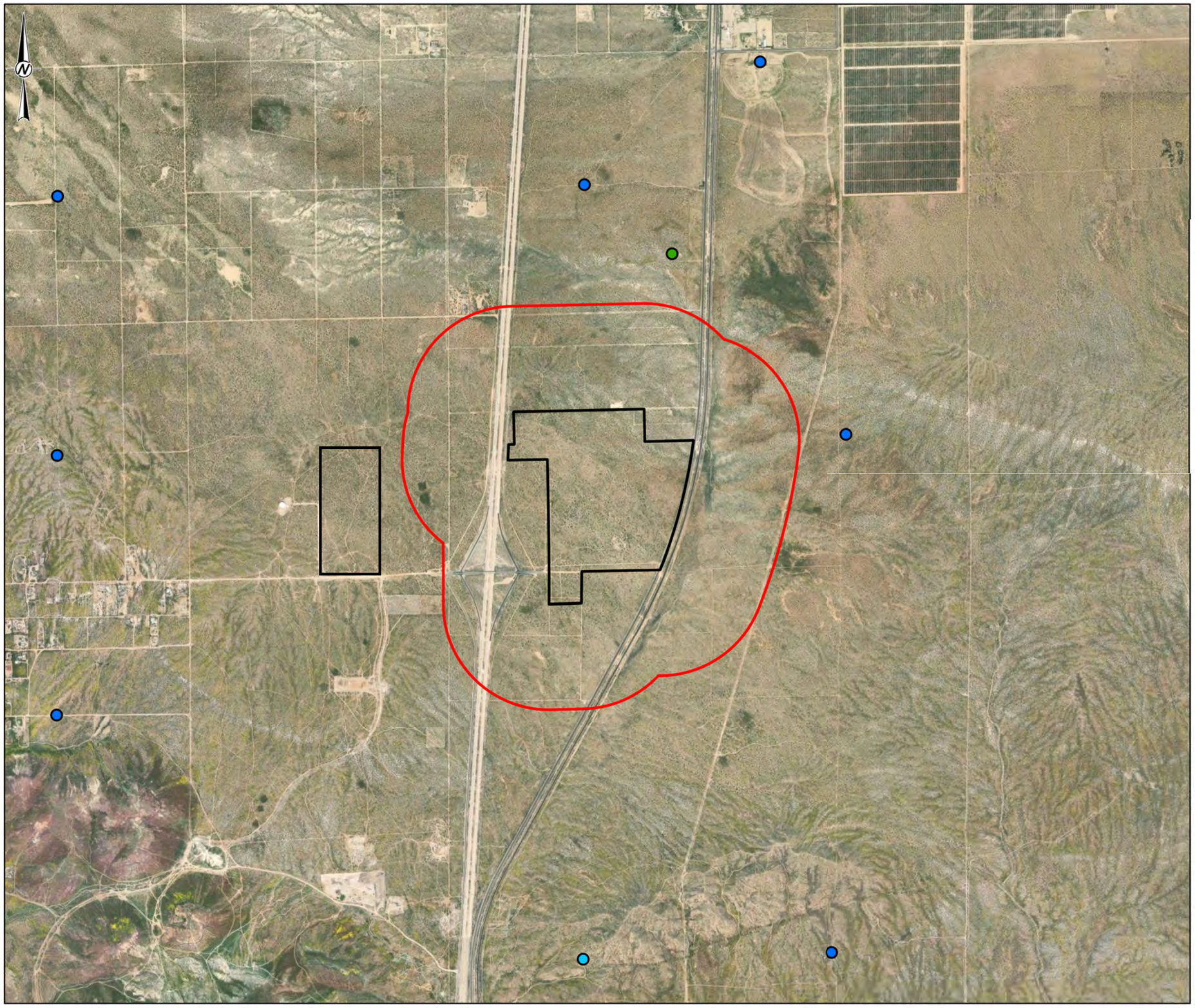
TITLE
GROUNDWATER BASIN MAP

CONSULTANT

YYYY-MM-DD	2024-01-25
DESIGNED	JAM
PREPARED	JAM
REVIEWED	SCH
APPROVED	VG/LL

PROJECT NO.
31406639.003

FIGURE
5.15-2



LEGEND

- PROJECT BOUNDARY
- HALF MILE RADIUS

WELLS

- WATER SUPPLY DOMESTIC
- WATER SUPPLY IRRIGATION - LANDSCAPE
- WATER SUPPLY PUBLIC

1:24,000

0 1,000 2,000 4,000 Feet

REFERENCE(S)

1. BASEMAP - ESRI PROVIDED BASEMAP SERVICE.
2. FLOODPLAIN DATASET: FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA).

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
GROUNDWATER WELLS MAP

CONSULTANT
wsp

YYYY-MM-DD	2024-01-24
DESIGNED	JAM
PREPARED	JAM
REVIEWED	SCH
APPROVED	VG/LL

PROJECT NO.
31406639.003

FIGURE
5.15-3

5.15.1.2.2 Groundwater Level and Flow

Well No. 009N012W23N001S is the USGS monitoring well closest to the WRESC Site and is approximately 4.2 miles to the southeast of the site. The most recent reported groundwater depth measurement (March 17, 2023) was 68.2 feet below the ground surface (USGS 2023). Long-term groundwater level data obtained from the California Statewide Groundwater Elevation Monitoring program and the U.S. Geological Survey (USGS) indicate that the groundwater levels in the FVGB have declined significantly since 1955, which is attributed to the prolonged drought period from 1945 to 1964 and excessive groundwater extraction in the FVGB in the late 1950s through the 1970s. Groundwater levels appear to have stabilized after the 1980s and have started recovering since then because of decreased groundwater pumping for agriculture and imported surface water deliveries to urban users being introduced to the area (Woodward and Curan 2018).

Within the FVGB, groundwater flow generally moves in an easterly direction along the surrounding mountains and then flows in the northerly direction toward Koehn Lake. There is no appreciable quantity of groundwater flowing out of the basin and surface drainage of the basin is of the closed type (Bader 1969). At the WRESC Site, groundwater flow is anticipated to be from west to east, following the local topography.

5.15.1.3 Water Quality

The Regional Water Quality Control Boards (RWQCBs) make water quality decisions for their designated regions, including setting standards, issuing waste discharge requirements, determining compliance with those requirements, and taking appropriate enforcement actions. Federal regulations require that the Total Maximum Daily Loads (TMDL), at a minimum, account for contributions from point sources (federally permitted discharges) and contributions from nonpoint sources. TMDLs are established at the level necessary to implement the applicable water quality standards. In California, the State Water Resources Control Board (SWRCB) has interpreted state law (Porter-Cologne Water Quality Control Act, California Water Code Sections 13000 et seq.) to require that implementation be addressed when TMDLs are incorporated into water quality control plans (Basin Plans). The Porter-Cologne Act requires each RWQCB to formulate and adopt Basin Plans for all areas within its region. The act also requires that a program of implementation be developed that describes how water quality standards will be attained. TMDLs can be developed as a component of the program of implementation, thus triggering the need to describe the implementation features, or alternatively as a water quality standard. When the TMDL is established as a standard, the program of implementation must be designed to implement the TMDL.

The Project is within the jurisdictional boundaries of the Lahontan RWQCB. The Lahontan RWQCB Basin Plan (https://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/references.html) establishes water quality objectives to ensure the reasonable protection of beneficial uses and a program of implementation for achieving water quality objectives. For those waters not attaining water quality standards, the RWQCB establishes TMDLs and a program of implementation to meet a TMDL. Section 303(d) of the Clean Water Act (CWA) requires that each state makes a list of waters that are not attaining water quality standards. For waters on this list, each state is to develop TMDLs. The closest downgradient stream to the WRESC Site is Cache Creek located approximately 13 miles to the north. Cache Creek is not listed as impaired per Section 303(d) of the CWA.

Groundwater quality is generally good within most parts of the FVGB and is influenced by historical and existing land use practices, water extractions, industrial discharges, urban and agricultural runoff, and natural conditions (Woodward and Curan 2018). California's Groundwater Bulletin 118 characterizes the FVGB as sodium bicarbonate in the southeast, sodium bicarbonate or calcium-sodium sulfate in the southwest, sodium sulfate-bicarbonate to sodium chloride in the north, and complex with variable mixtures of sodium, calcium, chloride, sulfate, and bicarbonate in the central region. These chemical compositions not only affect localized water quality but can also influence concentrations throughout the FVGB through groundwater flow resulting from high-volume pumping.

Table 5.15-1 summarizes site-specific groundwater data collected during a drilling program. Grab groundwater samples were collected from three boreholes from multiple depths. Samples were analyzed for pH, total dissolved solids (TDS), density, and viscosity. Samples from borehole BH3 were also analyzed for CAM 17 metals, perchlorate, asbestos, and other general chemistry parameters. The results are summarized in **Table 5.15-2**. Constituent concentrations were compared to maximum contaminant levels (MCLs) and secondary MCLs as defined in the California Code of Regulations Title 22 Division 4, Chapter 15. The results are below the MCLs for drinking water; manganese and iron detections were above the secondary MCLs. Secondary MCLs are

established as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor.

Table 5.15-1: Water Quality Summary

Sample Location	Depth (feet)	Date Sampled	pH	TDS (mg/l)	Density (g/ml)	Viscosity (cSt)			
						@60ºF	@70ºF	@80ºF	@100ºF
BH1	2400	5/17/2023	7.97	270	0.9978	0.930	0.810	0.710	0.560
BH1	1015	5/17/2023	8.26	280	0.9980	0.940	0.800	0.690	0.530
BH1	825	5/17/2023	8.11	240	0.9980	0.940	0.800	0.690	0.530
BH1	650	5/18/2023	8.17	260	0.9980	0.940	0.800	0.690	0.530
BH1	350	5/18/2023	8.17	260	0.9981	0.910	0.790	0.690	0.540
BH2	2100	7/23/2023	8.20	250	0.9985	0.947	0.810	0.700	0.537
BH2	1500	7/23/2023	8.12	290	0.9982	0.947	0.810	0.700	0.537
BH2	1280	7/23/2023	7.84	300	0.9983	0.960	0.820	0.710	0.550
BH2	787	7/23/2023	8.19	280	0.9983	0.960	0.820	0.710	0.550
BH2	394	7/23/2023	8.42	280	0.9983	0.960	0.820	0.710	0.550
BH3	2380	10/9/2023	8.90	410	0.9984	0.947	0.810	0.700	0.537
BH3	1600	10/10/2023	7.87	260	0.9982	0.947	0.810	0.700	0.537
BH3	1180	10/10/2023	8.78	240	0.9983	0.960	0.820	0.710	0.550
BH3	970	10/11/2023	8.97	240	0.9983	0.960	0.820	0.710	0.550
BH3	380	10/11/2023	8.96	270	0.9983	0.960	0.820	0.710	0.550

ºF = degrees Fahrenheit; cSt = centistokes; mg/l = milligrams per liter; pH results analyzed past hold time; TDS = total dissolved solids

Table 5.15-2: BH3 Water Quality Summary Additional Parameters

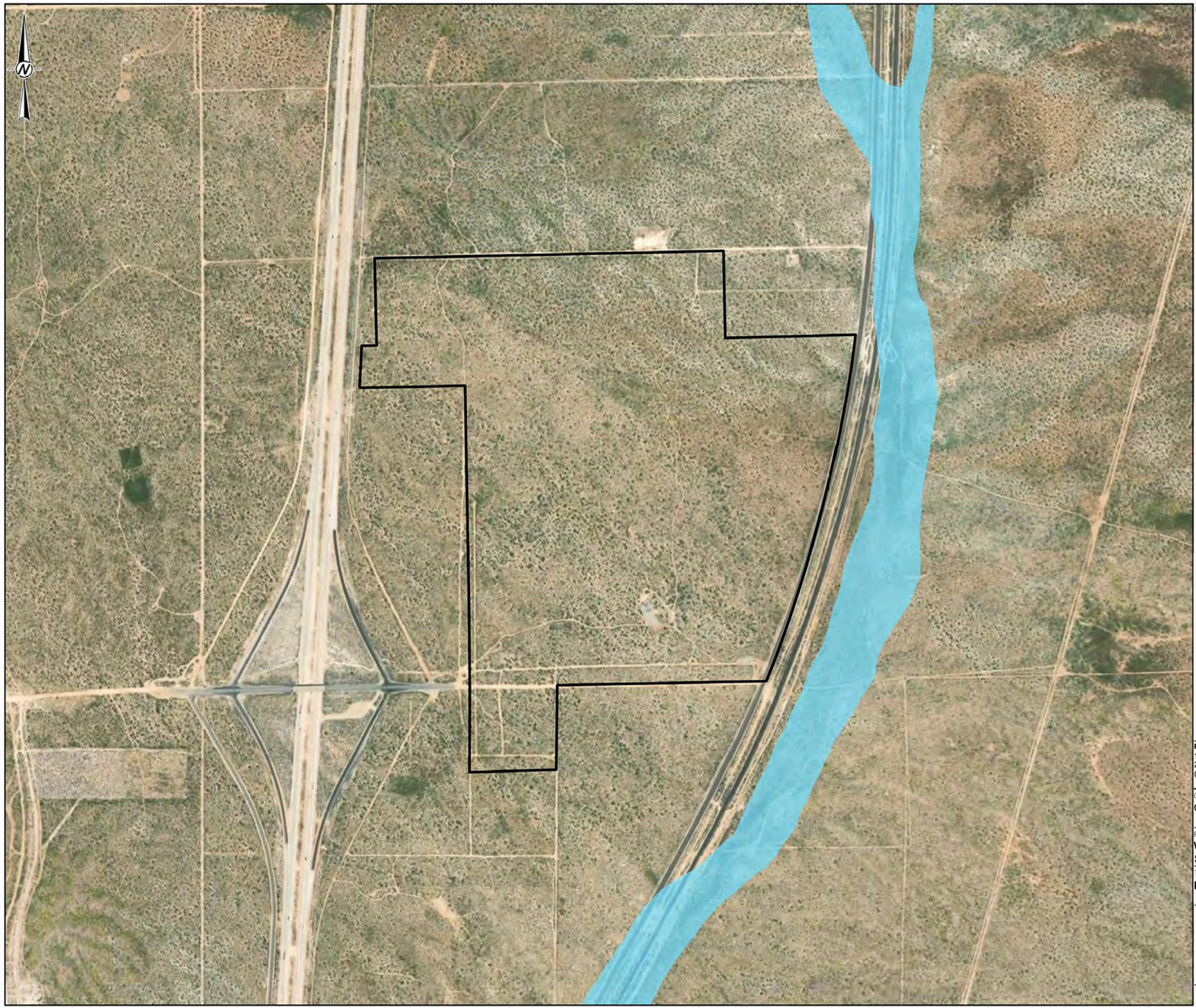
Location		BH3	BH3	BH3	BH3	BH3
Depth		2,380 feet	1,600 feet	1,180 feet	970 feet	380 feet
Parameter	Date	10/9/2023	10/10/2023	10/10/2023	10/11/2023	10/11/2023
Total Recoverable Calcium	mg/L	26	20	22	16	14
Total Recoverable Magnesium	µg/L	3,600	3,800	2,600	3,400	4,400
Total Recoverable Sodium	mg/L	87	73	79	57	50
Bicarbonate Alkalinity as $CaCO_3$	mg/L	170	73	61	56	51
Carbonate Alkalinity as $CaCO_3$	mg/L	21	ND<4.1	7.0	10	9.7
Chloride	mg/L	55	31	33	31	29
Fluoride	mg/L	0.51	0.57	0.93	1.0	1.2
Nitrate as N	mg/L	ND<0.024	ND<0.10	ND<0.024	ND<0.024	ND<0.024
Sulfate	mg/L	65	52	53	52	47
MBAS	mg/L	0.16 J	0.17	ND<0.024	0.027 J	0.14
Total Cyanide	mg/L	0.0017 J	ND<0.0017	ND<0.0017	ND<0.0017	0.0030 J

Location		BH3	BH3	BH3	BH3	BH3
Depth		2,380 feet	1,600 feet	1,180 feet	970 feet	380 feet
Parameter	Date	10/9/2023	10/10/2023	10/10/2023	10/11/2023	10/11/2023
Nitrite as N	mg/L	0.0079 J	0.049 J	0.0087 J	ND<0.0050	ND<0.0050
Perchlorate	µg/L	ND<0.81	ND<0.81	0.00012 J	ND<0.81	ND<0.000020
Hexavalent Chromium	mg/L	0.00026	0.00020	0.00012 J	0.00012 J	ND<0.00020
Total Recoverable Aluminum	µg/L	130	210	260	200	110
Total Recoverable Antimony	µg/L	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
Total Recoverable Arsenic	µg/L	ND<7.8	ND<7.8	ND<7.8	ND<7.8	ND<7.8
Total Recoverable Beryllium	µg/L	ND<0.77	ND<0.77	ND<0.77	ND<0.77	ND<0.77
Total Recoverable Boron	µg/L	150	140	130	110	27
Total Recoverable Cadmium	µg/L	ND<1.1	ND<1.1	ND<1.1	ND<1.1	ND<1.1
Total Recoverable Chromium	µg/L	17	11	7.4 J	9.8 J	5.2 J
Total Recoverable Copper	µg/L	6.0 J	2.8 J	ND<1.2	7.6 J	2.9 J
Total Recoverable Iron	µg/L	3800	4300	3000	9700	5600
Total Recoverable Manganese	µg/L	190	340	150	210	130
Total Recoverable Mercury	µg/L	ND<0.022	ND<0.022	0.037 J	0.055 J	0.029 J
Total Recoverable Nickel	µg/L	5.9 J	6.1 J	ND<2.3	3.7 J	2.9 J
Total Recoverable Selenium	µg/L	ND<27	ND<27	ND<27	ND<27	ND<27
Total Recoverable Silver	µg/L	ND<0.10	ND<0.10	ND<0.10	ND<0.10	ND<0.10
Total Recoverable Thallium	µg/L	ND<11	ND<11	ND<11	ND<11	ND<11
Total Recoverable Zinc	µg/L	1400	1200	380	1300	1500
Asbestos	MFL	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0

Notes: nitrate, MBAS, and nitrite results analyzed past hold time
J = estimated value; MBAS = methylene blue active substances; MFL = million fibers per liter; mg/l = milligrams per liter; µg/L = micrograms per liter; ND = not detected

5.15.1.4 Flooding Potential

A floodplain—designated as Zone A (blue shaded) as defined by the Federal Emergency Management Agency (FEMA)—is east of the WRESC Site and Sierra Highway (**Figure 5.15-4**). Zone A generally indicates a 1 percent chance of flooding in any given year, also known as the 100-year floodplain. To avoid potential flood-related impacts to the extent feasible, the 100-year floodplain levels of inundation will be considered during the design of Project facilities, including the site grading and drainage plans. However, no development is expected within the floodplain area. Should the final design contain elements that encroach on the floodplain, a floodplain permit will be obtained from Kern County to mitigate potential impacts. The floodplain permit application will include any necessary supporting studies.



LEGEND

PROJECT BOUNDARY

FEMA 100-YEAR FLOODPLAIN ZONE

1:9,000

0 375 750 1,500 Feet

REFERENCE(S)

1. BASEMAP - ESRI PROVIDED BASEMAP SERVICE.
2. FLOODPLAIN DATASET: FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA).

CLIENT

GEM A-CAES LLC

PROJECT

WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE

FLOOD ZONE POTENTIAL MAP

CONSULTANT

wsp

YYYY-MM-DD	2024-01-22
DESIGNED	JAM
PREPARED	JAM
REVIEWED	SC H
APPROVED	VG/LL

PROJECT NO.
31406639.003

FIGURE
5.15-4

5.15.1.5 Water Supply

This subsection describes the quantity of water required for construction and operation phases, the sources of the water supply, water treatment requirements, and the water quality of the source water.

Antelope Valley-East Kern Water Agency (AVEK) will provide the quantity and quality of water that the Project requires. AVEK is the third largest State Water Contractor for the State Water Project (SWP) and operates a water supply line that is by the eastern border of the site. The Applicant has submitted an application for AVEK service; AVEK confirmed the Project is located within their service territory and that AVEK has corresponding water supply availability. Representative AVEK water quality is provided in Appendix 5.15A. As described in AVEK's 2020 Urban Water Management Plan (UWMP), AVEK can meet all water demands in normal, single-dry, and multiple-dry years by utilizing its current water supply portfolio of State Water Project supplies and groundwater (AVEK 2021). Additional recovery of imported water from AVEK groundwater banks would be available to meet demand over multiple dry years, and AVEK's groundwater and storage are reliable in all water year types.

Onsite groundwater production is not anticipated during the Project's construction and operation phases. The use of recycled water was considered from the Palmdale and Lancaster water reclamation facilities (WRFs); however, because of the distance of the WRFs to the WRESC Site, lack of existing pipeline, and current WRF permit restrictions (prohibiting sale of WRF water outside of Los Angeles County), recycled water from these facilities is not considered viable (Antelope Valley Engineering, 2012; Board Order No. R6V-2009-0141). Recycled water from Rosamond Community Service District (RCSD) wastewater treatment plant was also considered. The RCSD is undergoing an update that includes tertiary treatment of wastewater in order to produce reclaimed water. Water from this source is not included with the preferred alternative because of current regulations that prohibit sale of RCSD water outside of its service territory.

5.15.1.5.1 Process Water

Section 2.1.14, Water Supply and Use provides a breakdown of the estimated average quantity of water required to construct and operate the Project. Process water for first fill for the Project will be sourced by imported water. For ongoing operations, water will come mainly from the recovery of water from the compressed air and using rainwater collection systems, and then sourcing imported water only if needed.

AVEK owns and operates a 36-inch-diameter water supply line that is adjacent to the WRESC Site approximately 300 feet east of the site boundary. AVEK will supply the Project with the required water rates and quantities from a new dedicated tap into its water supply line at a new turnout location adjacent to the WRESC Site. The turnout will consist of an approximate 8-by 11-foot area with a 1-foot buffer. A permanent approximately 6-inch-diameter buried water pipeline will be installed onsite to the turnout to deliver water from the AVEK main supply pipeline to the surface reservoir.

This source will also provide water for filling the storage tank used for fire protection and service water. Appendix 2D, Water Balance Diagrams and Construction Water Use provides water balance diagrams showing annual average and high-temperature ambient operating conditions for dry, normal, and wet annual precipitation years.

5.15.1.5.2 Construction Phase

During construction and during the initial filling of the compensation reservoir, WRESC will require a total of approximately 1,400 AF of water over approximately 5 years (incorporating a 20% contingency). Water will be primarily used for cavern development and for filling the compensation reservoir. The water for cavern development will be used for shaft drilling and for operating construction equipment (rock drills). The total required water volume will consist of roughly equal quantities for construction activities (700 AF) and initial reservoir fill (700 AF). The water supply will be required mainly on steady state basis over the construction cycle, or roughly 300 AF per year delivered to the site. This required water volume will equate to approximately 200 gallons per minute of supply on a 24/7 basis over approximately 5 years. The estimated peak consumption will be 175 AF per quarter.

Cavern Works

The water requirements for cavern construction are estimated to be approximately 252 AF during the construction period. Uses include site preparation, air and shaft drilling and excavation of the cavern. Refer to Appendix 2D, Water Balance Diagrams and Construction Water Use for the estimated water consumption required during construction by month.

Surface Works

The surface construction is expected to require approximately 47 AF of water for several purposes over the 24-month period:

- General purpose (de-dusting roads, daily washdown, etc.)
- Tank and sphere hydrotest
- Piping and vessel hydrotest
- Fire system testing

Water used for hydrotesting and flushing will be reused for hydrotesting other systems including the spheres, pipe circuits and initial fill. A temporary pumping sub-system with screening and filtering capabilities will be utilized to re-use this water. After testing, the volume of hydrotest water (losses at flange breaks, nozzle spray tests, etc.) will be screened and filtered to a suitable cleanliness tolerance to supplement the initial fill volume of the cold-water tanks and/or reservoir.

Refer to Appendix 2D, Water Balance Diagrams and Construction Water Use for the estimated water consumption required through surface construction by month.

Hydrostatically Compensating Surface Reservoir Fill

The roughly 600 AF surface reservoir will require approximately 868 AF of water for initial fill (accounting for evaporation losses during the filling period). The reservoir fill will require approximately 14 months with monthly fill requirements as shown in Appendix 2D, Water Balance Diagrams and Construction Water Use or dry, normal, and wet annual precipitation years. The required fill amount accounts for both precipitation and evaporation. After initial filling, the surface reservoir will be equipped with an interlocking shape floating cover estimated to be 90 percent effective in reducing evaporation. The estimated fill amount conservatively assumes no benefit from the cover.

5.15.1.5.3 Operation Phase

Once the facility commences operation, WRESC is expected to have an annualized positive balance of approximately 3.6 AF per year of nonportable recharge quality water to provide surface reservoir water make-up during a normal precipitation year. As noted on the water balance, under the considered normal ambient and atmospheric conditions, reservoir inventory is maintained throughout the year with no external make-up required for plant operation. The main reason for the positive balance is the high volume of water produced during the compression stages. When the plant is operating in charging mode and the compressors are filling the cavern with compressed air, water is produced at the exit of each compression stage. This is caused by compressed air becoming saturated during compression and moisture in the air condensing in each post-cooling stage. The condensate must be removed from the system to avoid damage to the compressors and sent to the water reservoir and evaporative cooling system.

Evaporative loss from the reservoir will be reduced by using a floating cover over the reservoir. The Applicant estimates an annual negative balance of 5.4 AF per year and an annual positive balance of 16.1 AF per year for dry and wet years, respectively, as shown in Appendix 2D. Because of seasonal variations associated with the production of water as well as evaporation losses, the reservoir will be designed with adequate freeboard to allow for seasonal fluctuations in water inventory and to provide a buffer to mitigate the requirement to import make-up water. Excess water will be managed by controlling evaporation of the reservoir by adjusting the floating cover surface area.

During plant operation, the expected water consumption from AVEK will be less than 2,000 gallons per day, as shown in the water balance. The water provided by AVEK during plant operation will mostly be used as a tap water source for offices, maintenance facilities, service water, fire system re-filling, and make-up water for cooling and thermal system water. As the cooling and thermal storage systems operate in a closed loop, losses are minimal, and make-up water demand will be small. The reservoir volume is balanced by controlling evaporation with the floating cover, the inflow of annual precipitation, and condensed water from compressed air.

5.15.1.5.4 Process Water Quality

Appendix 5.15A depicts the expected water quality of the source water based on AVEK's 2022 Annual Water Quality Report - Kern County System. AVEK reported that its water meets all state and federal requirements. During operations, process water is expected to trend toward the groundwater quality noted in **Table 5.15-1** and **Table 5.15-2**. Accumulation of salts and other insoluble constituents is not anticipated based on the net positive production of water during the operating phase during a normal precipitation year.

5.15.1.5.5 Domestic Water Supply

AVEK will deliver potable water to the site from a potable source. Potable water will be provided for drinking water, wash water, kitchen use, safety showers, and eye-wash stations. During operation, potable water demand is estimated to be less than 2,000 gallons per day (2.2 AF per year). Water for sanitary use during operations will be sourced from the reservoir.

5.15.1.6 Wastewater Collection, Treatment, Discharge, and Disposal

Project wastewater will be diverted to a zero-discharge, lined, retention pond for evaporation (evaporation pond). The remaining "sludge" will be hauled offsite by an approved waste disposal company to an approved disposal facility. The water balance diagrams in Appendix 2D, Water Balance Diagrams and Construction Water Use show the expected wastewater stream and flow rate under operating conditions.

The septic waste from the administration/control building will be handled by one of the two following methods:

- Sanitary waste from the administration/control building will be directed to a nearby underground septic storage tank, pumped out periodically by truck, and the waste will be trucked offsite to an approved disposal facility.
- Alternatively, the sanitary sewer system will consist of a lateral septic system containing a lateral line from the structure to a septic tank. From there, the waste will flow to the lateral system of pipes that allows the waste from the septic system to discharge via perforations in the lateral pipes.

The Applicant will not wash down any equipment with oily residues. Equipment that has oily residues will be cleaned with rags and sorbents, and appropriate cleaning solutions will be applied to the rags and sorbents. After cleaning, the oily rags and sorbents will be properly stored, manifested, and disposed of by licensed disposal companies in the regulatory-required time.

Plant area drains will be directed to oil-water separators. There will be at least one oil-water separator for the common plant areas and one for the four power trains. Water from the sumps will be pumped to the waste drains sump and then to the evaporation pond. The separated oil will be periodically pumped out of the oil-water separators by truck and disposed of offsite.

5.15.1.7 Water and Wastewater Requirements

Demineralized water will be produced onsite and used as make-up water for the water-based thermal storage and closed-cooling medium loops. Appendix 2D, Water Balance Diagrams and Construction Water Use includes water balance diagrams for annual average and high-temperature conditions and dry, normal, and wet annual precipitation years.

The evaporative cooling water is used intermittently during hot temperatures when the closed-cooling loops cannot meet the cooling objectives of the turbomachinery. The water for the evaporative cooling is expected to be sourced from the produced water at the compressors such that the evaporative cooling does not require sourcing of additional water.

The AVEK supply water will be used for make-up water to the plant water system, fire protection, and general needs such as equipment and surface washdown. The thermal energy storage system and cooling system will be filled with demineralized water during commissioning. A temporary, portable demineralization system will be used to generate water for the first filling and commissioning. Make-up demineralization water will be produced during operations to cover minor losses in the system.

The expected quality of demineralized water used for the first filling will have the following characteristics:

- Appearance: clear and colorless
- Odorless
- TDS max: <1 ppm
- Hardness: <0.01 dH
- Oil and grease: free
- Conductivity: -25 ▫C < 0.5 µS/cm
- Chloride: 0.5 ppm
- Iron: <0.005 ppm
- Copper: <0.01 ppm

5.15.1.7.1 Construction Phase

The construction of the facility from site preparation and grading to full-scale operation is expected to take roughly 60 months. During the construction phase, water will be required for the cavern development, in particular for shaft drilling. Shaft drilling water will be imported, and this water will be recycled through an aboveground settling pond and reused through the drilling process. Any wastewater will include spent drill water and groundwater inflow. A water sump will be constructed in the cavern to provide initial separation of solids and traces of oily matter. Further separation of any residual solids and oils will be accomplished with settling in frac tanks on the surface and managed similar to the excavation wastewater as described below.

Sanitary waste, stormwater runoff, equipment washdown water, hydrotest water, and dewatering activities from general construction activities during the construction phase will generate potential wastewater streams. Wastewaters will be collected and managed based on the type and levels of contamination. Depending on water quality, wastewater could be considered nonhazardous or hazardous. Wastewater will be collected and disposed of offsite if it cannot be reclaimed for onsite use. The Applicant will manage the following categories of nonhazardous wastewater:

- Sanitary Waste: Portable toilets will be housed onsite during the construction phase. Sanitary wastewater from portable toilets will be collected in the self-contained toilets. The vendor of the portable toilets will be responsible for proper handling and transporting portable toilets offsite for disposal.
- Excavation Wastewater: Groundwater from shaft and cavern drilling will be recycled through an aboveground temporary settling pond to allow settlement of solids. Once settled, water from the settling pond will be reused for the drilling process to the extent possible or left to evaporate. A licensed third-party contractor will dispose of excess wastewater offsite that cannot be evaporated. Before disposal, excavation wastewater will be tested for chemical constituents and characteristics.
- Stormwater: Potential water quality impacts from construction will be controlled through implementing a stormwater pollution prevention plan (SWPPP) and associated best management practices, and through practicing proper housekeeping at the construction site.
- Nonhazardous Wastewater: All other wastewater generated will be managed by source reduction techniques, water conservation, and re-use measures as discussed in Section 5.14.

5.15.1.7.2 Operation Phase

Appendix 2D, Water Balance Diagrams and Construction Water Use includes water balance diagrams that illustrate the expected waste streams and describe waste stream flow rates. The Project has been engineered to maximize onsite collection and recycling of wastewater streams, using water treatment systems with smaller volume discharges collected in tanks for ultimate disposal by third-party vendors.

Wastewater generated during operation will include portable water use, stormwater, and equipment washing. Other occasional wastewater streams, such as small equipment leaks, will occur. Depending on water quality, wastewater could be considered nonhazardous or hazardous. Before disposal, wastewater will be collected in bulk tanks or bins and sampled, then classified and disposed of in accordance with appropriate legislation. Sampling and analysis of materials and waste for identification purposes will be according to the applicable U.S. Environmental Protection Agency (U.S. EPA) test method. Section 5.14.4.2.2 discusses hazardous wastewater mitigation. The Applicant will manage the following categories of nonhazardous wastewater:

- Sanitary: Wastewater from portable toilets use will be collected in a septic tank and either discharged to an onsite leach field or an approved waste hauler will haul sanitary waste from the septic tank offsite.
- Stormwater: The WRESC site will be developed so that no industrial stormwater is discharged offsite. All treatment systems, with the exception of the cooling and thermal management system loops, will be indoors and will not likely be point sources for stormwater runoff. Outside, industrial stormwater will be collected and directed to the onsite stormwater pond to be retained for future site use, evaporated and/or infiltrated.
- Industrial Water: Wastewater generated from washing activities will be processed through an oil-water separator and collected in holding tanks, one for each turbine generator. Once full, a licensed third-party vendor will transport and dispose of the water at a permitted facility. WRESC will not have a practice of washing down any equipment with oily residues. Equipment that has oily residues will be cleaned with rags and sorbents. After the cleaning, the oily rags and sorbents will be properly stored, manifested, and disposed of by licensed disposal companies in the regulatory-required time frames. Wastewater from reverse osmosis backwash system will be in the form of a brine and will be discharged to a zero-discharge, lined evaporation pond, where it will be evaporated. Stormwater will not be directed to the evaporation pond. The evaporation pond will be designed with adequate freeboard to also accommodate the average annual direct precipitation amount to the pond. If necessary, a licensed third-party vendor will transport and dispose of the wastewater from the evaporation pond at a permitted facility.
- Occasional wastewater streams: Wastewater (or other wastes) from occasional small equipment leaks within the building will be retained in the building and collected for testing and disposal.

5.15.1.8 Stormwater

The WRESC site will be developed so that stormwater from the facility is collected in a stormwater pond located along the southeast part of the site. Onsite stormwater within the Project Boundary will not be discharged outside the WRESC Site. A summary of the approach for offsite perimeter stormwater drainage is described below for the “without berm” and “with berm” options. Upland drainage will be diverted from entering the WRESC Site by installing drainage channels along the north and west Project Boundary lines. The flows conveyed by the north channel will divert nonindustrial stormwater to the east to Sierra Highway, and the flows conveyed by the west channel will divert nonindustrial stormwater south and across Dawn Road. The onsite stormwater pond will be sized to accommodate the the 100-year, 24-hour storm rainfall event with a minimum of 1 foot of freeboard. The 100-year, 24-hour storm rainfall event was chosen because it is greater than the 10-year, 24-hour (5-day) storm. The collected stormwater will be retained for future site use, evaporated, and/or infiltrated. Appendix 5.15C provides the proposed site grading and drainage plan, stormwater basin design drawings, and supporting calculations.

All treatment systems, with the exception of the cooling and hot water loops, will be indoors and will not likely be point sources for stormwater runoff. Outside, a conveyance system will collect industrial stormwater, which will be directed to the onsite stormwater pond. Process water and wastewater will not be sent to the stormwater pond.

Option 1 – Without Berm

Offsite flows will be diverted via proposed drainage channels along the north and west side of the site to route them to where they are currently flowing. The flows conveyed by the west drainage channel will discharge stormwater south and then to the channel along Dawn Road. The flows conveyed by the north drainage channel will discharge stormwater to the east to the channel along the Sierra Highway. These drainage channels will be sized to carry at a minimum the 100-year discharge calculated using TR55 SCS Unit Hydrograph methodology.

Option 2 - With Berm

Offsite flows will be diverted via proposed drainage channels along the north and west side of the architectural berm and route them to where they are currently flowing. The flows conveyed by the west drainage channel will discharge stormwater south and then to the drainage channel along Dawn Road. The flows conveyed by the north drainage channel will discharge stormwater to the east to the ditch along the Sierra Highway. These ditches will be sized to carry at a minimum the 100-year discharge calculated using TR55 SCS Unit Hydrograph methodology.

Rainwater that falls on the north and west sides of the architectural berm will flow to the proposed ditches along the north and west side of the architectural berm described above. Rainwater that falls on the south and east side of the architectural berm will be directed south and east via ditches on the north and west boundaries of the main plant site and flow toward the Dawn Road and Sierra Highway ditches, respectively.

Stormwater from the architectural berm option will be conveyed to the east toward Sierra Highway and south toward Dawn Road.

5.15.2 Environmental Analysis

5.15.2.1 Significance Criteria

Factors used to evaluate the significance of Project-related Water Resources are set forth in Appendix G of the California Environmental Quality Act (CEQA). Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential Water Resources impacts associated with the construction and operations of the project, Appendix G, asks if the project would:

- a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?
  - Response: No. The Project will not result in any violations of water quality or waste discharge standards. See discussion in Section 5.15.1.3.
- b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
  - Response: No. The Project will not substantially decrease groundwater supplies or interfere substantially with groundwater recharge. The initial fill and small operational amount will be served by AVEK. See discussion in sections 5.15.1.5 and 5.15.2.1.
- 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:
  - Response: No. The Project will not substantially alter the existing drainage pattern of the site or area. See discussion in section 5.18.1.8.

  i) result in a substantial erosion or siltation on- or offsite;
  - Response: No. The Project will not result in a substantial erosion or siltation. See discussion in sections 5.18.1.8. and 5.15.5.2.3.

  ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;
  - Response: No. The Project will not substantially increase the rate or amount of surface runoff or significantly alter the existing drainage pattern of the site or area. See discussion in sections 5.15.5.2.3 and 5.15.5.2.4.

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

- Response: No. The Project will not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage system. See discussion in section 5.18.1.

iv) impede or redirect flood flows?

- Response: No. The Project will not impede or redirect flood flows. See discussion in sections 5.15.1.4 and 5.15.2.3.

- d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project Inundation?
  - Response: No. The Project will not result in flood hazard, tsunami, or seiche zones, risk release of pollutants. See discussion in section 5.15.2.4.
- e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?
  - Response: No. As a retail customer of AVEK, the Project will not substantially conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management. See discussion in sections 5.15.1.5 and 5.15.3.

5.15.2.2 Water Supply

AVEK owns and operates a 36-inch-diameter water supply line that is approximately 300 feet east of the site boundary. AVEK has adequate capacity to supply the Project with the required water rates and quantities from a new dedicated tap into its water supply line at a location adjacent to the WRESC Site. AVEK has sufficient water supplies in normal years to meet projected demand including demand generated by the proposed Project. In dry years or during disruptions in SWP supplies, AVEK can use stored groundwater (approximately 90,000 AF) to supplement its supply to meet overall demand.

5.15.2.3 Wastewater Collection, Treatment, Discharge, and Disposal

The Project is expected to have a slight surplus of water once in operation. Because there will be seasonal variation associated with the production of water as well as evaporation losses, the reservoir will be designed to allow for the management of inventory of water in part to mitigate the need for make-up water.

A small amount of blowdown water from the reverse osmosis system will be rejected. This water will be evaporated in the zero-discharge, lined, evaporation pond.

Septic waste will be collected onsite in a septic tank and either discharged to a leach field or trucked offsite to an approved disposal facility in compliance with applicable LORS. An industrial wastewater discharge permit is not required because impacts related to wastewater collection, treatment, discharge, and disposal will be less than significant.

5.15.2.4 Stormwater Runoff and Drainage

The Project is not within Zone A of the FEMA-designated floodplain. The site grading and drainage plans will be designed to comply with all applicable LORS to avoid potential flood-related impacts and minimize disturbance to the existing drainage pattern. Stormwater channels will be included in the design to divert offsite drainage from the west and north from entering the WRESC Site. Stormwater from the architectural berm option will be conveyed to the east toward Sierra Highway and south toward Dawn Road and comply with all applicable LORS.

As part of the site development plan, an onsite stormwater pond sized with a minimum of 1 foot of freeboard to accommodate the the 100-year, 24-hour storm rainfall event will retain stormwater from the areas of the site with industrial activity. For the Project Area, stormwater will be collected in the stormwater pond via sheet flow, catch basins, and conveyance piping. The collected stormwater will be retained for future site use, evaporated, or infiltrated.

Potential water quality impacts from construction will be controlled through implementing a SWPPP and associated best management practices, and through practicing proper housekeeping at the construction site. Successful implementation of the SWPPP will ensure that construction impacts on water resources are mitigated

to a less-than-significant level. SWPPP procedures include submitting a Notice of Intent to the Lahontan RWQCB for potential coverage under the General Permit for Stormwater Associated with Construction Activities, submitting a National Pollution Discharge Elimination System (NPDES) applicability form to Kern County Public Works Department, and developing the SWPPP before the start of construction activities.

Compliance with local and regional standards and regulations will ensure the Project will have less-than-significant impacts on water supply, wastewater collection and disposal, stormwater runoff and flooding, and stormwater quality.

5.15.2.5 Hydrostatically Compensating Surface Reservoir

The hydrostatically compensating surface reservoir will have a capacity of approximately 600 AF and will be designed to be seismically stable and to prevent the formation of seiches. The reservoir sidewalls are anticipated to be less than the jurisdictional height of 6 feet; therefore, the reservoir would not meet the definition of a jurisdictional dam. A reservoir is considered a jurisdictional dam if the dam jurisdictional height is more than 6 feet and it impounds 50 AF or more of water, or if the dam jurisdictional height is more than 25 feet and it impounds more than 15 AF of water, unless it is exempted ("Statutes and Regulations Pertaining to Supervision of Dams and Reservoirs", California Water Code, Division 3, Dams and Reservoirs, Part 1, Supervision of Dams and Reservoirs, Chapter 1). As determined by the Division of Safety of Dams (DSOD), a dam is any artificial barrier used to hold back water, including reservoirs. The jurisdictional height is defined as the vertical distance measured from the lowest point at the downstream toe of the dam to its maximum storage elevation.

Due to the height of the berms and the quantity of water stored between the maximum water elevation and the outside toe of the berm, the reservoir is not expected to be subject to California DSOD jurisdiction.

5.15.3 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "the cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects.".

Existing land uses surrounding the WRESC Site include open space and rural residential. Mojave Micro Mill is a proposed steel mill about 1 mile north of the WRESC Site on the east side of Sierra Highway. The Mojave Micro Mill project will consume 69 AF over a 2-year construction period and 1,018 AF per year during the operation period. AVEK is listed as the water supplier for the Mojave Micro Mill project and noted to have sufficient water supplies available to serve the Mojave Micro Mill project and its member agencies now and over a 20-year planning horizon (Kern County Planning and Natural Resources Department, 2023).

Local and regional standards and regulations have been developed to address regional impacts to water resources such as the cumulative water quality impacts associated with stormwater discharges and water usage. During the construction phase, AVEK will supply water to the Project and have minimal effect on groundwater annual yield or levels. During the operation phase, a surplus of water will be available for to use as make-up process water and limited potable water is needed (less than 2.2 AF per year). Therefore, there will be no significant cumulative impacts to local water supply, and the Applicant will comply with local and regional standards and regulations to ensure that the Project will not result in significant cumulative impacts.

5.15.4 Best Practices, Design Features, and Mitigation Measures

The Project will mitigate potential adverse impacts by complying with the requirements of applicable LORS (described in Section 5.15.5). Therefore, no mitigation other than compliance with permit conditions will be required.

5.15.5 Laws, Ordinances, Regulations, and Standards

Table 5.15-3 summarizes the federal and state LORS that apply to water resources and their anticipated compliance.

Table 5.15-3: Laws, Ordinances, Regulations, and Standards of Water Resources

Laws, Ordinances, Regulations, and Standards	Requirements	Lead Agency	Application for Certification Section Explaining Conformance
Federal			
Clean Water Act/Water Pollution Control Act. 1972, amended by Water Quality Act of 1987 P.L. 100-4 (33 Federal Code 466 et seq.) National Pollution Discharge Elimination System (CWA, Section 402)	▪ Prohibits discharge of pollutants to receiving waters unless the discharge is in compliance and authorized via a National Pollution Discharge Elimination System permit. ▪ Applies to all point-source discharges. ▪ Applied(s) to nonpoint sources through municipal National Pollution Discharge Elimination System permits.	Lahontan Regional Water Quality Control Board	Compliance with existing state National Pollution Discharge Elimination System general construction permit for stormwater (Section 5.15.1.7)
State			
Federal Clean Water Act (implemented by State of California)	Implements and enforces the federal National Pollution Discharge Elimination System permit program.	Lahontan Regional Water Quality Control Board	Compliance with existing state National Pollution Discharge Elimination System general construction permit for stormwater (Section 5.15.1.7)
Porter-Cologne Water Quality Control Act	Controls discharge of wastewater to surface water and groundwater of California.	Lahontan Regional Water Quality Control Board	
Local			
Kern County General Plan Policy 41 and Water Code Section 10910(b)	Development standards for stormwater quality control, waste supplies, and flood protection. Review of adequate water supply.	Kern County Engineering Department	Section 5.15.5.3
	Kern County Development Specification, Division Four, Standards for Drainage and the Kern County Hydrology Manual.	Kern County Planning Department	

5.15.5.1 Federal Laws, Ordinances, Regulations, and Standards

In California, SWRCB and RWQCBs regulate discharges of wastewater and stormwater into surface waters under the CWA and the Porter-Cologne Water Quality Control Act. Section 5.15.5.2 discusses relevant NPDES permits for stormwater quality management.

The U.S. EPA oversees the Underground Injection Control (UIC) Program. The UIC program consists of six classes of injection wells. Each well class is based on the type and depth of the injection activity, and the potential for that injection activity to result in endangerment of an underground source of drinking water (USDW). UIC regulations mandate the consideration of a variety of measures to ensure that injection activities will not endanger USDWs. Code of federal regulations (40 CFR 144.12), Section 144.12, Prohibition of movement of fluid into underground sources of drinking water, defines the concept of endangerment:

> *No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons.*

Preliminary feedback from U.S. EPA Region IX indicates that a UIC permit may not be required if the system is a closed loop where the caverns and associated shafts from the surface to the caverns are lined such that there would be no fluid communication (either air or water) with the external environment. Characterization of the surrounding bedrock of the cavern system will be conducted to demonstrate that the rock mechanics are sufficient to provide a hydraulicly isolated system with performance standards equivalent to lining. If the unlined cavern will function similarly to a lined cavern and behave as a closed loop system where water temporarily placed in the cavern during the power generation cycle will not be injected into the surrounding formation, then the caverns may not be lined.

The U.S. EPA may consider an unlined cavern to be a *Class V Wells for Injection of Non-Hazardous Fluids into or Above Underground Sources of Drinking Wate*r. Examples of Class V wells include stormwater, drainage, septic system leach fields, and agricultural drainage wells. Examples of complex Class V wells include aquifer storage and recovery wells, geothermal electric power wells, and deep injection wells for salinity control.

The U.S. EPA has established the following minimum requirements to prevent injection wells from contaminating USDWs. In most cases Class V wells are “authorized by rule.” “Authorized by rule” means that an injection well may be operated without a permit as long as the owners or operators:

- Submit inventory information to their permitting authority and verify that they are authorized (allowed) to inject. The permitting authority will review the information to be sure that the well will not endanger a USDW.
- Operate the wells in a way that does not endanger USDWs. The permitting authority will explain any specific requirements.
- Properly close their Class V well when it is no longer being used. The well should be closed in a way that prevents movement of any contaminated fluids into USDWs.

The Applicant expects to be able to provide supplemental information to U.S. EPA to support a determination of non-applicability of the Class V program. The Applicant expects to be able to establish that the lined or unlined cavern system and associated process water will not contaminate the aquifer or impact any USDW After reviewing the Applicant’s information, the U.S. EPA may either agree that the Class V program does not apply or determine that an individual permit is necessary (https://www.epa.gov/uic/federal-requirements-class-v-wells).

In California, the Water Board would also be involved with any water injection into the formation under waste discharge requirements.

5.15.5.2 State Laws, Ordinances, Regulations, and Standards

5.15.5.2.1 California Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code, Division 7) is the state law governing water quality of all California waters, including both surface waters and groundwater. Under the Porter-Cologne Water Quality Control Act, SWRCB has the ultimate authority over water quality policy on a statewide level, and nine RWQCBs establish and implement water quality standards specific for each respective region. The Lahontan RWQCB regulates water quality in the Project Area, jointly implementing the federal CWA and the state Porter-Cologne Water Quality Control Act.

5.15.5.2.2 National Pollution Discharge Elimination System Permit for Wastewater and Municipal Discharges

There will be no wastewater discharges to a surface water or municipal sewer system during the construction or operation phases of the Project; therefore, a site-specific NPDES permit is not required.

5.15.5.2.3 National Pollution Discharge Elimination System Construction Stormwater Permit

The federal CWA effectively prohibits discharges of stormwater from construction sites unless the discharge complies with an NPDES permit. SWRCB is the permitting authority in California and has adopted a statewide General Permit for Stormwater Discharges Associated with Construction Activity (SWRCB Water Quality Order No. 99-08-DWQ), known as the General Construction Permit, that generally applies to projects resulting in 1 acre or more of soil disturbance. The Applicant will prepare a construction SWPPP that will specify site management activities to be implemented during site development. These management activities will include construction stormwater best management practices, dewatering runoff controls, sediment and erosion control plan, and construction equipment decontamination. The RWQCB requires a Notice of Intent to be filed before any stormwater discharge from construction activities, and it requires that the SWPPP be implemented and maintained onsite. However, NPDES coverage under the RWQCB's General Construction Permit may not be required as the WRESC Site does not discharge to waters of the United States or state.

5.15.5.2.4 National Pollution Discharge Elimination System Stormwater Industrial General Permit

The State Industrial Storm Water General Permit Order 2014-0057-DWQ as amended in 2015 and 2018 (Industrial General Permit) is an NPDES permit that regulates discharges associated with industrial activities as listed by category in Code of Federal Regulations, title 40 (40 CFR Section 122.26(b)(14)). Per Industrial General Permit section XIX and Code of Federal Regulations, title 40, section 122.26(a)(9)(i)(D), the RWQCB may require a facility to obtain permit coverage even if it is not otherwise required to do so if the RWQCB determines that the facility's discharge contributes to a violation of water quality standards or is a significant contributor of pollutants to waters of the United States. The WRESC Site does not appear to meet the requirement for coverage under the Industrial General Permit based on its category and that the Applicant will direct industrial stormwater related to site operations to an onsite unlined stormwater pond designed to meet the 100-year 24-hour storm event with a minimum of 1 foot of freeboard (Kiewit, 2023). Upland drainage will be diverted from entering the WRESC Site by incorporating drainage channels north and west of the Project Area. Should the architectural berm option be implemented, stormwater related to the berm, assumed to meet water quality standards based on groundwater data (**Table 5.15-1** and **Table 5.15-2**), will also be conveyed to the east toward Sierra Highway and south toward Dawn Road.

Should site operations be considered to have activities requiring coverage under the Industrial General Permit, the Applicant will submit a Notice of Intent and prepare and comply with the provisions of an Industrial SWPPP or submit a Notice of Non-Applicability under the no discharge eligibility criteria per the Industrial General Permit.

5.15.5.2.5 DSOD Permit

The surface compensation reservoir is not expected to be subject to California DSOD jurisdiction.

5.15.5.2.6 Waste Discharge Requirement Permit for Wastewater Discharge to Land

There will be no waste discharges to the ground during the construction or operation phases of the Project; therefore, a Water Discharge Requirement permit is not anticipated.

5.15.5.3 Local Laws, Ordinances, Regulations, and Standards

Kern County is the lead review agency as defined by both the Water Code Section 10910(b) and Kern County General Plan Policy 41. Kern County General Plan Policy 41 requires a review of all development proposals within the county to ensure adequate water is available, to protect water supplies for projected growth, and to review new high consumptive uses for adequate waste supplies in addition to groundwater. The WRESC Site is not in an adjudicated groundwater basin. As noted in Section 5.15.2.2, AVEK will supply water to the Project during construction. Kern County requires the completion of an NPDES applicability form for projects with construction activities disturbing 1 or more acres and requires the Applicant to provide information about construction activities and to identify whether stormwater runoff has the potential of discharging into waters of the United States or waters of the state.

5.15.6 Agency Contacts, Permits, and Permit Schedule

Table 5.15-4 lists the agency contacts and required permits.

Table 5.15-4: Agency Contacts, Permits, and Permit Schedule

Permit	Agency Contact	Schedule
National Pollution Discharge Elimination System – Construction General Permit	Submit online using Stormwater Multiple Application and Report Tracking System https://smarts.waterboards.ca.gov	Submit Notice of Intent for coverage under the statewide permit at least 30 days before construction.
Grading Plan and NPDES Applicability Form	Kern County Public Works Department/ Building & Development Phone: (661) 862-5100	Submit application at least 60 days before construction.
Division of Safety of Dams Permit	Division of Safety of Dams 2720 Gateway Oaks Drive, Suite 300 Sacramento, CA 95833 Phone: (916) 565-7868 Email: damsafety@water.ca.gov	Request for non-applicability letter pending.

5.15.7 References

Antelope Valley East Kern Water Agency (AVEK). 2021. *2020 Urban Water Management Plan*. Available: https://www.avek.org/files/2a8e325f5/AVEK 2020UWMP_PublicDraft_210525.pdf. Accessed: January 5, 2024.

Antelope Valley Engineering, Engineering Report for Distribution and Use of Recycled Water, prepared for City of Palmdale Department of Public Works Utilities Division. June 2012.

Bader, J.S. 1969. Ground-Water Data as of 1967 South Lahontan Subregion California. U.S. Geological Survey. Water Resources Division.

California Department of Conservation, California Geological Survey. 2002. Note 36 California Geomorphic Provinces.

California Department of Water Resources (DWR). 2004. South Lahontan Hydrologic Region Fremont Valley Groundwater Basin, Updated 2/27/2004.

California Department of Water Resources (DWR). 2020. Sustainable Groundwater Management Act 2019 Basin Prioritization Process and Results. May 2020.

California Department of Water Resources (DWR). 2023. DWR Well Records. (https://dwr.maps.arcgis.com/apps/webappviewer). Accessed August 2023

California Statewide Groundwater Elevation Monitoring (CASGEM), 2023. Available at https://casgem.water.ca.gov. Accessed August 2023.

Kern County Planning and Natural Resources Department. 2023, Draft Environmental Impacts Report, Mojave Micro Mill Project, PSGMS Holdings Corp (Pacific Steel Group).

Kiewit. 2023. Preliminary Drainage Memorandum, Rev C. August 2, 2023.

Regional Water Quality Control Board (RWQCB). 2015. *Lahontan Region Water Quality Control Plan (Basin Plan)*. Available at: https://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/references.html

State Water Resources Control Board (SWRCB). 2023. Groundwater Ambient Monitoring and Assessment Database, 2023, https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/

U.S. Geological Survey (USGS). 1977. Ground Water in the Koehn Lake Area Kern County, California. Prepared by J.H. Koehler. Water-Resources Investigations 77-66. December 1977.

U.S. Geological Survey (USGS). 2023. National Ground-Water Monitoring Network. Available online: https://cida.usgs.gov/ngwmn/index.jsp. Accessed July 24, 2023.

U.S. Geological Survey (USGS) Soledad Mountain Quadrangle, California – Kern County 7.5-minute Series.

Western Regional Climate Center Mojave Station. 2023. Available at: https://wrcc.dri.edu.

Woodard and Curran. 2018. Fremont Valley Basin Groundwater Management Plan, December 2018.

5.16 Wildfire

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California. The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's (SCE's) Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way (ROW) associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of accessors parcels referred to as P1, P2N, P2S, and VH.

This section discusses the potential for wildfire associated with the Willow Rock, or WRESC and the potential effects on human health and the environment. Section 5.16.1 describes the existing environment that may be affected, as well as potential impacts on the environment and on human health during construction and operation. Section 5.16.2 discusses potential cumulative effects; Section 5.16.3 identifies proposed mitigation measures; Section 5.16.4 presents laws, ordinances, and standards applicable to wildfire; Section 5.16.5 identifies agencies involved and provides agency contacts; Section 5.16.6 describes permits; and Section 5.16.7 provides all references used to develop this section.

5.16.1 Affected Environment

5.16.1.1 Existing Conditions

The WRESC will be located in an unincorporated section of Kern County, with sections of the gen-tie lines running through Rosamond and Willow Springs. The California Department of Forestry and Fire Protection (CAL FIRE) has not assigned a Fire Hazard Severity Zone (FHSZ) rating[1] for the area encompassing the WRESC and the gen-tie line. The nearby community of Rosamond approximately 2 miles to the south of the WRESC Site has been designated a Community at Risk[2] by the California Fire Alliance (KCFD 2023a). The WRESC Site does not fall within a State Responsibility Area (SRA);[3] however, the closest SRA is located 1 mile west of the end of the gen-tie line, approximately 19 miles southwest of the WRESC Site, at SCE Whirlwind Substation, as shown on **Figure 5.16-1**. While fire risk may be elevated during construction and operation of the WRESC like the construction of any project; the facility addresses these risks by complying with all applicable laws, ordinances, and regulations. Proper planning and mitigation measures will avoid and minimize potential for accidental wildfire ignition. Additionally, the Applicant will conduct an emergency response planning session to address public health concerns regarding wildfire risk. The following sections describe wildfire risk regarding the construction and operation of WRESC.

[1] CAL FIRE has adopted FHSZs for SRAs throughout California. FHSZ rates areas for wildfire with categories of "moderate", "high", or "very high" based on fuel loading, slope, fire weather, and other relevant factors.

[2] There are 25 communities in Kern County registered as Communities at Risk by the California Fire Alliance. Threats to these communities vary from slight to extreme, depending on their vicinity to an SRA.

[3] SRAs are areas where the state has financial responsibility for wildland fires. Homeowners living in an SRA are responsible for ensuring that their property follows California's building and fire codes.

5.16.1.2 Fire History and Historical Fire Regime

The WRESC and its connecting gen-tie lines will be located in the Kern County Fire Department (KCFD) Tehachapi Management Area. Historically, many larger fires have originated in this area; however, residential development has reduced the number of large fires in recent years (KCFD 2023b). Historic fire events for greater Kern County suggest a cyclical pattern of short intervals with relatively high fire occurrence followed by longer intervals with fewer fire events. However, anomalous patterns are observed for the mid-2000s, with several years exceeding 40 fires per year. Most fires in the county have been relatively small (i.e., 300 acres or less), and just 10 percent have been greater than 300 acres in area (Kern County 2022). Human-caused ignition was the most common cause of fires in the county between 2005 and 2021. On August 18, 2021, human-caused ignition resulted in the French Fire near Lake Isabella, about 50 miles north of the proposed WRESC Site. The fire grew to 20,000 acres in one week and reached a final size of 27,285 acres. Other recent large fires (25,000 acres or more) in the region include the Cedar (about 64 miles north of WRESC), Erskine (about 40 miles north of the WRESC), Breckenridge Complex (about 50 miles northwest of WRESC), and Comanche Fires (about 43 miles northwest of the WRESC Site). The largest of these was the Erskine Fire, which consumed about 48,000 acres and destroyed or damaged nearly 300 residences.

Most fires in Kern County occur from May to September, when temperatures are high and hot and dry winds are most frequent. This trend coincides with the state's fire season, which usually occurs between July and November. However, fire seasons are increasing in length due to climate change, which results in warmer spring and summer temperatures, decreased snowpack, and earlier spring snow melt (Western Fire Chiefs Association 2023). In its Community Wildfire Prevention Plan, Kern County has identified focus areas in the Tehachapi Mountains with historical fire risk within the Tehachapi Management Area. The WRESC and its connecting gen-tie lines will not be located within a focus area (Kern County 2022). The closest focus area is approximately 13 miles northwest of the proposed WRESC Site and approximately 8 miles northwest of the nearest transmission line. As noted above, the community of Rosamond has been identified as a Community at Risk by the California Fire Alliance. The KCFD has performed fuel-reduction activities on thousands of acres in and around Communities at Risk (KCFD 2023a).

5.16.1.3 Wildfire Behavior and Fire Hazard Mapping

Wildfire behavior is dependent on several biophysical (climate, topography, and vegetation) and anthropogenic (human-influenced) factors. These factors include fuels (vegetation composition, cover, and moisture content); climate (weather, wind velocity and humidity); topography (slope and aspect); and ignition sources (e.g., lightning). Anthropogenic variables consist of human activities (e.g., prescribed burning, heat or sparks from vehicles and equipment, and industrial activities like welding, or grinding) and management (wildfire prevention and suppression efforts). These factors are described below.

5.16.1.3.1 Temperature, Humidity, and Precipitation

Kern County's climate generally is characterized by hot, dry summers and cool winters. Temperatures in Mojave, which is about 9 miles north of the proposed WRESC Site, are highest in July, averaging a high of 97.6 degrees Fahrenheit (°F). Temperatures are lowest in December, averaging a low of 32.9°F (WRCC 2016). Relative humidity during the summer months ranges from 29 to 34 percent. Winter humidity ranges from 51 to 54 percent (Climate Data n.d.). Humidity affects the moisture level of vegetation (fuels), and low humidity levels lead to dry fuels that can ignite more easily and burn more quickly than when humidity levels are high (NPS 2017). Average annual precipitation in Mojave is 5.93 inches, and average annual snowfall is 1.7 inches (Climate Data, N.D.).

5.16.1.3.2 Wind

Prevailing winds recorded at Edwards Airforce Base, with centroid of base approximately 15 miles east of the proposed WRESC Site, are generally from the southwest and average 10.8 miles per hour. Wind speeds are highest in June, averaging 13.8 miles per hour (WRCC 2023).

5.16.1.3.3 Topography

Topography and elevation vary greatly in the area encompassing the WRESC, which consists of hilly areas such as the Rosamond Hills and Tropico Hill, as well as flatter areas along Rosamond Boulevard (Kern County n.d.).

Steep slopes along the Rosamond Hills are located northwest of the proposed site of the WRESC and connecting gen-tie lines. Steep slopes along Tropico Hill are located west of the proposed gen-tie line site along Mojave-Tropico Road. Terrain type has a strong influence over fire behavior, and steep terrain can encourage the spread of fire when other factors such as fuels also are present. Fires can spread quickly up vegetated slopes because fuels are pre-heated by rising hot air from the active fire below (NPS 2017).

5.16.1.3.4 Fuels

Fuels are made up of various components of vegetation, live and dead, that occur on a given site. Fire is a natural component of Kern County's landscapes. As described in Section 5.2, Biological Resources, the majority of the WRESC Site contains creosote bush scrub, desert saltbush, Joshua tree scrub, desert wash, alkali scrub, and juniper-pinyon woodlands. Some of the mid-elevation areas in this region can support up to 70 species of shrubs per hectare (Randall et al. 2010). The WRESC Site is located within the Tehachapi Management Area, according to the Kern County 2023 Strategic Fire Plan (KCFD 2023a). Fuel models (FM) that predominate the area are grass (FM1 and FM2), brush (FM4 and FM6), and some areas of timber at higher elevations (FM8). There has been a substantial amount of insect-caused death in larger trees in this area, and an influx of residential development has reduced the number of large fires in recent years (IFTDSS n.d.). **Table 5.16-1** describes the fuel models in the Tehachapi Management Area.

Table 5.16-1: Fuel Models

Fuel Model	Description
FM1: Short Grass	*Fire spread is governed by fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured grass and associated material. Very little shrub or timber is present; generally less than one-third of the area. Grasslands and savanna are represented, along with stubble, grass-tundra, and grass-shrub combinations that meet the above area constraint. Annual and perennial grasses are included in this fuel model.*
FM2: Timber (Grass and Understory)	*Fire spread is primarily through fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, in addition to litter and dead/down stemwood from the open shrub or timber overstory, contributes to the fire intensity. Open shrub lands and pine stands or scrub oak stands that cover one-third to two-thirds of the area may generally fit this model; such stands may include clumps of fuels that generate higher intensities and that may produce firebrands. Some pinyon-juniper may be in this model.*
FM4: Chaparral	*Fire intensity and fast-spreading fires involve the foliage and live and dead fine woody material in the crowns of a nearly continuous secondary overstory. Typical candidates are stands of mature shrubs, 6 or more feet tall, such as California mixed chaparral, the high pocosin along the east coast, the pinebarrens of New Jersey, or the closed jack pine stands of the north-central States. Besides flammable foliage, dead woody material in the stands significantly contributes to the fire intensity. Height of stands qualifying for this model depends on local conditions. A deep litter layer may also hamper suppression efforts.*
FM6: Dormant Brush, Hardwood Slash	*Fires carry through the shrub layer where the foliage is more flammable than fuel model 5, but this requires moderate winds (winds greater than 8 mi/h [13 km/h] at midflame height). Fire will drop to the ground at low wind speeds or at openings in the stand. The shrubs are older, but not as tall as shrub types of FM 4, nor do they contain as much fuel as FM 4. A broad range of shrub conditions is covered by this model. Fuel situations include intermediate stands of chamise (Adenostoma fasciculatum; also called greasewood), chaparral, oak brush, low pocosin, Alaskan spruce taiga, and shrub tundra. Even hardwood slash that has cured can be considered. Pinyon-juniper shrublands may be represented but may over-predict rate of spread except at high winds (like 20 mi/h [32 km/h] at the 20-foot level).*

Fuel Model	Description
FM8: Closed Timber Litter	*Slow-burning ground fires with low flame lengths are generally the case, although the fire may encounter an occasional "jackpot" or heavy fuel concentration that can flare up. Only under severe weather conditions involving high temperatures, low humidity, and high winds do the fuels pose fire hazards. Closed canopy stands of short-needle conifers or hardwoods that have leafed out support fire in the compact litter layer. Because little undergrowth is present in the stand, this layer is mainly needles, leaves, and occasionally twigs. Representative conifer types are white pine, lodgepole pine, spruce, fir, and larch.*

Source: IFTDSS n.d.
FM = fuel model; km/h = kilometers per hour; mi/h = miles per hour

Based on the biological surveys summarized in Section 5.2, the area encompassing the WRESC was not observed to contain FM8.

5.16.1.3.5 CPUC-Designated Wildlife Hazard Zones

Pursuant to Fire Safety Rulemaking of the California Public Utilities Commission (CPUC), the CPUC mapped high fire threat areas where more stringent inspection, maintenance, vegetation clearance, and wire clearance requirements (as required by CPUC General Orders 95, 165, and 166, described below) would be implemented due to the elevated risk for a devastating wildfire and damage to electrical lines (CPUC 2017a). The CPUC High Fire Threat District Map identifies three tiers of elevated risk for fires associated with utilities (CPUC n.d.). The WRESC Site is not located in a CPUC Fire Threat District. The nearest CPUC Fire Threat District is about 0.75 miles west of the nearest transmission line.

5.16.1.3.6 CAL FIRE Hazard Severity Zones

CAL FIRE has adopted FHSZs for SRAs throughout California. FHSZs rate areas for wildfire using categories of "moderate," "high," or "very high" based on fuel loading, slope, weather, and other relevant factors. As shown in **Figure 5.16-1** and **Figure 5.16-2**, the WRESC Site is not located in an SRA and does not have an FHSZ rating.

5.16.1.4 Significance Criteria

Factors used to evaluate the significance of project related wildfire are set forth in Appendix G of the California Environmental Quality Act (CEQA). Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential wildfire risks associated with the construction and operations of the project, Appendix G, asks if the project is located in or near an SRA or lands classified as very high FHSZs, and if it would:

- Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency plan.
- 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.
- Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may elevate fire risk or that may result in temporary or ongoing impacts to the environment.
- Expose people or structures to significant risks, including downslope or downstream flooding or landslides, due to runoff, post-fire slope instability, or drainage changes.

The WRESC Project will not be located in or near a SRA or on lands classified as very high FHSZs. The closest SRA is located 1 mile west of the end of the most western end of the gen-tie approximately 19 miles northeast of the WRESC Site, as shown on **Figure 5.16-1**. Nevertheless, mitigation measures for wildfire have been established, and wildfire risk is expected to be low. Each of these criteria are discussed below in relation to the proposed WRESC.

T11N R15W
T11N R14W
T11N R13W
T11N R12W
T10N R15W
T10N R14W
T10N R13W
T10N R12W
T09N R15W
T09N R14W
T09N R13W
T09N R12W
T08N R15W
T08N R14W
T08N R13W
T08N R12W
Tehachapi Willow Springs Rd
Mojave Tropico Rd
Aerospace Hwy
Sierra Hwy
W Rosamond Blvd
Rosamond
170th St W
SCE Whirlwind Substation
Project Boundary
WRESC Site
1
2a
2b
3a
3b
4
5
6

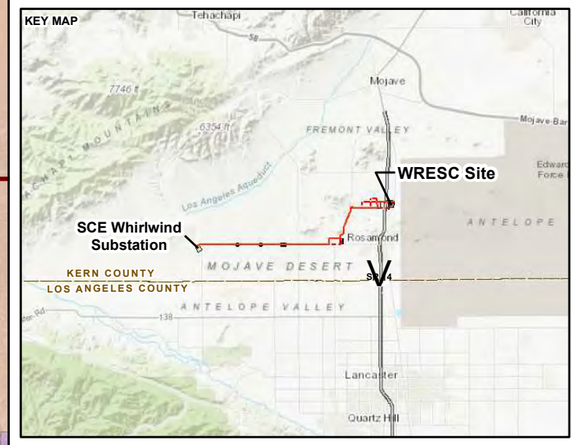
LEGEND

Proposed Transmission Line
- Preferred Route, Aboveground
- Preferred Route, Underground
- Route Options 1-6, Aboveground
- Route Options 1-6, Underground

Project Components
- WRESC Site
- Other Project Parcel
- Project Boundary
- SCE Whirlwind Substation
- Township/Range

State Responsibility Areas
- Federal Responsibility Area (FRA)
- Local Responsibility Area (LRA)
- State Responsibility Area (SRA)

KEY MAP



0 8,000 16,000

1 " = 8,000 feet FEET

REFERENCE(S)

1. TRANSMISSION LINES AND PROJECT COMPONENTS - GEM A-CAES LLC, 11/30/2023
2. PARCEL BOUNDARIES - KERN COUNTY GIS DEPT., 12/14/2023
3. CAL FIRE NOVEMBER 21, 2022, DOWNLOADED 11/01/2023
4. COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET
5. MAP SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
STATE RESPONSIBILITY AREAS

CONSULTANT
wsp

YYYY-MM-DD	2024-02-22
DESIGNED	MK
PREPARED	MK
REVIEWED	SCH
APPROVED	VG/LL

PROJECT NO.	CONTROL	REV.	FIGURE
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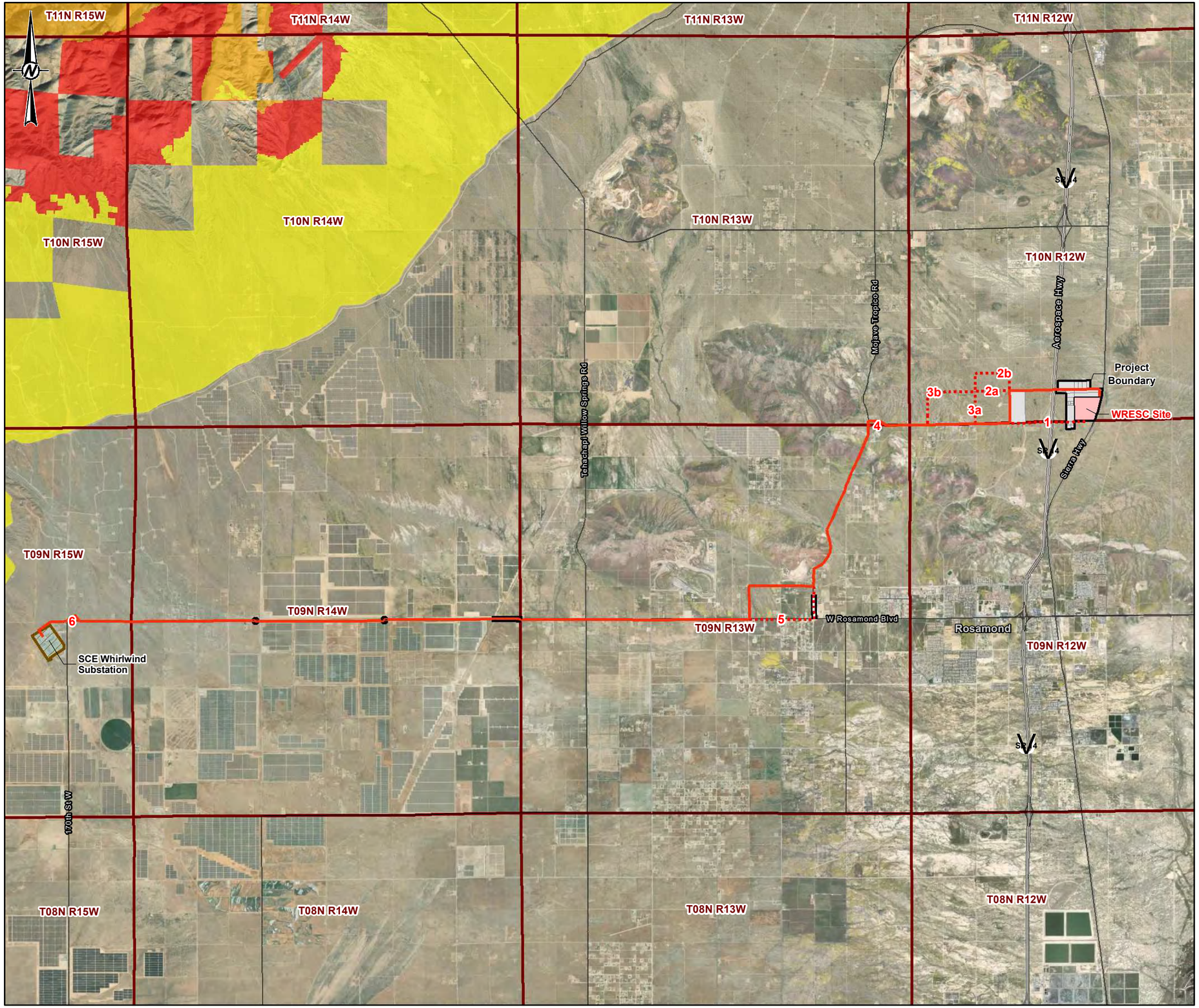
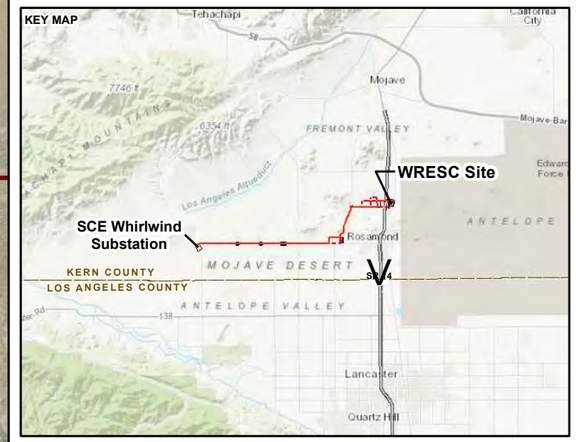


LEGEND

Proposed Transmission Line
- Preferred Route, Aboveground
- Preferred Route, Underground
- Route Options 1-6, Aboveground
- Route Options 1-6, Underground

Project Components
- WRESC Site
- Other Project Parcel
- Project Boundary
- SCE Whirlwind Substation
- Township/Range

Fire Hazard Severity Zones in State Responsibility Area
- Very High
- High
- Moderate



0 8,000 16,000

1 " = 8,000 feet FEET

REFERENCE(S)

1. TRANSMISSION LINES AND PROJECT COMPONENTS - GEM A-CAES LLC, 11/30/2023
2. PARCEL BOUNDARIES - KERN COUNTY GIS DEPT., 12/14/2023
3. CAL FIRE NOVEMBER 21, 2022, DOWNLOADED 11/01/2023
4. COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET
5. MAP SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
FIRE HAZARD SEVERITY ZONES (FHSZ)

CONSULTANT

YYYY-MM-DD	2024-02-22
DESIGNED	MK
PREPARED	MK
REVIEWED	SCH
APPROVED	VG/LL

PROJECT NO.	CONTROL	REV.	FIGURE
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5.16.1.5 Local Emergency Response and Evacuation Plans

The KCFD provides primary fire protection, fire prevention, emergency medical, and rescue services to more than 500,000 people in unincorporated areas of Kern County and nine incorporated cities (i.e., the cities of Rosamond, Arvin, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco). The KCFD operates 47 full-time fire stations within seven battalions and is equipped with 58 fire engines, six ladder trucks, 54 patrol vehicles, 30 command vehicles, six dozers, two helicopters, two hazardous material response teams, and other ancillary vehicles and equipment. The KCFD is staffed with 621 permanent employees, including 521 uniformed firefighters (KCFD 2022).

Sixty-two jurisdictions participated in the 2020 update to the Kern Multi-Jurisdictional Hazard Mitigation Plan to reduce losses resulting from natural disasters (Kern County 2020). The plan includes identifying actions for risk reduction; identifying resources at risk; building partnerships with citizens, organizations, businesses, and stakeholders; increasing education and awareness of threats and hazards; communicating priorities to state and local officials; and aligning risk reduction with other community objectives. The WRESC will adhere to all safety practices addressed in the plan; therefore, the WRESC is not anticipated to have effects on the Kern Multi-Jurisdiction Hazard Mitigation Plan.

- Evacuation planning is also incorporated into the Safety Element of the Kern County General Plan, per Section 65302 of the California Government Code, which requires the county to identify evacuation routes and their capacity, safety, and viability under a range of emergency situations. Provisions for safe evacuation are included in the Kern County General Plan with respect to wildland and urban fire hazards: Ensuring that newly developed structures have adequate access for emergency equipment and for the evacuation of residents.
- Requiring that all roads in the wildland-urban interface are appropriately marked and that properties have addresses conspicuously displayed.
- Ensuring that discretionary projects comply with the adopted fire code and the requirements of the KCFD.
- Promoting public education regarding fire safety at home and at work. (Kern County 2009):

The WRESC will adhere to all applicable provisions included in the Safety Element of the Kern County General Plan.

5.16.1.6 Impacts from Potential Pollutants

As the WRESC will have staff during operation, there is potential for workers to be exposed to increased risks associated with wildfire; however, operation of the WRESC is not anticipated to involve activities that would increase wildfire risk. Primary fire hazards from the WRESC would occur through the use of vehicles and equipment during construction and decommissioning. Heat or sparks from vehicles and equipment could ignite dry vegetation and cause a fire, particularly during drier, warmer conditions. Additionally, construction activities that could create a source of ignition.

The WRESC will involve increased vehicle activity on local and regional roads due to trucks and vehicles delivering equipment to the WRESC, which could result in an increased potential for ignitions. Furthermore, gen-tie lines connecting the WRESC to Whirlwind Substation could increase the potential for ignitions from downed lines. Therefore, depending on the time of year (as seasonality may affect climate conditions, prevailing winds, and vegetation/fuels) and the location of construction activities, the increase in sources of potential ignition associated with Project construction or decommissioning could elevate the risk of wildfire in the area.

Wildfires release large amounts of air pollutants, which can lead to harmful exposure for first responders, nearby communities, and populations that are located farther away. Therefore, due to the increase in potential sources of ignition, Project construction and decommissioning could increase the risk of surrounding communities' exposure to pollutant concentrations from wildfire and the uncontrolled spread of wildfire to a level that is substantially higher than existing conditions, which would result in a potentially significant impact (American Lung Association 2016).

5.16.1.7 Impacts from Built or Maintained Infrastructure

The Project would involve the construction and maintenance of the WRESC facility and related infrastructure, such as gen-tie lines and roads, which could elevate fire risk. The facility is described in Chapter 2.0, Project Description. Dawn Road is the main access road to the facility and would be maintained throughout the facility's lifespan. Vehicle activity on Dawn Road could result in an increased potential for ignitions by introducing new potential sources of ignition into vegetated areas.

The WRESC's overhead electrical collector systems are described in Chapter 2.0, Project Description and Chapter 3.0, Electric Transmission. These systems will include 19 miles of 230-kilovolt (kV) single-circuit three-phase conductor gen-tie lines installed primarily overhead with a small number of short underground gen-tie line segments. This will allow for crossing of a Los Angeles Department of Water and Power transmission corridor, as well as other locations where the transmission corridor is congested with pre-existing facilities. Vegetation clearance will be consistent with or greater than guidance for clearance around power lines (e.g., CPUC General Order 95). The risk of ignition from these collector lines would be low because there would be a low risk of objects such as downed trees striking the lines or poles based on this minimum clearance. Additionally, much of the Preferred Gen-Tie Route is along an existing road ROW with existing clearance. As a result, impacts are anticipated to be less than significant. The vegetation clearances that will be maintained around roads, collector lines, turbines, and other Project components would aid in reducing wildfire risk and facilitating emergency suppression of fires should they occur, consistent with defensible space guidelines.

5.16.1.8 Impacts to Nearby Communities

Downslope communities, such as Rosamond, could be impacted by post-fire flooding, landslides, and runoff. As previously discussed, implementation of the WRESC may increase potential wildfire risk due to increased sources of ignition. However, adherence to applicable laws, best management practices (BMPs), facility design features, and employee training will reduce potential for ignition events and prepare work crews to respond to incidents caused by construction equipment.

Post-fire conditions influence surface water quality because water flowing through burned areas is likely to carry increased levels of sediment, organic debris, and chemicals (such as residuals from fire suppressants), contributing to degradation of water quality and aquatic resources. Additionally, post-fire conditions can increase the potential for erosion and flooding due to the loss of vegetation that holds soils in place, causing increased erosion, and the loss of the water-absorbing properties of soils, causing increased runoff (Colorado State University 2012; USGS 2023).

5.16.2 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects". Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an EIR [Environmental Impact Report] is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects".

Depending on the pathway of migration for a wildfire, the geographic scope for cumulative effects related to wildfires would be the air basin, watershed boundary, or extent of adjacent wildlands. Regions surrounding the WRESC Site are dominated by what appear to be agricultural farms, small residences, and undeveloped natural landscapes. Historical wildfire perimeters were researched using CAL FIRE's fire perimeters. There are no records of historic fires within a 1-mile radius of the proposed WRESC facility and associated gen-tie lines. Future projects proposed are subject to, and likely to follow, federal, state, and local laws and ordinances for wildfire mitigation. As discussed in this section, the WRESC will not be located within an SRA, and mitigation measures

for wildfire have been established, wildfire risk and associated potential impacts of the Project are not expected to be cumulatively considerable.

5.16.3 Best Practices, Design Features, and Mitigation Measures

The use of BMPs will reduce the likelihood of potential incidents involving wildfire. A discussion of Project design features and BMPs to reduce construction-related drainage and subsequent erosion impacts can be found in Section 5.15, Water Resources. Fire and explosion hazards and mitigation measures are discussed in Section 5.5.2.3.4 of Section 5.5, Hazardous Materials. General industry health, safety, and environmental BMPs will be implemented by construction personnel. The following BMPs are designed to reduce incidents involving wildfire ignition:

- Trees or other vegetation that make contact with or cross within flash-over distance of transmission lines can cause phase-to-phase or phase-to-ground electrical arcing, fire ignition, or local, regional, or cascading, grid-level service interruption (PG&E 2023). Routine vegetation inspections near the Project's gen-tie lines will be carried out, and vegetation will be cleared as appropriate to reduce ignition risk.
- Additional aerial and LiDar inspections may be carried out at the height of the vegetation growing season and the most active part of the fire season on at-risk sections of the gen-tie lines. Mitigation measures should include LiDAR inspection, visual verification of findings, and mitigation of vegetation encroachments. This would allow complete supplemental assessment of potential vegetation growth following seasonal rain to reduce risk of potential ignitions.
- Routine vegetation and infrastructure inspections may be carried out on the entire gen-tie line to verify adequate clearance between gen-tie lines and fuel sources, as well as identifying damages to gen-tie lines that may increase fire risk.
- The area around the facility should be routinely assessed to identify potential flammable fuels and vegetation for removal to decrease potential for ignition and fire spread outside the facility. This would improve structure defense capabilities for local fire fighters by ensuring adequate defensible space between critical infrastructure and vegetation.
- Underground options for gen-tie lines would also reduce the risk of ignition by removing the possibility of sparks to encounter vegetation.
- Water suppression system at the facility should be used to contain and extinguish fires.
- Within the facility, risk of chemical explosions or fires due to the combined presence of air and flammable chemicals could be reduced by ensuring that contents within the A-CAES system always flow in designed routes and directions. Alternatives to flammable materials used during facility operations can also be considered to mitigate fire risk (Zhang et al. 2023).
- Flammable materials and equipment should be enclosed in ignition-resistant housing, stored underground, or treated with a fire retardant (FEMA 2008). When possible, fire-resistant materials should be used.

In the unlikely event of an ignition, the KCFD would be notified. All response activities will comply with federal, state, and local ordinances. With competent and trained personnel, small fires can be contained and extinguished immediately. Large fires would require reporting to local emergency contacts. A designated onsite health and safety person will be responsible for implementing health and safety guidelines. Onsite personnel will call local fire and emergency services in the event of a fire or injury.

As required by California Code of Regulations (CCR) Title 8 (344.20), licensed lead construction personnel will perform controlled detonations. The Applicant's contractors will establishing and implement safety plans and BMPs used during construction. WRESC construction personnel will store explosives in the proper magazine type, as outlined in California Occupational Safety and Health Administration Title 8; California Division of Industrial Safety, subchapter 7, General Industry Safety Orders, Group 18; Explosives and Pyrotechnic, Article 114, Storage of Explosives. Specifically, caps and detonators will be stored in separate magazines away from other explosives to prevent accidents. All use of explosives will occur underground, will comply with all applicable state regulations (cited above) and federal regulations (27 Code of Federal Regulations [CFR] Part 555 and Mine Safety and Health Administration CFR Title 30 Chapter I), and will not impact surface resources.

BMPs will be implemented during the cavern construction phase to reduce risk of accidental fire and explosion and include the following:

- No smoking or open flames will be permitted within 50 feet of explosive handling.
- No source of ignition, except during firing, will be permitted in the areas containing loaded holes.
- Only non-sparking tools will be used for opening containers and explosives.
- Explosives will be kept clear of electrical circuits by at least 25 feet.
- Unused explosives will be returned promptly to the magazine.
- A tally sheet at each magazine stored onsite will record all movement of explosives.
- All loaded holes and explosives during controlled detonations will be attended.

5.16.3.1 Monitoring

WRESC personnel will regularly inspect all wildfire risk facility elements for compliance with applicable federal, state, and local regulations and will ensure that any deficiencies are promptly resolved. In addition to compliance with the California Energy Commission's certification, the WRESC will also work cooperatively with KCFD and the Kern County Fire Prevention Office.

5.16.4 Laws, Ordinances, Regulations, and Standards

Wildfire risk at the WRESC will be governed by laws, ordinances, regulations, and standards established and enforced at the federal, state, and local levels. Applicable laws are addressed and described below and summarized in **Table 5.16-1.**

5.16.4.1 Federal Laws, Ordinances, Regulations, and Standards

5.16.4.1.1 National Fire Plan

The National Fire Plan (NFP) was created to address fire protection strategies for rural communities. Together, the U.S. Department of Agriculture, Forest Service and the U.S. Department of the Interior are working to implement key points outlined in the NFP, including firefighting, rehabilitation and restoration, hazardous fuel reduction, forest health management, rural and community assistance, accountability, and research and development (USDA 2002).

There are no requirements in the NFP that pertain to the WRESC.

5.16.4.1.2 National Cohesive Wildland Fire Management Strategy

The Federal Wildland Fire Management Policy is intended to provide strategic consistency among federal agency fire management programs focusing on restoring and maintaining landscapes, creating fire adapted communities, and responding to fire. The Guidance for Implementation of Federal Wildland Fire Management Policy (USFS et al. 2009) replaces the Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy (National Association of State Foresters et al. 2003) and clarifies changes that have occurred since 2003, while providing revised direction for consistent implementation of the Review and Update of the 1995 Federal Wildland Fire Management Policy (USDOI 2001).

There are no requirements in the Federal Wildland Fire Management Policy that pertain to the WRESC.

5.16.4.1.3 North American Electric Reliability Corporation Standards

To improve the reliability of regional electric transmission systems, the North American Electric Reliability Corporation (NERC) developed a transmission vegetation management program for all transmission lines operated at 200 kV and above, and to lower-voltage lines designated by the Regional Reliability Organization as critical to the reliability of the regional electrical system. Developed in 2006, requirements of the program govern clearances between vegetation and any overhead, ungrounded supply conductors must be identified and documented while considering transmission line voltage; effects of ambient temperature on conductor sag under maximum design loading; fire risk; line terrain and elevation; and effects of wind velocity on conductor sway. The

clearances between vegetation and transmission lines identified must be no less than those set forth in Institute of Electrical and Electronics Engineers Standard 516-2003.

Gen-tie lines associated with the WRESC will comply with NERC standards.

5.16.4.2 State Laws, Ordinances, Regulations, and Standards

California laws and regulations relevant to wildfire risks at the WRESC facility are discussed in the sections below.

5.16.4.2.1 Fire Hazard Severity Zones

CAL FIRE is required by law to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. FHSZ maps influence how people construct buildings and protect property to reduce risk associated with wildland fires. FHSZs are divided into SRAs, where the state has financial responsibility for wildland fire protection, and local responsibility areas (LRAs), where local governments have financial responsibility for wildland fire protection. Homeowners living in an SRA are responsible for ensuring that their property follows California's building and fire codes. Only lands zoned for very high fire hazard are identified within LRAs.

The WRESC and associated facilities will not be located within an FHSZ and therefore are not subject to any FHSZ requirements.

5.16.4.2.2 California Public Utilities Commission General Order

The CPUC regulates private investor-owned utilities (IOUs) in the state of California, including electric power companies like SCE, as well as natural gas, telecommunications, and water companies. Rules established by the CPUC are called "General Orders." SCE's construction of the electrical connections to its infrastructure, Project substation, and interconnection facilities would be subject to the CPUC General Orders because SCE is an IOU. Aspects of the Project to be constructed by the Applicant, such as the WRESC facility, would not be subject to the General Orders because the Applicant is not an IOU. Additional information on CPUC LORS can be found in Chapter 3, Electric Transmission.

Fire Protection in California Fire Code and Public Resources Code

The California Fire Code is contained within CCR Title 24, Part 9. Based on the International Fire Code, the California Fire Code was created by the California Buildings Standards Commission and regulates the use, handling, and storage requirements for hazardous materials at fixed facilities. Like the International Fire Code, the California Fire Code and the California Building Code use a hazards classification system to determine the appropriate measures to incorporate to protect life and property. The Public Resources Code (PRC) includes fire safety provisions that apply to SRAs during the time of year designated as having hazardous fire conditions. During the fire hazard season these regulations restrict the use of equipment that may produce a spark, flame, or fire; require the use of spark arrestors on equipment that has an internal combustion engine; specify requirements for the safe use of gasoline-powered tools in fire hazard areas; and specify fire-suppression equipment that must be provided on site for various types of work in fire-prone areas.

Additional codes require that any person who owns, controls, operates, or maintains any electrical transmission or distribution line must maintain a firebreak clearing around and adjacent to any pole, tower, and conductors that carry electric current as specified in PRC §§4292 and 4293. Section 4292 requires that a 10-foot zone around the base of poles be cleared of all flammable vegetation. The state's Fire Prevention Standards for Electric Utilities (14 CCR §§1250–1258) provide specific exemptions from electric pole and tower firebreak and electric conductor clearance standards and specifies when and where standards apply. PRC §4119 authorizes CAL FIRE or its authorized agent to inspect properties to determine whether they comply with state forest and fire laws, regulations, or use permits. Section 4427 limits the use of any motor, engine, boiler, stationary equipment, welding equipment, cutting torches, tarpots, or grinding devices that may generate a spark or flame if the equipment is located on or near forested land or land covered in brush or grass. Section 4427 establishes requirements such as clearing flammable material within 10 feet of the area of operation, as well as carrying of fire response equipment such as a shovel, backpack pump water type fire extinguisher. PRC §4428 limits industrial operations by requiring certain firefighting equipment to be used when operating internal combustion

engines on or near land covered by forest brush or grass between April 1 and December 1 of any year, or other times when ground litter and vegetation could sustain combustion and facilitate the spread of fire. Section 4428 requires that such work provide and maintain the following tools:

- A sealed box of tools containing a backpack pump-type fire extinguisher filled with water, two axes, two McLeod fire tools, and a shovel for each worker onsite must be in near the operating area in a manner that would be accessible in the event of a fire.
- At least one serviceable chainsaw or timber felling tools must be provided and maintained.
- Each passenger vehicle must be equipped with a shovel and an ax, and every other vehicle or tractor must have a shovel.

PRC §4431 requires users of gasoline-fueled internal combustion–powered equipment located within 25 feet of forest, brush, or grass to keep firefighting tools at the immediate location of use. The Director of Forestry and Fire Protection administers and specifies the type and size of fire extinguisher necessary to provide at least minimum assurance of controlling fire caused by use of portable power tools under various climatic and fuel conditions. In addition, Section 4442 restricts the use and operation of any internal combustion engine that uses hydrocarbon fuels on any forest, brush, or grass areas unless the engine is equipped with a spark arrestor, as defined in PRC §4442(c) and pursuant to §4443.

The Applicant will adhere to the requirements set forth in the California Fire Code and PRC.

Defensible Space and the Fire Safe Regulations

State law requires a minimum clearance (defensible space) of 100 feet around structures (PRC §§4290, 4291). Implementing regulations (the “Fire Safe Regulations”) provide related requirements to be implemented in an SRA, including road standards for fire equipment access (14 CCR §1273 et seq.); standards for signs identifying streets, roads, and buildings (14 CCR §1274 et seq.); requirements for minimum private water supply reserves for emergency fire use (14 CCR §1275 et seq.); and requirements for fuel breaks such as defensible space and greenbelts (14 CCR §§1272, 1276 et seq.).

The Applicant will adhere to the requirements set forth in defensible space and fire safe regulations.

5.16.4.2.3 Fire Management Plans

CAL FIRE requires counties within the state to develop fire protection management plans that address potential threats of wildland fires. The Kern County Wildland Fire Management Plan identifies federal, State, and local responsibility areas for the entire County to facilitate coordination efforts for fire protection services. The WRESC Site is sparsely vegetated and not within an area identified by CAL FIRE as having high or very high fire risk, as determined by the Kern County General Plan and CAL FIRE (Kern County 2022).

CAL FIRE has developed an individual Unit Fire Management Plan for each of its 21 units and six contract counties. These plans address citizen and firefighter safety, watersheds and water, timber, wildlife and habitat (including rare and endangered species), unique areas (scenic, cultural, and historic), recreation, range, structures, and air quality. They also includes stakeholder contributions and priorities and identify strategic areas for pre-fire planning and fuel treatment as defined by the people who live and work with the local fire issues. The WRESC will falls within CAL FIRE’s Kern County Management Unit and thus be covered by the Kern County Unit Fire Management Plan (KCFD 2023a).

The Applicant will adhere to the requirements set forth in the Fire Management Plan.

5.16.4.3 Local Laws, Ordinances, Regulations, and Standards

5.16.4.3.1 Kern County General Plan

The WRESC will adhere to all policies in the Kern County General Plan, Section 4.6 Wildland and Urban Fire (Kern County 2009). The following policies and implementation measures for Kern County were identified:

- ***Policy 1.*** *Require discretionary projects to assess impacts on emergency services and facilities.*

- ***Policy 2.*** *The County will encourage the promotion of public education about fire safety at home and in the work place.*
- ***Policy 3****. The County will encourage the promotion of fire prevention methods to reduce service protection costs and costs to taxpayers.*
- ***Policy 4.*** *Ensure that new development of properties have sufficient access for emergency vehicles and for the evacuation of residents.*
- ***Policy 5.*** *Require that all roads in wildland fire areas are well marked, and that homes have addresses prominently displayed.*
- ***Policy 6.*** *All discretionary projects shall comply with the adopted Fire Code and the requirements of the Fire Department.*
- ***Implementation Measure A.*** *Require that all development comply with the requirements of the Kern County Fire Department or other appropriate agency regarding access, fire flows, and fire protection facilities.*
- ***Implementation Measure B.*** *The provision of an adequate water supply for firefighting purposes should be encouraged for all housing areas where an inadequate supply now exists.*

The WRESC will adhere to all applicable provisions included in the General Plan.

5.16.4.3.2 Kern County Community Wildfire Protection Plan

The Kern County Community Wildfire Protection Plan (CWPP) enables local communities to improve wildfire mitigation capacity while working with government agencies to identify high fire risk areas and prioritize areas for mitigation, fire suppression, and emergency preparedness. The CWPP enhances public awareness by helping residents better understand the natural and human-caused risk of wildfires that threaten lives, safety, and the local economy.

According to the 2003 Healthy Forests Restoration Act the minimum requirements for a CWPP are:

- Collaboration: Local and State government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP.
- Prioritized Fuel Reduction: A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments and recommend the types and methods of treatment that will protect one or more communities at risk and their essential infrastructures.
- Treatments of Structural Ignitability: A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan (Society of American Foresters 2004).

The 2022 Kern County CWPP provides County-wide wildfire risk and protection and brings together the responsible wildfire management and suppression entities in the county to support planning and implementation of the necessary mitigation measures (Kern County 2022).

The WRESC will adhere to all applicable provisions included in the CWPP.

5.16.4.3.3 Kern County 2023 Strategic Fire Plan

The Kern County 2023 Strategic Fire Plan aims to safeguard people, property, and resources within the county (KCFD 2023a). This plan documents the assessment of the wildland fire situation throughout all SRAs within the county. It includes stakeholder contributions and priorities and identifies strategic targets for pre-fire solutions as defined by the people who live and work with the local fire problem. The goal of the plan is to reduce costs and losses from wildfire by protecting assets at risk through focused pre-fire management prescriptions and increasing initial attack success. The Kern County 2023 Strategic Fire Plan systematically assesses the existing levels of wildland protection services and identify high-risk and high-value areas that are potential locations for costly and damaging wildfires. The plan then ranks the areas in terms of priority needs and prescribe what can be done to reduce future costs and losses.

The WRESC will adhere to all applicable provisions included in the Strategic Fire Plan.

5.16.4.3.4 Kern County Fire Hazard Reduction Program

Per the Fire Hazard Reduction Program, the KCFD will send out a “Notice to Abate Fire Hazard” to all Kern County property owners whose properties are located within SRAs. Property owners in these areas are required to perform fire hazard reduction clearance by June 1 of every year and maintain their property free of fire hazards or nuisance vegetation year-round (KCFD 2023c).

The WRESC will adhere to all applicable provisions included in the Fire Hazard Reduction Program.

5.16.5 Agencies and Agency Contacts

Several agencies regulate wildfire prevention, and they will be involved in regulating the wildfire risk at the WRESC. Federal, and some state, agencies discussed in this section will all be involved in wildfire regulation and prevention. However, the regulations are administered and enforced primarily through designated local agencies. Contact information is provided in **Table 5.16-2.**

Table 5.16-2: Agency Contacts for Wildfire

Agency	Contact
Kern County Fire Department Fire Prevention Office 3219 35th Street Rosamond, CA 93560 661-256-2401	General Supervisor, Station 15 (661) 256-2401

5.16.6 Permits and Permit Schedule

The Kern County Fire Prevention Office requires that the project developers obtain the permits listed in **Table 5.16-3**.

Table 5.16-3: Permits and Permit Schedule for Wildfire

Permit	Agency Contact	Schedule
Above Ground Storage Tank	Kern County Fire Department Fire Prevention Office 3219 35th Street Rosamond, CA 93560 661-256-2401	Submittal prior to construction and operation. Permit applications are available on the Kern County Fire Department website.

5.16.7 References

American Lung Association. 2016. How Wildfires Affect Our Health. Available at: https://www.lung.org/blog/how-wildfires-affect-health#:~:text=Dangers%20of%20wildfire%20smoke&text=Many%20of%20the%20particles%20in,and%20strokes%E2%80%94and%20can%20kill.California Governor's Office of Emergency Services. 2017. State of California Emergency Plan. Available at https://www.caloes.ca.gov/wp-content/uploads/Preparedness/Documents/California_State_Emergency_Plan_2017.pdf. Accessed November 19, 2023.

California Public Utilities Commission (CPUC). 2020. General Order Number 95, Rules for Overhead Electric Line Construction, Amended January, 2020, by D18-05-042 in R.18 and R80.1-A2.

California Public Utilities Commission (CPUC). 2017a. Decision 17-12-024- Order Instituting Rulemaking to Develop and Adopt Fire Threat Maps and Fire-Safety Regulations. Rulemaking 15-05-006. Issued December 21, 2017.

California Public Utilities Commission (CPUC). 2017b. General Order Number 165, Inspection Requirements for Electric Distribution and Transmission Facilities, Amended December 14, 2017, by D17-12-024 in R.15.05-006.

California Public Utilities Commission (CPUC). 2021. General Order Number 166, Standards for Operation, Reliability, and Safety During Emergencies and Disasters, Amended December 14, 2017, by D17-12-024 in R.15.05-006.

California Public Utilities Commission (CPUC). N.d. CPUC High Fire Threat District (HFTD). Available at: https://www.arcgis.com/apps/webappviewer/index.html?id=5bdb921d747a46929d9f00dbdb6d0fa2. Accessed November 19, 2023.

Colorado State University. 2012. Soil Erosion Control After Wildfire – 6.308. Available at: https://extension.colostate.edu/topic-areas/agriculture/soil-erosion-control-after-wildfire-6-308/. Accessed November 15, 2023.

Climate Data. Not dated. Mojave Climate. Available at: https://en.climate-data.org/north-america/united-states-of-america/california/mojave-125143/. Accessed October 12, 2023.

FEMA. 2008. Wildfire Hazard Mitigation Handbook for Public Facilities. Available at: https://www.fema.gov/sites/default/files/2020-08/fema_p_754.pdf. Accessed November 19, 2023.

IFTDSS. Not dated. Fire Behavior Fuel Models (FBFMs) and Their Environments. Available at: https://iftdss.firenet.gov/firenetHelp/help/pageHelp/content/10-mapstudio/files/fbfmsummaries.html. Accessed October 12, 2023.

Kern County Fire Department (KCFD). 2022. About – Kern County Fire Department. Available at: https://kerncountyfire.org/about-kcfd/. Accessed November 19, 2023. Kern County Fire Department (KCFD). 2023a. 2023 Strategic Fire Plan. Available at: https://34c031f8-c9fd-4018-8c5a-4159cdff6b0d-cdn-endpoint.azureedge.net/-/media/osfm-website/what-we-do/community-wildfire-preparedness-and-mitigation/fire-plan/2023/2023-kern-county-unit-fire-plan.pdf?rev=52f177ada6d94 10bb31f873646453613&hash=BA1E8217149DC5745A07128973C6EACE Accessed October 11, 2023.

Kern County Fire Department (KCFD). 2023b. Fees, Permits, Apps. Available at: https://kerncountyfire.org/fees-permits-applications/. Accessed September 13, 2023.

Kern County Fire Department (KCFD). 2023c. Fire Hazard Reduction. Available at: https://kerncountyfire.org/fire-prevention/hazard-reduction/. Accessed October 10, 2023.

Kern County. 2009. Kern County General Plan. Available at: https://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP_Complete.pdf. Accessed September 13, 2023.

Kern County. 2020. Kern Multi-Jurisdictional Hazard Mitigation Plan Executive Summary. Available at: http://mitigatehazards.com/county-of-kern/. Accessed September 13, 2023.

Kern County. 2022. Kern County Community Wildfire Protection Plan. Available at: https://www.swca.com/sites/default/files/kern_cwpp.pdf. Accessed October 10, 2023.

Kern County. Not dated. Kern County Interactive County Map (GIS Tool). Available at: https://www.kerncounty.com/government/gis-menu/interactive-county-map-gis-tool. Accessed September 13, 2023.

National Association of State Foresters, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service, Bureau of Indian Affairs, U.S. Department of Agriculture, and National Wildfire Coordinating Group. 2003. Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy. June 20, 2003. Available at: https://www.sierraforestlegacy.org/Resources/Community/SmokeManagement/AirQualityPolicy/FedWldFireMgmtPolicy.pdf.

National Park Service (NPS). 2017. Wildland Fire Behaviour. Available at: https://www.nps.gov/articles/wildland-fire-behavior.htm. Accessed June 24, 2019.

Randall, J. M., S.S. Parker, J. Moore, B. Cohen, L. Crane, B. Christian, D. Cameron, J. MacKenzie, K. Klausmeyer, and S. Morrison. 2010. Mojave Desert Ecoregional Assessment. Available at: https://www.scienceforconservation.org/assets/downloads/Mojave_Desert_Ecoregional_Assessment_2010.pdf. Accessed September 7, 2021.

Pacific Gas & Electric. 2023. 2023-2025 Wildfire Mitigation Plan. https://www.pge.com/content/dam/pge/docs/outages-and-safety/outage-preparedness-and-support/pge-wmp-r3-092723.pdf. Accessed November 20, 2023.

Society of American Foresters. 2004. Preparing a Community Wildfire Protection Plan. Available at https://www.forestsandrangelands.gov/documents/resources/communities/cwpphandbook.pdf. Accessed November 19, 2023.

Southern California Edison (SCE). 2023. 2023-2025 Wildfire Mitigation Plan. Available at: https://www.sce.com/sites/default/files/AEM/Wildfire%20Mitigation%20Plan/2023-2025/2023-03-27_SCE_2023_WMP_R0.pdf. Accessed October 10, 2023.

U.S. Department of Agriculture (USDA), 2002. FY 2002 Budget Justification. Available at: https://srwp.opennrm.org/assets/06942155460a79991fdf1b57f641b1b4/application/pdf/NFP_final32601.pdf Accessed November 15, 2023.

U.S. Department of Agriculture (USDA). Not dated. The National Strategy: The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy. Available at: https://www.forestsandrangelands.gov/strategy/thestrategy.shtml

U.S. Department of Interior (USDOI), 2001. Review and Update of the 1995 Federal Wildland Fire Management Policy. Available at: https://www.doi.gov/sites/doi.gov/files/uploads/2001-wfm-policy-review.pdf. January 2001. Accessed November 15, 2023.

U.S. Environmental Protection Agency (EPA). 2007. Developing Your Stormwater Pollution Prevention Plan – A Guide for Construction Sites. Available at: https://www3.epa.gov/npdes/pubs/sw_swppp_guide.pdf. Accessed November 8, 2023.

U.S. Forest Service, U.S. Bureau of Land Management, Bureau of Indian Affairs, U.S. Fish and Wildlife Service, and National Park Service. 2009. Guidance for Implementation of Federal Wildland Fire Management Policy. February 13, 2009. Available online at: https://www.doi.gov/sites/doi.gov/files/uploads/2009-wfm-guidance-for-implementation.pdf. Accessed November 19, 2023.

U.S. Geological Survey. 2023. Water Quality after Wildfire. https://www.usgs.gov/mission-areas/water-resources/science/water-quality-after-wildfire. Accessed November 15, 2023.

Western Fire Chiefs Association. 2023. California Fire Season: In-Depth Guide. Available at: https://wfca.com/wildfire-articles/california-fire-season-in-depth-guide/#:~:text=Fires%20are%20possible%20throughout%20the%20year%20in%20California%2C,late%20spring%20%28May-June%29%20and%20runs%20until%20October.%201. Accessed November 8, 2023.

Western Regional Climate Center (WRCC). 2016. MOJAVE, CALIFORNIA (045756) Period of Record Monthly Climate Summary. Available at: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5756. Accessed October 12, 2023.

Western Regional Climate Center (WRCC). 2023. Wind Information. Available at: https://wrcc.dri.edu/Climate/wind.php. Accessed on October 12, 2023.

Zhang, A., Z. Yin, Z. Wu, M. Xie, Y. Liu, and H. Yu. 2023. Investigation of the Compressed Air Energy Storage (CAES) System Utilizing Systems-theoretic Process Analysis (STPA) Towards Safe and Sustainable Energy Supply. Available at: https://www.sciencedirect.com/science/article/pii/S0960148123002501.

5.17 Worker Health and Safety

GEM A-CAES LLC's (GEM, the Applicant) Willow Rock Energy Storage Center (WRESC, or Willow Rock) will be located on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated, southeastern Kern County, California. The WRESC will be a nominal 520-megawatt (MW) gross (500 MW net) and 4,160 megawatt-hour (MWh) gross (4,000 MWh net) facility using Hydrostor, Inc.'s (Hydrostor's) proprietary, advanced compressed air energy storage (A-CAES) technology. Energy stored at the WRESC will be delivered to Southern California Edison's (SCE's) Whirlwind Substation located southwest of the WRESC at the intersection of 170th Street W and Rosamond Boulevard, via a new approximately 19-mile 230-kilovolt (kV) generation-tie (gen-tie) line.

This section summarizes worker health and safety issues that may be encountered during construction and operation of the proposed WRESC. Because of the subject matter, this section follows a slightly different format than other sections in Chapter 5. Instead of a standard discussion of affected environment followed by the Project's environmental consequences and proposed mitigation measures for significant impacts, this section contains worker safety information, including the laws, ordinances, regulations, and standards (LORS) that apply to the WRESC Project. Section 5.17.1 contains a brief description of the work environment and setting. Section 5.17.2 describes the health and safety programs in terms of analyses conducted to identify hazards and the safety compliance and training programs that will be established onsite. Section 5.17.3 discusses the applicable LORS. Section 5.17.4 lists the regulatory agencies involved and key agency contacts. Section 5.17.5 provides information regarding required permits and permitting schedules. The WRESC will be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

5.17.1 Setting

The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of assessor's parcels referred to as P1, P2N, P2S, and VH.

5.17.2 Health and Safety Program

5.17.2.1 Environmental Checklist

Impacts would normally be evaluated with respect to the California Environmental Quality Act checklist, which does not include specific questions for worker health and safety. Related questions are addressed in Section 5.5, Hazardous Materials Management, and Section 5.7, Noise.

5.17.2.2 Hazard Analysis

Workers at the WRESC will be exposed to plant construction, operation conditions, and activities that pose potential safety hazards. A hazard analysis is included to evaluate the hazards and assess control measures. The analysis identifies the hazards anticipated during construction and operation and indicates which safety programs should be developed and implemented to avoid, mitigate, and appropriately manage those hazards. The hazard analysis for construction activities is presented in **Table 5.17-1**; the hazard analysis prepared for plant operation is presented in **Table 5.17-2**. The types of hazards anticipated during plant construction and operation are similar, so there is duplication between the tables. Programs are overall plans that set forth the method or methods that will be followed to achieve particular health and safety objectives. For example, the Fire Protection and Prevention Program will describe what is necessary to protect against and prevent fires. This will include the equipment required, such as alarm systems and firefighting equipment, and procedures to follow to protect against fires. The Emergency Action Program/Plan will describe evacuation procedures, muster points, rescue and medical protocols, alarm and communication systems, operational upsets, and response procedures for

every hazardous material spill. The programs or plans will be in written and electronic formats that will be stored at specific locations in the facility and readily available to staff and first responders.

Each program or plan will contain job-specific training requirements that are translated into detailed training courses. These courses will be taught to plant construction and operating personnel as needed. For example, all plant operating personnel will receive training in evacuation procedures under the Emergency Action Program/ Plan, but only personnel working with flammables will receive training under the Fire Protection and Prevention Program.

Table 5.17-1 and **Table 5.17-2** list construction and operation activities and associated hazards, respectively, and the tables show the program designed to reduce the occurrence of each hazard (in the Control column).

Table 5.17-1: Construction Hazard Analysis for the Willow Rock Energy Storage Center

Activity	Hazard [a, b]	Control
Motor vehicle and heavy equipment use	▪ *Employee injury and property damage from collisions between people and equipment*	▪ *Motor Vehicle and Heavy Equipment Safety Program*
Forklift operation	▪ *Same as heavy equipment*	▪ *Forklift Operation Program*
Trench and excavation	▪ *Employee injury and property damage from the collapse of trenches and excavations or exposure to fumes or vapors that have collected in the trench/excavation* ▪ *Trench/excavation specifics for Valley Fever*	▪ *Excavation/Trenching Program* ▪ *Confined Space Training*
Working at elevated locations	▪ *Falls from the same level and elevated areas*	▪ *Fall Prevention Program* ▪ *Scaffolding/Ladder Safety Program* ▪ *Articulating Boom Platforms Program* ▪ *Working at Heights Awareness Training*
Using cranes and derricks	▪ *Property damage from falling loads* ▪ *Employee injuries from falling loads* ▪ *Injuries and property damage from contact with crane or derrick* ▪ *Inclement weather*	▪ *Crane and Material Handling Program* ▪ *Critical Lift Studies, as necessary* ▪ *Crane Operator Certification*
Working with flammable and combustible liquids	▪ *Fire/spills*	▪ *Fire Protection and Prevention Program* ▪ *Housekeeping and Material Handling and Storage Program*
Hot work (including cutting and welding)	▪ *Employee injury and property damage from fire* ▪ *Exposure to fumes during cutting and welding* ▪ *Ocular exposure to ultraviolet and infrared radiation during cutting and welding*	▪ *Hot Work Safety Program* ▪ *Respiratory Protection Program* ▪ *Employee Exposure Monitoring Program* ▪ *PPE Program* ▪ *Fire Protection and Prevention Program*
Inspection and maintenance of temporary systems used during construction activities	▪ *Employee injury and property damage from contact with hazardous energy sources* ▪ *(e.g., electrical, thermal, and mechanical)*	▪ *Electrical Safety Program* ▪ *Lock-out/Tag-out Program*
Working on electrical equipment and systems	▪ *Employee contact with live electricity and energized equipment*	▪ *Electrical Safety Program* ▪ *PPE Program*

Activity	Hazard [a, b]	Control
Exposure to hazardous waste	▪ *Personnel who are working with or have the potential to be exposed to contaminated soil, groundwater, or debris during construction*	▪ *Hazardous Waste Program*
Confined space entry	▪ *Employee injury from physical and chemical hazards*	▪ *Permit-required, Confined-space Entry Program*
General construction activity	▪ *Employee injury from hand and portable power tools*	▪ *Hand and Portable Power Tool Safety Program* ▪ *PPE Program* ▪ *Powder-actuated Tools Program*
	▪ *Employee injury/property damage from inadequate walking and work surfaces*	▪ *Housekeeping and Material Handling and Storage Program*
	▪ *Employee exposure to occupational noise*	▪ *Hearing Conservation Program* ▪ *PPE Program*
	▪ *Employee injury from improper lifting and carrying materials and equipment*	▪ *Back Injury Prevention Program*
	▪ *Employee injury to head, eye/face, hand, body, foot, and skin*	▪ *PPE Program*
	▪ *Employee exposure to hazardous gases, vapors, dusts, and fumes*	▪ *Hazard Communication Program* ▪ *Respiratory Protection Program* ▪ *PPE Program* ▪ *Air Monitoring Program*
	▪ *Employee exposure to various hazards* ▪ *Employee exposure to airborne disease* ▪ *Reporting of hazardous conditions during construction*	▪ *Injury and Illness Prevention Program*
	▪ *Heat and cold stress*	▪ *Heat and Cold Stress Monitoring and Control Program*
Construction and testing of high-pressure steam and air systems	▪ *Employee injury and property damage attributable to failure of pressurized system components or unexpected release of pressure*	▪ *Pressure Vessel and Pipeline Safety Program* ▪ *Electrical Safety Program* ▪ *Lock-out/Tag-out Program*
Use of explosives	▪ *Employee injury and property damage from contact with explosive energy sources* ▪ *Regulatory non-compliance* ▪ *Post-blast air quality – reentering excavation before blast gases have cleared* ▪ *Unexploded blasting caps or initiators fire off during mucking operation* ▪ *Damage to life and property due to improper storage and transport of explosives* ▪ *Secure storage and inventory of explosives to prevent theft*	▪ *Explosive Control Plan* ▪ *Housekeeping and Material Handling and Storage Program* ▪ *Post-Blast Ventilation Protocol* ▪ *Post-Blast Muck Pile Inspection* ▪ *ATF Regulations – Storage and Transport of Explosives* ▪ *ATF Regulations – Storage and Transport of Explosives*

Activity	Hazard [a, b]	Control
Underground excavation activities	▪ *Employee injury from inadequate ground control* ▪ *Employee injury from underground fire* ▪ *Employee injury from slips, trips, and falls* ▪ *Employee injury and property damage from loose wall rock falls* ▪ *Employee injury due to poor atmospheric conditions related to equipment exhaust* ▪ *Employee injury due to equipment striking employee* ▪ *Employee injury due to employees entering sump areas* ▪ *Employee injury while working in shaft areas* ▪ *Employee injury due to inhalation of silica*	▪ *Underground Ground Control Plan* ▪ *Inspection and Monitoring Plan for Reporting of Ground Conditions* ▪ *Hazard Communication Plan* ▪ *Housekeeping Plan* ▪ *Inspection and Scaling Plan* ▪ *Ventilation Plan* ▪ *Pedestrian Travel Plan* ▪ *Confined Space Entry Plan* ▪ *Fall Protection Plan* ▪ *Dust Control Plan* ▪ *Injury and Illness Prevention Plan*
Shaft Drilling	▪ *Employee injury due to rotating equipment* ▪ *Explosive gas mixture encountered while drilling* ▪ *Employee injury due to equipment failure during heavy lift operations*	▪ *Physical Barriers* ▪ *Atmospheric Monitoring Plan* ▪ *Critical Lift Plan*
Valley Fever Spore Potential Exposure From Fugitive Dust	▪ *Employee acute or chronic respiratory illness associated with Valley Fever*	▪ *Valley Fever Awareness Training* ▪ *Fugitive Dust Minimization Plan*
Working Near Water	▪ *Employee injury when working near reservoir (slips, trips, or falls)*	▪ *Fall Protection Plan* ▪ *Working near Water Hazards Training* ▪ *Life Safety Vest (PPE) training*
Working Outdoors/Remote	▪ *Employee injury when working alone outdoors* ▪ *Lightning strike during a storm*	▪ *Working Alone / Man Down Plan* ▪ *Lightening Procedure*

[a] *The hazards and hazard controls provided are generic to construction activities. During various phases of construction, additional hazard analysis will be performed to evaluate the relevant hazards more specifically and to develop appropriate controls.*

[b] *Because neither construction nor operation of the Willow Rock facility will involve contact with groundwater, it will have no contact with contaminated groundwater.*

ATF = Bureau of Alcohol, Tobacco, Firearms, and Explosives; PPE = personal protective equipment

Table 5.17-2: Operation Hazard Analysis for the Willow Rock Energy Storage Facility

Activity	Hazard [a]	Control
Motor vehicle and heavy equipment use	▪ *Employee injury and property damage from collisions between people and equipment*	▪ *Motor Vehicle and Heavy Equipment Safety Program*
Forklift operation	▪ *Same as heavy equipment*	▪ *Forklift Operation Program*
Trench and excavation	▪ *Employee injury and property damage from the collapse of trenches and excavations*	▪ *Excavation/Trenching Program* ▪ *Confined Space Training*
Working at elevated locations	▪ *Falls from the same level and elevated areas*	▪ *Fall Prevention Program* ▪ *Scaffolding/Ladder Safety Program* ▪ *Working at Heights Training*
Using cranes and derricks	▪ *Property damage from falling loads.* ▪ *Employee injuries from falling loads.* ▪ *Injuries and property damage from contact with crane or derrick*	▪ *Crane and Material Handling Program* ▪ *Critical Lift Studies, as necessary* ▪ *Crane Operator Certification*
Working with flammable and combustible liquids	▪ *Fire/spills*	▪ *Fire Protection and Prevention Program*
Working with hazardous materials	▪ *Employee injury (chemical burns, inhalation, digestion, absorption)*	▪ *Safe Use Handling Procedures* ▪ *Job-Specific Training* ▪ *PPE Program* ▪ *Spill Response Procedures* ▪ *Emergency Response Program*
Hot work (including cutting and welding)	▪ *Employee injury and property damage from fire* ▪ *Exposure to fumes during cutting and welding* ▪ *Ocular exposure to ultraviolet and infrared radiation during cutting and welding*	▪ *Hot Work Safety Program* ▪ *Respiratory Protection Program* ▪ *Employee Exposure Monitoring Program* ▪ *PPE Program* ▪ *Fire Protection and Prevention Program* ▪ *Hexavalent Chromium Program*
Troubleshooting and maintenance of plant systems and general operational activities	▪ *Employee injury and property damage from contact with hazardous energy sources (e.g., electrical, thermal, and mechanical)*	▪ *Electrical Safety Program* ▪ *Lock-out/Tag-out Program*
Working on electrical equipment and systems	▪ *Employee contact with live electricity*	▪ *Electrical Safety Program* ▪ *PPE Program*
Confined space entry	▪ *Employee injury from physical and chemical hazards*	▪ *Confined-space Program*

Activity	Hazard [a]	Control
General plant operation activities	▪ *Employee injury from hand and portable power tools*	▪ *Hand and Portable Power Tool Safety Program* ▪ *PPE Program*
	▪ *Employee injury and property damage from inadequate walking and work surfaces*	▪ *Housekeeping and Material Handling and Storage Program*
	▪ *Employee overexposure to occupational noise*	▪ *Hearing Conservation Program* ▪ *PPE Program*
	▪ *Employee injury from improper lifting and carrying materials and equipment*	▪ *Back Injury Prevention Program*
	▪ *Employee injury and property damage from unsafe driving*	▪ *Safe Driving Program*
	▪ *Employee overexposure to hazardous gases, vapors, dusts, and fumes* ▪ *Employee exposure to airborne disease*	▪ *Hazard Communication Program* ▪ *Respiratory Protection Program* ▪ *PPE Program* ▪ *Employee Exposure Monitoring Program* ▪ *Injury and Illness Prevention Program*
	▪ *Reporting and repairing hazardous conditions*	▪ *Injury and Illness Prevention Program*
	▪ *Heat and cold stress*	▪ *Heat and Cold Stress Monitoring and Control Program*
	▪ *Ergonomic injuries*	▪ *Ergonomic Awareness Program*
Maintaining and repairing high-pressure systems	▪ *Employee injury and property damage due to failure of pressurized system components or unexpected release of pressure*	▪ *Pressure Vessel and Pipeline Safety Program* ▪ *Electrical Safety Program* ▪ *Lock-out/Tag-out Program*
Housekeeping (General)	▪ *Electrostatic charge from use of vacuum trucks* ▪ *Dust and airborne risk - filter change out on filter houses*	▪ *Respirator Training* ▪ *Grounding Procedures*
Valley Fever Spore Potential Exposure From Fugitive Dust	▪ *Employee acute or chronic respiratory illness associated with Valley Fever*	▪ *Valley Fever Awareness Training*
Working near Water	▪ *Employee injury when working near reservoir (slips trips fall),*	▪ *Fall Protection Plan* ▪ *Working near water hazards* ▪ *Life Safety Vest (PPE) training* ▪ *Life Saving Stations at regular intervals*
Working Outdoors	▪ *Employee working alone outdoors could suffer an injury* ▪ *Lightning strike during a storm*	▪ *Working Alone / Man Down plan* ▪ *Lightning Procedure* ▪ *Heat Stress Training and Management*

Activity	Hazard [a]	Control
Biological Hazards	▪ *Wildlife Hazards* ▪ *Flora* ▪ *COVID-19 Impacts*	▪ *Emergency Response Plan* ▪ *Working Alone / Man Down Plan* ▪ *Pest Management Protocol* ▪ *Vector Management Program* ▪ *Poison Species Awareness Program for Employees* ▪ *Hygiene Program*

[a] *The hazards and hazard controls provided are generic to operations. During various phases of operation, additional hazard analysis will be performed to evaluate the relevant hazards more specifically and to develop appropriate controls.*

PPE = personal protective equipment

5.17.2.3 Training and Safety Programs

To protect the safety and health of workers during the construction and operation of the WRESC, LLC will implement health and safety programs designed to mitigate hazards and comply with applicable regulations. Periodic audits will be performed by qualified individuals to determine whether proper work practices are being used to mitigate hazardous conditions and to evaluate regulatory compliance.

Rock samples were collected throughout the anticipated cavern interval from three core holes drilled at the proposed cavern site. The average quartz content is 26%, which indicates it is likely exposure to respirable crystalline silica will occur and steps will need to be taken to limit worker exposure during construction. Dust control measures may involve wet drilling, wetting faces before blasting, delaying re-entry into areas of controlled detonation, and water spray for crushers and haul roads, et.al. (Lane 2024 provided in Appendix 1A). A section on Silica Dust will be included in the Dust Control Plan.

The WRESC Site is in an area that is highly endemic for the infectious disease known as “Valley Fever.” This area yields concentrated fungus spores—specifically, the Coccidioides ssp. spores—within the soil that are easily released as an airborne illness during construction activities. The Project will include mitigation measures compliant with Kern County’s Air Quality Conditions—specifically, the creation of a fugitive dust control plan—prior to commencement of construction activities. In addition, both construction workers and operational staff will receive Valley Fever Awareness Training that conforms to Kern County requirements.

The following subsections contain information on the anticipated content of the health and safety programs.

5.17.2.3.1 Construction Health and Safety Program

The following construction safety programs will be developed and implemented during construction of the WRESC:

- **Injury and Illness Prevention Program**
  - Philosophy and safety commitment
  - Safety leadership and responsibilities
  - Accountability
  - Specific core safety processes (see Construction Safety Programs in this subsection)
  - Employee communication
  - Planning “job hazard analysis and pre-task”
  - Compliance with work rules and safe work practices and corrective action measures
  - Measurement of compliance and effectiveness of prevention methods, and inspections/audits
  - Procedures to investigate occupational injury and illness
  - Procedures to correct unsafe or unhealthy conditions, work practices and work procedures in a timely manner

- Communication of performance and implementation of necessary improvements
- Training and other communication requirements
- Documentation and accessibility of records

- **Fire Protection and Prevention Program**
  - General requirements
  - Housekeeping and proper material storage
  - Employee alarm/communication system
  - Portable fire extinguishers
  - Fixed firefighting equipment
  - Fire control and containment
  - Flammable and combustible liquid storage
  - Dispensing and disposal of flammable liquids
  - Service and refueling areas
  - Training and other communication requirements
  - Documentation and accessibility of records
- **Personal Protective Equipment (PPE) Program**
  - Personal protective devices
  - Hazard analysis
  - Training
  - Head protection
  - Eye/face protection
  - Body protection
  - Hand protection
  - Foot protection
  - Skin protection
  - Fall protection
  - Electrical arc flash protection
  - Respiratory protection
  - Hearing protection
- **First Aid, CPR, and Automated External Defibrillator**
  - General requirements
  - Written program
  - Training
  - Maintenance/inspections of equipment
- **Emergency Action Program/Plan**
  - Emergency procedures for the protection of personnel, equipment, the environment, and materials:
    - Emergency evacuation types and alarm descriptions
    - Site assembly procedures
    - Emergency evacuation routes and procedures
    - Procedures to employees designated to keep critical operations onsite
    - Fire and emergency reporting procedures

  - Response actions for accidents involving personnel and/or property
  - Bomb threat response procedures
  - Active shooter response procedures
  - Natural disaster response procedures
  - Training and regular drills
  - Documentation and accessibility of records
- Reporting and notification procedures for emergencies and contacts, including offsite and local authorities:
  - Alarm and communication systems
  - Spill response, prevention, and control action plan
  - Emergency response equipment
  - Emergency personnel (response team) responsibilities and notification roster
  - Training requirements

- **Construction Safety Programs**
  - **Motor Vehicle and Heavy Equipment Safety Program**
    - Operation and maintenance of vehicles
    - Inspection of equipment
    - PPE
    - Training of operators
    - Documentation requirements
  - **Forklift Operation Program**
    - Trained and certified operators
    - Fueling operations
    - Safe operating parameters
    - Training
    - Documentation requirements
  - **Excavation/Trenching Program**
    - Shoring, sloping, and benching requirements
    - California Division of Occupational Safety and Health (Cal/OSHA) permit requirements
    - Inspection
    - Air monitoring
    - Access and egress
  - **Fall Protection Program**
    - Evaluation of fall hazards
    - Protection devices
    - Training
    - Documentation and accessibility of records
  - **Scaffolding/Ladder Safety Program**
    - Construction and inspection of equipment
    - Proper use

  - Training
- **Articulating Boom Platforms Program**
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Operator training
  - Documentation and accessibility of records
- **Crane and Material Handling Program**
  - Certified and licensed operators
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Training
- **Hazardous Waste Program (KCEHD 2021)**
  - Evaluation of wastes
  - Management of hazardous waste onsite
  - Offsite disposal of hazardous wastes
  - Training
  - Air monitoring for tanks only
  - Medical surveillance for hazardous waste handlers
  - Health and Safety Plan preparation
  - Documentation procedures
- **Hot Work Safety Program**
  - Welding and cutting procedures
  - Acetylene and fuel gas safety procedures
  - Fire watch
  - Hot work permit
  - PPE
  - Training
  - Documentation procedures
- **Employee Exposure Monitoring Program**
  - Exposure evaluation
  - Monitoring requirements
  - Reporting of results and documentation requirements
  - Medical surveillance
  - Training
- **Electrical Safety Program**
  - Grounding procedure
  - Overhead and underground utilities safety procedures
  - Utility clearance

  - Assured Grounding Program/Ground Fault Circuit Interrupters
  - Training
  - Documentation procedures
- **Lock-out/Tag-out Program**
  - Allocation of devices (e.g., locks, tags, and adaptors)
  - Lock-out/tag-out sequencing
  - Types/magnitudes of energy
  - Types/locations of machines
  - Verification procedures
  - Training
  - Documentation procedures
- **Permit-required Confined-space Entry Program**
  - Air monitoring and ventilation requirements
  - Rescue procedures
  - Lock-out/tag-out and blocking, blinding, and blanking requirements
  - Permit completion
  - Training
  - Documentation procedures
- **Hand and Portable Power Tool Safety Program**
  - Guarding and proper operation
  - Training
- **Powder-actuated Tool Safety Program**
  - Operator qualification
  - Inspection requirements
  - Repair requirements
  - Storage requirements
  - Training
- **Housekeeping and Material Handling and Storage Program**
  - Hazardous materials storage requirements
  - Walkways and work surfaces
  - Equipment handling requirements
  - Housekeeping best practices and schedule
  - Training
  - Hazardous materials reporting and documentation
- **Hearing Conservation Program**
  - Identifying high-noise environments
  - Exposure monitoring
  - Medical surveillance requirements
  - Hearing-protective devices
  - Training

  - Documentation procedures
- **Back Injury Prevention Program**
  - Proper lifting and material handling procedures
  - Injury or Illness response and reporting procedures
  - Training
- **Hazard Communication Program (KCEHD 2021)**
  - Labeling requirements
  - Storage and handling procedures
  - Safety data sheets accessibility
  - Chemical inventory management and reporting
  - Training
  - Documentation procedures
- **Respiratory Protection Program**
  - Selection and use
  - Cleaning and Storage procedures
  - Fit testing
  - Medical requirements
  - Inspection and repair
  - Training
  - Documentation procedures
- **Heat and Cold Stress Monitoring and Control Program**
  - Monitoring requirements
  - Prevention and control
  - Awareness training/briefs
- **Pressure Vessel and Pipeline Safety Program**
  - Line-breaking program
  - Equipment inspection and maintenance
  - Blocking, bleeding, and blanking
  - Corrective action procedures
  - Training
- **Underground Safety Programs**
  - Pre- and post-blast inspection programs
  - Storage, handling, training and transportation of explosives
  - Evacuation Plan
  - Underground Fire Plan
  - Underground Water Management Plan
  - Access management
  - PPE training
  - Housekeeping Plan
  - Inspection and Scaling Plan

  - Ventilation Plan
  - Refueling Plan
  - Pedestrian Travel Plan
  - Spill Response Plan
  - Confined Space Entry Plan
  - Fall Protection Plan
  - Air Monitoring Plan
  - Dust Control Plan
  - Mobile Equipment Inspection Program
- **Site-Specific Airborne Disease Program (Valley Fever)**
  - Equipment and vehicle washdown procedures
  - Fugitive Dust Control Plan
  - Equipment staging and wind direction Guidance
  - Vehicle specifications (i.e., equipped with high-efficiency particulate [HEPA] filters)
  - Worker PPE and respirators
  - Training and documentation for Kern County Planning and Natural Resources Department

5.17.2.3.2 Operation Health and Safety Program

Upon completion of construction and commencement of operations at the WRESC, the Construction Health and Safety Plan will transition into an operation-oriented program reflecting the hazards and controls necessary during operation. The following outline sets forth the topics that will be included in the Operation Health and Safety Program:

- **Injury and Illness Prevention Program**
  - Personnel with the responsibility and authority for implementing the plan
  - Safety and health policy
  - Work rules and safe work practices
  - System for ensuring that employees comply with safe work practices
  - Employee communication procedures
  - Identification and evaluation of workplace hazards
  - Methods and/or procedures for correcting unsafe or unhealthy conditions, work practices, and work procedures in a timely manner based on the severity of the hazards
  - Specific safety procedures (see Plant Operation Safety Program)
  - Training and instruction
  - Procedures to investigate occupational injury and illness
  - How to access the Injury and Illness Prevention Plan
- **First Aid, CPR, and Automated External Defibrillator**
  - General requirements
  - Written program
  - Training
  - Maintenance of equipment
  - Documentation procedures

- **Fire Protection and Prevention Program**
  - General requirements and emergency contact information
  - Fire hazard inventory, including ignition sources and mitigation
  - Housekeeping and proper materials storage
  - Employee alarm/communication system
  - Portable fire extinguishers
  - Fixed firefighting equipment
  - Fire control
  - Flammable and combustible liquid storage
  - Use of flammable and combustible liquids
  - Dispensing and disposal of liquids
  - Training and drills
  - Personnel to contact for information on plan contents
- **Emergency Action Program/Plan (part of the Risk Management Plan and Process Safety Management Program).**
  - Emergency escape procedures and emergency escape route assignments
  - Designation of incident commander and chain-of-command
  - Procedures to be followed by employees who remain to operate critical plant operations before they evacuate
  - Procedures to account for all employees after emergency evacuation has been completed
  - Rescue and medical duties for those employees performing them
  - Fire and emergency reporting procedures
  - Alarm and communication system
  - Personnel to contact for information on plan contents
  - Training requirements and drills
  - Document accessibility
- **PPE Program**
  - Hazard analysis and designation of appropriate PPE
  - Personal protective devices for head, eye and face, body, hand, foot, and skin
  - Respiratory PPE
  - Hearing protection PPE
  - Sanitation and maintenance of PPE
  - Safety belts and lifelines for fall protection
  - Protection for electric shock
  - Medical services and first aid/bloodborne pathogens
  - Airborne pathogens PPE
  - Life safety
  - Training
- **Plant Operation Safety Program**
  - **Motor Vehicle and Heavy Equipment Safety Program**
    - Operation and maintenance of vehicles
    - Inspection

  - Washdown procedures, including requirements for protecting against Valley Fever
  - PPE
  - Training
  - Document accessibility
- **Forklift Operation Program**
  - Trained and certified operators
  - Fueling operations
  - PPE and safe operating parameters
  - Training
  - Documentation procedures
- **Excavation/Trenching Program**
  - Shoring, sloping, and benching requirements, including requirements for protecting against Valley Fever
  - Cal/OSHA permit requirements
  - Inspection
  - Air monitoring
  - Access and egress
  - Training
  - Documentation procedures
- **Fall Protection Program**
  - Evaluation of fall hazards
  - Protection devices
  - Training
- **Scaffolding/Ladder Safety Program**
  - Construction and inspection of equipment
  - Proper use
  - Training
- **Articulating Boom Platforms Program**
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Operator training
  - Documentation procedures
- **Crane and Material Handling Program**
  - Certified and licensed operators
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Training

- **Hazardous Waste Program (KCEHD 2021)**
  - Evaluation of wastes
  - Management of hazardous waste onsite
  - Offsite disposal of hazardous wastes
  - Training
  - Air monitoring for tanks only
  - Medical surveillance for hazardous waste handlers
  - Health and Safety Plan preparation
  - Documentation procedures
- **Hot Work Safety Program**
  - Welding and cutting procedures
  - Acetylene and fuel gas safety
  - Fire watch
  - Hot work permit
  - PPE
  - Training
  - Documentation procedures
- **Workplace Ergonomics Program**
  - Identification of personnel at risk
  - Evaluation of personnel
  - Workplace and job activity modifications
  - Training
  - Documentation procedures
- **Employee Exposure Monitoring Program**
  - Exposure evaluation
  - Monitoring requirements
  - Reporting of results
  - Medical surveillance
  - Training
  - Documentation procedures
- **Electrical Safety Program**
  - Grounding procedure
  - Overhead and underground utilities
  - Utility clearance
  - Training
  - High-voltage switching
- **Lock-out/Tag-out Program**
  - Allocation of lock-out/tag-out devices (e.g., locks, tags, and adaptors)
  - Machine-specific lock-out/tag-out procedures
  - Steps for verification of isolation

  - Training (Affected and Authorized and Interaction with Energized Electrics)
  - Annual program review
  - Documentation procedures
- **Permit-required Confined-space Entry Program**
  - Air monitoring and ventilation requirements
  - Rescue procedures
  - Lock-out/tag-out and blocking, blinding, and blanking requirements
  - Permit completion
  - Training
  - Documentation procedures
- **Hand and Portable Power Tool Safety Program**
  - Guarding and proper operation
  - Training
- **Housekeeping and Material Handling and Storage Program**
  - Materials handling storage requirements
  - Housekeeping best practices procedures
  - Hazardous materials reporting
  - Walkways and work surfaces
  - Equipment handling requirements
  - Inspections
  - Training
  - Documentation procedures
- **Hearing Conservation Program**
  - Identifying high-noise environments
  - Exposure monitoring
  - Medical surveillance requirements
  - Hearing-protective devices
  - Training
  - Documentation procedures
- **Back Injury Prevention Program**
  - Proper lifting and material-handling procedures
  - Training
- **Hazard Communication Program (KCEHD 2021)**
  - Labeling requirements
  - Storage and handling procedures
  - Safety data sheets accessibility
  - Chemical inventory updates and reporting
  - Inspections
  - Training
  - Documentation procedures

- **Respiratory Protection Program**
  - Selection and use
  - Cleaning and Storage
  - Fit testing
  - Medical requirements
  - Inspection and repair
  - Training
  - Documentation procedures
- **Heat and Cold Stress Monitoring and Control Program**
  - Monitoring requirements
  - Prevention and control
  - Training and awareness briefing
- **Pressure Vessel and Pipeline Safety Program**
  - Line-breaking policy
  - Equipment inspection and maintenance
  - Blocking, bleeding, and blanking
  - Communication
  - Incident reporting and corrective action procedures
  - Training
- **Safe Driving Program**
  - Inspection and maintenance
  - Training
- **Wellhead Safety Program**
  - Inspection and maintenance
  - Job-specific training
  - Preventative maintenance procedures
  - Restricted access
- **Reservoir Safety Program**
  - Life safety training
  - Utilization of work permits
  - Life-saving stations
  - Emergency response procedures

5.17.2.3.3 Safety Training

To ensure that employees recognize and understand how to protect themselves from potential hazards during this project, comprehensive training programs for construction and operation will be implemented as indicated in **Table 5.17-3** and **Table 5.17-4**. Each of the safety procedures developed to control and mitigate potential site hazards will require some form of training. Training will be delivered in a variety of methods depending on the requirements of Cal/OSHA standards, the complexity of the topic, the characteristics of the workforce, and the degree of risk associated with each of the identified hazards.

Table 5.17-3 and **Table 5.17-4** summarize the safety training programs that will be provided to construction and operations personnel, respectively.

Table 5.17-3: Construction Training Program

Training Course	Target Employees
Injury and Illness Prevention Training	*All*
Emergency Action Program/Plan	*All*
PPE Training	*All*
Motor Vehicle and Heavy Equipment Safety Training	*Employees working on, near, or with heavy equipment or vehicles*
Forklift Operation Training	*Employees operating forklifts*
Excavation/Trenching Safety Training	*Employees involved with trenching or excavation*
Fall Protection Training	*Employees working at heights greater than 6 feet required to use fall protection*
Scaffolding/Ladder Safety Training	*Employees required to erect or use scaffolding*
Crane Safety Training	*Employees supervising or performing crane operations*
Fire Protection and Prevention Training	*Employees responsible for the handling and storage of flammable or combustible liquids or gases*
Hazard Communication Training	*Employees handling or working with hazardous materials*
Hazardous Waste	*Employees handling or excavating hazardous waste*
Hot Work Safety Training	*Employees performing hot work*
Electrical Safety Training	*Employees performing lock-out/tag-out or working on systems that require lock-out/tag-out activities*
	Employees required to work on electrical systems and equipment or use electrical equipment and cords
Permit-required Confined-space Entry Training	*Employees required to supervise or perform confined-space entry activities*
Hand and Portable Power Tool Safety Training	*Employees who will be operating hand and portable power tools*
Powder-actuated Tool Safety Training	*Employees who will be operating powder-actuated tools*
Heat Stress and Cold Stress Safety Training	*Employees who are exposed to temperature extremes*
Hearing Conservation Training	*All*
Back Injury Prevention Training	*All*
Safe Driving Training	*Employees supervising or driving motor vehicles*
Pressure Vessel and Pipeline Safety Training	*Employees supervising or working on pressurized systems or Equipment*
Respiratory Protection Training	*All employees who are required to wear respiratory protection*
Airborne Related Illness (Valley Fever Awareness) Training	*All employees and construction workers*
Fire Protection and Prevention Training	*All*
First Aid, CPR, and Automated External Defibrillator	*All*
Underground Training	*All employees entering underground facilities*
Underground Emergency Response	*All employees entering underground facilities.*
Explosive	*All employees handling explosives*
Underground Mobile Equipment Operation	*All employees operating underground mining mobile equipment*
Worker Exposure Awareness Training	*All*
Worker Environmental Awareness Training	*All*

Table 5.17-4: Operations Training Program

Training Course	Target Employees
Injury and Illness Prevention Training	*All*
Emergency Action Plan	*All*
PPE Training	*All*
Excavation/Trenching Safety Training	*Employees involved with trenching or excavation*
Scaffolding/Ladder Safety Training	*Employees required to erect or use scaffolding*
Fall Protection Training	*Employees required to use fall protection*
Forklift Operator Training	*Employees operating forklifts*
Crane Safety Training	*Employees supervising or performing crane operations*
Workplace Ergonomics	*Employees performing repetitive activities*
Fire Protection and Prevention Training	*Employees responsible for the handling and storage of batteries or flammable or combustible liquids or gases*
Hot Work Safety Training	*Employees performing hot work*
Electrical Safety Training	*Employees performing lock-out/tag-out or required to work on electrical systems and equipment*
Permit-required Confined-space Entry	*Employees required to supervise or perform confined-space entry*
Hand and Portable Power Tool Safety Training	*Employees operating hand and portable power tools*
Heat Stress and Cold Stress Safety Training	*Employees exposed to temperature extremes*
Hearing Conservation Training	*All*
Back Injury Prevention Training	*All*
Safe Driving Training	*Employees supervising or driving motor vehicles*
Hazard Communication Training	*Employees handling or working around hazardous materials*
Pressure Vessel and Pipeline Safety Training	*Employees supervising or working on pressurized systems or equipment*
Respiratory Protection Program	*Employees who are required to wear respiratory protection*
Fire Protection and Prevention Training	*All*
First Aid, CPR, and Automated External Defibrillator	*All*
Worker Exposure Awareness Training	*All*
Worker Environmental Awareness Training	*All*

CPR = cardiopulmonary resuscitation; PPE = personal protective equipment

5.17.2.4 Fire Protection

Fire suppression at the WRESC Site will incorporate facilities designed in compliance with current California Fire Code.

Fire sprinkler systems will be installed in specific locations in the turbomachinery hall, such as office areas, lunchrooms, and meeting places within the buildings, and other areas within the facility as required by the California Fire Code. The sprinkler systems will also service sprinklers on specific pieces of equipment within the turbomachinery hall, such as the bearing boxes on the compressors, turbines, and generators. The fire protection system will have electric-motor-driven pumps connected to a power supply to the electrical grid system with a backup diesel-fired emergency fire pump engine.

Given the site use and classification, relevant to the WRESC, a minimum fire flow of 1,500 gallons per minute (gpm) and minimum operational duration of 4 hours should be used as a basis for the fire water pump flow and the required volume of water in a reservoir. National Fire Protection Agency (NFPA) code 14 has particularly useful information pertaining to flow at the points of use (standpipes), pressure, and other design guidelines pertaining to fire water piping network that can be related to the design fire water system for the WRESC. The WRESC Site's plot plans were reviewed based on NFPA 14 principles to determine the flow rates required for various areas of the facility with probability of class A and B fire events. The results of the review are summarized in **Table 5.17-5**.

Table 5.17-5: Estimation of Demand for Fire Area

Location	Flowrate (gallons per minute)	Quantity
GIS Building	*250*	*1*
Chemical Treatment Area	*250*	*1*
Visitor Building	*250*	*1*
Utility Area (i.e., pumps)	*250*	*1*
Operations Building	*250*	*1*
		Total Flowrate = 1,250 gallons per minute

As an approximation, flowrate requirements for each identified user area have been evaluated to determine the total required flowrate. Since the calculated flowrate is lower than the industrial minimum required, the flowrate used for calculations is the fire flow minimum of 1,500 gpm. Based on the fire code requirements of a 4-hour duration and a 1,500-gpm flowrate, a minimum of 360,000 gallons of water is required. Water will be available from the reservoir at all times, year-round, including during times when the facility has completely discharged (i.e., air in the cavern has been displaced by water). **Table 5.17-6** shows that the reservoir can be used as a water source because of the small volume percentage required for the fire water. The reservoir will always be maintained with a minimum volume to facilitate this.

Table 5.17-6: Estimation of Available Water for Fire Demand

Source	Working Volume	Fire Water Requirement (% of Reservoir Volume)
Reservoir	*146,351,317 gallons*	*0.25%*

The nearest fire station is Kern County Fire Station No. 15, located at 3219 35th Street W in Rosamond, California. The fire station is approximately 4.9 miles southwest of the WRESC Site and will provide first response in the event of a fire at the Willow Rock site. Unless specified by local agencies, Kern County Fire Station No.15 will be contacted in the event of a fire or emergency spill. Water will also be maintained in the firewater tank at a volume that meets the requirements set by the Kern County Fire Department for emergency fire suppression associated with the WRESC Site.

5.17.3 Laws, Ordinances, Regulations, and Standards

The construction and operation of the WRESC will be conducted in accordance with all applicable LORS. **Table 5.17-7** summarizes the federal, state, and local (Kern County) LORS relating to worker health and safety. **Table 5.17-7** also summarizes the applicable national consensus standards. Petroleum products (i.e., fuel handling) is discussed in Section 5.5.4.2.2.

Table 5.17-7: Laws, Ordinances, Regulations, and Standards for Worker Health and Safety

LORS	Requirements/Applicability	Administering Agency
Federal		
29 CFR Part 1910	*Contains the minimum occupational safety and health standards for general industry in the United States*	*OSHA*
29 CFR Part 1926	*Contains the minimum occupational safety and health standards for the construction industry in the United States*	*OSHA*
30 CFR, Mineral Resources, Part 1–199	*Contains rules under the MSHA, Department of Labor*	*MSHA*
Commerce of Explosives (27 CFR Part 555)	*Explains requirements for manufacturing, importing, buying, selling, transporting, and storing explosive materials*	*ATF*
State		
California Occupational Safety and Health Act, 1973	*Establishes minimum safety and health standards for construction and general industry operations in California*	*Cal/OSHA*
Surface Mining and Reclamation Act, Public Resources Code, Sections 2710–2796	*Provides mining and reclamation policies for surface mining operations*	*State Mining and Geology Board*
8 CCR 339	*Requires list of hazardous chemicals relating to the Hazardous Substance Information and Training Act*	*Cal/OSHA*
8 CCR 450	*Addresses hazards associated with pressurized vessels*	*Cal/OSHA*
8 CCR 750	*Addresses hazards associated with high-pressure steam*	*Cal/OSHA*
8 CCR 1509	*Addresses requirements for construction, accident, and prevention plans*	*Cal/OSHA*
8 CCR 1509, et seq., and 1684, et seq.	*Addresses construction hazards, including head, hand, and foot injuries and noise and electrical shock*	*Cal/OSHA*
8 CCR 1528, et seq., and 3380, et seq.	*Requirements for PPE*	*Cal/OSHA*
8 CCR 1532, and 5206	*Addresses chromium IV (hexavalent chromium)*	*Cal/OSHA*
8 CCR 1597, et seq., and 1590, et seq.	*Requirements addressing the hazards associated with traffic accidents and earthmoving*	*Cal/OSHA*
8 CCR 1604, et seq.	*Requirements for construction hoist equipment*	*Cal/OSHA*
8 CCR 1620, et seq., and 1723, et seq.	*Addresses miscellaneous hazards*	*Cal/OSHA*
8 CCR 1709, et seq.	*Requirements for steel reinforcing, concrete pouring, and structural steel erection operations*	*Cal/OSHA*
8 CCR 1920, et seq.	*Requirements for fire protection systems*	*Cal/OSHA*
8 CCR 2300, et seq., and 2320, et seq.	*Requirements for addressing low-voltage electrical hazards*	*Cal/OSHA*
8 CCR 2395, et seq.	*Addresses electrical installation requirements*	*Cal/OSHA*
8 CCR 2700, et seq.	*Addresses high-voltage electrical hazards*	*Cal/OSHA*
8 CCR 3200, et seq., and 5139, et seq.	*Requirements for control of hazardous substances*	*Cal/OSHA*

LORS	Requirements/Applicability	Administering Agency
8 CCR 3203, et seq.	*Requirements for operational accident prevention programs*	*Cal/OSHA*
8 CCR 3270, et seq., and 3209, et seq.	*Requirements for evacuation plans and procedures*	*Cal/OSHA*
8 CCR 3301, et seq.	*Requirements for addressing miscellaneous hazards, including hot pipes, hot surfaces, compressed air systems, relief valves, enclosed areas containing flammable or hazardous materials, rotation equipment, pipelines, and vehicle-loading dock operations*	*Cal/OSHA*
8 CCR 3360, et seq.	*Addresses requirements for sanitary conditions*	*Cal/OSHA*
8 CCR 3511, et seq., and 3555, et seq.	*Requirements for addressing hazards associated with stationary engines and compressors, as well as portable, pneumatic, and electrically powered tools*	*Cal/OSHA*
8 CCR 3649, et seq., and 3700, et seq.	*Requirements for addressing hazards associated with field vehicles*	*Cal/OSHA*
8 CCR 3940, et seq.	*Requirements for addressing hazards associated with power transmission, compressed air, and gas equipment*	*Cal/OSHA*
8 CCR 5109, et seq.	*Requirements for addressing construction accident and prevention programs*	*Cal/OSHA*
8 CCR 5110, et seq.	*Requirements for the implementation of an ergonomics program*	*Cal/OSHA*
8 CCR 5139, et seq.	*Requirements for addressing hazards associated with welding, sandblasting, grinding, and spray-coating*	*Cal/OSHA*
8 CCR 5150, et seq.	*Requirements for confined space entry*	*Cal/OSHA*
8 CCR 5155, et seq.	*Requirements for use of respirators and for controlling employee exposure control to airborne contaminants*	*Cal/OSHA*
8 CCR 5160, et seq.	*Requirements for addressing hot, flammable, poisonous, corrosive, and irritant substances*	*Cal/OSHA*
8 CCR 5184 and 5185.	*Requirements for storage battery systems and changing the charging storage batteries*	*Cal/OSHA*
8 CCR 5192, et seq.	*Requirements for conducting emergency response operations*	*Cal/OSHA*
8 CCR 5193, et seq.	*Requirements for controlling employee exposure to bloodborne pathogens associated with exposure to raw sewage water and body fluids associated with first aid/CPR duties*	*Cal/OSHA*
8 CCR 5194, et seq.	*Requirements for employee exposure to dusts, fumes, mists, vapors, and gases*	*Cal/OSHA*
8 CCR 5405, et seq.; 5426, et seq.; 5465, et seq.; 5500, et seq.; 5521, et seq.; 5545, et seq.; 5554, et seq.; 5565, et seq.; 5606, et seq.	*Requirements for flammable liquids, gases, and vapors*	*Cal/OSHA*
8 CCR 5583, et seq.	*Requirements for design, construction, and installation of venting, diking, valving, and supports*	*Cal/OSHA*
8 CCR 6150, et seq.; 6151, et seq.; 6165, et seq.; 6170, et seq.;6175, et seq.	*Requirements for fire protection*	*Cal/OSHA*

LORS	Requirements/Applicability	Administering Agency
Title 24, Part 3, California Electrical Code	*Requirements for electrical safety, which include the Uniform Electrical Code, Title 24, Part 3*	*Cal/OSHA*
Title 24, Part 9, Chapter 6, Section 608	*California Fire Code requirements for stationary storage battery systems*	*Cal/OSHA*
8 CCR, Part 6	*Requirements for health and safety for working with tanks and boilers*	*Cal/OSHA*
Health and Safety Code Sections 25500 through 25541	*Requirements for the preparation of a Hazardous Material Business Plan that details emergency response plans for a hazardous materials emergency at the facility*	*Cal/OSHA*
Local		
Specific hazardous material handling requirements	*Hazardous materials used or stored shall conform to the Uniform Fire Code.*	*Kern County Fire Prevention Office*
Emergency Response Plan	*Kern County Environmental Health Services Division is the designated CUPA and is responsible for administering Hazardous Materials Business Plans, which incorporate Emergency Response Plans and are filed by businesses located in the county.*	*Kern County Public Health Services Department, Environmental Health Services Division*
Business Plan	*Kern County Environmental Health Services Division is the designated CUPA and is responsible for administering the Hazardous Materials Business Plans filed by businesses located in the county.*	*Kern County Public Health Services Department, Environmental Health Services Division*
National Standards		
National Institute for Occupational Safety and Health	*Conducts research and makes recommendations for prevention of work-related injury and illness.*	*CDC*
NFPA 10, Standard for Portable Fire Extinguishers	*Requirements for selection, placement, inspection, maintenance, and employee training for portable fire extinguishers*	*NFPA*
NFPA 11, Standard for Low-Expansion Foam and Combined Agent Systems	*Requirements for installation and use of low-expansion foam and combined-agent systems*	*NFPA*
NFPA 11A, Standard for Medium- and High-Expansion Foam Systems	*Requirements for installation and use of medium- and high-expansion foam systems*	*NFPA*
NFPA 12, Standard on Carbon Dioxide Extinguishing Systems	*Requirements for installation and use of carbon dioxide extinguishing systems*	*NFPA*
NFPA 13, Standard for Installation of Sprinkler Systems	*Guidelines for selection and installation of fire sprinkler systems*	*NFPA*
NFPA 13A, Recommended Practice for the Inspection, Testing, and Maintenance of Sprinkler Systems	*Guidance for inspection, testing, and maintenance of sprinkler systems*	*NFPA*
NFPA 14, Standard for the Installation of Standpipe and Hose Systems	*Guidelines for selection and installation of standpipe and hose systems*	*NFPA*
NFPA 15, Standard for Water Spray Fixed Systems	*Guidelines for selection and installation of water spray fixed systems*	*NFPA*

LORS	Requirements/Applicability	Administering Agency
NFPA 17, Standard for Dry Chemical Extinguishing Systems	*Guidance for selection and use of dry chemical extinguishing systems*	*NFPA*
NFPA 20, Standard for the Installation of Centrifugal Fire Pumps	*Guidance for selection and installation of centrifugal fire pumps*	*NFPA*
NFPA 22, Standard for Water Tanks for Private Fire Protection	*Requirements for water tanks for private fire protection*	*NFPA*
NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances	*Requirements for private fire service mains and their appurtenances*	*NFPA*
NFPA 26, Recommended Practice for the Supervision of Valves Controlling Water Supplies	*Supervision guidance for valves controlling water supplies*	*NFPA*
NFPA 30, Flammable and Combustible Liquid Code	*Requirements for storage and use of flammable and combustible liquids*	*NFPA*
NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines	*Fire protection requirements for installation and use of combustion engines and gas turbines*	*NFPA*
NFPA 50A, Standard for Gaseous Hydrogen Systems at Consumer Sites	*Fire protection requirements for hydrogen systems*	*NFPA*
NFPA 54, National Fuel Gas Code	*Fire protection requirements for use of fuel gases*	*NFPA*
NFPA 59A, Standard for the Storage and Handling of Liquefied Petroleum Gases	*Requirements for storage and handling of liquefied petroleum gases*	*NFPA*
NFPA 68, Guide for Explosion Venting	*Guidance in design of facilities for explosion venting*	*NFPA*
NFPA 70, National Electric Code	*Guidance on safe selection and design, installation, maintenance, and construction of electrical systems*	*NFPA*
NFPA 70, Article 480, National Electric Code (Storage Batteries)	*Requirements for safe installation and wiring for battery electrical systems*	*NFPA*
NFPA 70B, Recommended Practice for Electrical Equipment Maintenance	*Guidance on electrical equipment maintenance*	*NFPA*
NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces	*Employee safety requirements for working with electrical equipment*	*NFPA*
NFPA 71, Standard for the Installation, Maintenance, and Use of Central Station Signaling Systems	*Requirements for installation, maintenance, and use of central station signaling systems*	*NFPA*

LORS	Requirements/Applicability	Administering Agency
NFPA 72A, Standard for the Installation, Maintenance, and Use of Local Protective Signaling Systems for Guard's Tour, Fire Alarm, and Supervisory Service	*Requirements for installation, maintenance, and use of local protective signaling systems*	*NFPA*
NFPA 72E, Standard on Automatic Fire Detection	*Requirements for automatic fire detection*	*NFPA*
NFPA 72F, Standard for the Installation, Maintenance, and Use of Emergency Voice/Alarm of Communication Systems	*Requirements for installation, maintenance, and use of emergency and alarm communications systems*	*NFPA*
NFPA 72H, Guide for Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Systems	*Testing procedures for types of signaling systems anticipated for facility*	*NFPA*
NFPA 75, Standard for the Protection of Electronic Computer/Data Processing Equipment	*Requirements for fire protection systems used to protect computer systems*	*NFPA*
NFPA 78, Lightning Protection Code	*Lightning protection requirements*	*NFPA*
NFPA 80, Standard for Fire Doors and Windows	*Requirements for fire doors and windows*	*NFPA*
NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems	*Requirements for installation of air conditioning and ventilating systems*	*NFPA*
NFPA 101, Code for Safety to Life from Fire in Buildings and Structures	*Requirements for design of means of exiting the facility*	*NFPA*
NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants	*Guidelines for testing and marking of fire hydrants*	*NFPA*
NFPA 850, Recommended Practice for Fire Protection for Fossil Fuel Steam Electric Generating Plants	*Requirements for fire protection in fossil-fuel steam electric generating plants*	*NFPA*
NFPA 1961, Standard for Fire Hose	*Specifications for fire hoses*	*NFPA*
NFPA 1962, Standard for the Care, Maintenance, and Use of Fire Hose Including Connections and Nozzles	*Requirements for care, maintenance, and use of fire hoses*	*NFPA*
NFPA 1963, Standard for Screw Threads and Gaskets for Fire Hose Connections	*Specifications for fire hose connections*	*NFPA*

LORS	Requirements/Applicability	Administering Agency
American National Standards Institute / American Society of Mechanical Engineers, Boiler and Pressure Vessel Code	*Specifications and requirements for pressure vessels*	*American National Standards Institute / American Society of Mechanical Engineers*
American National Standards Institute, B31.2, Fuel Gas Piping	*Specifications and requirements for fuel gas piping*	*American National Standards Institute*

ATF = Bureau of Alcohol, Tobacco, Firearms, and Explosives; Cal/OSHA = California Occupational Safety and Health Administration; CCR = California Code of Regulations; CDC = Centers for Disease Control and Prevention; CFR = Code of Federal Regulations; MSHA = Mine Safety and Health Administration; NFPA = National Fire Protection Association; CUPA = Certified Unified Program Agency; OSHA = Occupational Safety and Health Administration; PPE = personal protective equipment;

5.17.4 Agencies and Agency Contacts

Several agencies are involved to ensure the protection of worker health and safety. Agency contacts relative to worker health and safety and fire are shown in **Table 5.17-8**.

Table 5.17-8: Agency Contacts for Worker Health and Safety

Issue	Agency	Contact
Worker Health and Safety	*Cal/OSHA, Region 4, Bakersfield District Office*	*Efren Gomez District Manager (661)-558-6400*
CUPA for Hazardous Materials Business Plan	*Kern County Public Health Services Department - Hazardous Materials Program*	*Cilal Korin 661-862-8730*
Hazardous Materials Response for Spills or Fires	*Kern County Public Health Services Department Emergency Response Hotline*	*661-549-9927* [a]
Kern County Air Quality, specifically for Valley Fever	*Kern County Public Health Services Department*	*661-321-3000*

[a] *Kern County Public Health Services Department Hotline does not have a specified personnel contact.*
Cal/OSHA = California Occupational Safety and Health Administration; CUPA = Certified Unified Program Agency

5.17.5 Permits and Permit Schedule

Table 5.17-9 lists possible applicable permits related to the protection of worker health and safety. Third party subcontractors will be responsible for obtaining permits for assigned Project tasks. No permitting schedule is provided; however, notification requirements for each agency will be followed.

Table 5.17-9: Applicable Permits for Worker Health and Safety

Permit	Agency Contact	Schedule
Trenching and Excavation Permit	*Any Cal/OSHA district or field office*	*Submit completed permit application to any Cal/OSHA district or field office before commencing construction.*
Hazardous Materials Business Plan	*Kern County Public Health Services Department Hazardous Materials Program 2700 M Street, Suite 300 Bakersfield CA 93301 (661)-862-8740*	*Submittal prior to operation. Permits are available on the Kern County Public Health Services Department main website.*

Permit	Agency Contact	Schedule
Risk Management Plan	*Kern County Public Health Services Department Hazardous Materials Program 2700 M Street, Suite 300 Bakersfield CA 93301 (661)-862-8740*	*Submittal prior to operation. Permits are available on the Kern County Public Health Services Department main website.*
Airborne Pathogen Training – Valley Fever	*Kern County Planning and Natural Resources Department 2700 M Street, Suite 100 Bakersfield, CA 93301 (661) 862-8600*	*Submittal of training records on construction operations and detection of Valley Fever*

Cal/OSHA = California Occupational Safety and Health Administration

5.17.6 References

Kern County Public Health Services, Environmental Health Division – Hazardous Waste Program (KCEHD). 2021. Hazardous Materials Business Plan/California Environmental Reporting System (CERS). Available at: https://kernpublichealth.com/hazardous-materials-business-plan-california-environmental-reporting-system-cers/. Accessed July 5, 2021.

6.0 ALTERNATIVES

This section discusses alternatives to the proposed Willow Rock Energy Storage Center (WRESC, or Willow Rock). These include the "no project" alternative, site alternatives, generation-tie (gen-tie) line route alternatives, technology alternatives, water supply alternatives, and excavated rock recycling or disposal alternatives.This discussion focuses on alternatives that could feasibly accomplish most of the Project's basic objectives and could avoid or substantially lessen one or more of the potentially significant effects.

The California Environmental Quality Act (CEQA) requires consideration of "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project and evaluate the comparative merits of the alternatives" (Title 14, California Code of Regulations [CCR] 15126.6[a]).

Thus, an alternatives analysis should focus on alternatives that "could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects" (Title 14, CCR 15126.6[c]). The CEQA Guidelines further provide that "among the factors that may be used to eliminate alternatives from detailed consideration in an EIR [environmental impact report] are: (i) failure to meet most of the basic project objectives, (ii) infeasibility, or (iii) inability to avoid significant environmental impacts."

The Energy Facilities Siting Regulations (Title 20, CCR, Appendix B) guidelines titled Information Requirements for an Application require the following:

> *A discussion of the range of reasonable alternatives to the project, including the no project alternative… which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and an evaluation of the comparative merits of the alternatives.*

The data adequacy regulations also require the following:

> *A discussion of the applicant's site selection criteria, any alternative sites considered for the project, and the reasons why the applicant chose the proposed site.*

A range of reasonable alternatives is identified and evaluated in this section, including the "no project" alternative (i.e., not developing a new power generation facility), alternative site locations for constructing and operating the WRESC Project; alternative Project design features (including gen-tie line routes, water supply sources, and excavated rock recycling/disposal options); and various technology alternatives. This section also describes the site selection criteria used to determine the proposed location of the WRESC Project.

6.1 Project Objectives

The WRESC has been designed to deliver energy and reliability services with no fossil fuel combustion or related air quality impacts. The Project will be one of the first commercial applications of Hydrostor's Advanced Compressed Air Energy Storage (A-CAES) technology at this scale. The WRESC will combine dispatchable, operationally flexible, and efficient energy generation with state-of-the-art A-CAES technology to facilitate the integration of variable renewable energy sources on the grid and to meet the needs of California and the region for reliability services. The Project or Project Area encompasses the WRESC Site, the parcels within the Project Boundary, and the right-of-way (ROW) associated with the WRESC's gen-tie line. The Project Boundary encompasses the WRESC Site and the parcels of land (an additional 133 acres of private land surrounding the WRESC) that will be allocated for potential temporary staging and laydown area (referred to herein as the Staging Area) during construction, or the construction of a permanent architectural berm constructed from the material excavated during cavern construction. The Staging Area consists of groups of accessors parcels referred to as P1, P2N, P2S, and VH.

On July 14, 2021, U.S. Secretary of Energy, Jennifer M. Granholm, announced the U.S. Department of Energy's (DOE)'s new goal to reduce the cost of grid-scale, long-duration energy storage by 90 percent within the decade. The second target within DOE's Energy Earthshot Initiative, "Long Duration Storage Shot," sets bold goals to accelerate breakthroughs that store clean electricity to make it available anytime, anywhere and support more abundant, affordable, and reliable clean energy solutions. "We're going to bring hundreds of gigawatts of clean energy onto the grid over the next few years, and we need to be able to use that energy wherever and whenever it's needed," said Secretary Granholm. "That's why DOE is working aggressively toward cheaper, longer duration energy storage to reach President Biden's goal of 100 percent clean electricity by 2035" (U.S. Department of Energy 2021). Former California Energy Commission Commissioner Douglas at the September 9, 2021, California Coastal Commission Informational Briefing and Public Comment on Offshore Wind stated: "the State will need to add between 4 to 6 gigawatts per year of renewable energy and storage starting now" to meet the state's ambitious goal of zero carbon emissions by 2045 (California Coastal Commission 2021). On June 24, 2021, the California Public Utilities Commission (CPUC) adopted Decision 21-06-035 recognizing the need for long lead time, long-duration energy storage resources, such as the WRESC. Among other things, the CPUC decision requires "at least 1,000 megawatts (MW) of long-duration storage (able to deliver at maximum capacity for at least eight hours from a single resource)" by June 2026 (CPUC 2021), which the CPUC recently extended (CPUC 2023). The WRESC Project's capabilities are completely aligned with this objective.

Kern County has become a significant area of renewable energy concentration for California. Kern County produced 16,028 gigawatt hours of renewable power in 2021 (Bakersfield Californian 2023). Increases in renewable generation and curtailments of solar and wind energy have followed an increase in new renewable capacity additions (Kern County Administrative Office 2021). In 2020, the California Independent System Operator (CAISO) curtailed 1.5 million MWh of utility-scale solar or 5 percent of its utility-scale solar production (U.S. Energy Information Administration 2021). Enhanced stability of the electrical grid afforded by long-duration energy storage will allow for less curtailment and further integration of renewable resources, such as the extensive wind and solar development continuing to occur in eastern Kern County. The WRESC will provide a wide range of operational capabilities, including the crucial flexible capacity to support electrical system stability and reliability during periods of rapidly changing renewable energy output, as well as a local response to other instances of grid instability.

The WRESC's basic Project objectives are the following:

1) Provide 500 MW of quick-starting, flexible, controllable generation with the ability to ramp up and down through a wide range of electrical output to facilitate the integration of renewable energy into the electrical grid in satisfaction of California's Renewable Portfolio Standard and climate objectives, by displacing older and less efficient generation.
2) Interconnect the Project to the CAISO-controlled Southern California Edison (SCE) Whirlwind Substation, a major substation in or near the Tehachapi Renewable Wind Resource Area, to facilitate the integration of onshore and offshore renewable energy development.
3) Implement a proven sustainable energy storage technology that provides improved technological diversity, non-combustible energy storage, minimal residual hazardous waste at asset retirement, a long-term commercial lifespan of 30 years or greater, and non-degrading energy storage.
4) Use A-CAES technology to provide dispatchable long-duration storage and energy delivery for a minimum of 8 hours; fossil fuel and greenhouse gas emissions-free operation; flexible capacity with minimal response time; provide long-duration storage to avoid curtailment through energy storage and to facilitate the further integration of renewable resources; peaking energy for local contingencies; voltage support and primary frequency response, including synchronous power output to support grid resiliency without the need for fossil fuel; superior transient response attributes, including synchronous power output; and superior round-trip thermodynamic efficiency.
5) Locate the facility on a site with adequate geologic characteristics for the underground facilities for compressed air storage, including suitable overburden characteristics (limited thickness, constructable soil type); deep subsurface geological formation (2,000 to 2,500 feet below ground surface [bgs]) of sufficient quality and definition at the required depth for construction of the excavated storage cavern; low hydraulic conductivity and permeability in deep subsurface geological

formation to retain water and air under pressure within the excavated storage cavern; and competent geological structural integrity to sustain an excavated storage cavern at depth intact indefinitely, allowing for repeated compressed air injection and discharge cycles over the life of the Project without eroding or collapsing.

6) Site the Project on land with acceptable constructability and with adequate access and size for construction of aboveground facilities—at least approximately 80 acres.
7) Site the Project near adequate water supply for construction.
8) Locate the Project on a site that is available to provide adequate site control, through long-term lease or purchase.
9) Minimize additional supporting infrastructure needs and reduce potential environmental impacts by locating the facility near existing and planned infrastructure, including access to an existing substation with available transmission capacity.
10) Create jobs in Kern County and the state of California through both construction and operation of the facility.
11) Be a good corporate citizen and respected member of the community through the lifecycle of the Project.

6.2 Siting Criteria

The WRESC requires specific siting criteria to be feasible.

The location of the WRESC requires geologic characteristics for the underground facilities for compressed air storage, including:

- Suitable overburden characteristics (limited thickness, constructable soil type);
- Deep subsurface geological formation (2,000 to 2,500 feet bgs) of sufficient quality and definition at the required depth for construction of the excavated storage cavern;
- low hydraulic conductivity and permeability in deep subsurface geological formation to retain water and air under pressure within the excavated storage cavern;
- Competent geological structural integrity to sustain an excavated storage cavern at depth intact indefinitely, allowing for repeated compressed air injection and discharge cycles over the life of the Project without eroding or collapsing.

To minimize additional supporting infrastructure needs and reduce potential environmental impacts, locating the WRESC near existing and planned infrastructure, including access to an existing substation with available transmission capacity, was also considered a priority.

The search for alternate sites focused on sites meeting the above criteria based on screening level desktop review of mapped geologic characteristics, and was refined to the following micrositing criteria:

- Identify sites that are available to provide adequate site control, through long-term lease or purchase,
- It is preferred that the WRESC be sited on land with acceptable constructability and with adequate access and size for construction of aboveground facilities— approximately 80 acres.
- Due to the initial need for water to fill the reservoir, the WRESC Site should be near an adequate water supply for use during construction.

The siting criteria relating to preferred geologic characteristics for finding potential Project sites initially focused on selecting sites located on or directly adjacent to quartz monzonite outcroppings. The presence of quartz monzonite at the surface was expected to be a strong indicator for suitable geologic conditions at the cavern construction depth. In addition to presence of quartz monzonite, it was later determined that suitable sites should not be located near volcanic outcroppings. The presence of volcanic outcroppings are associated with deleterious incongruities in the quartz monzonite formation that are undesirable for subsurface A-CAES cavern construction and operation.

The site alternatives developed using these criteria and considered for the Project are discussed in Section 6.4.

6.3 The "No Project" Alternative

If the Project were not constructed, none of the WRESC's basic Project objectives would be met. Grid reliability, and environmental and policy benefits, as identified above and throughout this Application, from this highly dispatchable and flexible project, would not be realized. The WRESC would provide a significant carbon-free contribution to the state's ambitious renewable energy and storage needs, and the no project alternative would deprive the state and the area of this significant contribution. The no project alternative would also not be consistent with California's environmental policy goals of encouraging development and deployment of long lead time, long-duration energy storage resources, such as the WRESC, as articulated in CPUC Decision 21-06-035 and other state policy objectives focused on long-duration storage and renewable integration.

The no project alternative could result in inadequate system reliability (more blackouts), greater fuel consumption, increased greenhouse gas emissions, more air pollution, and contributions to climate change and other environmental impacts in the state because older, less efficient plants or emergency generation facilities with higher air emissions would continue to supply transitional power instead of being replaced with cleaner, more flexible, curtailment of renewable generation, and more efficient energy storage such as the WRESC. The no project alternative would also deprive the area of a significant multi-year construction employment opportunity with associated purchases of local goods and services, as well as permanent jobs associated with the operation of the facility, ongoing property tax revenue, and other community benefits. Therefore, because the no project alternative would not satisfactorily meet the Project objectives specified above, the no project alternative was rejected in favor of the proposed project.

6.4 Willow Rock Energy Storage Center Site Alternatives

6.4.1 Site Selection

GEM A-CAES LLC (GEM, the Applicant) considered nine alternative sites for the WRESC: the proposed WRESC Site and eight alternatives. These sites are shown in **Figure 6-1**.

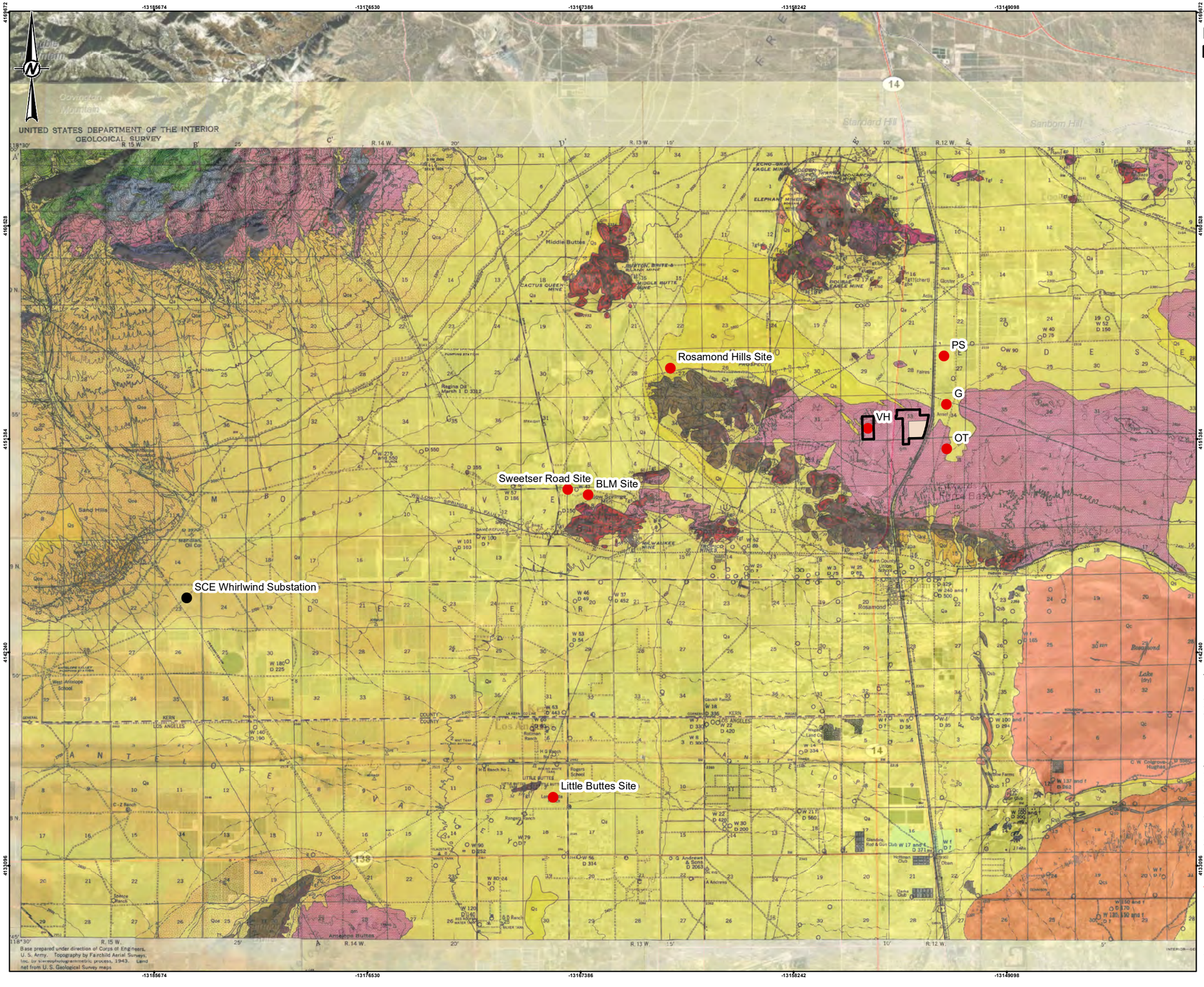
The Applicant initiated a search for an alternative Project site that would fulfill the Project's objectives, targeting areas meeting the siting criteria. Priority was placed on selecting locations closest to the SCE Whirlwind Substation as possible and met the preferred geologic characteristics. The initial screening limited the spatial search to an approximate 10-mile radius from the SCE Whirlwind Substation. This screening, described in the original Project application for certification (AFC) (docket number TN 240751), resulted in the identification of four site alternatives: Sweetser Road Site (the original WRESC Site), BLM Site, Little Buttes Site and Rosamond Hills Site.

An exploratory drilling program completed at the Sweetser Road Site revealed that the quartz monzonite adjacent to the Gem Hill Volcanics exhibited a high degree of alternation that would not be suitable for cavern development at the target depth. To improve the probability of finding geologic conditions suitable for cavern development, it was determined that the preferred site should not be located in proximity to any volcanic outcroppings. The refined geologic characteristic criteria eliminated the Sweetser Road Site and other previously identified alternatives from consideration since all were located in close proximity to volcanic outcroppings.

The site selection radius was expanded as necessary to locate the closest quartz monozonite outcroppings that are not proximate to volcanic outcroppings. A large quartz monzonite deposit located east of the Rosamond Hills Site was identified from desktop analysis. Additional alternative sites were identified in this area.

The Applicant focused on private landowners in order to expedite the Project development timeline and the concern that securing site control for government-owned property would not be compatible with Project development timeline constraints. Five privately owned sites were identified that met the new

geologic criteria, were potentially available for purchase, and were of sufficient size to warrant further consideration: the WRESC Site, Site PS, Site G, Site OT and Site VH (alpha designations relate to the corresponding landowner for each parcel).



LEGEND

- WRESC Site
- Project Boundary
- Alternative Site
- SCE Whirlwind Substation

0 2.5 5 Miles

1 " = 2.5 miles

NOTE(S)

1. TRANSMISSION LINES PROVIDED BY GEM A-CAES LLC NOVEMBER 30, 2023
2. PROJECT PARCELS PROVIDED BY GEM A-CAES LLC DECEMBER 14, 2023
3. GEOLOGY SOURCE: USGS 1963. GEOLOGY OF THE WILLOW SPRINGS AND ROSAMOND QUADRANGLES, CALIFORNIA BULLETIN 1089-C

CLIENT
GEM A-CAES LLC

PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC

TITLE
PROJECT SITE ALTERNATIVES

YYYY-MM-DD	2024-02-13
DESIGNED	SCH
PREPARED	SCH
REVIEWED	DS
APPROVED	VG/LL

PROJECT NO.	CONTROL	REV.	FIGURE
31406639.003	01	0	6-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

These five sites were then assigned ratings based on geology risk, constructability considerations (overburden thickness, topography), and site access to rank them subjectively in order of Project development preference, with a strong emphasis on geology risk and compared with the original four sites. The results of this risk assessment are shown in **Table 6-1**.

Table 6-1: Constructability and Geologic Risk Rankings[a]

Property Name/Owner	Size (Acres)	Geology Risk	Overburden Thickness Risk	Topography Risk	Site Access Risk	Proximity to SCE Whirlwind (miles)
WRESC Site	*112*	*1*	*1*	*2*	*1*	*19*
OT Site	*160*	*1*	*1*	*2*	*4*	*20*
G Site	*160*	*1*	*2*	*2*	*4*	*20*
PS Site	*154*	*1*	*3*	*1*	*3*	*21*
VH Site	*80*	*2*	*1*	*4*	*1*	*17*
Sweetser Road (Original Site)	*71*	*4*	*3*	*3*	*2*	*11*
BLM Site	*90*	*4*	*3*	*5*	*2*	*11*
Little Buttes Site	*Uncertain*	*4*	*Not available*	*3*	*3*	*10*
Rosamond Hills Site	*160*	*5*	*Not available*	*4*	*3*	*15*

Notes:

[a] *Risk is ranked from Low (1) to High (5)*

As the above rankings note, the geology risk for all of the original alternative sites, including the original Sweetser Road Site, is unacceptably high due to the proximity to volcanic outcroppings. Of the five remaining sites, the proposed WRESC Site is rated the highest when geology risk is considered in conjunction with other risk factors.

Engagements were made with landowners of each of the sites to assess the possibility of executing a land use agreement on any of these parcels. Favorable negotiations were concluded relatively quickly with landowners for both the WRESC Site and the VH Site parcels and land use agreements were executed to provide site control and purchase options for the Project. Although negotiations also progressed satisfactorily with the OT site, it was ultimately determined that site access risk was problematic (would require new extension of Dawn Road to the northern site boundary as well as a new railroad crossing) and as a result, negotiations did not proceed further. Successful negotiations were not concluded with the G Site, which had a similar site access risk to the OT site. The PS Site was determined to not be available since the landowner had pre-existing development plans (future Mojave Micro Mill site).

Of the two potential sites for which land use agreements were reached, it was determined that the WRESC Site was preferable for Project development for several reasons— the WRESC Site exhibits much flatter topography and lower geology risk. Importantly, it was also deemed that both of these sites were preferable to the current Sweetser Road Site that was previously being pursued as a result of the poor geology conditions encountered at that site.

6.4.1.1 Willow Rock Energy Storage Center Site

The WRESC will be located on an approximately 88.9-acre area consisting of a portion of the 112-acre parcel, Assessor's Parcel Number 431-022-13, immediately north of Dawn Road and directly west of Sierra Highway, hereinafter "WRESC Site." The Project Area is in Kern County, approximately 3.5 miles northeast from central Rosamond. The WRESC Site is currently undeveloped desert land located in an area that is zoned A-1-District (Limited Agriculture). The WRESC Site is not under a Williamson Act Contract. The Department of Defense's Edwards Air Force Base nearest runway lies approximately 13.5

miles east of the WRESC Site. The area within an approximate 2- to 2.5-mile radius of the WRESC Site is also largely undeveloped desert land with sparse residential development. The nearest residence is located approximately 0.8 miles to the north. While energy development uses, including an electrical generating plant, are conditionally permitted uses in the A-1 zone, the County has recommended an application for administrative rezoning of the parcel to A (Exclusive Agriculture), which is currently pending. Once the administrative rezone is complete, the County expects the rezone will support a determination that WRESC Site is a conforming use, as further discussed in Section 5.6, Land Use.

The Applicant conducted an extensive geotechnical data collection and analysis program at the WRESC Site, including the execution of four boreholes to a depth of 3,000 feet bgs as well as nine shallow boreholes to assess both deep and nearer surface geotechnical conditions. Based on the collected site-specific geotechnical data, the geology underlying the WRESC Site consists of hard rock at the target cavern depth of 2,000 to 2,500 feet that is compatible with the design of an A-CAES cavern storage system capable of producing 500 MW. Nearer to surface geotechnical characteristics have also been determined to be acceptable and compatible with the Project requirements.

The 88.6-acre WRESC Site has adequate space for the aboveground A-CAES facilities. A purchase option agreement has been executed with the current landowner. Project optimization engineering studies have confirmed the constructability of the WRESC Site with an acceptable development schedule.

The WRESC Site has excellent transportation access from Dawn Road by virtue of its location near the Dawn Road exit of State Route (SR) 14 as well as the proximity of Sierra Highway bordering the WRESC Site on the east.

The WRESC will interconnect with SCE's Whirlwind Substation via a new, approximately 19-mile-long tie line, as described in Chapter 3, Electrical Transmission. The SCE Whirlwind Substation is a major point of interconnection for existing and planned renewable energy projects in the Tehachapi Wind Resource Area.

Water supply for the reservoir filling, construction, and nominal operation uses will be available in adequate quantity and quality from an Antelope Valley East Kern Water Agency (AVEK) water supply connection located adjacent to the WRESC Site along Sierra Highway. No groundwater well construction will be required at the WRESC Site.

With respect to western Joshua tree, the Applicant is developing a comprehensive Biological Resources Mitigation Implementation and Monitoring Plan that includes a specific western Joshua tree mitigation component to mitigate all biological resource impacts to less than significant levels.

The proposed WRESC Site is not expected to result in any environmental effects that cannot be either avoided or mitigated to insignificant levels.

The WRESC Site, therefore, attains all the basic project objectives and was selected for WRESC development.

This effort resulted in the execution of a purchase option agreement for the approximately 112-acre parcel (Assessor's Parcel Number 431-022-13, known colloquially as the "WRESC Site") as the primary target site for WRESC development.

Upon gaining site control, the Applicant initiated a Phase I Environmental Site Assessment, field surveys for biological and cultural resources, and a geotechnical data collection program to confirm the suitability of site subsurface geology. Other attributes of the WRESC Site that are attractive include excellent site access from the WRESC Site's proximity to SR 14, the lack of any nearby residences, and access to a nearby water supply line operated by AVEK.

Initial and ongoing geotechnical data collection and preliminary engineering studies to evaluate the viability of the WRESC Site confirmed that development of the WRESC Project at the WRESC Site would be viable, would meet all of the Project's objectives, and is preferable to the Sweetser Road Site that was proposed in the original AFC. The WRESC Site was therefore adopted as the preferred location.

6.4.1.2 Alternative 1 – Sweetser Road Site

Following the siting criteria, the WRESC was originally to be located on an approximately 71-acre area consisting of two adjacent parcels in unincorporated Kern County (County), approximately 1.0-mile northeast of the community of Willow Springs and 7 miles west of Rosamond, California, hereinafter referred to as the "Sweetser Road Site".

The Sweetser Road Site is currently undeveloped desert land located in an area that is zoned E-District (Estate 2.5 Acres I, Residential Suburban Combining (RS)). The area to the southeast of the Sweetser Road Site, including Willow Springs Butte, is public land administered by the U.S. Department of the Interior, Bureau of Land Management (BLM). The area to the north of the Sweetser Road Site across Sweetser Road is used for irrigated agriculture. The Sweetser Road Site is not under a Williamson Act Contract. Based on comments received from Kern County, the WRESC was expected to be a conforming land use at the Sweetser Road Site with a rezone from Estate 2.5 Acres to Limited Agriculture (A-1).

The Sweetser Road Site was originally expected to meet the Project objectives (Docket number TN 240751).

Subsequent to the filing of the original AFC, the Applicant undertook an extensive geotechnical data collection campaign at the Sweetser Road Site. The results of this effort were documented in a series of monthly geotechnical updates, with the final report (TN#: 250724) summarizing laboratory analysis and concluding that suboptimal geologic conditions exist at the Sweetser Road Site:

> *From a geotechnical perspective, the alteration zones within the quartz monzonite would result in difficult cavern construction conditions around the target depth of 2,000 ft. The soft and moderately soft zones would require high levels of ground support to maintain cavern stability. In addition, large pillars would be required to accommodate the overburden loads in the variable strength rock. This would, in turn, require a larger cavern footprint to achieve the volumetric requirements of the facility.*
>
> *From a long-term serviceability perspective, the very low to low durability rock would degrade over time from the wetting and drying conditions that would be experienced in the cavern. This would impact pillar and cavern stability. As such, it is recommended that if cavern construction is pursued at this site, a shallower horizon where rock durability is higher should be targeted.*

Incorporating these findings into the Project optimization process resulted in the following conclusions:

- Development of a larger cavern to address suboptimal conditions would require additional land area beyond the Sweetser Road Site that was not under the Applicant's control.
- Construction of a larger cavern would result in greater environmental impacts associated with excavation and management of a significantly larger quantity of cavern rock and disturbance of a much larger surface area.
- Construction of a larger cavern would significantly increase the capital cost and schedule for the Project.
- Insufficient adjacent parcel acreage was available to implement the option of a larger cavern.
- Construction of the originally planned cavern size at the Sweetser Road Site would not allow the Applicant to achieve the objective of generating up to 500 MW over an 8-hour period.

As a result of these findings, the Sweetser Road Site does not meet all of the objectives of the Project.

6.4.1.3 Alternative 2 – BLM Site

The BLM Site is an approximate 90-acre irregularly shaped parcel owned by the U.S. Government and managed by the BLM. It is located nearly adjacent to the Sweetser Road Site, abutting the Willow Springs Butte on the north side, with only about 350 feet separating the southeast corner of the Sweetser Road Site and the northwest boundary of the BLM Site. The BLM Site was identified in Hydrostor's preliminary examination of the geology of the area with suitable deep subsurface geological characteristics (required

hardness and lack of permeability at cavern depth), adequate parcel size, a viable process for establishing site control, and a location within a 10-mile radius of the SCE Whirlwind Substation. Hydrostor submitted a SF299 form with BLM to initiate the site control process. However, further examination of the BLM Site from a constructability and operability perspective revealed that the vast majority of the BLM Site (approximately southern 70 to 80 percent) consists of irregular, complex and steep terrain that would not be conducive to WRESC development. Creating a developable project site of adequate size with the remaining usable portion of the BLM parcel would have required Hydrostor to fill in the developable portion of the BLM Site by securing site control over more than 20 separately owned parcels. This was viewed as an intractable, time-intensive problem with a low probability of success in achieving the basic Project objectives.

From an environmental perspective, the BLM Site would pose very similar potential impacts compared to the Sweetser Road Site. The BLM Site exhibits the same basic habitat, the length of gen-tie interconnection would be very similar, the distance to the originally identified excavated rock beneficial use recycling destination) is nearly the same, the BLM Site is in the same groundwater basin with similar water supply expected. Other environmental attributes of the BLM Site would be nearly identical. Since the BLM is a federal agency and issuance of a land or ROW grant is a discretionary federal action, BLM approval to use the BLM Site would need to conform to requirements of the National Environmental Policy Act. At the time, this was viewed as an additional regulatory process for the BLM Site, but not viewed as a major concern.

The BLM Site, was not selected for the following primary reasons:

- Inadequate development area - The BLM Site is located on complex, irregular terrain that would render the vast majority of the parcel unusable for development.
- Low probability of gaining site control for adjoining area - Securing control over additional adjoining parcels area to expand the usable portion of the BLM Site into a compatible size would be challenging, time consuming, and with a low probability of success.
- Site proximity to volcanic outcroppings likely to result in unacceptable incongruities in subsurface geologic formation at target cavern depth.

6.4.1.4 Alternative 3 – Little Buttes Site

The Litte Buttes Site is near the Little Buttes outcropping in unincorporated Los Angeles County, approximately 8.5 miles east southeast of the SCE Whirlwind Substation. This Little Buttes Site was also identified in an initial geological review of the general area as exhibiting high potential for subsurface hard rock, low permeability characteristics compatible with Hydrostor's A-CAES cavern design requirements, although the geology is considered less preferred than the Sweetser Road Site. The Little Buttes themselves consist of complex terrain that would pose uniquely challenging constructability issues. The area surrounding the Little Buttes Site is undeveloped open land with biological features similar to the Sweetser Road Site that are characteristic of this general area. The area surrounding the Little Buttes Site is sparsely populated with the nearest resident approximately 0.75 miles away, at the northern border of the unincorporated community of Antelope Acres.

Land availability and the likelihood of gaining site control over sufficient property to accommodate a 500 MW Hydrostor A-CAES facility was a major hurdle in this area. The area surrounding Little Buttes is checkered with small parcels ranging in size from approximately 2.5 to 10 acres with the majority appearing to be zoned Agriculture. There is no single parcel in the area of adequate size to accommodate the facility and creating a site from multiple parcels was viewed as an extremely challenging exercise with a low probability of success.

From an environmental and land use perspective, the Little Buttes Site would pose very similar potential impacts compared to the proposed Sweetser Road Site. The Little Buttes Site exhibits the same basic habitat, the length of gen-tie interconnection would be very similar, and the Little Buttes Site is in the same groundwater basin with similar water supply expected. Other environmental attributes of the Little Buttes Site would be similar to the Sweetser Road Site. Since the Little Buttes Site is located in Los Angeles County, the permitting associated with the SCE gen-tie interconnection would need to involve

both Kern County and Los Angeles County. Although this would pose an additional regulatory process for the Little Buttes Site, this was not viewed as a major concern.

The Little Buttes Site, was not selected for the Project for the following primary reasons:

- Inadequate development area - The Little Buttes Site itself consists of complex terrain with extreme slopes that are not realistically suitable for Project construction.
- Low probability of gaining site control for adequate area - Securing control over an additional 15 to 20 parcels needed to achieve an adequate area for Project development would be challenging, time consuming, and with a low probability of success.
- Site proximity to volcanic outcroppings likely to result in unacceptable incongruities in subsurface geologic formation at target cavern depth.

6.4.1.5 Alternate 4 – Rosamond Hills Site

The Rosamond Hills Site is an approximately 160-acre parcel that was available for lease near the Rosamond Hills outcropping in unincorporated Kern County, approximately 4 miles northeast of the Sweetser Road Site and approximately 12 miles northeast of the SCE Whirlwind Substation. The Rosamond Hills Site is a combination of complex rugged terrain to the south and more gently sloping or relative flatter terrain to the north. The northern approximately 80 acres were initially considered of adequate size to support development. This Rosamond Hills Site was identified in an initial geological review of the general area as exhibiting possible potential for subsurface hard rock, low permeability characteristics compatible with Hydrostor's A-CAES cavern design requirements.

However, more focused geologic assessment revealed the Rosamond Hills Site to be the least favorable of the alternate sites as a result of the presence of surface fanglomerate and underlying tuff and/or tuffaceous sandstone. The near-surface fanglomerate at the Rosamond Hills Site is problematic because its strength would be highly variable depending on whether the matrix or the larger particle (pebbles or boulders) predominate, as well as on the mineralogy of the pebbles/boulders and the matrix. Also, the underlying tuff and/or tuffaceous sandstone would not be expected to be as strong, durable, and impermeable as the Sweetser Road Site or the other alternate sites.

The area surrounding the Rosamond Hills Site is undeveloped open land with biological features similar to the Sweetser Road Site that are characteristic of this general area. The area surrounding the Rosamond Hills Site is generally sparsely populated but there are approximately a dozen residences within 0.25 miles of the northern Rosamond Hills Site boundary. The parcel is zoned Agriculture.

From an environmental and land use perspective, the Rosamond Hills Site would pose many similar potential impacts compared to the originally proposed Sweetser Road Site. The Rosamond Hills Site exhibits the same basic habitat and is in the same groundwater basin with similar water supply expected. Other environmental attributes of the Rosamond Hills Site would be similar to the Sweetser Road Site.

The Rosamond Hills Site, was not selected for the following primary reasons:

- Less desirable surface and subsurface geology – Both the surface geology and subsurface geology at cavern depth at the Rosmond Hills Site are expected to be inferior to the other sites from both a constructability and performance perspective.
- Site proximity to volcanic outcroppings likely to result in unacceptable incongruities in subsurface geologic formation at target cavern depth.

6.4.1.6 Alternative 5 – VH Site

The VH Site is an approximately 80-acre parcel of land located on Dawn Road with the eastern parcel border approximately 0.4 miles west of SR 14 in unincorporated Kern County. The VH Site is currently undeveloped desert land located in an area that is zoned as an A-1 District (Limited Agriculture). The VH Site is not under a Williamson Act contract. The Department of Defense Edwards Air Force Base nearest runway is approximately 15 miles east of the parcel. The nearest residences are approximately 0.5 miles west of the parcel along Dawn Road. From a zoning perspective, the VH Site would be expected to

require a rezone from A-1 (Limited Agriculture) to A (Exclusive Agriculture) similar to the County's recommendation for the WRESC Site.

The VH Site is not flat. There are problematic grades and undulations in grade on the northern half of the parcel present potentially significant grading and constructability issues for the VH Site. The VH Site also exhibited extensive surface rock features that are considered problematic for overall grading as well as excavation hydrostatically compensating reservoir and construction of equipment foundations.

Although the VH Site was identified as relatively low risk based on the initial desktop geology screening, no site-specific geotechnical data exists upon which to confirm whether underlying formations at a depth of 2,000 to 2,500 feet below ground surface would be sufficient for A-CAES cavern construction.

Development at the VH Site would also require a slightly shorter gen-tie line to the SCE Whirlwind Substation compared the WRESC Site.

The VH Site access via the SR 14 Dawn Road exit was a positive feature. However, there is no similar secondary access to the VH Site (such as Sierra Highway for the WRESC Site).

The VH Site may require the construction of groundwater wells to support construction. An initial review of available groundwater wells in the area (see Section 5.15 Water Resources) revealed that other groundwater wells in the area are not capable of producing the flow needed to support Project construction, posing a risk for successfully accessing the required groundwater flow at this location. Alternatively, water would either need to be piped from an AVEK water supply line or trucked to meet the required amount of construction water to the VH Site. By contrast, the WRESC Site has available water supply service directly adjacent to the WRESC Site.

Other environmental attributes of the VH Site would be similar to the WRESC Site.

The VH Site, was not selected for the following primary reasons:

- The VH Site is not flat. There are problematic grades and undulations in grade as well as extensive surface rock features that present potentially significant grading and constructability issues for the VH Site.
- The VH Site does not have the same potential to gain site control of bordering properties to support construction laydown and parking or a possible onsite excavated architectural berm. The parcels immediately surrounding the VH Site were not available.

Based on the above, the VH Site was identified as a viable site for possible construction laydown and parking rather than serving as the primary development site.

Alternate Site 6 – PS Site

The PS Site is an approximately 154-acre site located at the southeast intersection of Sierra Highway and Sopp Road in unincorporated Kern County, east of the Union Pacific (UP) railroad corridor. The PS Site is currently on undeveloped desert land located in an area zoned as A-1 (Limited Agriculture). The PS Site is not under a Williamson Act contract. The Department of Defense Edwards Air Force Base nearest runway is approximately 13.5 miles east of the parcel. The nearest residence is directly north and across Sopp Road from the parcel. From a zoning perspective, the PS Site would be expected to require a rezone from A-1 (Limited Agriculture) to A (Exclusive Agriculture) similar to the County's recommendation for the WRESC Site.

The PS Site is located on quartz monzonite and has adequate distance from any known volcanic outcropping to be deemed a low geology risk. This would need to be proven with site-specific geotechnical boring and data collection which have not been completed at the PS Site.

The PS Site is relatively flat. Based on desktop review, it was determined to have a deeper overburden relative to the other sites.

The PS Site could be accessed from SR 14 at the Backus Road exit. There is no Sopp Road exit from SR 14. In addition, access to the PS Site would require crossing an active railroad corridor. For these reasons, the PS Site was assigned a higher access risk.

The PS Site is farther away from the SCE Whirlwind Substation, presenting the need for additional ROWs and potentially impacting biological, water and other resources avoided by the WRESC due to its additional length.

The PS Site would require the construction of groundwater wells to support construction. An initial review of available groundwater wells in the area (see Section 5.15 Water Resources) revealed that other groundwater wells in the area are not capable of producing the flow needed to support Project construction, posing a risk for successfully accessing the required groundwater flow at this location. Alternatively, water would either need to be piped from an AVEK water supply line or trucked to meet the required amount of construction water to the PS Site. By contrast, the WRESC Site has available water supply service directly adjacent to the WRESC Site.

Environmentally the PS Site appeared, at the time of the screening, to be very similar to the G site and the OT site.

Contact with the landowner revealed that the PS Site is not available for purchase. The landowner is planning to develop a steel micro mill on the PS Site. As a result the PS Site was eliminated from further consideration as infeasible due to an inability to gain site control.

Alternate Site 7 – G Site

The G Site is an approximately 160-acre site consisting of the northwest quarter of Section 34, Township 10 North, Range 12 W in unincorporated Kern County. The G Site is bordered on the west by Sierra Highway and the UP railroad corridor. The G Site is currently on undeveloped desert land located in an area zoned as A-1 (Limited Agriculture). The G Site is not under a Williamson Act contract. The Department of Defense Edwards Air Force Base nearest runway is approximately 13.5 miles east of the parcel. The nearest residence appears to be approximately 1.3 miles northwest on the west side of SR14. From a zoning perspective, the G Site would be expected to require a rezone from A-1 (Limited Agriculture) to A (Exclusive Agriculture) similar to the County's recommendation for the WRESC Site.

The G Site is located on quartz monzonite and has adequate distance from any known volcanic outcropping to be deemed a low geology risk. This would need to be proven with site-specific geotechnical boring and data collection which have not been completed at the G Site.

The G Site is not as flat as the PS Site, but is judged to be constructable with some grading. Based on desktop review, it was determined to have a slightly deeper overburden relative to the WRESC Site.

The G Site could be accessed from either the SR 14 Backus Road or Dawn Road exits east to Sierra Highway. The nearest exit is Dawn Road, but Dawn Road is not improved east of the exit and there is no improved railroad crossing on Dawn Road. Access to the G Site would require a new railroad crossing from Sierra Highway. For these reasons, the G Site was assigned a significantly higher access risk.

The G Site is farther away from the SCE Whirlwind Substation, presenting the need for additional ROWs and potentially impacting biological, water and other resources avoided by the WRESC due to its additional length.

The G Site would require the construction of groundwater wells to support construction. An initial review of available groundwater wells in the area (see Section 5.15 Water Resources) revealed that other groundwater wells in the area are not capable of producing the flow needed to support Project construction, posing a risk for successfully accessing the required groundwater flow at this location. Alternatively, water would either need to be piped from an AVEK water supply line or trucked to meet the required volume of construction water to the G Site. By contrast, the WRESC Site has available water supply service directly adjacent to the WRESC Site.

Contact with the landowner did not result in completion of a site purchase agreement. The inability to gain site control makes Site G infeasible. The G Site also poses significant site access risks. Moreover, because of the expedited development timetable to achieve the Project objectives, the time and effort to begin site-specific geotechnical data collection (assuming site control) to confirm the expected site geophysical characteristic, and the expected less than favorable development characteristics placed the G Site is infeasible to meet the basic Project objectives.

Alternate Site 8 – OT Site

The OT Site is an approximately 160-acre site consisting of the northwest quarter of Section 3, Township 9 North, Range 12 W in unincorporated Kern County. The OT Site is east of the intersection where Dawn Road terminates at Sierra Highway and the UP railroad corridor. The OT Site is currently on undeveloped desert land located in an area zoned as A-1 (Limited Agriculture). The OT Site is not under a Williamson Act contract. The Department of Defense Edwards Air Force Base nearest runway is approximately 13.5 miles east of the parcel. The nearest residence appears to be approximately 2 miles northwest on the west side of SR14. From a zoning perspective, the OT Site would be expected to require a rezone from A-1 (Limited Agriculture) to A (Exclusive Agriculture) similar to the County's recommendation for the WRESC Site.

The OT Site is located on quartz monzonite and has adequate distance from any known volcanic outcropping to be deemed a low geology risk. This would need to be proved out with site-specific geotechnical boring and data collection which have not been completed at the OT Site.

The OT Site topography risk is relatively low and similar to the WRESC Site and the G Site. Based on desktop review, it was determined to have a similar overburden depth relative to the WRESC Site.

The OT Site is farther away from the SCE Whirlwind Substation, presenting the need for additional ROWs and potentially impacting biological, water and other resources avoided by the WRESC due to its additional length.

The OT Site cannot be access by an existing improved roadway. The nearest SR 14 exit is Dawn Road, but Dawn Road terminates at Sierra Highway. Access to the OT Site would require extension of Dawn Road east, across Sierra Highway and a new upgraded crossing of the active railroad to extend Dawn Road to the northern border of the OT Site. In addition, 10th Avenue, an unimproved dirt road bisects the OT Site. For these reasons, the OT Site was assigned a significantly higher access risk.

The OT Site would require the construction of groundwater wells to support construction. An initial review of available groundwater wells in the area (see Section 5.15 Water Resources) revealed that other groundwater wells in the area are not capable of producing the flow needed to support Project construction, posing a risk for successfully accessing the required groundwater flow at this location. Alternatively, water would either need to be piped from an AVEK water supply line or trucked to meet the required volume of construction water to the OT Site. By contrast, the WRESC Site has available water supply service directly adjacent to the WRESC Site.

Contact with the landowner appeared to be progressing toward a satisfactory site purchase agreement. However, negotiations were not pursued further due to the significant site access concerns described above.

6.4.2 Alternative Site Summary

The WRESC Site and alternatives are compared in **Table 6-2**. Only the WRESC Site meets all of the Project objectives and siting criteria. While some of the alternative sites would meet some of the Project objectives, they fail to feasibly obtain most or all of the basic Project objectives while avoiding potentially significant effects. Moreover, potential environmental impacts of the alternatives are expected to be similar to or greater than those expected for the WRESC Site. Thus, none of the alternative sites will avoid or minimize a potentially significant effect. CEQA provides that alternatives need not be examined in the same detail as the proposed Project and thus site-specific resource analyses are not required for alternatives. Nevertheless, in addition, the alternative sites may themselves have potentially significant

effects that are avoided or minimized by the WRESC site. For example, longer generation tie lines and site-specific environmental conditions could result in additional environmental impacts to land, water, air, and other environmental resources.

Table 6-2: Site Selection Summary

Project Objective[a]	WRESC Site	Alternative 1 – Sweetser Road Site	Alternative 2 – BLM Site	Alternative 3 – Little Buttes Site	Alternative 4 – Rosamond Hills Site	Alternative 5 – VH Site	Alternative 6 – PS Site	Alternative 7 – Grigbsy Site	Alternative 8 – Odel Trust Site
1 – 500 MW of quick-starting, flexible, controllable generation	*Yes – Site-specific geotechnical data collection has confirmed the adequacy of the site*	*No – The site geology and available acreage would limit development to a smaller project.*	*No – The geology of the site is expected to be negatively influenced by close proximity to volcanic outcroppings that would limit Project development*	*No – The geology of the site is expected to be negatively influenced by close proximity to volcanic outcroppings that would limit Project development*	*No – The geology of the site is expected to be negatively influenced by close proximity to volcanic outcroppings that would limit Project development*	*Maybe – assuming site-specific data collection proved out adequate underground geotechnical conditions*	*Maybe – assuming site-specific data collection proved out adequate underground geotechnical conditions*	*Maybe – assuming site-specific data collection proved out adequate underground geotechnical conditions*	*Maybe – assuming site-specific data collection proved out adequate underground geotechnical conditions*
2 – Interconnect to SCE Whirlwind Substation	*Yes , ~19 miles*	*Yes, ~ 11 miles*	*Yes ~11 miles*	*Yes ~ 10 miles*	*Yes ~ 15 miles*	*Yes, ~17 miles*	*Yes ~ 21 miles*	*Yes ~ 20 miles*	*Yes ~ 20 miles*
3 – Sustainable energy storage technology	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
4 – Fossil-fuel and GHG emissions-free long-duration (>8 hour) A-CAES technology	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
5 – Adequate geological characteristics for A-CAES technology	*Yes, Applicant has obtained a significant amount of site-specific deep borehole and surface borehole geotechnical data from multiple locations on the site to confirm site suitability*	*Yes, but not at the target depth necessary to generate 500 MW on the available site*	*No – the geology of the site is expected to be negatively influenced by close proximity to volcanic outcroppings that would limit Project development*	*No – the geology of the site is expected to be negatively influenced by close proximity to volcanic outcroppings that would limit Project development*	*No – the geology of the site is expected to be negatively influenced by close proximity to volcanic outcroppings that would limit Project development*	*Maybe – assuming site-specific data collection proved out adequate underground geotechnical conditions*	*Maybe – assuming site-specific data collection proved out adequate underground geotechnical conditions*	*Maybe – assuming site-specific data collection proved out adequate underground geotechnical conditions*	*Maybe – assuming site-specific data collection proved out adequate underground geotechnical conditions*
6 – Close, adequate fresh water supply	*Yes – AVEK supply line directly adjacent to the facility*	*Likely, but would require construction of new groundwater wells for delivery via purchase of surplus water rights from other groundwater basin users*	*Likely, but would require construction of new groundwater wells for delivery via purchase of surplus water rights from other groundwater basin users*	*Likely, but would require construction of new groundwater wells for delivery via purchase of surplus water rights from other groundwater basin users*	*Likely, but would require construction of new groundwater wells for delivery via purchase of surplus water rights from other groundwater basin users*	*No – local groundwater wells are not suitably productive, new pipeline to AVEK would be required*	*No – local groundwater wells are not suitably productive, new pipeline to AVEK would be required*	*No – local groundwater wells are not suitably productive, new pipeline to AVEK would be required*	*No – local groundwater wells are not suitably productive, new pipeline to AVEK would be required*
7 – Flat land with adequate size (>80 acres) and access	*Yes – site constructability confirmed during Project optimization. Site access is excellent given proximity to SR 14 and existing Dawn Road exit*	*No – Site is less than ideal 80-acre size and, given geological constraints, is not large enough tor development of a 500 MW project; construction on a larger area (if it were available) would be less feasible due to significantly increase capital cost and schedule.*	*No – large portion of the site is complex, steep terrain that is not suitable, remaining flat portion is less than 60 acres*	*No – site itself consists of complex terrain unsuitable for development, no parcels of adequate size in the area*	*Yes – 160-acre site; site access appears to be manageable*	*No - site topography poses significant constructability risk due to excessive slope, irregular terrain and extensive surface rock features*	*Maybe – site topography is judged to flatter than WRESC Site*	*Maybe – site topography is judged to be similar to WRESC, site access considerably more challenging than WRESC*	*Maybe – site topography is judged to be similar to WRESC; site access considerably more challenging than WRESC*
8 – Site available for long-term lease or purchase	*Yes – In addition, site control of surrounding parcels allows for the option of onsite waste rock storage in lieu of hauling offsite.*	*Yes – but site is not large enough for a 500 MW project and, adjacent parcels to expand the site are not available for purchase or lease.*	*Unlikely – site control of >20 separate parcels would be required to create a site of adequate size*	*Unlikely – site control over numerous parcels would be required to create a site of adequate size*	*Yes*	*Yes – The Applicant secured site control and may use this site for additional construction laydown and parking if needed*	*No - the site owner has other development plans for this site*	*No – negotiations on land purchase did not result in site control; was not pursued further due to significant site risk/access concerns.*	*Maybe – negotiations on land purchase were proceeding satisfactorily but not pursued further due to significant site access risk/concerns.*

Project Objective[a]	WRESC Site	Alternative 1 – Sweetser Road Site	Alternative 2 – BLM Site	Alternative 3 – Little Buttes Site	Alternative 4 – Rosamond Hills Site	Alternative 5 – VH Site	Alternative 6 – PS Site	Alternative 7 – Grigbsy Site	Alternative 8 – Odel Trust Site
9 – Minimize additional infrastructure, including avoiding lengthy gen-tie to minimize environmental impacts	*Yes – Inclusion of onsite Architectural berm would eliminate impacts associated with hauling rock offsite; slightly longer than 19 miles, but the majority will be in existing County Road right-of-way.*	*Yes ~ Shorter interconnection would minimize new disturbance*	*Yes – Slightly longer interconnection but comparable to Sweetser Road in routing*	*Yes – Similar gen-tie length to Sweetser Road Site and Alternative Site 2*	*Yes – longer than Alternatives 1, 2 & 3 but shorter than WRESC*	*Yes – ~17-mile gen-tie would be viable using similar route as proposed site; limited ability to expand site boundary may restrict viability of onsite waste rock storage option*	*Yes – ~21 mile gen-tie routing would be similar to WRESC but slightly longer*	*Yes – ~20-mile gen-tie routing would be similar to WRESC but slightly longer*	*Yes – ~20-mile gen-tie routing would be similar to WRESC but slightly longer*
10 – Create jobs for Kern County and California	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
11 – Good corporate citizenship	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*

[a] *See Section 6.1 for the complete description of each of the numbered Project objectives*

A-CAES = advanced compressed air energy storage; AVEK = Antelope Valley East Kern Water Agency; gen-tie = generation-tie; GHG = greenhouse gas; MW = megawatt; SCE = Southern California Edison; SR = State Route; WRESC = Willow Rock Energy Storage Center

6.5 Alternative Project Design Features

This subsection addresses alternatives to some of WRESC design features such as the linear facility routing, interconnection location, water supply source, excavated rock recycling, and/or disposal alternatives.

6.5.1 Electrical Gen-tie Line Route Alternatives

6.5.1.1 Preferred Gen-Tie Route

The facility will connect with SCE's Whirlwind substation via an approximately 19-mile-long generation tie-line (designated the Preferred Gen-Tie Route). This is the most direct interconnection route that will follow existing Kern County public ROW and an expected franchise agreement with Kern County, maximize the use of existing improved surface road corridors, avoid placement of the line in close proximity to public schools or the downtown Rosemond residential and business district, and minimize the required number of private easements. The Preferred Gen-Tie Route leaves the northwest corner of the WRESC Site and continues north for approximately 650 feet. It then transitions 90 degrees east and crosses SR 14 and continues west for approximately 1 mile parallel and north of Dawn Road. Just before reaching a property designated as Stand Lands (Assessor Parcel Number 431-002-08), the line transitions 90 degrees south to Dawn Road (0.4 miles), then follows Dawn Road west to Mojave-Tropico Road (2.2 miles). From Dawn Road, the route follows Mojave-Tropico Road south to Felsite Avenue (2.8 miles), west along Felsite Avenue to 65th Street W (1.0 mile), and south along 65th Street W to Rosamond Boulevard (0.5 mile). The route then continues along Rosamond Boulevard west to the SCE Whirlwind Substation for approximately 10.8 miles. Before reaching 170th Street W, east of the SCE Whirlwind Substation, the line diverts northwest to cross an existing SCE transmission line and then diverts southwest back to the Rosamond Boulevard alignment west of 170th Street W. The total length of the Preferred Gen-Tie Route primary alignment is approximately 19.1 miles. The Preferred Gen-Tie Route includes five named road segments and two segments that do not follow existing roads, which are located at the SR 14 crossing and the SCE Whirlwind Substation interconnection area. Approximately 17.8 miles would be aboveground, and approximately 1.2 miles would be underground, including at three utility crossing locations along Rosamond Avenue and in a residential area along Felsite Avenue. The Preferred Gen-Tie Route, including options discussed below, is shown in **Figure 6-2**.

Willow Rock Energy Storage Center Transmission Line

Preferred and Alternative Routes

- Project Boundary
- WRESC Site
- Other Project Parcel
- SCE Whirlwind Substation

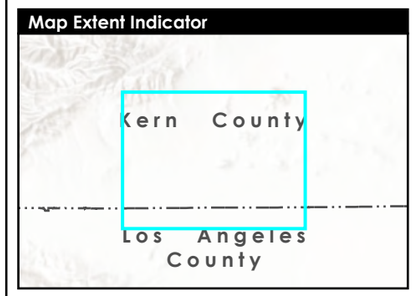
Preferred Route Primary
- Aboveground
- Underground

Preferred Route Options
- Aboveground
- Underground

Alternative Routes
- Alternative A
- Alternative B
- Alternative C

Surface Managment Agency
- DOD
- BLM
- Forest Service
- State
- Local Government
- County

Map Extent Indicator



Scale =1:85,000

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Basemap: 10/2/2021

Date Created: 2/20/2024

PANORAMA

6.5.1.2 Preferred Gen-Tie Route Options

There are six Preferred Gen-Tie Route options that deviate slightly from the primary alignment that are also included in the proposed Project. These are all considered available but less preferrable than the primary route. Some may present issues related to feasibility, i.e., ability to gain site control and potential interactions with existing and planned uses. These options include:

- **Option 1 (1.3 miles in total or 1.0 mile from the southwest Project corner).** Dawn Road approximately 1 mile west of the WRESC Site following the existing SR 14 overpass, instead of the northern crossing location where the primary route is identified. This segment was the original Preferred Gen-Tie Route but was later changed to the northern SR 14 crossing based on recommendations by the California Department of Transportation (Caltrans) to avoid a more complex review process that would be involved if the gen-tie line crossed SR 14 adjacent to the overpass.
- **Option 2a (0.5 miles).** This option is a continuation of the SR 14 northern crossing route 0.5 mile farther west to 30th Street W, which cuts through a State Lands parcel (Assessor Parcel Number 431-022-06), which may not be feasible.
- **Option 2b (1.1 miles).** This option avoids the State Lands parcel by following the northern boundary and remaining outside of the property and ends at the same location as Option 2b at 30th Street W.
- **Option 3a (0.5 mile).** This option follows 30th Street W to Dawn Road.
- **Option 3b (1.2 miles).** This option continues west past 30th Street W in the same east-to-west alignment as Option 2a. When it reaches Werner Street, the line would then transition 90 degrees south and follow Werner Street to Dawn Road.
- **Option 4 (0.3 miles).** This option is an alternate segment of Dawn Road approximately 0.3 mile east of Mojave-Tropico Road that follows the existing roadway used by motorists and visible in aerial imagery. The primary route identified for the preferred gen-tie route at the western end of Dawn Road follows the County's road easement instead of the existing roadway used by motorists and visible in aerial imagery. This variant is included until further direction is provided by the County regarding the route the County prefers to include in its franchise agreement.
- **Option 5 (1.5 miles).** Mojave-Tropico Road between Felsite Avenue and Rosamond Avenue, and Rosamond Avenue between Mojave-Tropico Road and 65th Street W. This segment was the original Preferred Gen-Tie Route but was later changed to Felsite Avenue and 65th Street W to avoid passing in front of Tropico Middle School. Approximately 0.4 mile of this option would be underground in the vicinity of the school.
- **Option 6 (0.2 miles).** This option follows Rosamond Boulevard east of 170th Street W in a generally parallel direction before continuing to SCE Whirlwind Substation and provides an alternate route for crossing the existing SCE transmission line corridor northeast of the substation.

6.5.1.3 Alternative Routes (Determined Infeasible)

Three alternative routes were developed that deviate significantly from the Preferred Gen-Tie Route alignment. All three have been determined infeasible due to one or more major constraints or constructability issues. These are summarized briefly below and shown, along with the Preferred Gen-Tie Route, in **Figure 6-2**.

- **Alternative A (19.2 miles).** Alternative A follows Sierra Highway south of the WRESC site for 3.2 miles before diverting west along Rosamond Boulevard for 15.6 miles to the SCE Whirlwind Substation. The preliminary position of the route is located immediately east of Sierra Highway and immediately west of the Southern Pacific Railroad owned by UP, which runs parallel to the highway. This route would require two crossings of SR 14, one near the site at Dawn Road and the other near downtown Rosamond. Early consultation with Caltrans indicated that such crossings would not be preferred and could result in Project delay. The route also passes in front of four public schools along Rosamond Boulevard: Rare Earth Highschool (2800 W. Rosamond Boulevard), Abraham Lincoln Alternative School (3082 Glendower Street), Rosamond Elementary (1981 Rosamond Boulevard), and Rosamond Highschool (2925 Rosamond Boulevard). Early consultation with Kern

County indicated that routes near public schools may be a community concern. The Preferred Gen-Tie Route was specifically modified to avoid crossing in front of Tropico Middle School for this reason. The route would also be more visible from Sierra Highway and SR-14 than the Preferred Gen-Tie Route. The route would also pass directly through moderate- to high-density residential and businesses in downtown Rosemond along Rosemond Boulevard. For these reasons, the route was not considered feasible and potentially results in new significant visual effects. Environmental impacts along the route itself would be similar to those of the Preferred Gen-Tie Route, with any impacts avoidable or mitigable to less than significant levels with judicious pole placement.

- **Alternative B (19.2 miles).** Alternative B follows Dawn Road 0.9 miles south and west of the WRESC Site and crosses SR 14 adjacent to the Dawn Road overpass. East of the overpass, the route follows a frontage road immediately west of SR 14 for 3.2 miles south to Rosamond Boulevard, then continues west along Rosamond Boulevard for 14.8 miles to the SCE Whirlwind Substation. This route was rejected for similar reasons to Alternative A. Namely, the crossing of SR 14 near the site at Dawn Road was viewed as problematic, the route would pass in front of medium- to high-density residential and business in downtown Rosemond along Sierra Highway and Rosamond Boulevard, the route would pass in front of Rosamond Highschool (2925 Rosamond Boulevard), and the route would be more visible along Sierra Highway and SR 14 than the Preferred Gen-Tie Route.
- **Alternative C (19.4 miles).** Like the Preferred Gen-Tie Route, Alternative C leaves the northwest corner of the WRESC Site, crosses SR 14, and continues west for approximately 1 mile north of Dawn Road, then transitions 90 degrees south to Dawn Road (0.4 miles) and follows Dawn Road west to Mojave-Tropico Road (2.2 miles). It continues along Mojave-Tropico Road for 1.2 miles south, Sweetser Road for 1.5 miles west, 65th Street W for 2.0 miles south, and Rosamond Boulevard for 10.8 miles west to the SCE Whirlwind Substation. Key concerns associated with this route are the absence of public ROW along portion of 65th Avenue West south of Sweetser Road and the much larger number of private landowners from which ownership or easements would need to be obtained for the gen-tie line. For these reasons, this route was rejected as infeasible. As with Alternatives A and B, environmental impacts along the route itself would be similar to those of the Preferred Gen-Tie Route, with any impacts avoidable or mitigable to less than significant levels with judicious pole placement.

6.5.2 Water Supply Source Alternatives

The WRESC will use water available from the AVEK water supply line located near the eastern border of the WRESC Site. The primary source of AVEK water is the State Water Project. AVEK also operates a groundwater bank in the underlying groundwater basin. Alternatives to the AVEK water supply are discussed below.

6.5.2.1 Ocean Water

The Pacific coast lies approximately 90 miles from the WRESC Site, over mountainous terrain. Routing a pipeline to the ocean would be extremely complex environmentally and cost prohibitive. For these reasons, the alternative of using the ocean as a water source was not considered further.

6.5.2.2 Reclaimed Water

The Rosamond Community Sanitation District (RCSD) operates the Rosamond Wastewater Treatment Plant (WWTP) located approximately 9 miles from the WRESC Site. Although the facility has sufficient reclaimed water capacity to meet the needs of the Project, the WRESC Site is not within the service boundaries of the RCSD. The WRESC would need to obtain an exemption from the requirement to be within RCSD boundaries to receive reclaimed water from the Rosamond WWTP. In addition, reclaimed water service would require siting and constructing a new, approximately 9-mile pipeline or delivery to the site by a numerous water truck. Both options would involve additional permitting to allow service outside the RCSD service area and potential environmental effects avoided by the AVEK supply, add to base case development costs, and have greater environmental impacts than the preferred water supply option. For these reasons, reclaimed water from the Rosamond WWTP is not a feasible option.

The Lancaster Water Reclamation Plant (LWRP) located approximately 11 miles from the WRESC Site, is under the jurisdiction of Los Angeles County. Although the facility has sufficient reclaimed water capacity to meet the needs of the Project, the WRESC Site is not within the service boundaries of the LWRP and not within Los Angeles County area served by this publicly owned facility. The WRESC would need to obtain permission from Los Angeles County to receive reclaimed water for use in Kern County from the LWRP. In addition, reclaimed water service would require siting and constructing an approximately 11-mile pipeline or delivery to the site by numerous water truck trips. Both options would involve additional permitting, add to base case development costs, and have greater environmental impacts than the preferred water supply option. For these reasons, reclaimed water from the LWRP is not a feasible option.

The Palmdale Water Reclamation Plant (PWRP), located approximately 24 miles from the WRESC Site, is under the jurisdiction of Los Angeles County. Although the facility has sufficient reclaimed water capacity to meet the needs of the Project, the WRESC Site is not within the service boundaries of the PWRP and not within Lois Angeles County area served by this publicly owned facility. The WRESC would need to obtain permission from Los Angeles County to receive reclaimed water from the PWRP for use in Kern County. In addition, reclaimed water service would require siting and constructing a 24-mile pipeline or delivery to the site by numerous water trucks. Both options would involve additional permitting, add to base case development costs, and have greater environmental impacts than the preferred water supply option. For these reasons, reclaimed water from PWRP is not a feasible option.

6.5.2.3 Ground Water Wells

Groundwater wells would need to be constructed since there are no existing groundwater wells on the site. A search of well production records in the vicinity reveals no well records to the immediate east or south of the site. To the north and west, there are some low-capacity producing wells within several miles, but the only evidence of wells producing in the several hundred gallons per minute range needed to support filling of the surface reservoir lie approximately 8 to 10 miles to the west, where active agriculture is visible on aerial imaging. This evidence suggests that groundwater wells drilled onsite would present a capital investment and drilling risk of yielding low-capacity or nonproducing wells. To access areas of apparent high-capacity groundwater production sufficient to support the Project, an 8- to 10-mile pipeline and a negotiated water supply agreement with a current well owner/operator would be needed. This would result in greater environmental impacts and higher capital cost and was rejected in favor of the readily available AVEK water supply adjacent to the WRESC Site that would avoid the need for an extended pipeline and groundwater supply agreement or the risk of attempting to construct one or more groundwater wells onsite.

6.5.3 Excavated Rock Recycle or Disposal Alternative

Construction of the WRESC Project will result in the excavation of approximately 1.3 million cubic yards of rock that is expected to be of aggregate quality. As a result, the Applicant has proposed to recycle excavated material for site grading and construction of the earthen berms for the surface compensation reservoir to extent feasible and either haul the remaining excavated rock to select offsite third-party offtakers or store unused excavated rock onsite in the form of an architectural berm to the north and west of the main facility.

The Applicant engaged an independent waste rock broker to assist in a comprehensive identification of possible third-party offtakers for the excavated rock within 30 to 40 miles of the site. The search identified the following potential offtakers that may be able to beneficially recycle or re-use the excavated rock:

- Ridgeline Materials
- Kern County Public Works
- Vulcan Materials
- Robertson Construction
- Holiday Rock
- All American Asphalt

- Golden Queen Mine

Each of these parties was engaged to determine:

- Interest in taking excavated rock from the site
- Capacity to take the material
- Existence of all necessary permits facilities to receive the material without additional permitting
- Feasible acceptance criteria
- Acceptable commercial terms

Based on the collected information, three facilities emerged as potentially viable offtakers: Vulcan Materials, Roberston Construction, and Holiday Rock. All of these facilities are located in the city of Palmdale with haul distances of 30 to 34 miles.

The remaining alternative facilities were eliminated from further consideration because they exhibited one or more of the following:

- No commercial interest in waste rock and no legal or regulatory obligations to accept such rock
- Lack of fully permitted facilities that represented an unacceptable risk
- Acceptance criteria incompatible with expected waste rock composition
- Infeasible commercial terms

The hauling of excavated material offsite would result in air quality and greenhouse gas emissions, as well as traffic impacts, as discussed in Sections 5.1, Air Quality and 5.12, Traffic and Transportation. Air quality impacts associated with hauling the material to any of the four facilities would be very similar, with slightly lower emissions associated with the closer facilities. To be conservative, the AFC assumes that all rock would be hauled to the most distant facility. The environmental impacts associated with hauling for other environmental disciplines would be also very similar. Although there are environmental benefits associated with avoiding hauling materials offsite and other advantages associated with the re-use of excavated material in an onsite architectural berm, the analyses assume the worst-case impacts of hauling 100 percent of the material offsite. Alternatives to this plan for the excavated material are discussed below.

6.5.3.1 Recycle for Additional Onsite Beneficial Use

Instead of hauling the material that is expected to be surplus, WRESC could also use the excess material to raise the entire site by several feet. Additional testing of site-specific core material would need to be conducted to establish whether the material has appropriate engineering qualities to be used for this purpose. Raising the site would result in the structures being slightly taller and thus slightly more visible from key observation points. However, given the scale of the facility, this additional visual impact would not be expected to be significant. Elevating the facility may also result in slightly greater noise impacts at nearby receptors that would need to be evaluated but mitigation measures would likely be available to reduce these incremental impacts to insignificant levels. With appropriate onsite stormwater management, raising the site by this amount would not be expected to result in a significant change to stormwater management requirements to ensure that offsite drainage patterns remain unimpacted by the Project. This alternative would have characteristics similar to those of the proposed construction of permanent architectural berm onsite and would also avoid truck traffic and rock crushing emissions associated with hauling the material offsite.

6.5.3.2 Disposal at Offsite Landfill

Another alternative for the excavated rock would be to dispose of the material at a nearby landfill. This alternative would likely result in truck traffic and emissions impacts similar to those of hauling the material offsite for beneficial re-use, but without the benefits of re-use. Disposal at a local landfill would consume valuable landfill capacity and not advance the state's objectives to recycle waste material to the greatest extent possible. For these reasons, this alternative is less preferred.

6.6 Technology Alternatives

6.6.1 Conventional and Renewable Generation Technology Alternatives

Conventional generation technologies such as combined cycle or peak load (simple Brayton cycle) combustion turbine-based power plants as well as Rankine Cycle steam electric power plants would generate comparable power output to the WRESC. However, these would not meet the basic Project objectives of providing long-term energy storage or fossil-fuel and greenhouse gas emissions-free operation and therefore were not considered further. Renewable energy generation technologies such as wind or solar are not energy storage and are dependent on available wind and sun and thus have variable power output profiles that would not provide dispatchable long-term energy storage with synchronous generation response capability. Biomass-fired power plant technology also does not meet basic Project objectives, including dispatchable energy storage and greenhouse gas emissions-free operation. As such, renewable energy technologies do not meet the basic Project objectives and were not considered further.

6.6.2 Energy Storage Alternatives

6.6.2.1 Battery Storage Systems

Battery-based energy storage technology offers some similar attributes to Hydrostor's A-CAES technology, including ancillary service provision and fossil-fuel-free generation. However, battery energy storage is typically much shorter-duration (typically ranging from 2 to 4 hours) and significantly lower-capacity energy storage. Battery storage systems are more limited in lifespan (typically requiring replacement within 10 years) and exhibit performance degradation starting early in their lifespan and declining nearly linearly thereafter. Additionally, battery-based energy storage technologies present an operation risk due to the potential for chemical fire and hazardous waste disposal requirement at the end of life. Performance is also materially impacted by environmental factors like temperature. Batteries, therefore, serve an important distributed, smaller-scale role with excellent frequency response and provide very different grid services from A-CAES. While batteries primarily focus on distributed, behind-the-meter applications and frequency response, A-CAES can deliver grid-level services like capacity, voltage support, and synchronous inertia much like conventional generating sources.

Recent market reception of Hydrostor's long-term storage capability has indicated the desirability and importance of long-duration energy storage (more than 8-to-10-hour duration) to be able to provide reliable capacity to the grid when it is required. As a mechanical storage technology, A-CAES performance is not significantly impacted by time (minimal performance degradation over project life), amount of cycling, or environmental factors like temperature. It is, therefore, a very reliable long-term, long-duration storage that is highly cost-effective at scale and able to directly replace synchronous generation with similar operating characteristics. For these reasons, the battery energy storage systems do not meet basic Project objectives and were rejected in favor of Hydrostor's A-CAES technology.

6.6.2.2 Pumped Hydro Storage

Pumped hydro storage uses water released by gravity from an upper reservoir through turbine generating equipment into a lower reservoir separated by at least several hundred to 1,000 feet or more of elevation to generate electricity. Typically, power is generated during peak power demand periods or when needed to address system reliability. During off-peak periods, water from the lower reservoir is pumped back up into the upper reservoir to "recharge" the system. Pumped hydro storage shares many positive characteristics with A-CAES, including a long lifespan (50+ years), long storage durations, and the provision of synchronous generation (including rotational inertia) to the grid (including similar performance characteristics). Pumped hydro storage would require much larger reservoirs and surface elevation differentials than are required for A-CAES technology. The creation of large reservoirs would require inundation of a much larger area than the WRESC and may result in much greater land use, biological, and visual resource impacts. No viable sites are located near the SCE Whirlwind Substation, making this technology infeasible due to lack of suitable, available sites. The technology is also much more capital intensive per installed MW than the A-CAES technology. Finally, pumped hydro storage would not meet

the basic Project objective of deploying Hydrostor's A-CAES technology. For these reasons, this alternative was rejected as not attaining important basic Project objectives.

6.6.2.3 Traditional Compressed Air Energy Storage

Traditional compressed air energy storage (CAES) is similar to A-CAES in that a compressor is used to convert electrical energy into high-pressure compressed air that is stored in this increased energy state, typically by injecting the compressed air into existing, deep salt caverns or depleted gas reservoirs that can store compressed air and retain it in the formation for long periods. No feasible sites, such as salt caverns are known, making this option infeasible. When electricity is required, traditional compressed air is expanded through a turbine generator, converting the stored energy back into electricity. Because the expansion process results in significant cooling of the expanding air stream, heat is added back into the compressed air before expansion to avoid unacceptably low temperatures for continuing operation of the turbine. Traditional CAES generally uses the combustion of significant quantities of fossil fuel with associated emissions, including criteria and toxic air contaminants, as well as significant emissions of greenhouse gases.

Hydrostor's technology also deploys a heat transfer and storage system that extracts and stores the heat from air compression and uses it to heat the expanding air during the generation portion of the process without the need to burn fuel of any kind. Hydrostor's A-CAES process, therefore, operates with no emission of greenhouse gases or other air pollutants. Because the technology involves emissions of greenhouse gases and other air pollutants, traditional CAES technology is not compatible with key Project objectives.

6.7 References

Bakersfield Californian 2023. Kern plays biggest role as California taps renewable energy to avoid blackouts. John Cox. May 28, 2023. https://www.bakersfield.com/news/kern-plays-biggest-role-as-california-taps-renewable-energy-to-avoid-blackouts/article_8670110a-fc25-11ed-acea-87cb2ba9a4d3.html. Accessed January 12, 2024.

California Coastal Commission. 2021. California Coastal Commission Meeting: Informational Briefing on Offshore Wind, September 9, 2021. Video recording. https://www.youtube.com/watch?v=k0fyOex2ePA. Accessed September 28, 2021.

California Public Utilities Commission (CPUC). 2021. Decision 21-06-035, June 24, 2021. Decision Requiring Procurement to Address Mid-Term Reliability (2023-2026).

California Public Utilities Commission (CPUC). 2023 Decision 23-02-040, February 23, 2023. Decision Ordering Supplemental Mid-term Reliability Procurement (2026-2027) and Transmitting Electric Resource Portfolios to California Independent System Operator for 2023-2024 Transmission Planning Process.

U.S. Department of Energy.2021. July 14, 2021. “Secretary Granholm Announces New Goal to Cut Costs of Long Duration Energy Storage by 90 Percent.” https://www.energy.gov/articles/secretary-granholm-announces-new-goal-cut-costs-long-duration-energy-storage-90-percent. Accessed September 13, 2021.

U.S. Energy Information Administration. 2021. August 24, 2021, California’s Curtailments of Solar Electricity Generation Continue to Increase. https://www.eia.gov/todayinenergy/detail.php?id=49276. Accessed January 12, 2024.