DOCKETED	
Docket Number:	21-AFC-02
Project Title:	Willow Rock Energy Storage Center
TN #:	262184
Document Title:	Willow Rock Energy Storage Center Partial Preliminary Staff Assessment
Description:	N/A
Filer:	Marichka Haws
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	3/13/2025 5:43:14 PM
Docketed Date:	3/13/2025

WILLOW ROCK ENERGY STORAGE CENTER

Partial Preliminary Staff Assessment

CALIFORNIA
ENERGY COMMISSION
Gavin Newsom,
Governor

March 2025
CEC-700-2025-003-D-PSA

DOCKET NUMBER 21-AFC-02

PARTIAL PRELIMINARY STAFF ASSESSMENT

Willow Rock Energy Storage Center

(21-AFC-02)

Lead Agency

California Energy Commission

March 2025

Table of Contents

Section 1

Executive Summary

1 Executive Summary

The purpose of this limited, partial Preliminary Staff Assessment (PSA) is to provide objective information regarding the Willow Rock Energy Storage Center's (WRESC or Willow Rock) significant effects on the environment, identify possible ways to minimize the significant effects, and assess the project's conformance with applicable local, state, and federal laws, ordinances, regulations, and standards. This partial PSA contains a limited subset of sections establishing partial environmental analysis and engineering evaluation supporting CEC staff's conclusions and proposed conditions of certification, including: **Facility Reliability**, **Transmission System Engineering**, **Efficiency and Energy Resources**, **Noise and Vibration**, and **Transmission Line Safety and Nuisance**. A cumulative impacts assessment for these topics is also included in the respective sections. The partial PSA includes the **Executive Summary**, **Introduction**, **Project Description**, and **Compliance Conditions and Compliance Monitoring Plan**.

This partial PSA has been prepared by the California Energy Commission (CEC) staff to evaluate the potential environmental effects of the construction and operation of the WRESC (21-AFC-02), in compliance with the California Environmental Quality Act (CEQA), the CEQA Guidelines, the Warren-Alquist Act, and California Code of Regulations, Title 20. The PSA also evaluates whether the construction and operation of the project would conform with all applicable local, state, and federal laws, ordinances, regulations and standards (LORS).

This partial PSA of the Willow Rock Energy Storage Project contains staff's partial analysis based on site visits, data requests and responses, and additional staff research, including consultation with other agencies, such as responsible and trustee agencies, and relevant information received during any public meetings. Additional information is expected imminently and will factor into the analysis of the outstanding sections of the PSA. CEC staff anticipates publishing a complete PSA soon, and initiating a public comment period immediately thereafter. The complete PSA will be considered by the Committee of two California Energy Commission (CEC) Commissioners assigned to this proceeding in deciding whether to recommend the CEC grant a certificate to build and operate the WRESC.

Determinations of LORS conformance are made through the CEC staff's active coordination with other regulatory agencies and incorporation of their findings, such as the Eastern Kern Air Pollution Control District and its Final Determination of Compliance (TN 256372), Lahontan Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW), and Department of Water Resources Division of Safety of Dams (DSOD). The complete PSA will include the outcome of coordination with agencies. The result of staff's research, collaboration, and comprehensive process of discovery and analysis are recommendations for mitigation requirements to reduce to

less than significant any adverse environmental effects resulting from the proposed project and to ensure project compliance with applicable LORS.

Introduction

On December 1, 2021, GEM A-CAES LLC (GEM, or the applicant) filed an Application for Certification (AFC) with the California Energy Commission (CEC) seeking to construct and operate the Gem Energy Storage Center (21-AFC-02) (TN 240751-1). On June 8, 2022, the CEC determined that the project is exempt from the Notice of Intention process under Public Resources Code section 25540.6(a)(3), and it issued an order directing Staff to process the application as an AFC (TN 243543). On July 13, 2022, the CEC adopted the Executive Director's recommendation determining that the AFC was complete, initiating the 12-month timeline for the CEC to reach a final decision on the AFC pursuant to Public Resources Code section 25540.6 (TN 244093). On August 5, 2022, the applicant changed the name of the project to the Willow Rock Energy Storage Center (Willow Rock, or WRESC) (TN 244331). On June 21, 2023, the applicant's Status Report No. 10 stated that efforts to optimize the proposed WRESC were ongoing, including consideration of alternative surface facility configurations, cavern engineering options given the site geotechnical results, and alternate sites that may better support the cavern design. Alternative sites included adjacent and offsite properties in the area with potentially more favorable geologic conditions (TN 250707).

On July 12, 2023, CEC staff filed a motion requesting that the CEC Siting Committee for Willow Rock (Committee) grant an order suspending the AFC proceeding for Willow Rock and requested that the applicant be directed to submit a supplemental AFC that contains all necessary information for the updated project (TN 251029).

On August 9, 2023, the Committee issued an order (TN 251599) suspending the Willow Rock proceeding "while applicant completes its exploration of alternative sites, offsite properties, surface facility configurations and cavern engineering options." This order suspended the proceeding until the applicant filed a certified, complete supplemental AFC that reflected changes to the project description and all project modifications as well as satisfied the information requirements for an AFC as detailed in Appendix B to Article 6 of title 20 in the California Code of Regulations. The applicant was required to include in its supplemental AFC an attestation confirming completeness of the supplemental AFC. Last, the order required that, within 30 days of receipt of all required elements of the application, the CEC's Executive Director verify completeness of the supplemental AFC or docket staff's report indicating the deficiencies in the filing.

On March 1, 2024, the applicant filed a Supplemental AFC, changing the project location to 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated Kern County, California, approximately 4 miles north of Rosamond, California (TN 254774).

On April 23, 2024, CEC staff completed its data adequacy review of the Willow Rock Supplemental AFC and determined that it did not meet all the requirements listed in

California Code of Regulations, title 20, section 1704, Appendix B, for the 12-month certification process (TN 255890). Staff provided a summary table and data worksheets for deficient areas, requesting information that staff deemed necessary to fulfill the AFC information requirements.

On July 16, 2024, CEC staff determined that topic areas identified as deficient were complete and the Executive Director recommended that the Committee accept the Supplemental AFC as complete (TN 257763).

The WRESC would 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. The overall facility would consist of four nominal 130 MW gross power turbine trains, outputting a total of 500 MW net at the point of interconnection. The trains would contain electric motor-driven air compressors, heat exchangers, air turbine generators, air exhaust stacks, and ancillary equipment. The trains would share a common set of thermal storage tanks (hot and cold water), as well as the air storage cavern. Energy stored at the WRESC would 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 would be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

As a long-duration energy storage asset, the WRESC would be able to provide power during periods of increased need on the grid such as times of high electrical load, periods when intermittent renewable source generation fluctuates, when baseload plants are not operating or are being brought online, or during grid emergency conditions or local reliability needs. To maximize efficiency, the facility is expected to charge during times of low demand on the grid such as times of low electrical load and during periods when renewable source generation is higher than the instantaneous system demand, thus affording the ability to store excess renewable generation that might otherwise be lost.

1.1 Proposed Project Location

The proposed project is 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 Kern County, California, approximately 4 miles north of Rosamond, California. The project site is on undeveloped land in an area zoned Exclusive Agriculture (A-1) District. The area surrounding the project boundary is largely undeveloped with very sparse residential development; the nearest residence is approximately 0.8 mile northwest of the northwest corner of the WRESC site.

1.2 Summary of Engineering Evaluation, Environmental Impact Assessment, and LORS Conformance

Below is an overview of the limited analysis included in Section 5 Environmental Setting, Environmental Impacts and Mitigation. Staff's analysis of all sections will be included in the complete PSA. Impacts are categorized by the type of impact as follows:

- No Impact. The scenario in which no adverse changes to (or impacts on) the environment would be expected.
- Less Than Significant Impact. An impact that would not exceed the defined significance criteria or would be eliminated or reduced to a less than significant level through implementation of the applicant's project measures and/or compliance with existing federal, state, and local laws and regulations.
- Less Than Significant with Mitigation Incorporated. An impact that would be reduced to a less than significant level through implementation of the identified mitigation requirements.
- Significant and Unavoidable Impact. An adverse effect that meets the significance criteria, but there appears to be no feasible mitigation available that would reduce the impact to a less than significant level. In some cases, mitigation may be available to lessen a given impact, but the residual effects of that impact would continue to be significant even after implementation of the mitigation measure(s).

Table 1-1 summarizes the engineering evaluation and environmental impacts and consequences of the project, including mitigation proposed and the project's compliance with laws, ordinances, regulations, and standards (LORS).

TABLE 1-1 SUMMARY OF ENGINEERING EVALUATION AND ENVIRONMENTAL IMPACTS AND LORS COMPLIANCE

Technical Area	Complies with LORS?	Impacts Mitigated?	Information Needed?
Engineering Evaluation			
Facility Reliability	N/A	N/A	No
Transmission System Engineering	Yes	Yes	No
Environmental Impact Assessment			
Efficiency and Energy	Yes	N/A	No
Noise and Vibration	Yes	Yes	No
Transmission Line Safety and Nuisance	Yes	Yes	No

N/A = not applicable (technical area not subject to CEQA consideration or has no applicable LORS the project must comply with).

1.2.1 Engineering Evaluation and LORS Conformance

Facility Reliability. WRESC would be built to operate in a manner consistent with industry norms for reliable operation and would be expected to demonstrate an equivalent availability factor of 95 percent, which is an acceptable level of availability.

The proposed project would perform reliably and would not adversely affect project reliability.

Transmission System Engineering. The Transmission System Engineering COCs include measures to ensure project conformance with applicable LORS and that the WRESC is reliably and safely interconnected to the SCE transmission grid. Therefore, the project would be reliably and safely interconnected to the transmission grid, thereby reducing impacts to less than significant.

1.2.2 Environmental Impact Assessment and LORS Conformance

Efficiency and Energy Resources. Energy consumed by WRESC would not create significant adverse effects on energy supplies or resources, nor would it consume energy in a wasteful or inefficient manner. Furthermore, through energy-efficient design, storage and renewable electricity generation, the project would neither conflict with nor obstruct state or local plans for renewable energy or energy efficiency and, therefore, would have no impact on those plans.

For **Noise and Vibration** and **Transmission Line Safety and Nuisance,** staff concludes that with the implementation of the conditions of certification potentially significant impacts would be avoided or reduced to less than significant levels. In addition, staff concludes, for **Noise and Vibration** and **Transmission Line Safety and Nuisance**, the project would conform with all applicable LORS.

1.3 Cumulative Projects

Preparation of a cumulative impact analysis is required under CEQA. In the CEQA Guidelines, "a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts" (Cal. Code Regs., tit. 14, § 15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects, is "cumulatively considerable" (Cal. Code Regs., tit. 14, § 15130(a)). Such incremental effects are to be "viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects" (Cal. Code Regs., tit. 14, § 15064(h)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

The discussion of cumulative impacts must reflect the severity of impacts, as well as the likelihood of their occurrence, yet "the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion of cumulative impacts shall be guided by standards of practicality and reasonableness, and shall focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact" (Cal. Code Regs., tit. 14, § 15130(b)).

Definition of the Cumulative Project Scenario

The cumulative impacts analysis is intended to identify past, present, and probable future projects that are closely related either in time or location to the project being considered and consider how they have harmed or may harm the environment. Most of the projects on the master cumulative project list below (**Table 1-2**) are required to undergo their own independent environmental reviews under CEQA. Staff developed the master cumulative project list by contacting planning staff with Kern County. Staff also reviewed proposed project information from other agencies, including Imperial County Planning Department, Bureau of Land Management, and the CEQANet database to develop a list of past, present, and reasonably foreseeable projects.

Under CEQA, there are two commonly used methodologies for establishing the cumulative impact setting or scenario: the "list approach" and the "projections approach." The first approach would use a "list of past, present, and probable future projects producing related or cumulative impacts." (Cal. Code Regs., tit. 14, § 15130(b)(1)(A)). The second approach would use a "summary of projections contained in an adopted local, regional or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect" (Cal. Code Regs., tit. 14, § 15130(b)(1)(B)). This PSA uses the "list approach" for purposes of state law to provide a tangible understanding and context for analyzing the potential cumulative effects of the proposed project. All projects used in the cumulative impacts analyses are listed in the master cumulative project list table (**Table 1-2**), and locations are shown on **Figure 1-1**.

Approach to Cumulative Impact Analysis

This PSA evaluates cumulative impacts within the analysis of each resource area, following three steps:

- Define the geographic scope of cumulative impact analysis for each discipline, based on the potential area within which impacts of the proposed project could combine with those of other projects.
- Evaluate the effects of the project in combination with past and present (existing) projects within the area of geographic effect defined for each discipline.
- Evaluate the effects of the proposed project with foreseeable future projects that occur within the area of geographic effect defined for each discipline.

TABLE 1-2 MASTER CUMULATIVE PROJECT LIST

Project Title	Description	Location	Distance to Proposed Project (Miles)	Status
Edwards Air Force Base Solar Project	Photovoltaic (PV) solar project on 4,000-acre Edwards Air Force Base (AFB) property and generation tie (gen-tie) line approximately 16 miles in length. Greater than 100 megawatts (MW) but not more than 750 MW, with the generated energy distributed to investor owned utilities, municipalities, other energy off-takers and/or Edwards AFB	Located on Edwards AFB, approximately 6 miles northeast of the community of Rosamond and 6 miles south of Mojave	2.5 miles northeast of the project site	Construction completed 2023
Investment Concepts Inc	Conditional Use Permit (CUP) 118 multi-unit apartment complex	County Assessor's Parcel Numbers (APN) 471-112-06	2.8 miles south of the project site	Applied
Dewalt Corp for Rosamond 5 properties	Construct 89-unit multifamily project	APN 473-022-23	4.1 miles south of the project site	Approved
Dewalt Corp	Precise development of 87 duplex structures (174 units)	APN 473-022-23	4.1 miles south of the project site	Approved
Investment Concepts Inc	CUP for apartment complex	APN 252-161-49	3.9 miles northwest of the project site	Approved
Kern County Planning Dept	Kern County Housing Element Implementation 2022, zone change to R-3 Site No.6	APN 252-161-49	3.9 miles northwest of the project site	Approved
Westpark LLC, Howard Field	Proposed hotel development	APN 471-022-07	1.8 miles south of the project site	Applied
Halterty development	Develop plan for mixed commercial, retail development	APNs 251-181-145, 251-181-152	3.0 miles south of the project site	Approved

TABLE 1-2 MASTER CUMULATIVE PROJECT LIST

Project Title	Description	Location	Distance to Proposed Project (Miles)	Status
BHT Developers, LLC	Auto Auction Facility	APNs 473-023-042, 473-023-059, 473-023-067, 473-023-061	4.1 miles south of the project site	Applied
Golden Queen Mining Company, LLC	Addendum to EIR approved for surface mining and reclamation plan	APN 429-190-69	5.5 miles north of the project site	Approved
Interex Property advisors	Development plan for auto service station, motel, retail, and restaurants	APN 251-120-010	3 miles south of the project site	Applied
RE McCollum, LLC	Self-storage development plan	APN 258-090-02	3 miles south of the project site	Applied
GEM Hill Quarry (CalPortland Company)	Surface mining operation and development of a reclamation plan on approximately 82.2 acres, 15 MM tons of volcanic tuff GEM Hill	APNs 345-294-17, 345-032-05, 345-032-31, 345-031-02 and 345-032-02	3.1 miles west of the project	Approved
FH II LLC / Frontier Communities	Change zoning to allow for 120-unit single family residential development	APN 472-100-63	3.6 miles southwest of the project site	Approved
Garo Karakoulian	CUP for auto dismantling and recycling facility	APN 258-160-26	3.5 miles south of the project site	Applied
SSI Rosamond Solar, LLC	Solar array accessory to water treatment facility	APN 471-040-01	3.4 miles north of the project site	Approved
True North Renewable Energy	Amendments to Kern County General Plan and Willow Springs Specific Plan to designate the site as Solid Waste Disposal Facility and CUP to allow a renewable energy facility on 117 acres.	APNs 429-101-30 through 429-101-37	5.4 miles north of the project site	Approved
Capella Solar	Approximate 5 MW modular commercial concentrating solar power plant with a supercritical CO2 power cycle and solid media thermal, which is comprised of an approximately 117-acre field of	APNs 429-060-13 through 429-060-19	5.4 miles north of the project site	Processing

TABLE 1-2 MASTER CUMULATIVE PROJECT LIST

Project Title	Description	Location	Distance to Proposed Project (Miles)	Status
	computer-controlled heliostat mirrors focusing solar energy on receiver apertures on top of an approximate 330-foot-tall, centralized power tower, and ancillary. The project would be operated as a test facility.			
Enterprise Solar	Construction and operation of a PV solar facility and associated infrastructure necessary to generate 600 MWs of renewable electrical energy with up to 4,000 megawatt-hours (MWh) of energy storage capacity (approximately 1,000 MW) on approximately 2,320 acres. Infrastructure includes laydown yards, a meteorological station, and a substation. PV panels, inverters, converters, foundations, and transformers will be installed onsite.	Cross Streets: SR14 and SR58	7.6 miles northeast of the project site	Approved
Castellanos Truck Parking and Storage	General Plan Amendment, Zone Classification Change, Precise Development plan to allow a Truck Parking and Storage Facility	APN 430-053-08	2.5 miles north of the project site	Applied
Babkan Safarian & Denise Rodriguez	General Plan Amendment, Zone Classification Change, Precise Development plan to allow vehicle and cargo container storage	APN 430-141-27	3.2 miles north of the project site	Applied
Irvine Camillo	Precise Development Plan for commercial development	APN 472-100-15	3.2 miles southeast of the project site	Applied
Antonio & Jeanette Vergara	CUP for construction materials recycling facility	APN 429-010-02	4.4 miles north of the project site	Applied
Carl Wood	Precise Development Plan for new retail development	APNs 258-170-16, 258-170-17	2.9 miles south of the project site	Applied
Walter DeBoer, BRPH	Modification to Precise Development Plan for change of occupancy to manufacturing.	APN 258-160-42	3.4 miles south of the project site	Applied

TABLE 1-2 MASTER CUMULATIVE PROJECT LIST

Project Title	Description	Location	Distance to Proposed Project (Miles)	Status
Silvia Valdez	CUP for installation of mobile home greater than 10 years	APN 251-191-13	3.5 miles southeast of the project site	Applied
Aaron Rivani by Cindy Parra	Zone classification change from A-1 to R-1	APN 472-100-16	3.2 miles southeast of the project site	Applied
Kern County Planning Dept	Kern County Housing Element Implementation 2022, Zone change to R3 Site No, 4	APNs 258-120-12, 258-130-16, 258-150-02, 258-130-23	3.6 miles south of the project site	Approved
Kern County Planning Dept	Kern County Housing Element Implementation 2022, plan amendment to 5 1/2.5 and zone classification change to R3, Site No.9	APN 473-031-03	3.7 miles South of the project site	Approved
Kern County Planning Dept	Kern County Housing Element Implementation 2022, Zone change to R3 Site No.2	APN 430-030-10	3.1 miles north of the project site	Approved
Kern County Planning Dept	Kern County Housing Element Implementation 2022, Zone change to R3 Site No.7	APN 473-031-09	3.9 miles south of the project site	Approved
Kern County Planning Dept	Kern County Housing Element Implementation 2022, Zone change to R3 Site No.5	APN 473-031-27	3.8 miles south of the project site	Approved
Matthew McCormick	CUP for single family residence in C-2	APN 251-025-09	2.7 miles south of the project site	Applied
Sanborn Solar	Solar PV power generating facilities and associated facilities that would generate up to a combined total of 300 MW of renewable electrical energy and up to 3 GWh of energy storage capacity	Cross Streets: SR 14 and Silver Queen Road and SR 58 (Business) and Lone Butte Road	5.9 miles northeast of the project site	Approved
Bellefield Solar Project	Solar PV facility and energy storage system along with associated infrastructure necessary to generate	Cross Streets: Altus Avenue & State Route 58	6.9 miles northeast of the project site	Approved

TABLE 1-2 MASTER CUMULATIVE PROJECT LIST

Project Title	Description	Location	Distance to Proposed Project (Miles)	Status
	up to 1,500 MW of alternating current and up to 1,500 MWh energy storage capacity			
Mojave Micro Mill	Construct and operate a micro mill facility and associated infrastructure necessary to produce rebar from scrap metal through various recycling processes. Development would include an approximate 475,800 square-foot steel mill facility with an additional 51,221 square feet of accessory buildings and structures, as well as an approximate 63-acre accessory solar array on 174 total acres of privately owned land. Outdoor storage for scrap materials and staging is proposed as part of the project.	Cross streets: Sopp Road and Sierra Highway	1.3 miles north of the project site	Completed in 2025
Bullhead Solar	PV solar facility with associated infrastructure on approximately 1,343.2 acres. Preferred and optional generation-tie (gen-tie) routes to the Rosamond and Whirlwind substations, only one of which would be constructed. The project also includes laydown yards, a meteorological station, a microwave/ communication tower, and a substation.	Along Dawn Road off Sierra Hwy 14 between 105th Street West and 75th Street West, north of Favorito Avenue Dawn Road and South of Champagne Avenue.	8.1 miles west of the project	Approved
Gettysburg Solar/AV Apollo	Approximately 30t MW photovoltaic (PV) electric generating facility, including approximately 30 MW of energy storage capacity, on approximately 158 acres of privately-owned land in unincorporated Kern County.	Rosamond, ¼ miles east of intersection of Rosamond Blvd and 80th	6.9 miles southwest of the project site	Approved
Organics Energy Solar	High solids anaerobic digestion (HSAD) facility with incidental advanced composting for the management and processing of residential, commercial, and industrial organic waste and green	Silver Queen Road and United Street	5.4 miles north of the project site	Processing

TABLE 1-2 MASTER CUMULATIVE PROJECT LIST

Project Title	Description	Location	Distance to Proposed Project (Miles)	Status
	material. The Project would provide organics processing infrastructure and organic materials diversion from regional landfills and generate renewable energy through the HSAD process			

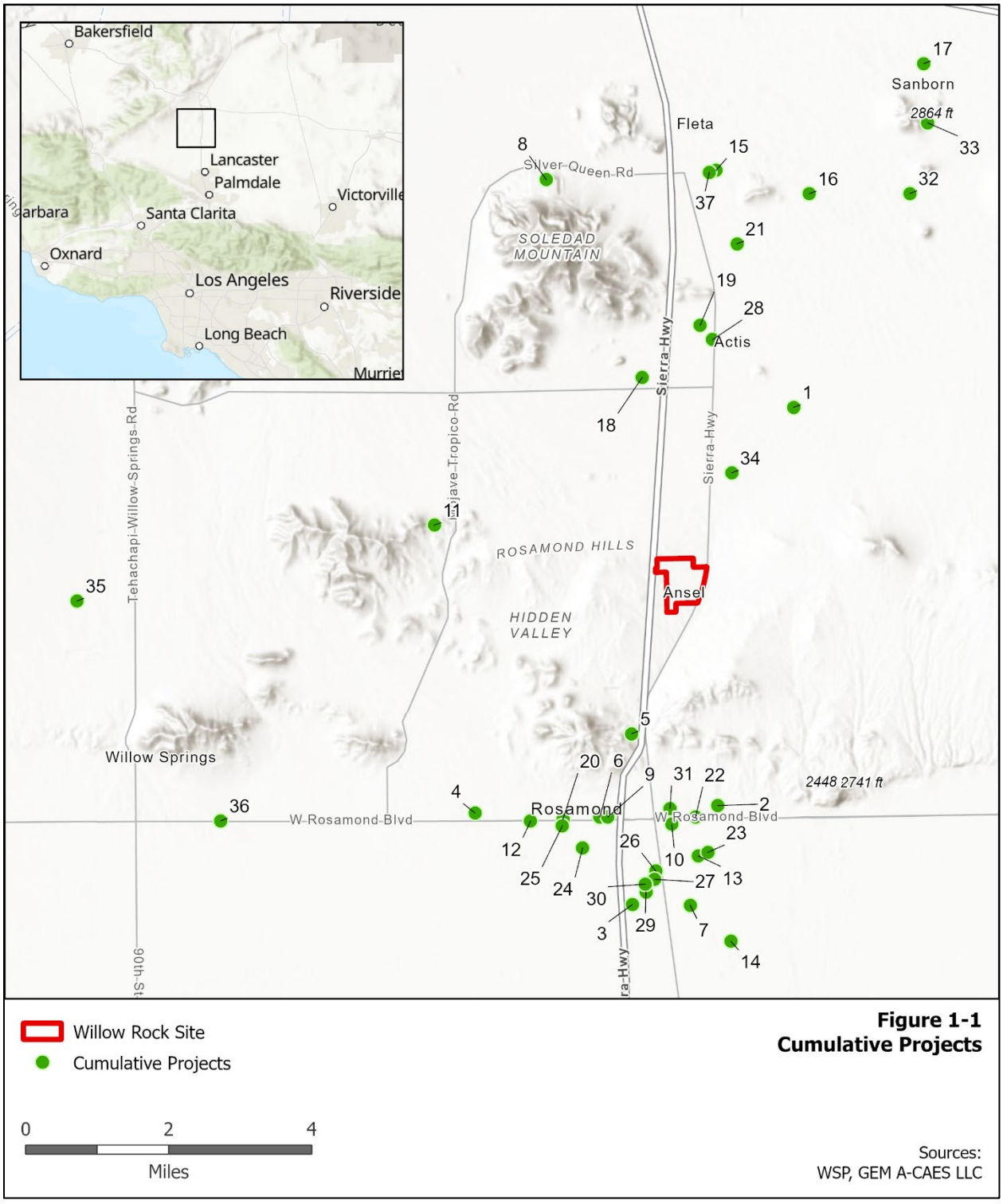


Figure 1-1
Cumulative Projects

As described in the respective sections, the project presents no cumulative impacts in the area of noise and vibration or transmission line safety and nuisance.

Section 2

Introduction

2 Introduction

2.1 Purpose of the Preliminary Staff Assessment

The purpose of this partial Preliminary Staff Assessment (PSA) is to provide objective information regarding the Willow Rock Energy Storage Center's (WRESC or Willow Rock) significant effects on the environment, identify possible ways to minimize the significant effects, describe reasonable alternatives to the project, and assess the project's conformance with applicable local, state, and federal laws, ordinances, regulations, and standards.

This partial PSA includes analysis of **Facility Reliability**, **Transmission System Engineering**, **Efficiency and Energy Resources**, **Noise and Vibration**, **Transmission Line Safety and Nuisance**, and related cumulative impacts.

2.2 California Energy Commission Application for Certification Process

The CEC has the exclusive authority to certify the construction, modification, and operation of thermal electric power plants 50 megawatts (MW) or larger (and related facilities) in California. The CEC certification is in lieu of any permit required by state, regional, or local agencies, and federal agencies to the extent permitted by federal law, for use of the site and related facilities, and supersedes any applicable statute, ordinance, or regulation of any state, local, or regional agency, or federal agency to the extent permitted by federal law (Pub. Resources Code, § 25500). The CEC must review thermal power plant AFCs to assess potential environmental, public health and safety impacts, engineering assessment related to facility efficiency, health and safety and potential measures to mitigate those impacts and ensure compliance with applicable governmental laws or standards (Pub. Resources Code, §§ 25519 and 25523(d)).

The CEC's siting regulations require staff to review the proposed project, assess whether the potential environmental impacts have been properly identified, and whether the applicant's proposed mitigation is complete or other, more effective, mitigation measures are necessary, feasible, and available (Cal. Code Regs., tit. 20, § 1742(b)). Additionally, staff is required to assess the adequacy of the measures proposed by the applicant to ensure the assessment evaluates the safety and reliability of the project (Cal. Code Regs., tit. 20, § 1742(b)). Staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations, and standards (LORS) are met and adhered to (Cal. Code Regs., tit. 20, § 1744(b)).

The CEC's power plant site certification program has been certified by the Secretary of the California Natural Resources Agency as meeting all requirements of a certified regulatory program (Pub. Resources Code, § 21080.5 and Cal. Code Regs., tit. 14, § 15251 (j)), constituting an environmental analysis in accordance with the requirements

of the California Environmental Quality Act (CEQA). The CEC is the lead agency. No additional environmental impact report (EIR) is required.

CEC staff prepares a preliminary staff assessment (PSA) that presents staff's initial analyses, conclusions, and recommendations to the applicant, intervenors, agencies, California Native American tribes, interested parties, and members of the public. Where it is appropriate, the PSA incorporates comments received from agencies, the public, parties to the siting case, and comments made at public meetings. This partial PSA contains a limited subset of sections establishing partial environmental analysis supporting CEC staff's conclusions and proposed conditions of certification. The complete PSA will replace the partial PSA, and CEC will accept public comments on the complete PSA during one 45-day comment period to be held after publication of the complete PSA.

2.3 Agency Coordination

As noted above, the CEC decision (certification) is in lieu of any permit required by state, regional, or local agencies and federal agencies to the extent permitted by federal law for use of the site and related facilities, and supersedes any applicable statute, ordinance, or regulation of any state, local, or regional agency, or federal agency to the extent permitted by federal law (Pub. Resources Code, § 25500). However, the CEC staff seeks comments from, and works closely with, other regulatory agencies that administer LORS that are applicable to proposed projects.

In accordance with California Code of Regulations, Title 20, section 1714, staff provided notification of the WRESC AFC to stakeholder agencies via an Agency Request for Participation letter, which was sent to appropriate agencies on March 15, 2022 (TN 242326). These agencies included Eastern Kern Air Pollution Control District, California Air Resources Board, United States Environmental Protection Agency Region 9, California Department of Fish and Wildlife, Central Region (Region 4), United States Fish and Wildlife Service, Pacific Southwest Region, Native American Heritage Commission, California Office of Historic Preservation, Kern County Planning and Natural Resources Department, California Office of Environmental Health Hazard Assessment, State Board of Equalization, Lahontan Regional Water Quality Control Board, State Water Resources Control Board, California Department of Transportation, California Public Utilities Commission, California Independent System Operator, California Highway Patrol, and California Division of Occupational Safety and Health (Region 4, Bakersfield District Office).

2.4 Consultation with Tribes

CEC staff sent letters to California Native American tribes on a Native American Heritage Commission (NAHC) list of tribes identified as having cultural affiliation in the project vicinity and interested in consulting on development projects in the project area. On April 8, 2024, the CEC staff requested from the NAHC a search of the Sacred Lands File and a list of contacts among California Native American tribes affiliated with the WRESC

area. Following receipt of the NAHC's response, the CEC staff mailed letters to 21 individuals among the following 14 California Native American tribes on July 26, 2024. Emails were also sent to the tribes. The letters and emails invited the tribes to comment on the proposed project and offered to hold face-to-face consultation meetings if any were requested. CEC staff received the following responses/requests:

- The Fernandeno Tataviam Band of Mission Indians responded via email on August 19, 2024.
- The Kern Valley Indian Community provided feedback via telephone conversations and requested project documents and studies be provided to better inform consultation on August 8, 2024.
- The Morongo Band of Mission Indians responded via email to CEC staff on August 19, 2024, stating that the proposed project is outside the boundaries of the ancestral territory or traditional use area of the Cahuilla and Serrano people of the Morongo Band of Mission Indians and did not request consultation.

As of the date of publication of this partial PSA, CEC staff has not received responses to consultation invitations from representatives of the Barbareño/Ventureño Band of Mission Indians, Chumash Council of Bakersfield, Kitanemuk & Yowlumne Tejon Indians, Northern Chumash Tribal Council, San Fernando Band of Mission Indians, Serrano Nation of Mission Indians, and Tule River Indian Tribe. More detail on CEC staff's consultation efforts with California Native American tribes will be included in the forthcoming complete PSA.

2.5 Public Outreach and Notification

The CEC's public outreach program is primarily facilitated by the CEC's Office of the Public Advisor, Energy Equity, and Tribal Affairs. The Public Advisor's Office contacted local elected officials, interested parties, agencies, and school districts. The Committee conducted an Informational Hearing and Site Visit on November 6, 2024, the public notice for which was distributed on October 31, 2024 (TN 259869). This is an ongoing process, and efforts will be discussed in greater detail in **Section 6, Environmental Justice** of the forthcoming complete PSA.

As specified in California Code of Regulations, Title 20, section 1713(a), staff prepared a summary of the WRESC AFC, which included a description of the CEC's procedures for an AFC proceeding. This summary, called a "Notice of Receipt" (TN 241982), was sent on February 28, 2022, to public libraries in the communities near the proposed site (Rosamond Library) as well as libraries in Eureka, Fresno, Los Angeles, San Diego and San Francisco; and to all members, to the ex officio members, to the public advisor, to the hearing officer, to the general counsel, to the applicant, to any person who requests such mailing or delivery, and to all parties to the proceeding (Cal. Code Regs, tit. 20, § 1713(b)). As required by section 1713(c), the summary was published in a newspaper of general circulation in the county of the project site. The summary was published in

Rosamond News (English) on March 28, 2022 (TN 242487), and El Popular News (Spanish) on April 8, 2022 (TN 242632).

2.6 Organization of this Staff Assessment

The Staff Assessment is prepared to conform to the requirements of CEQA, the CEQA Guidelines (California Code of Regulations, title 14, section 15000 et seq.), the Warren-Alquist Act (Public Resources Code, section 25000 et seq.), and CEC's siting regulations (California Code of Regulations, title 20, section 1701 et seq.).

This partial Preliminary Staff Assessment is organized into six sections, as described below (see also the Table of Contents):

- Section 1 Executive Summary. This section provides an overview of the proposed project; a list of cumulative projects; the environmental impacts that would result from the proposed project; conditions of certification identified to reduce or eliminate these impacts; project alternatives; and issues to be resolved.
- Section 2 Introduction. This section describes the CEC's authority and function of the Staff Assessment; the environmental review process; and the organization of the Staff Assessment.
- Section 3 Project Description. This section summarizes the proposed project, including the location of the site and project boundaries, characteristics of the proposed project, and objectives sought by the proposed project.
- Section 4 Engineering Evaluation. This section evaluates the applicant's proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification that would monitor and ensure compliance with engineering LORS and any other special design requirements. Topics included in this partial PSA are:
  - Facility Reliability
  - Transmission System Engineering
- Section 5 Environmental Setting, Environmental Impacts and Mitigation. This section includes the environmental setting; regulatory background; approach to analysis; project-specific and cumulative impacts; and mitigation measures, when appropriate. Staff evaluates the potential environmental impacts that might reasonably be anticipated to result from construction and operation of the proposed project. For this partial PSA, staff's analysis is broken down into the following environmental resource topics derived from CEQA Appendix G and Warren Alquist Act requirements:
  - Efficiency and Energy Resources
  - Noise and Vibration
  - Transmission Line Safety and Nuisance

  For each subject area, the analysis includes a description of the existing conditions and setting related to the subject area, an analysis of the proposed project's

potential environmental impacts, and a discussion of mitigation measures and conditions of certification, if necessary, to reduce potentially significant impacts to less than significant levels and ensure conformance with LORS. These sections may be updated as necessary in the complete PSA.

- Section 9 Compliance Conditions and Compliance Monitoring Plan (Compliance Plan). The Compliance Plan contains the means for ensuring all aspects of construction, operation and closure comply with LORS and with conditions/mitigations adopted by the CEC.

Section 3

Project Description

3 Project Description

3.1 Project Overview

The Willow Rock Energy Storage Center (WRESC, or Willow Rock) would be 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 would 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 would 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 long 230-kilovolt (kV) generation-tie (gen-tie) line. The WRESC would be capable of operating on a 24-hour basis, 365 days a year with an approximately 50-year lifespan.

The proposed project would include the following key features:

- A-CAES Energy Storage Process, Cooling Systems and Electric Transmission
    - Eight electric-motor-driven air compressors configured in four trains, totaling nominally 500 MW net
    - Four nominally 130 MW air-powered turbine generators with 100-foot-tall air vent stacks
    - Heat extraction and recovery main process heat exchangers
    - Thermal storage system using water, including up to six, 87.5-foot-diameter by 100-foot-tall (maximum) hot-water spherical storage tanks and two 150-foot-diameter, 60-foot-tall cold-water storage tanks
    - Cooling system: three air-cooled heat exchangers with evaporative mist system using excess internally produced process water
    - One approximately 21.5-acre, 600-acre-foot capacity hydrostatically compensating surface reservoir with liner and interlocking shape floating cover
    - One lined evaporation pond for process water[1]
    - Aboveground piping pipe racks and filter houses
    - Underground compressed air storage cavern (approximately 900,000 cubic yards capacity)

1 In a meeting on March 6, 2025, the applicant indicated they will be removing the evaporation pond and they will provide more information to staff.

- Interconnecting conduits for movement of compressed air to and from the cavern
- Potential permanent aboveground architectural berm for onsite re-use of excavated cavern rock[2]
- Onsite 230 kV substation with oil-filled transformers with 230/13.8 kV rating
- One approximately 19-mile-long 230 kV single-circuit double-bundle conductor gen-tie line interconnecting to the SCE Whirlwind Substation with a preferred gen-tie route and route options
- Approximately 186 transmission poles (approximately 0.2 acres permanent disturbance)

- Operation and Maintenance Facilities, Ancillary Support Systems, and Other Features
  - Site stormwater drainage system and stormwater percolation/evaporation ponds
  - Water supply connection to an existing Antelope Valley East Kern Water Agency's supply pipeline adjacent to Sierra Highway east of the WRESC Site
  - Fire detection and fire monitoring systems
  - Firewater tank and fire suppression system
  - Acoustic enclosures for Turbomachinery
  - Weather Enclosures for Motor Control Center
  - One diesel-fired 345-kilowatt (kW) (460 horsepower) emergency fire pump
  - Three diesel-fired up to 2.5 MW, 4.16 kV emergency backup power supply engines to maintain critical loads in the event of a loss of power
  - One combined office, control room, and maintenance building
  - Employee and visitor parking area with electric vehicle charging ports and landscaping
  - Primary and secondary entrances with security access gates and site perimeter fencing
  - Permanent plant access roads within the WRESC Site
  - Extension/upgrades to Dawn Road between the SR 14 interchange and Sierra Highway

2 Approximately 1.3 million cubic yards of crushed rock (accounting for swell and void space) would be extracted during construction of the cavern. The WRESC would include options for managing the extracted rock that may be implemented alone or in any combination, including (a) permanent on-site storage in the form of an architectural berm around portions of the WRESC; (b) off-taker transport for commercial use; and (c) off-taker transport for permanent off-site storage. The size of the potential architectural berm would depend on the quantity of rock. The height is expected to not exceed approximately 10 feet. If all the rock were re-used onsite, the total facility size would increase by up to an additional approximately 74.6 acres for a total of approximately 163.5 acres.

- Temporary Construction Facilities
    - Up to approximately 122.2-acre total laydown areas including cavern construction laydown area, construction phase earthwork areas, cavern rock temporary re-use areas, cavern rock temporary backup re-use areas, and parking areas located on adjacent and nearby parcels
    - Rock crushing facility and concrete batch plant to support cavern construction and excavated rock management (acreage included in total temporary disturbance)
    - Two temporary entrances for construction; the Dawn Road construction entrance may be converted to permanent
    - An estimated up to 1.5 miles of unpaved temporary access road along the gen-tie line corridor as needed (approximately 3.7 acres)
    - Approximately 35 conductor pull and tensioning sites (approximately 21.5 acres total)
    - Approximately 75- by 75-foot temporary disturbance for placement of each transmission pole (approximately 23.6 acres total)

Willow Rock would not require the combustion of fossil fuel and would not produce combustion-related air emissions during normal operation.[3]

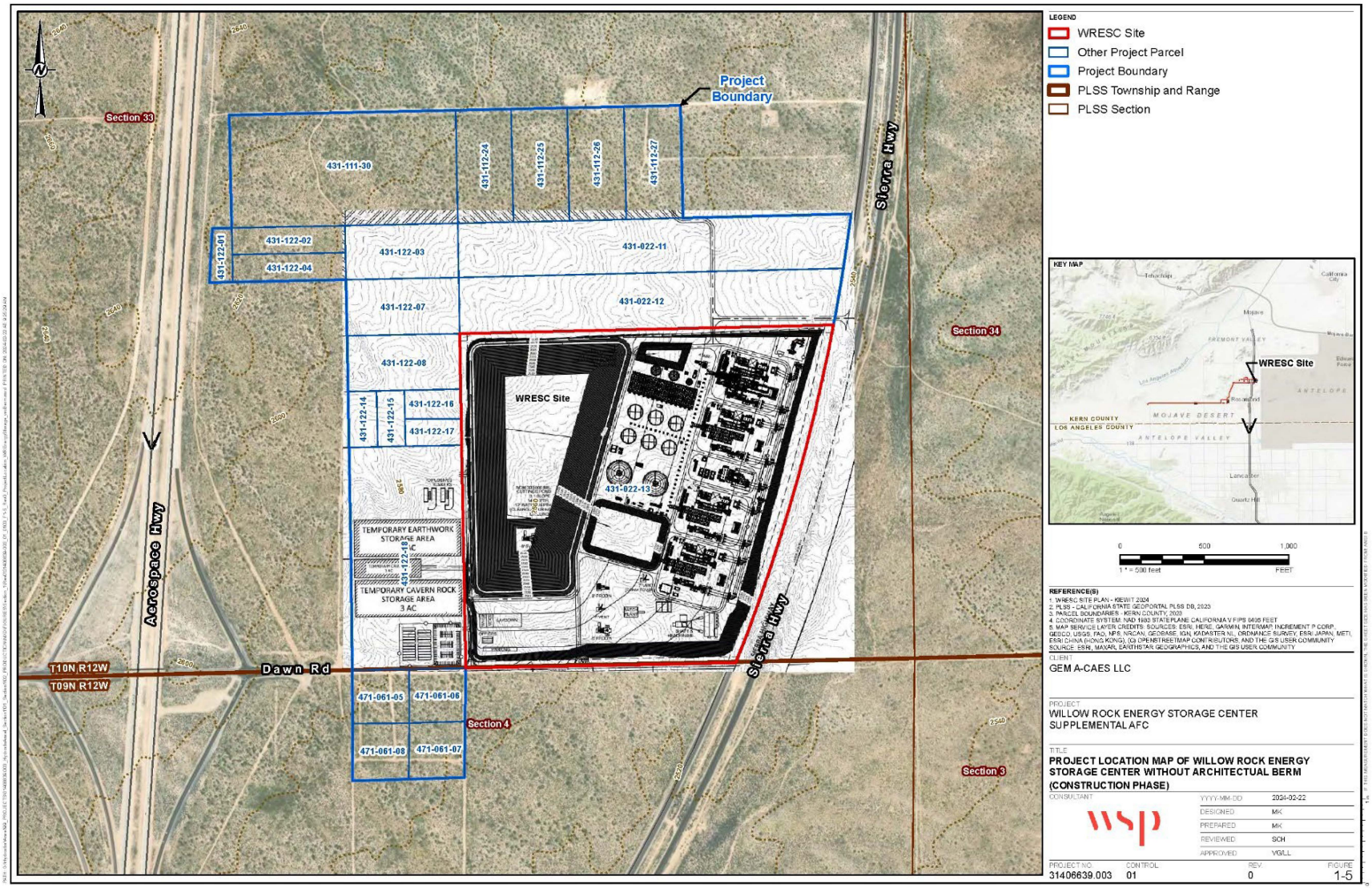
The WRESC site is immediately north of Dawn Road and immediately west of Sierra Highway, Rosamond, California, on the 88.6-acre portion of Assessor's Parcel Number 431-022-13, located west of Sierra Highway. The final site boundary and potential construction laydown areas depend on whether the facility would include onsite re-use of excavated cavern rock in an architectural berm on the west and north sides of the facility.

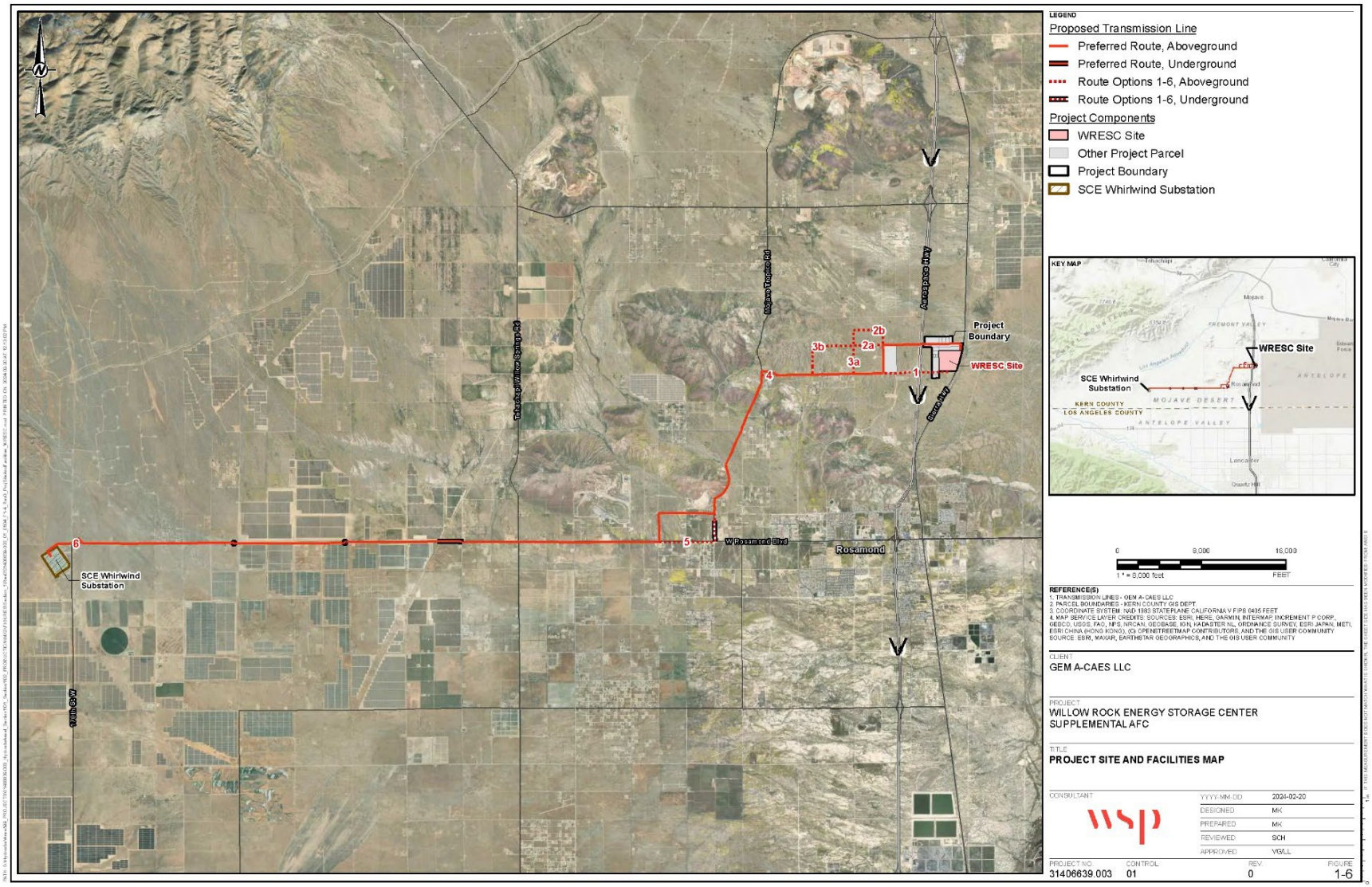
3.2 Project Location

In March 2024, the applicant filed a Supplemental AFC for the project, changing the location to 88.6 acres of private land immediately north of Dawn Road and between State Route (SR) 14 and Sierra Highway within unincorporated Kern County, California, approximately 4 miles north of Rosamond, California. The new project site is on undeveloped land in an area zoned Exclusive Agriculture (A-1) District. The area surrounding the project boundary is largely undeveloped with very sparse residential development; the nearest residence is approximately 0.8 mile northwest of the

3 The project would include three emergency diesel-fired engines to maintain critical loads in the event of a loss of power and one diesel-fired fire pump engine. These engines are expected to operate less than 50 hours per year for reliability testing and maintenance and would not operate concurrently during testing. The diesel-fired engines would operate in an emergency for other critical facility loads when electric power is not available. A separate diesel-engine-driven fire pump would provide water in the event of an emergency. This emergency backup equipment does not need to operate for the WRESC to function during normal operation.

northwest corner of the WRESC site. Figure 1-5 and Figure 1-6 show the WRESC site layout and a regional location map.


Project Boundary
WRESC Site
Section 33
Section 34
Section 4
Section 3
Aerospace Hwy
Sierra Hwy
Dawn Rd
T10N R12W
T09N R12W
431-111-30
431-112-24
431-112-25
431-112-26
431-112-27
431-122-01
431-122-02
431-122-03
431-122-04
431-122-07
431-122-08
431-122-14
431-122-15
431-122-16
431-122-17
431-022-11
431-022-12
431-022-13
TEMPORARY EARTHWORK STORAGE AREA 3 AC
TEMPORARY CAVERN ROCK STORAGE AREA 3 AC
471-061-05
471-061-06
471-061-07
471-061-08
LEGEND
WRESC Site
Other Project Parcel
Project Boundary
PLSS Township and Range
PLSS Section
KEY MAP
WRESC Site
KERN COUNTY
LOS ANGELES COUNTY
MOJAVE DESERT
ANTELOPE VALLEY
0 500 1,000
1 " = 500 feet
FEET
REFERENCE(S)
1. WRESC SITE PLAN - KIEWIT 2024
2. PLSS - CALIFORNIA STATE GEOPORTAL PLSS DB, 2020
3. PARCEL BOUNDARIES - KERN COUNTY, 2020
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
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
CLIENT
GEM A-CAES LLC
PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC
TITLE
PROJECT LOCATION MAP OF WILLOW ROCK ENERGY STORAGE CENTER WITHOUT ARCHITECTUAL BERM (CONSTRUCTION PHASE)
CONSULTANT
wsp
YYYY-MM-DD 2024-02-22
DESIGNED MK
PREPARED MK
REVIEWED SCH
APPROVED VGILL
PROJECT NO. 31406639.003
CONTROL 01
REV. 0
FIGURE 1-5


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
KEY MAP
WRESC Site
SCE Whirlwind Substation
KERN COUNTY
LOS ANGELES COUNTY
MOJAVE DESERT
ANTELOPE VALLEY
Project Boundary
WRESC Site
SCE Whirlwind Substation
W Rosamond Blvd
Rosamond
Mojave-Tropico Rd
Sierra Hwy
Tehachapi-Willow Springs Rd
Valley Blvd
1
2a
2b
3a
3b
4
5
6
0
8,000
16,000
1" = 8,000 feet
FEET
REFERENCE(S)
1. TRANSMISSION LINES - GEM A-CAES LLC
2. PARCEL BOUNDARIES - KERN COUNTY GIS DEPT.
3. COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET
4. 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
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
CLIENT
GEM A-CAES LLC
PROJECT
WILLOW ROCK ENERGY STORAGE CENTER
SUPPLEMENTAL AFC
TITLE
PROJECT SITE AND FACILITIES MAP
CONSULTANT
wsp
YYYY-MM-DD 2024-02-20
DESIGNED MK
PREPARED MK
REVIEWED SCH
APPROVED VGILL
PROJECT NO. 31406639.003
CONTROL 01
REV. 0
FIGURE 1-6

3.3 Statement of Project Objectives

The objectives for the project include:

- 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.
- Interconnect the project to the California Independent System Operator-controlled 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.
- 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.
- Use A-CAES technology to provide dispatchable long-duration storage and energy delivery for a minimum of 8 hours to achieve the following:
    - fossil fuel and greenhouse gas emissions-free operation,
    - flexible capacity with minimal response time,
    - 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.
- 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.
- Create jobs in Kern County and the state of California through both construction and operation of the facility.

3.4 Land Use Zoning

3.4.1 Site Land Use

The main project site was recently rezoned by the Kern County Board of Supervisors, at the request of the applicant after talks with the Kern County Planning and Natural Resources Department, from Limited Agriculture to Exclusive Agriculture (Kern County

2025). Exclusive Agriculture is consistent with the General Plan Designation of Resource Management.

The Exclusive Agriculture zoning district allows "electrical power generating plants", and therefore, energy storage, with approval of a Conditional Use Permit (CUP). Temporary construction processes, such as rock crushing and a concrete batch plant, would also be permitted, subject to a CUP.

A potential architectural berm would be located on the north and west sides of the project on parcels zoned Exclusive Agriculture. The berm and laydown and parking yards would be under the jurisdiction of Kern County.

The proposed gen-tie line passes through a variety of base zoning designations and their zoning overlays, including the general base zoning designations of: Estate, Exclusive Agriculture, Limited Agriculture, General Commercial, Neighborhood Commercial, Light Industrial, Open space, Low Density Residential, Platted lands, and Recreation forestry. The gen-tie line is permitted under all these zoning designations as transmission lines and supporting infrastructure.

3.4.2 Surrounding Land Uses

The approximately 112-acre undeveloped site is bounded on the north and west by vacant, undeveloped property, on the east by Sierra Highway, and on the south by Dawn Road. Additional parcels adjacent to the WRESC site on the north and west sides may be used for project activities including temporary parking, construction laydown, or construction of an architectural berm. The area surrounding the project site is mostly undeveloped, with a few sparsely scattered residences, the closest one being approximately 0.8 miles northwest of the WRESC site.

3.4.3 Important Farmland and Williamson Act

The project and its linears are not located on lands under a Williamson Act contract for preservation of agricultural land. There are a few parcels under a Williamson Act contract just south of the gen-tie line along Rosamond Boulevard, and one just west of the Whirlwind Substation with which the gen-tie line would connect (DOC 2022b), but project construction and operation would not cross any of these parcels.

3.5 Project Overview and General Description of the Project's Technical and Environmental Characteristics

3.5.1 Generating Facility Description, Design, and Operation

The WRESC would be a nominal 4,160 MWh energy storage facility capable of charging and discharging daily. The overall facility would consist of four nominal 130 MW (gross) trains, outputting a total of 500 MW net at the point of interconnection. Each train would contain an electric motor-driven air compressor drivetrain, heat exchangers, an air turbine generator, air exhaust stacks and ancillary equipment. Each train would

share a common set of thermal storage tanks (hot and cold water), as well as the air storage cavern.

The WRESC would be designed and constructed following the design criteria provided in the applicant's Appendix 2A, Engineering Design Criteria (ESHD 2024o) following applicable laws, ordinances, regulations, and standards (LORS).

3.5.1.1 General Site Arrangement and Layout

The main access to the Willow Rock site would be from Dawn Road. There would be two entry/exit points from Dawn Road for heavy load traffic. Access at the west side would lead to the laydown area, while access at the east side would lead to the east end of the power block. Temporary access during construction would be obtained from crushed rock driveways from both Dawn Road and Sierra Highway; the Dawn Road temporary construction access may be converted to permanent. The Sierra Highway access point would enter the WRESC Site at the construction laydown areas to the north. The permanent entrances and main plant roads within WRESC Site would be surfaced to provide internal access to all project facilities and onsite buildings. Personnel parking spaces, electric vehicle charging stations, and parking lot landscaping would be provided and would conform to Kern County requirements. The areas around equipment would have crushed rock surfacing, not paved or concreted.

3.5.1.2 Process Description

Hydrostor's proprietary A-CAES technology is a bulk-scale energy storage solution. It is intended to provide long-duration, emission-free energy storage that can be sited where the electricity grid requires long-duration storage, providing multi-hundred MW of generation capacity and a suite of ancillary services with an estimated 30-year service life for major equipment and an estimated 50-year service life for the cavern. This is enabled by combining industry-proven technologies with two key innovations: the use of hydrostatically compensated air storage caverns and a proprietary water-based thermal management system.

The system stores compressed air in a purpose-built underground storage cavern, analogous to those used worldwide for hydrocarbon storage. The storage cavern is filled with water through a hydraulic conduit from a water storage compensation reservoir at the ground surface level. The weight of the water in this compensation reservoir maintains a near-constant air pressure in the cavern throughout both the charging and discharging cycles, supporting efficient operation, and significantly reducing the cavern volume requirements.

The water-based thermal management system captures the heat developed during air compression, stores it, and re-uses it when generating electricity, making the process nearly adiabatic. This increases the system's efficiency and eliminates the need for burning fossil fuels.

When the Hydrostor A-CAES system is charging (known as the "charge cycle"), off-peak energy or surplus electricity (such as excess solar that might otherwise be curtailed when production exceeds demand) from the grid is used to drive air compressors, converting the electrical energy into potential energy in the compressed air and heat energy stored by the thermal energy management system. At multiple points in the compression process, the heat generated during air compression is transferred to boiler-grade water as the only thermal water by a set of heat exchangers and is stored separately for later use during the discharge cycle.

The air stream exits the compression process at the same pressure as that maintained in the air storage cavern which is governed by the vertical distance between the cavern and the connected hydrostatic compensation reservoir located at the surface. As air is charged into the storage cavern, water is displaced up the hydraulic conduit and into the surface reservoir. This maintains near-constant air pressure within the cavern and stores substantial potential energy in the elevated water. Once in the cavern, the air can be stored until electricity is required.

To generate electricity (known as the "discharge cycle"), compressed air is discharged from the cavern, which allows the compensation water to flow back into the cavern. Similar to the charge cycle, the compensation water from the reservoir maintains near-constant air pressure in the cavern during discharging. The cool high-pressure air exiting the cavern is reheated using the heat stored by the thermal management system and the same set of heat exchangers that were initially used to extract it. The reheated compressed air is then used to drive air- expansion turbine generators, which efficiently convert the stored potential energy back into electricity for the grid. **Table 3-1** summarizes the main process.

TABLE 3-1 ENERGY STORAGE PROCESS STEPS

STEP 1 Air Compression Using Electricity	STEP 2 Heat Capture in a Thermal Management System	STEP 3 Compressed Air Storage	STEP 4 Compressed Air Conversion to Electricity
Off-peak or surplus electricity from the grid is used to operate air compressors that produce high-pressure heated compressed air.	Heat is extracted from the compressed air and stored in a proprietary thermal management system. This nearly adiabatic process increases overall cycle efficiency and eliminates the subsequent need for burning fossil fuels.	Air is stored in a purpose-built storage cavern, where hydrostatic compensation is used to maintain the system at near-constant air pressure during operation.	Hydrostatic pressure forces air back to the surface, where it is recombined with the stored heat and expanded through turbine generators to generate electricity on demand.

The actual net electrical output of the system would vary in response to ambient air temperature conditions, electrical grid operating requirements such as voltage or volt ampere reactive (VAR) support and other operating factors. Operational modes would

be driven by good operating practices, market conditions, and grid dispatch requirements.

3.5.1.3 Facility Operational Modes

Hydrostor's facility is an electrical energy storage technology with unique operating characteristics that must be considered across its operating states (charge, discharge, standby).

Based on 95 percent availability, the facility would be designed to operate:

- Up to 13.5 hours per day and 4,960 hours per year in charging mode at a total capacity of 500 MW (plus 213 hours at 75 percent or less).
- Up to eight hours per day and 2,976 hours per year in discharging mode at a total capacity of 500 MW (plus 128 hours at 75 percent or less).
- A minimum of 372 hours in standby mode.

Facility Charge Cycle Mode

The facility would be designed for 520 MW gross rated capacity on both charge and discharge with an 8-hour discharge duration at full rated capacity. The facility would be designed to achieve an average round trip efficiency (RTE) of 55 to 60 percent. This means that the facility would return 55 to 60 percent of the electric energy used to complete the storage cycle as useful power output during the discharge cycle and that a complete charge of the cavern would require about 13.5 hours at full rated capacity (eight hours divided by 60 percent RTE).

The frequency of charging the system is dependent on the electrical grid operator's requirement to discharge the system. The system could be charged, or partially charged, daily. It could feasibly remain charged for long durations before discharging, but the hot water stored in the spherical tanks must be maintained by electrical heaters for very long standby periods (exceeding a few days).

When electricity from the electrical grid is available, the system would enter charge mode. While charging, electricity is drawn from the electrical grid to operate multi-stage, electrically driven air compressors. Air at atmospheric pressure and ambient temperature is compressed to cavern storage pressure. The cavern storage pressure is expected to be 870 to 1,100 pounds per square inch gauge (psig) across three sequential pressure sections of compression, low pressure, intermediate pressure, and high pressure (LP, IP, and HP, respectively), to allow storage in an underground hydrostatically compensated rock cavern with a floor depth of approximately 2,000 to 2,500 feet below ground surface (bgs).

As the compressed air enters the storage cavern, the air pressure would overcome the hydrostatic head of the compensation water system, forcing an equivalent volume of

water out of the cavern and up the compensation shaft (water conduit), increasing the water level of the surface reservoir.

The hot air exiting each section of compression is cooled using boiler-grade water in the LP, IP, and HP heat exchangers. The water exits each heat exchanger and combines into a common stream. The heated water (water) flows to the hot-water spherical tanks, where it is stored at its vapor pressure to avoid vaporization. This is achieved through a system of self-pressurization whereby water vapor generated inside the tank acts as the head gas to maintain positive pressure.

Facility Generation/Discharge Mode

When the plant is sufficiently charged and is called to operate as a power generation facility, a discharge cycle would commence. A grid signal would initiate the operation of the appropriate electrical breakers and transformers, heat exchangers, and balance-of-plant equipment and begin operation of the turbine generators. With the air flowing from the storage cavern, the turbine generators would start receiving reheated high-pressure air, which would allow the turbine generators to ramp up to "sync-idle" speed, whereupon they can be electrically synchronized to the grid. Thereafter the turbine generators would begin loading (increasing electrical output) until they reach the required plant electrical output.

While discharging, the high-pressure air from the cavern would pass through three turbine sections (HP, IP, and LP) to expand the gas from cavern pressure down to atmospheric pressure. The power produced by the turbine would drive a synchronous electrical generator. The turbine stages are pressure-grouped into the same number of pressure sections as the compressors, and, just as in the case with the compressor, air would flow though the turbine sections sequentially. As the air exits the cavern, the surface water reservoir level would decrease and the compensation water level would increase in the cavern, maintaining a near-constant cavern pressure throughout discharge.

For the discharge cycle, the same heat exchangers (LP, IP, and HP) that were used to remove heat-of- compression for storage would be used, but in reverse, using the stored hot water to increase the temperature of the air before each expansion through each turbine section. This is necessary to avoid low temperatures and liquid condensation from the air as it is expanded and naturally cooled through the turbine's blade path. As the water passes through the heat exchangers, it would be cooled by the air,but would not reach a low enough temperature for the next charge cycle. Accordingly, a secondary cooling system is used to reduce the water temperature as required.

Facility Standby/Idle Mode

When the plant is not actively charging or discharging, it would be maintained in standby/idle mode. Standby/idle mode may occur either at the end of a charge cycle

(e.g., the plant is ready and waiting to be called to operate as a power generator) or can occur at the end of a discharge cycle (e.g., the need for power generation has ceased and there is no immediate need to (re)charge the facility with potential energy (high-pressure air and hot water). The electrical power draw of the facility during standby/idle primarily consists of relatively small pumps, heaters, and coolers in various sections of the plant.

If the standby/idle mode follows a complete charge cycle, the stored air contained in the cavern would be at the maximum level and maintained at a high pressure by the hydrostatic compensation system, and the stored thermal energy (heat) would be maintained in the insulated hot-water spherical tanks, which are full. Both the motor-driven air compressors and the air-expansion turbine generators would be idle, with the lubricating oil systems heated and lubricating oil circulating through them to keep them warm and ready to start, slow-speed turning gears operating if required, and with the generators or motors internally heated to keep them at an optimum temperature.

If the standby/idle mode follows a full discharge cycle the stored air contained in the cavern would be at the minimum level and the cavern would be mostly filled with compensation water, leaving the water level in the surface- level compensation reservoir at its minimum level, while the remaining air in the cavern stays at constant hydrostatic pressure. Very little water would remain in the hot-water spherical tanks, and the cooled water would be held in the cold thermal storage tank. Both the motor-driven air compression equipment and the air-expansion turbine generators would be idle, with heated lubricating oil circulating, and motor and generator heaters maintaining them at optimum temperatures, all to keep them ready to start. With the hot-water storage tanks are holding a low level of liquid, the temperature would reduce quickly due to the small amount of water in the tank. Therefore, supplementary heating via tank immersion heaters would be initiated to counteract any temperature and pressure drops.

In very exceptional circumstances (e.g., a complete plant shutdown for major maintenance), the complete plant could be in a wholly de-pressurized, and potentially a wholly cooled state, with potentially all piping and tanks in a de-watered state (except for the cavern and the compensation reservoir), and all turbomachines allowed to cool as major work is conducted.

3.5.1.4 Air Compression Equipment Drivetrain

The WRESC would include four air compression drivetrains in the system, one LP compressor, and one IP/HP compressor for each nominal 130 MW gross train, totaling a nominal 520 MW gross load during charge mode.

The compression/charge portion of the basic facility design would consist of a two-part compression drivetrain, each part using a dedicated electrical motor. The basic framework for the charge/compression equipment consists of:

- **LP compressor:** A dedicated LP compressor drawing filtered ambient air, driven by a synchronous electrical motor, with capacity flow and surge control managed by inlet flow mechanisms combined with discharge piping blow-off valves. Filtration and moisture knockout provisions are fitted as required. A non-return valve would be fitted in the LP compressor discharge to prevent air backflow. The "low-pressure" air discharge from the LP compressor, after being cooled by the downstream heat exchanger, would then be piped to the inlet of the IP/HP compressor, as described below.
- **IP/HP compressor:** A separate compressor with a combined IP compressor and HP compressor, all driven by a single, separate, synchronous electrical motor. Cooled and filtered inlet air for both pressure groups in this combined compressor would be delivered from the upstream air-to-water heat exchanger. The high-pressure discharge from the HP compressor section would be directed to a final air-to-water heat exchanger and the resulting cooled air would thereafter be directed to the air storage cavern at near-constant pressure. All compressors would utilize heavy process-industry quality synchronous motors with brushless excitation. Each compressor would be fitted with a dedicated lubricating/control oil system, dedicated synchronous motor controllers, and protective relaying. The compressor surge controller would be integrated to monitor and manage the compressors.

3.5.1.5 Air-Expansion Turbine Generators

The WRESC system would include four air-expansion turbine generators. There would be one turbine and one generator for each 130 MW (gross) train for a plant-wide total of 520 MW (gross).

All turbine generators would be single-casing axial-bladed machines with multiple air inlets and outlets, driving a synchronous generator, and would be complete with power-generation-industry-quality speed/load controls, generator-protective relaying, voltage regulators, and synchronizing equipment. Each unit would have a dedicated lubricating/control oil system, a dedicated turbine and generator control, and protection systems.

Each air-expansion turbine would consist of three sections or pressure groups. The high-pressure air (produced from the charge cycle) that has been stored in the underground cavern would be utilized to power the turbine. The discharge air would first be piped to the first HP set of heat exchangers where it would be heated, using the hot water from the hot-water (spherical) tanks. The heated air would be used to power the HP heated turbine sections.

After the HP turbine section, the exiting air would have cooled due to the expansion process and would be routed to the IP heat exchangers, where it would be reheated using the hot water. After the IP turbine section, the cooled air would be routed to the LP heat exchangers. This reheated air would be admitted to the low-pressure expansion

section of the turbine machine, after which it would exit to the atmosphere via an exhaust stack.

3.5.1.6 Thermal Management System

The thermal management system would consist of water, main process heat exchangers, fin fan coolers, and both hot and cold thermal storage tanks. During charging, the system would use water to extract heat from the air in the compression process. This heated water would be stored separately in a dense and insulated environment. During discharging, the heat from the heated water would be re-injected back into the air during the expansion process on discharge. The thermal management system is key to an adiabatic and fuel/emission-free process.

The water management system is a closed system whereby the water would be passed between the hot- and cold-water storage tanks during the charge and discharge cycles (as described above). The stored volume within each of the tanks would fluctuate as part of normal operations. Make-up water for the thermal management system would be taken from the reservoir or the Antelope Valley East Kern (AVEK) water supply line and treated before it is sent to the cold-water tank.

Cold water would be stored outdoors in two cylindrical tanks (approximately 150 feet in diameter by 60 feet high). The cold-water tanks would be fitted with a nitrogen blanketing system, operated at low pressure, to prevent air ingress and oxygenation of the treated water.

Hot water would be stored outdoors in up to six spherical storage tanks, each with a diameter of approximately 87.5 feet and a maximum estimated height of up to 100 feet, including appurtenances. The head gas in the hot-water tanks is steam in liquid-vapor equilibrium with the stored water.

The hot-water tanks would be outfitted with immersion fluid electrical heaters that would counteract any thermal losses. Each tank would be insulated for heat conservation.

The LP, IP, and HP heat exchangers would be designed to both heat the air on discharge and cool the air on charge. They are standard industrial shell and tube heat exchangers and would be insulated to retain heat on standby periods.

3.5.1.7 Hydrostatically Compensating Surface Reservoir

An approximately 600-acre-foot surface reservoir would be excavated and constructed predominantly in cut (below finished grade) using earthen berms approximately 6 feet high. The reservoir would cover a surface area of approximately 21.5 acres and have an average depth of approximately 45 feet. The berms would be constructed from a combination of excavated soil and excavated rock from underground storage cavern construction. Each berm would have an approximate height of up to 6 feet from the exterior toe (native soil) to the berm's top. The water level in the reservoir would

fluctuate to maintain constant underground air storage pressure and be designed to operate with a minimum freeboard of approximately 4 feet at full state of charge. The surface reservoir would be equipped with an engineered liner on the bottom (to prevent percolation and possible comingling with groundwater) and a floating cover consisting of interlocking shapes to minimize evaporative water loss.

The applicant designed the reservoir to not be Department of Water Resources, Division of Safety of Dams (DSOD) jurisdictional. However, the applicant was informed during consultation with DSOD that the design and construction would require the project to be reviewed under relevant sections of the Water Code and DSOD regulations. The reservoir would be constructed in compliance with all applicable laws, ordinances, regulations and standards (LORS).

3.5.1.8 Underground Storage Infrastructure (Cavern and Shafts)

The A-CAES facility would utilize underground storage infrastructure consisting of one underground manmade cavern for the storage of compressed air and compressed air as well as manmade shafts for conveyance of air and water between the cavern and topside facility.

The storage cavern would be constructed in the bedrock below the WRESC site targeting a depth of approximately 2,000 to 2,500 feet bgs. Initial access to the cavern depth ("cavern access") for mobilization of the construction equipment and crews would be accomplished by one of two methods:

1. Construction of a large-diameter conventionally sunk shaft, or
2. Construction of several rotary drilled (blind bore) shafts.

The preferred cavern access approach is still being finalized, so both options have been shown on the plot plan to date. Regardless of the cavern access technique employed, cavern excavation would be accomplished using the same mining approach and techniques. The cavern construction requirements associated with each of these approaches are described below.

Cavern Access

To access the cavern during construction, a combination of conventionally sunk shafts and/or rotary drilled shafts would be constructed on a 24-hour-per-day, 7-day-per-week basis.

Conventionally Sunk Shaft

If a conventionally sunk shaft is used for cavern construction access, a concrete-lined shaft with 24 feet inside diameter would be constructed and equipped with a double-drum hoist, service hoist, dual ventilation ducts, and utilities to support cavern construction. For construction of this shaft, controlled detonations would occur from the top of bedrock surface (approximately 50 to 100 feet bgs) until the cavern construction

horizon (2,000 to 2,500 feet bgs) is reached. The controlled detonation associated with shaft construction would increase in depth and decrease in frequency as the shaft is advanced from the surface down to the cavern construction depth. The amount and frequency of controlled detonations would depend on rock properties, but an average of one or two controlled detonations per day are anticipated. Each detonation would last less than a few seconds.

It is expected that the rate of conventional shaft sinking would be around of five to eight feet/day, with an overall shaft construction duration of about 12 to 14 months, including pre-grouting of the overburden. Deeper grouting of the broken bedrock zones would be performed from within the shaft as a step in the sinking cycle if and when necessary.

Once completed, this 24-foot shaft would be sufficient for supporting the hauling, ventilation, and equipment/personnel all in one shaft.

Rotary Drilled Shafts

If rotary drilled shafts are used for construction access, it is expected that five- by eight-foot-diameter shafts would be constructed to support the proposed operations. No controlled detonation would be done at the surface or during the drilling phase of the cavern construction if this approach is utilized. Of the five shafts that are constructed, one would be used for equipment and personnel access, two would be used for material movement (rock hauling), and two would be used for ventilation. To construct these shafts, a lined drill cuttings pond would be required that would hold up to approximately three times the shaft volume in water to support the boring operations. Once complete, the pond would be emptied and backfilled. The drilling water would be used for reservoir fill or disposed offsite by a licensed hauler. Liner material from the drill pond would be removed or perforated, and surplus muck would be spread on top of the settled drill cuttings to completely backfill the pond excavation.

A-CAES Process Shafts

Two types of flow conduits connected to the cavern would be necessary to operate the A-CAES facility: one for the conveyance of air and another for water. It is expected that up to two shafts would be constructed for water conduits, and up to four shafts would be constructed as air conduits. It is possible that fewer shafts would be constructed, but a conservative case is being assumed for this AFC.

If rotary drilled shafts are used for cavern access, two of the cavern access shafts are expected to be repurposed for use as the water shafts for A-CAES operation upon completion of construction. In this case, only the four air wells would need to be constructed. If a conventionally sunk shaft is utilized for cavern construction access, then all six shafts would need to be drilled.

Similar to the rotary drilled cavern access shafts, a drill cuttings pond would be required for the delivery of the A-CAES process shafts. This pond would be sized so that it holds up to approximately three times the shaft volume in water to support the boring operations. Once complete, surplus water would be pumped into the water reservoir, liner material from the drill pond would be removed or perforated, and surplus rock would be spread on top of the settled drill cuttings to completely backfill the pond excavation.

Water Shaft

One large-diameter blind bore or conventionally sunk shaft, approximately 8 feet (blind bore) to 24 feet (conventional) in diameter, would be constructed for use as water conduit during A-CAES operations. Depending on the cavern access used, the shaft either would be a converted construction shaft (for blind bore access) or would be purposely constructed (for conventionally sunk access). The water shaft would be used to convey compensation water between the cavern and topside compensation reservoir during A-CAES operations. The water shaft would be lined and cemented in place to provide formation isolation. The lower end of the water shaft would extend into a sump below the cavern floor to ensure that a water seal would be maintained at all times during operation.

Air Shaft

Up to two blind-bored air shafts, approximately four feet in diameter, would be constructed during the cavern construction for use as air shafts during A-CAES operations. The air shaft would be lined and cemented in place for formation isolation. These air shafts would be used to convey compressed air between the cavern and topside process trains during A-CAES operations. The lower end of the air shaft would be located at a high point in the roof of the cavern, such that it is never submerged during operation.

Cavern Excavation

The cavern would be constructed by conventional mining methods including drilling and controlled detonation. The cavern layout would be designed to have a room and pillar or parallel gallery layout. The size and shape of excavated openings would depend on the strength of the host rock and would be finalized during detailed engineering. The size and shape selection of the excavated openings does not materially influence the overall volume of the cavern or rock excavated.

After completion of the cavern access shaft(s), cavern excavation would begin using a combination of conventional controlled detonation methods and physical/mechanical excavation. Cavern excavation would continue on a 24-hour-per-day, seven-day-per-week basis until excavation is complete. The following are the typical steps included in the normal full-scale mining cycle:

1. A jumbo face-drill drills holes into the working face on a predetermined pattern and to a predetermined depth.
2. The drilled holes are loaded with explosives and the charges are set off to break the rock into muck (broken rock).
3. Load-haul-dump vehicles load the muck and haul it from the working face to the production shaft, where it is dumped into the loading pocket and hoisted to the surface.
4. The roof and sidewalls are scaled to remove any loose hanging rock.
5. Rock bolting machines install appropriate ground support (typically rock bolts and wire mesh) for the newly exposed roof and sidewalls.
6. The centerline and drill pattern are marked on the new working face by surveyors and the cycle is repeated.

During underground construction, twice-daily controlled detonation episodes of a few seconds duration each would occur at the beginning of each shift. Controlled detonation would not be continuous throughout the day and would occur on a regular schedule of approximately 10- to 12-hour intervals. During full-scale cavern excavation, explosives would be placed in closely spaced locations and detonated remotely. Early in the cavern excavation process, personnel would clear the underground area and remain aboveground during the detonation sequence. Once the cavern is large enough, personnel would remain underground during the detonation sequence.

For gallery construction, a top heading would be initially driven, and roof support would be installed as the excavation advances. One or more successive benches would then be excavated to develop the cavern opening to full height. Waste muck would be crushed underground and brought to the surface via a shaft skip. The cavern floors would be graded to drain toward water sump and shaft. Where geology and ground conditions permit, roofs would be sloped up to naturally vent into the air shaft and avoid the possibility of trapped air pockets. Most caverns are completed with unlined, bare rock surfaces, though some are lined with a thin layer of shotcrete for worker safety and geotechnical integrity. Grouting may also be used, if required, to seal large fractures that could permit water inflow. Upon completion of cavern excavation, the cavern would be commissioned into operations which would require the filling and sealing of the construction shafts that are not converted for use in A-CAES operations.

During operations, the cavern would be filled with water through a hydraulic conduit from the surface reservoir. The weight of the water in this surface reservoir would maintain a near-constant air pressure in the cavern throughout both the charging and discharging cycles. This approach supports efficient operations and significantly reduces the cavern volume requirements. The dimensions and design of the cavern are presented in **Table 3-2.**

TABLE 3-2 CAVERN DESIGN	
Design Element	**Value**
Depth	Approximately 2,000 to 2,500 feet bgs
Pressure	870 to 1,100 psig
Volume	Approximately 900,000 cubic yards

bgs = below ground surface; psig = pounds per square inch gauge

3.5.1.9 Major Electrical Equipment and Systems

The net electric power generated at the WRESC would be transmitted to the electrical grid at the point of interconnection. Transmission and auxiliary uses are discussed in the following subsections. The electric power required for charging the system would be drawn from the electrical grid with additional power for the auxiliaries. Refer to the preliminary single-line diagram provided in Chapter 3.0, Electric Transmission (Figure 3-3) (ESHD 2024i) depicting the onsite Willow Rock main substation, including applicable ratings of key equipment. The facility would not be designed to be black start capable (i.e., capable of starting up without an external utility power feed).

For metering of the import and export of power, a power quality meter suitable for revenue metering of MWh and megavolt ampere reactive-hours would be located at the SCE Whirlwind Substation. The power revenue metering would be constructed according to SCE standards.

A power management system would interface with SCE to coordinate power export/import quality and voltage regulation.

3.5.1.9.1 Generators and Motors

Turbine Generators

Generators would generate at medium voltage (13.8 kV). This power would be transformed via unit transformers to 230 kV for the electrical grid connection.

Generators are preliminarily rated 150 megavolt amperes (MVA) at 0.9 to 0.95 power factor to supply 130 MW gross and 125 MW net to the electrical grid at the point of interconnection. This allows maximum turndown (reduction in total overall output) of plant, whereby a single generator can operate while other generators are offline for maintenance.

Synchronous Motors for Compression Train

Full charging capacity requires eight synchronous motors running to supply the four air compressor trains. The power to the synchronous motors would be supplied via unit transformers.

The synchronous motors would normally run at unity or a slightly leading power factor to mitigate the VAR import requirements of induction motors within the auxiliary power system.

The synchronous motors would be started using a variable frequency drive (VFD) soft start system. One soft start unit would be utilized for each of the four sets of motors (one two-motor set per compressor power train) if required.

3.5.1.9.2 Alternating Current Power—Transmission

Power would be generated by the four generators at 13.8 kV and transformed to 230 kV for the grid interconnection. 230/13.8 kV main transformers in each train support connection to the local 230 kV network at the SCE Whirlwind Substation. For motor operation, four additional 230/13.8 kV unit transformers provide back-feed power to the compressor motors. Surge arrestors at the point of interconnection would protect the system from disturbances in the 230 kV system caused by lightning strikes or other system disruptions.

The transformers would be set on concrete foundations, and the design would include a secondary oil containment reservoir to contain the transformer oil in the event of a leak or spill. There would be differential protection on transformers rated 5 MVA and greater. The 230/13.8 kV transformer would be connected to a single-circuit three-phase 230 kV line, which would be connected to the Whirlwind Substation via an approximately 19-mile predominantly overhead gen-tie line. A detailed discussion of the electric transmission system is provided in **Section 4.3, Transmission System Engineering**.

3.5.1.10 Power Supply Systems

Alternating Current Power—Distribution to Auxiliaries

The distribution voltages for plant auxiliary systems and lighting would include: 4.16 kV, 480 V, and 208/120 V.

Auxiliary power supplies for instruments would be 24 volts direct current (VDC); however, in the even that increased power consumption is required, 120 volts alternating current (VAC) would be used.

Direct Current Power Supply System

Turbine/generator and compressor/motor auxiliaries would be supplied by 125 VDC.

Process control systems (PCS) would be supplied from 24 VDC power supply modules within system cabinets. Control power for the switchgear would be 12 VDC supplied from a dedicated direct current (DC) battery system.

The 125 VDC battery system would be independent of the 120 VAC uninterruptible power supply (UPS) battery system. All DC systems would have 8-hour battery duration.

The system would be designed to provide continuous rated power in the event of main power failure. The DC systems would be located on the emergency generator bus. The DC systems' health would be monitored by the distributed control systems (DCS).

Uninterruptible Power Supply (UPS) System

An independent UPS system would be dedicated to supply power to the following loads:

- Critical instruments, emergency lighting, and valves
- Control panel fans and other ancillaries
- DCS control racks, including programmable logic controllers (PLCs), flow computers, vibration monitoring system, etc.
- Telecommunications system
- Building cameras and security access system
- Smoke and building heat detector UPS systems include:
  - 20 kVA or less:
    - Input voltage: 208 volts (V)
    - Output voltage: 208 V
  - Greater than 30 kVA:
    - Input voltage: 480 V
    - Output voltage: 480 V

The system would be designed to provide continuous rated power in the event of main power failure. The UPS would be located on the emergency generator bus. The UPS and emergency generators health would be monitored by the DCS.

Emergency Power

Three diesel-fired self-contained 4.16 kV generators, up to approximately 2.5 MW each, would supply emergency power for all critical loads via double sided 5 kV emergency switchgear. These units would meet United States Environmental Protection Agency (U.S. EPA) Tier 4 emissions standards and would normally operate only to facilitate maintenance and reliability testing for up to 50 hours per year. Only one unit would operate at a time to perform maintenance and reliability testing.

When needed for emergency power due to a loss of utility interconnection, the generators would activate and operate during the emergency period.

3.5.1.11 Water Supply and Use

The AVEK water agency currently owns and operates a 36-inch-diameter water supply line that is located adjacent to the WRESC site approximately 300 feet east of the WRESC site's boundary. AVEK would supply Willow Rock 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. A permanent 6-inch-diameter buried water pipeline would be installed onsite to deliver water from the AVEK main supply pipeline to the surface reservoir.

These sources would also provide water for filling the storage tank used for fire protection and service water. The applicant's Appendix 2D, Water Balance Diagrams and Construction Water Use (ESHD 2024o), provides water balance diagrams showing annual average and high temperature ambient operating conditions.

During plant operation, the expected water consumption from AVEK would be less than 2,000 gallons per day, as shown in the water balance. As the cooling and thermal storage systems operate in a closed loop, losses are minimal, and make-up water demand would 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.

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.

The water provided by AVEK during operations would 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.

During construction and during the initial filling of the surface reservoir the WRESC would require approximately 1,400 acre-feet of water. Construction water requirements are discussed further in Section 5.15, Water Resources. Once the facility commences operation, it is expected to have an annualized surplus of approximately 3.6 acre-feet per year (on average) of non-potable recharge quality water to provide surface reservoir water make-up. Evaporative loss would be reduced by using a cover on the reservoir. Since there would be a seasonal variation associated with the production of water as well as evaporation losses, the reservoir would be designed with adequate freeboard to allow for seasonal fluctuations in water inventory.

3.5.1.11.1 Construction Water

An estimated 1,400 acre-feet of water (incorporating approximate 20 percent contingency) would be needed throughout the construction and startup period. Most of the water would be used for filling the hydrostatically compensating reservoir. Other uses include supporting construction of the cavern works (shaft drilling and cavern excavation), surface works (hydrotesting and general purpose washdown), and fire system testing. These are discussed briefly below. Refer to the applicant's Appendix 2D,

Water Balance Diagrams and Construction Water Use (ESHD 2024o), for the estimated water consumption required during construction by month.

Cavern Works

Construction of the cavern is estimated to require an estimated 252 acre-feet of water over the construction period. Uses include site preparation, air and shaft drilling, and excavation of the cavern. Water remaining in the drilling pond(s) after shaft sinking would be filtered, water quality tested and then either sent to the reservoir, or, if necessary, based on test results, hauled offsite by an approved waste hauler.

Surface Works

The surface construction is expected to require approximately 47 acre-feet of water for several purposes over the 24-month period, including the following:

- General purpose (de-dusting roads, daily washdown, etc.)
- Tank and sphere hydrotest
- Piping and vessel hydrotest
- Fire system testing

Water used for hydrotesting would be reused for hydrotesting other systems, including the spheres, pipe circuits, and initial fill. A temporary pumping sub-system with screening and filtering capabilities would be utilized to re-use this water. After all testing, the volume of hydrotest water (losses at flange breaks, nozzle spray tests, etc.) would be screened and filtered to a suitable cleanliness level to supplement the initial fill volume of the cold thermal storage tanks and/or reservoir.

Surface workers are assumed to use 20 gallons of potable water per person per day during all stages of construction, including drinking and wash water.

Hydrostatically Compensating Surface Reservoir Fill

The roughly 600-acre-foot surface reservoir would require approximately 868 acre-feet of water for initial fill (accounting for evaporation losses during the filling period). The reservoir fill would require approximately 14 months, with additional monthly fill requirements. The required fill amount accounts for both precipitation and evaporation. After initial filling, the surface reservoir would 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.

3.5.1.11.2 Water and Wastewater Requirements

Demineralized water would be produced onsite and used as make-up water for the water-based thermal storage and closed-cooling medium loops.

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 air compressors such that the evaporative cooling does not require sourcing of additional water.

3.5.1.11.3 Water Treatment

The AVEK supply water would be used for make-up to the plant water system, fire protection, and general needs such as equipment and surface washdown.

The thermal energy storage system and cooling system would be filled with demineralized water during commissioning. A temporary, portable demineralization system would be used to generate water for the first filling and commissioning. Make-up demineralized water would be produced during operations to cover minor losses in the system. The expected quality of demineralized water used for the first filling would have the following characteristics:

- Appearance: clear and colorless
- Odor: odorless
- Total dissolved solids maximum: < 1 part per million (ppm)
- Hardness: < 0.01 Deutsche Harte
- Oil and grease: none
- Conductivity at 25 degrees Celsius: < 0.5 micro Siemens per centimeter
- Chlorides: <0.5 ppm
- Iron: <0.005 ppm
- Copper: <0.01 ppm

3.5.1.11.4 Water Availability and Water Quality

AVEK would provide the required quantity and quality of water required by the project. GEM A-CAES LLC (GEM, the applicant) has filed an application for water service with AVEK and is in the process of securing a water service agreement. Projected water quality will be based on available testing data.

3.5.1.12 Waste Management

Waste management is the process whereby all wastes produced at Willow Rock would be properly collected, treated if necessary, and disposed of. Wastes include process wastewater, as well as nonhazardous waste (primarily excavated waste rock) and hazardous waste, both liquid and solid. Waste management will be discussed in more detail in the **Waste Management** section of the complete PSA.

3.5.1.12.1 Wastewater and Stormwater Collection, Treatment, and Disposal

Wastewater and Septic Waste

Project wastewater would be diverted to the zero-discharge evaporation pond. The oil-free evaporation pond would be maintained, and the remaining "sludge" would be hauled offsite by an approved waste disposal company to an approved disposal facility.

The septic waste from the administration/control building would be handled by one of the two methods described below:

- Sanitary waste from the administration/control building would be directed to a nearby underground septic storage tank, pumped out periodically by truck, and trucked offsite to an approved disposal facility.
- Alternatively, the sanitary sewer system would consist of a lateral septic system containing a lateral line from the structure to a septic tank. The waste would flow to the lateral system of pipes that allows the waste from the septic system to discharge via perforations in the lateral pipes.

Willow Rock would not have a practice of washing down any equipment with oily residues. Equipment that has oily residues would be cleaned with rags and sorbents, and appropriate cleaning solutions would be applied to the rags and sorbents.

After cleaning, the oily rags and sorbents would be properly stored, manifested, and disposed of by licensed disposal companies in the regulatory-required time frames.

Stormwater

Onsite stormwater flows generated within the WRESC site boundary would be routed to an unlined stormwater pond and would not be discharged outside the WRESC site. Plant area drains would be directed to oil-water separators. There would be at least one oil-water separator for the common plant areas, and one oil-water separator for each power block. Water from the oil-water separator sumps would be discharged to the waste drains sump and then to the lined evaporation pond. The separated oil would be periodically pumped out of the oil-water separators by truck and disposed of offsite by a licensed hauler.

A summary of the approach for offsite perimeter stormwater drainage is described below for the "without berm" and "with berm" options.

Option 1 – Without Berm

Offsite flows would be diverted via proposed ditches along the north and west side of the WRESC site to route them to where they are currently flowing. The flows conveyed by the west ditch would discharge stormwater south and then to the ditch along Dawn Road. The flows conveyed by the north ditch would discharge stormwater to the east to the ditch along the Sierra Highway. These ditches would be sized to carry, at a

minimum, the 100-year discharge calculated using TR55 Soil Conservation Service (SCS) Unit Hydrograph methodology.[4]

Onsite flows generated by the WRESC site would not be discharged outside the WRESC site boundary. All the WRESC site stormwater would be conveyed via sheet flow and system flow (catch basins, swales, and stormwater conveyance piping) to a proposed, unlined stormwater pond on the southeast corner of the WRESC site.

Option 2 - With Berm

Offsite flows would be diverted via proposed ditches 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 ditch would discharge stormwater south and then to the ditch along Dawn Road. The flows conveyed by the north ditch would discharge stormwater to the east to the ditch along the Sierra Highway. These ditches would be sized to carry at a minimum the 100-year discharge calculated using TR-55 SCS Unit Hydrograph methodology.

Rainwater that falls on the north and west sides of the architectural berm would 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 would be directed south and east via ditches on the north and west boundaries of the WRESC site and flow towards the Dawn Road and Sierra Highway ditches, respectively.

Onsite flows generated by the WRESC site would not be discharged outside the WRESC site. All the WRESC site stormwater would be conveyed via sheet flow and system flow (catch basins, swales, and stormwater conveyance piping) to a proposed, unlined stormwater pond on the southeast corner of the site.

Excavation Waste

The WRESC would produce excavated material associated with typical mining techniques to create the underground compressed air storage cavern. Excavation waste generally includes soil and rock. The cavern has an equivalent volume of excavated material of approximately 1.3 million cubic yards based on an expected swell by a factor of 1.4. The swell factor accommodates the volumetric expansion from solid rock at depth to crushed rock at the surface.

Based on preliminary engineering and environmental planning, the applicant is considering options for adaptive re-use of the cavern rock onsite within the project boundaries or hauled offsite to up to four independent third parties. To plan conservatively, the project analyses assume that cavern rock would be fully reused in

4 The Soil Conservation Service (SCS) proposed a parametric Unit Hydrograph (UH) model. The model is based upon averages of UH derived from gaged rainfall and runoff for a large number of small agricultural watersheds throughout the US. SCS Technical Report 55 (1986) and the National Engineering Handbook (1971) describe the UH in detail.

four options: up to 100 percent reused onsite as an architectural berm, up to 100 percent hauled offsite to the Robertson's Ready Mix in Los Angeles County, up to 100 percent hauled offsite to the Holliday Rock facility in Kern County, and/or up to 100 percent hauled offsite to the Vulcan Materials Inc. processing facility in Los Angeles County. At the time of filing, commercial agreements are underway with the private off-takers, and design of an onsite architectural rock berm is being advanced through engineering.

Offsite third-party off-takers have expressed interest in potentially reusing the rock material for commercial purposes. Each potential off-taker will have the appropriate permits in place to import material from third parties.

In lieu of hauling the excavated rock offsite, another option is to re-use the material within the project boundaries as an architectural berm. The specific design of the feature is to be determined through final engineering.

3.5.1.12.2 Solid Nonhazardous Waste

The WRESC would produce nonhazardous waste related to construction, operation, and maintenance that is typical of power generation and energy storage operations. Surface construction wastes would generally include soil, scrap wood, excess concrete, empty containers, scrap metal, insulation, and sanitary waste. Cavern construction wastes would include some of the same materials, as well as explosives packaging.

Facility waste during operation would include nonhazardous waste, scrap metal and plastic, insulation material, defective or broken electrical materials, empty containers, and other solid wastes, including the typical refuse generated by workers. Solid waste would be trucked offsite for recycling or disposal.

3.5.1.12.3 Hazardous Wastes

Several methods would be used to properly manage and dispose of hazardous wastes generated by the project. Waste lubricating oil would be recovered and recycled by a waste oil recycling contractor. Spent lubrication oil filters would either be recycled or disposed of in a Class I landfill. Workers would be trained to handle hazardous wastes generated at the WRESC site. Chemical cleaning wastes would be temporarily stored onsite in portable tanks or sumps and disposed of offsite by an appropriate contractor in accordance with applicable regulatory requirements.

3.5.1.13 Management of Hazardous Materials

A variety of chemicals, including oily rags, would be stored, handled, and used during the construction and operation of Willow Rock, following applicable LORS. Chemicals would be stored in appropriate chemical storage facilities. Bulk chemicals would be stored in storage tanks, and most other chemicals would be stored in returnable delivery containers. Chemical storage and chemical feed areas would be designed to contain leaks and spills. Containment areas and drain piping design would allow a full-

tank capacity spill without overflowing the containment area. For multiple tanks located within the same containment area, the capacity of the largest single tank would determine the volume of the containment area and drain piping with an allowance for rainwater. Drain piping for reactive chemicals would be trapped and isolated from other drains to eliminate noxious or toxic vapors.

Safety showers and eyewashes would be provided adjacent to, or in the vicinity of, chemical use and storage areas. Plant personnel would use approved personal protective equipment during chemical spill containment and cleanup activities. Personnel would be properly trained in the handling of these chemicals and would be instructed in the procedures to follow in the event of a chemical spill or accidental release. Adequate supplies of emergency response equipment, including absorbent material, would be stored onsite for spill cleanup.

3.5.1.14 Fire Protection

The fire protection system would be designed to protect personnel and limit property loss and facility downtime in the event of a fire. The system would include an electric fire pump, a small jockey pump to keep the system under pressure, and a fire protection water network system consisting of hydrants or standpipes and portable fire extinguishers. Where required, automatic or fire sprinkler systems would be provided. A diesel-fired approximately 345 kW (460 horsepower) fire pump would be provided for emergency backup. The fire protection and piping network system would be designed to protect the facility, which would be designed under the following regulations:

- Federal, state, and local fire codes, and occupational health and safety regulations, in concert with the Authority Having Jurisdiction
- California Building Code, where applicable
- Applicable, mandatory National Fire Protection Association standards

The diesel-fired pump engine would meet U.S. EPA Tier 3 emission standards and normally only operate for maintenance and reliability testing for up to 50 hours per year.

Firefighting water would be stored in the service/fire water storage tank. The tank would have an internal service water pump suction standpipe so that the required water volume for a fire event is always available to the fire water pumps. The system can supply maximum water demand for any fire suppression requirements, as well as water for fire hydrants. The total capacity of the tank is estimated at 350,000 gallons, with 300,000 gallons reserved for fire water.

Separation criteria would be evaluated in a fire protection study during further engineering.

Portable and wheeled fire extinguishers would be provided at strategic locations around the facility. Their locations would be determined based on the guidelines of National Fire Protection Association 10 or relevant local requirements.

The following types of portable fire extinguishers can be used as appropriate for the type of risk:

- For areas where there are ordinary combustibles such as wood, cloth, paper, plastic, etc., extinguishers would be suitable for Class A fires. These can be in the form of water, foam, or dry powder.
- For areas where there are flammable liquids, oils, grease, paint etc., extinguishers would be suitable for Class B fires. These can be carbon dioxide (CO2) dry powder, or foam or any other suitable film forming foams.
- For areas where there is energized electrical equipment, extinguishers would be suitable for Class C fires. These would be CO2 or other suitable dry chemicals.

Portable fire extinguishers, where applicable, would be installed at a suitable distance above the floor for ease of deployment and to minimize the potential for corrosion. Fire extinguishers would be fixed to walls, columns, or structural supports as appropriate. Weatherproof storage cabinets would be provided for extinguishers located in open areas. Wheeled extinguishers located in external areas would be equipped with a weatherproof cover.

3.5.1.15 Plant Auxiliaries

The following systems would support, protect, and control the Willow Rock facility.

Process Systems

A 5 kV substation would be required in the process area to supply power to the area loads. The 230/5 kV transformers would be distributed at the WRESC site. Large motors in the process area (above 300 horsepower) would be fed from the 5 kV system with many of the motors on emergency power for operation during a power outage.

Smaller motors would be fed from the 480 V system, and some would be on emergency backup power.

Heating, Ventilation, and Air Conditioning Systems

All buildings would be equipped with suitable heating, ventilation, and air conditioning systems and critical systems would operate on emergency power as required.

Lighting

Indoor building lighting would be designed consistent with building code requirements to provide adequate indoor illumination with consideration for human factors. Exterior lighting would be hooded and downward facing to provide adequate space lighting while minimizing offsite glare.

The emergency lighting would be sufficient to illuminate the exit path from process areas and inside the buildings and would be supplied from a 120 V UPS located indoors. Exit signs would be self-illuminating. In outdoor areas, emergency light fixtures would be equipped with rechargeable battery packs with minimum 1-hour battery backup. These emergency lighting fixtures would not normally be switched on and would be identical to the fixtures used throughout the facility.

Process plant lighting and convenience outlets would be supplied from a 208 V/120 V, three-phase, four-wire, 60 hertz system.

Grounding

All systems would be grounded and bonded as per the National Electric Code and local municipal codes and standards.

All equipment containing flammable liquids or gases and liable to static discharge ignition would be grounded by having one or more anchor bolts connected to the reinforcing bar of the equipment foundation.

The grounding system design would be as per Institute for Electrical and Electronics Engineers (IEEE)-80 and IEEE-142 guidelines. A detailed step/touch potential, including ground potential rise calculation, would be performed. The substation grounding systems would be designed to limit the overall resistance to earth to safe step and touch voltage conditions.

Prior to detailed design execution, sufficient site soil data would be obtained for performing grounding studies and calculations

All equipment would be connected to the ground through a minimum of two paths, except for small equipment that can be safely connected to a single source.

A dedicated, clean, instrument-grounding system would be provided to connect all PCSs, in addition to a standard equipment grounding system.

The instrumentation grounding system would be bonded to the electrical system ground below grade.

Cathodic Protection

The cathodic protection system would be designed to control corrosion of metallic piping when buried in the soil. Depending on the corrosion potential, type of soils on the WRESC Site, ease of isolation of buried pipe from the aboveground facilities, and proximity to ground grid and foundations, either a passive or impressed current cathodic protection would be provided where required.

Freeze Protection

Freeze protection for above- and below-grade piping and instrumentation lines would be evaluated and installed as necessary, based on the expected minimum ambient temperature at the facility. Given that the record minimum temperature near Willow Rock is 24 degrees Fahrenheit, freeze protection is not expected to be required for large piping but may be required for small piping and air tubing. Below-grade piping would be installed below freezing depth according to site's climate and soil data. Where necessary, the above-grade piping would be protected with an electrical heat tracing system and/or continuous circulation in rare instances of freezing temperatures. The foundation of aboveground pipe support would be rooted below the freezing depth.

3.5.1.16 Control Systems

Process Control System

The Process Control System (PCS) would provide all monitoring and control of the facility. The PCS configuration would be justified with the plant engineering contractor based on the facility complexity.

The facility would function automatically with minimum operator intervention. Emphasis would be given to automating routine actions so that the operator would have more time to analyze and identify short- and medium-term plant performance, efficiency, and imminent failures.

Adequate instrumentation would be installed to enable operations personnel to monitor facility performance from the central control room with minimum field intervention. Field operators would only assist in visual surveillance and would intervene only when critical equipment and systems warrant immediate attention. All field functions would require a permissive signal from the control system.

For stand-alone control packages within the facility where operator action would be entirely local, a package common alarm would be connected to the PCS to direct an operator to examine local indicators or panels to determine equipment status.

Operator Interface System

Under normal conditions, the facility would be operated from the central control room with operator displays with mouse and operator keyboards, radio, and telephone panels, monitors for internet protocol camera access.

The PCS operator workstations would provide the following functions at minimum:

- Presentation of process information to the operator
- Facilities to enable the operator to adjust and control the process
- Monitoring and control of packaged equipment
- Monitoring and control of utility systems

- Short-term logging of process conditions and operator actions
- Diagnostic of the PCS and its component parts
- Site security

Monitoring and Controls

The PCS would use solid-state equipment and a PLC or DCS to increase reliability and flexibility.

Electromechanical control relays would not be used, except when required for safety interlocks. The plant DCS would meet cyber-security standards as required by the California Independent System Operator.

If the control system involves electromechanical timing sequences or interlocks, auxiliary dry contacts would be provided for indication of steps or conditions. These contacts would be used to interface with the PCS to monitor the operational status.

All failure and alarm switches would be "fail safe"—i.e., an abnormal condition would cause a loss in output signal. Upon loss of power, control circuits and alarms would go to the "fail safe" condition. Solenoid valves and actuating relays would be normally energized and would de-energize upon protective action or alarm. All alarm contacts shall open to alarm. When contacts are controlled by a pneumatically loaded device, the device would be normally loaded and would vent to create the alarm or shutdown condition.

In general, interlock system circuits would be activated from separate primary instruments. Each interlock signal initiating a shutdown would also activate a separate pre-alarm point to indicate that an abnormal condition exists, and failure to take corrective action would result in a shutdown of the affected equipment. Pre-alarms may be actuated by a "normal" instrumentation system signal.

Communications between the PLC and human-machine interface, and PLC to PCS would be Ethernet transmission control protocol/internet protocol or ProfiNet.

Communications to motor control centers and VFDs would be Ethernet- or fiber-based. Communications to discrete field contacts would be automated with limit switch indications.

Wireless communication devices would be used for communication between control room and operators in the facility.

3.5.1.17 Service Air and Instrument Air

The service air system would supply compressed air to hose connections for general use at the WRESC. Service air headers would be routed to hose connections located at various points throughout the facility.

The instrument air system would provide dry, filtered air to pneumatic operators and devices. Air from the service air system would be dried, filtered, and pressure-regulated before delivery to the instrument air piping network. An instrument air header would be routed to locations within the facility equipment areas.

3.5.1.18 Interconnect to Electrical Grid

The facility would connect to the SCE electrical grid via a 230 kV overhead (predominantly) single-circuit gen-tie line that would run approximately 19 miles from the SCE Whirlwind Substation to the WRESC site. The 230 kV line would terminate at a dead-end tower before the main power transformers, which would step down the voltage to 13.8 V and five kV, suitable for distribution within the WRESC. The grid connection would be capable of power import and export, rated to suit all operating scenarios. There are expected to be a small number of short underground gen-tie line segments to allow for crossing of a Los Angeles Department of Water and Power high-voltage transmission corridor and in other locations where the transmission corridor is congested with preexisting facilities. Open trenching or horizontal directional drilling would be used to complete these short underground segments.

3.6 Project Construction

3.6.1 Construction Schedule

The construction of the WRESC from site preparation and grading to full-scale operation and construction closure is expected to take roughly 60 months. Major milestones are listed in **Table 3-3**. The applicant would assess the prospect of initiating full-scale operations for a portion of the facility's energy capacity in advance of the target date shown below.

TABLE 3-3 MAJOR PROJECT MILESTONES

TARGET PROJECT MILESTONES	BEGIN		COMPLETE	
	MONTH NUMBER	CALENDAR DATE	MONTH NUMBER	CALENDAR DATE
Site Preparation & Mobilization	1	Dec-25	3	Feb-26
Grading	2	Jan-26	13	Dec-26
Reservoir Excavation	3	Feb-26	13	Dec-26
Shaft Drilling (Ventilation and Process Connections)	10	Sep-26	35	Oct-28
Access Shaft Excavation	11	Oct-26	23	Oct-27
Topside Equipment Installation	15	Feb-27	45	Aug-29
Transmission Line Construction	24	Nov-27	39	Feb-29
Cavern Construction (and Cavern Rock Crushing and Hauling)	24	Nov-27	47	Oct-29
Topside Equipment Commissioning	40	Mar-29	52	Mar-30
Subsurface Commissioning	47	Oct-29	52	Mar-30
Full Plant Commissioning	52	Mar-30	55	Jun-30
Startup	55	Jun-30	60	Oct-30

TABLE 3-3 MAJOR PROJECT MILESTONES

TARGET PROJECT MILESTONES	BEGIN		COMPLETE	
	MONTH NUMBER	CALENDAR DATE	MONTH NUMBER	CALENDAR DATE
Construction Demobilization	59	Sep-30	60	Oct-30
Commercial Operation	60	Oct-30	61	Nov-30

Source: Hydrostor 2025

3.6.2 Construction Workforce

During construction, there would be an average and peak workforce of approximately 273 and 749 workers, respectively, including construction craft workers and supervisory, support, and construction management personnel onsite if 100 percent of the waste rock is hauled offsite. The construction average and peak workforce would decrease slightly to 269 and 731, respectively, if all the excavated rock is re-used onsite in the form of an architectural berm.

Surface work would normally occur in eight-hour shifts, 5 days a week. Cavern work is planned as follows:

- Mobilization and site preparation (months one through three): five days a week, 10-hour shifts
- Grading, excavation, and shaft drilling (months two through 26): 12 hours/day, 10 days on, four days off
- Cavern construction (months 26 until completion): 24 hours/day, seven days/week, 12-hour shifts

During cavern construction, trucks would either haul excavated waste rock up to 24 hours per day from the WRESC site or re-use the material onsite. Excavated rock during construction may be temporarily stored for re-use if necessary.

Cavern construction would occur 24 hours per day, seven days per week. Additional hours may also be necessary for surface construction work to make up schedule deficiencies or to complete critical activities (e.g., pouring concrete at night during hot weather, and working around time-critical shutdowns and constraints).

3.6.3 Construction Laydown and Traffic

Construction laydown and parking would be located on property to the west and north of the WRESC site. The peak construction site workforce level is expected to last from month 25 through month 46 of the construction period, with the peak being months 26 and 27.

Table 3-4 provides an estimate of the average and peak construction traffic during the 60-month construction/commissioning period for Willow Rock based on the worst-case workforce (100 percent excavated rock hauled offsite).

TABLE 3-4 ESTIMATED WORST-CASE AVERAGE AND PEAK CONSTRUCTION TRAFFIC		
VEHICLE TYPE	**AVERAGE DAILY TRIPS**	**PEAK DAILY TRIPS**
Construction Workers (one way, no carpooling assumed)	273	749
Deliveries	45	60
Total	318	809

Source: Hydrostor 2025

3.6.4 Temporary Construction Rock Crushing Facility

A temporary portable rock crushing facility would be located onsite for up to 10 hours per day, seven days per week for 22 months beginning approximately in month 25. The rock crushing facility would be capable of processing up to 350 tons per hour and is expected to consist of a primary jaw crusher, a secondary cone crusher, screens, three conveyors, and two stackers. The facility would use a combination of water sprays and a baghouse to control fugitive dust and fine particulate matter emissions. The facility would be capable of operating from a locally provided power feed or using two 779-horsepower diesel-fired engine generators meeting U.S. EPA Tier 4 emission standards. The entire facility is expected to be certified under the California Air Resources Board Portable Equipment Registration Program.

The overall quantity of rock to be crushed would depend on whether an architectural berm would be constructed onsite or whether excavated rock would be hauled offsite. If an architectural berm is constructed, only 25 percent of the excavated rock is expected to be crushed to facilitate berm stability. If the excavated rock is hauled offsite, then up to 100 percent of the excavated rock is expected to be crushed to meet off-taker specifications.

3.6.5 Temporary Concrete Batch Plant

A temporary portable concrete batch plant is also expected to be located onsite to support construction of the shafts and, if necessary, initial cavern construction. The concrete batch plant is expected to operate onsite for approximately 12 to 15 months. Construction is expected to require up to 80 cubic yards per day of finished cement. The facility would be capable of operating from a locally provided power feed or using one 500-horsepower diesel-fired engine generator meeting U.S. EPA Tier 4 emission standards. The entire facility is expected to be certified under the California Air Resources Board Portable Equipment Registration Program.

3.7 Willow Rock Facility Operation

The WRESC would be operated and monitored continuously 24 hours per day, seven days per week by qualified and licensed onsite operations staff and would not be remotely operated (other than potential grid regulation-required operations such as generator transfer trips or special protection schemes).

There would be a total of approximately 40 full-time staff to operate the facility. The operations staff would include control room operators (24 hours per day, seven days per week) and roving operators in the field conducting general rounds at least twice per 12-hour shift.

Additional field checks would be done as needed for maintenance activity, upsets, or other general operations requirements.

3.7.1 Facility Safety Design

Willow Rock would be designed to maximize safe operation. Potential hazards that could affect the facility include earthquake, flood, and fire. Facility operators would be trained in safe operation, maintenance, and emergency response procedures to minimize the risk of personal injury and damage to the facility.

3.7.2 Facility Availability and Quality Control

The WRESC would be designed to be available to operate at its full load at least 95 percent of the time.

Availability is the duration of time that the entire facility would be able to perform its intended task. It is calculated as a ratio expressed in percentage, where the numerator is the number of hours when the system as a whole either (1) is ready to either charge or discharge (during idle/standby periods), or (2) is charging or discharging, all divided by the total number of hours in the period.

Typically, both planned and unplanned outages are subtracted from the availability calculation numerator to calculate actual availability for a period. The availability calculation denominator can be the total amount of time in the day, week, month, or, most commonly, year during which availability is being calculated.

For further clarity, availability is not the same as a typical generating plant's capacity factor, which accounts for annual criteria such as the plant's actual energy MWh output (numerator) versus the plant's nameplate capability to produce MWh over a full year (denominator), and which is usually based on the general assumption that the relevant plant would always operate at baseload.

The WRESC is intended to be operated for approximately 50 years. Reliability and availability projections are based on this operating life. Operation and maintenance procedures would be consistent with industry standard practices to maintain the useful life of plant components.

3.7.2.1 Fuel Availability

The WRESC would not use fuel for the process. California ultra-low sulfur diesel (15 ppm sulfur by weight) would be used for the emergency backup generators and fire pump and is readily available in the marketplace.

3.7.2.2 Water Availability

Potable and process water would be provided by interconnection with the AVEK water distribution system. The availability of water to meet the requirements of the facility need is discussed in more detail in **Section 5.15, Water Resources**.

3.7.2.3 Redundancy of Critical Components

The following subsections identify equipment redundancy as it applies to project availability. Sparing of equipment must take into consideration the requirement to provide the targeted overall system availability of 95 percent. A Reliability, Availability, and Maintainability (RAM) study would be performed during final engineering design to further refine this preliminary redundancy information.

3.7.2.4 Turbomachinery

As is typical in the industry, there is no redundancy in turbomachinery (spares), given the overall reliability of the component parts and the need to control capital expenditures. Routine minor inspection and maintenance would be performed between charge and discharge cycles during pre-planned outages. Major inspections and overhauls would require shutdowns for removal of the turbomachinery casings, rotors, and other major components.

3.7.2.5 Pumps

All types of pumps are considered susceptible to mechanical breakdown and generally have one installed spare. The decision not to install a spare would depend on the criticality of the service. In general, pumps would be spared in an N +1 arrangement as an early front-end engineering design assumption until either more accurate input is available or the RAM analysis has completed.

3.7.2.6 Heat Exchangers

Shell and tube (S&T) heat exchangers are less susceptible to mechanical breakdown, though appropriate protection would be provided to safeguard equipment against tube failures and cross contamination of fluids. S&T heat exchangers would not be spared; however, the parallel nature of the heat exchanger system would allow the plant to remain available when individual exchanger units are under service. Appropriate filtration would be included to prevent corrosion and increase reliability. Tube inspection and maintenance allowances would be made in the layout design and procurement.

3.7.2.7 Storage Tanks

Multiple spherical tanks are required due to size constraints on the technology at the required operating condition, effectively resulting in sparing. They are not spared beyond the minimum number of spherical tanks required to store the hot water. That is, the WRESC would still be able to operate with a spherical tank rendered unusable, but at a reduced charge/discharge duration.

The low-pressure (atmospheric) tank is not susceptible to mechanical breakdown and, as such, does not require frequent shutdowns for maintenance purposes.

Both types of tanks would be inspected and maintained during pre-planned outages, with major inspections coordinated with major work on the turbomachinery.

Critical sensors and transducers would have triple redundancy.

3.7.2.8 Project Quality Control

The project would implement a QC program that would ensure the highest level of oversight while meeting the desired project outcomes, as well as the appropriate license and social license for ongoing operations.

3.7.2.9 Quality Control Records

The following QC records would be maintained for review and reference:

- Project instructions manual
- Design calculations
- Project design manual
- Quality assurance audit reports
- Conformance to construction records drawings
- Procurement specifications (contract issue and change orders)
- Purchase orders and change orders
- Project correspondence
- Any other records as required by LORS

During construction, field QC activities would be performed during the last four stages of the project: receipt inspection, construction/installation, system/component testing, and plant operations. The construction contractor would be contractually responsible for performing the work in accordance with the quality requirements specified by contract.

The subcontractors' quality compliance would be surveyed through inspections, audits, and administration of independent testing contracts and ultimately verified by the CEC's Delegate Contract Building Official.

A plant operation and maintenance program, typical of a project this size, would be implemented at the Willow Rock site to control operation and maintenance quality. A specific program for this project would be defined and implemented prior to initial plant startup.

3.8 Facility Closure

Closure of the facility can be temporary or permanent. Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance, with an intent to restart in the future. Permanent closure is defined as a cessation in operations with no intent to restart operations. For more information, see **Section 9**, **Compliance Condition and Compliance Monitoring Plan**.

3.8.1 Temporary Closure

For a temporary closure where there is no release of hazardous materials, the applicant would maintain security of the WRESC facilities and would notify the CEC and other responsible agencies as required by law. If the temporary closure includes damage to the Willow Rock facilities, and if there is a release or threatened release of regulated substances or other hazardous materials into the environment, procedures would be followed as set forth in an Emergency Management Plan in accordance with a Hazardous Materials Plan. Procedures would include methods to control releases, notification of applicable authorities and the public, emergency response, and training for facility personnel in responding to and controlling releases of hazardous materials. Once the immediate problem is solved and the regulated substance/hazardous material release is contained and cleaned up, temporary closure would proceed as described above for a closure where there is no release of hazardous materials.

3.8.2 Permanent Closure

When the facility is permanently closed, the closure procedure would follow a decommissioning plan that would be developed as described below.

To ensure that public health and safety and the environment are protected during decommissioning, a decommissioning plan would be submitted to the CEC for approval prior to decommissioning. The plan would discuss the following:

- Proposed decommissioning activities for Willow Rock and all appurtenant facilities constructed as part of Willow Rock
- Conformance of the proposed decommissioning activities to all applicable LORS and local/regional plans
- Associated costs of the proposed decommissioning and the source of funds to pay for the decommissioning

In general, the decommissioning plan for Willow Rock would attempt to maximize the recycling or re-use of all facility components. It is anticipated that the potential cavern rock architectural berm would remain in place to minimize environmental impacts associated with its removal. It would be decommissioned such that no ongoing maintenance is needed for flood control. All nonhazardous wastes would be collected and disposed of in appropriate landfills or waste collection facilities. All hazardous wastes would be disposed of according to all applicable LORS.

3.9 References

ESHD 2024i – Ellison Schneider Harris & Donlan LLP (TN 254806). Willow Rock Energy Storage Center SAFC, Volume 1, Part A, dated March 1, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

ESHD 2024o – Ellison Schneider Harris & Donlan LLP (TN 254812). Willow Rock Energy Storage Center SAFC Volume II-Appendix 1A-51F, dated March 4, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

WSP 2025g – Williams Sale Partnership (TN 261563). Willow Rock Updated SAFC Project Description - Section 2 Redline, dated February 5, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

WSP 2025h – Williams Sale Partnership (TN 261564). Willow Rock Updated SAFC Introduction - Section 1 Redline, dated February 5, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

Section 4

Engineering Evaluation

The purpose of this analysis is to ensure that the project would be built to applicable engineering codes, ensure public health and safety, and verify that applicable engineering LORS have been identified. This analysis also evaluates the applicant's proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification that would monitor and ensure compliance with engineering LORS and any other special design requirements. These conditions allow both the California Energy Commission (Energy Commission) compliance project manager (CPM) and the applicant to adopt a compliance monitoring program that will verify compliance with these LORS.

4.2 Facility Reliability

Kenneth Salyphone

4.2.1 Setting

Existing Conditions

The proposed Willow Rock Energy Storage Center (WRESC or project) would include four trains of compressors and air-powered turbine generators with a net generating capacity of up to 500 megawatts (MW) for up to 8 hours (4,000 MWh). The project would also include an air storage cavern excavated from granite rock. In addition, three 2.5-MW diesel fuel-fired generators (genset) would be utilized for emergency backup generation and one 343-kilowatt genset for the fire pump.

Regulatory

This section addresses Public Resources Code section 25520 which requires that applications for certification contain facility reliability information and Public Resources Code section 25523(h) which requires the written decision to contain a discussion on the electricity reliability benefits of the project. These two sections are made applicable to the evaluation of the project through Public Resources Code sections 25545.2 and 25545.8. See **Section 4.3, Transmission System Engineering,** for discussion regarding the project's impacts and benefits on the reliability of the electricity network the project would serve.

4.2.2 Impacts

The project must be built in accordance with industry standards for reliable power generation. Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs and must achieve an availability factor similar to the existing power plant facilities in the California electricity grid system. To achieve this, this reliability analysis, of the project's power plant (electrical generating) systems, encompasses the following benchmarks and ensures that the project would not degrade the overall reliability of the electric system it serves.

- equipment availability;
- plant maintainability and maintenance program; and
- power plant reliability in relation to natural hazards.

Staff uses the above benchmarks as appropriate industry norms to evaluate the project's reliability and determine if its availability factor is achievable.

Equipment Availability

Equipment availability would be ensured by adoption of appropriate quality assurance/ quality control (QA/QC) programs during the design, procurement, construction, and

operation of the plant and by providing for adequate maintenance and repair of project equipment and systems. An operation and maintenance protocol would be implemented in accordance with the maintenance requirements prescribed by the project's equipment manufacturers.

Emergency Backup Generator

A power generating facility must be capable of receiving ancillary power during electrical outages. The project would include four diesel-fired backup gensets to support the operation and maintenance buildings and critical auxiliary loads when power from the electrical grid is unavailable. These gensets include three 2.5-MW Kohler KD2500-4 gensets and a 343-kW Cummins CFP15EVS-F10 genset.

Plant Maintainability and Maintenance Program

Equipment manufacturers provide maintenance recommendations for their products, and power plant owners develop their plant's maintenance program based on those recommendations. Such a program encompasses both preventive and predictive maintenance techniques. The project would develop its maintenance program in the same way. Moreover, the project would implement a Process Control System (PCS) to monitor and control the facility (ESHD 2024i). This system would ensure the project's operational performance, efficiency and reliability.

Facility Reliability in Relation to Natural Hazards

Natural forces can threaten the reliable operation of a power plant. Seismic shaking (earthquakes) could present credible threats to the project's reliable operation.

Seismic Shaking

Seismic events affect many regions in California, including the project site. The American Society of Civil Engineers' (ASCE) Hazard Tool identifies Kern County as being seismic design category D. Under this category, buildings and structures would experience severe and destructive ground shaking. The project site would be located approximately 15 miles southeast of the Garlock Fault and approximately 20 miles northeast of the San Andreas Fault; see **Section 5.6, Geology, Paleontology, and Minerals,** in the forthcoming complete PSA. The faults are considered active; however, the possibility of surface rupture at the project site is considered less-than-significant because no known active or potentially active faults intersect the project site (CDOC 2015; USGS 2017).

A geotechnical evaluation of the cavern found that the bedrock is expected to be seismically stable (ESHD 2024i). Literature evaluating the seismic stability of caverns supports the conclusion that deep underground openings are seismically stable, if the rupturing fault does not intersect the opening; see **Section 5.6, Geology, Paleontology, and Minerals,** in the forthcoming complete PSA. The cavern and air and water shafts would be constructed following implementation of civil and structural

design criteria provided in AFC Appendix 2A (ESHD 2024o) and **Section 4.1, Facility Design**, in the forthcoming complete PSA, conditions of certification.

The project would be designed and constructed to meet the latest applicable engineering codes. Compliance with the latest seismic design requirements represents an upgrade in performance during seismic shaking, compared to older facilities, since these requirements have been continually upgraded and made more stringent. Because the project would be built to the latest seismic design requirements, it would be expected to perform better than the older existing power plants in California's electricity grid system and withstand strong ground shaking.

CEC staff proposes conditions of certification (COCs) to ensure the project complies with these requirements; see COCs in **Section 4.1, Facility Design** (to be released in the forthcoming complete PSA). These COCs would include standard engineering design requirements for mitigation of strong seismic shaking, liquefaction, and potential excessive settlement due to dynamic compaction. CEC staff anticipates the COCs in **Section 4.1, Facility Design**, in the forthcoming complete PSA, would adequately mitigate potentially significant impacts associated with the project's functional reliability due to seismic shaking.

Landslides and Seiches

Landslides would not affect the project site. The topography of the project site and its surroundings are relatively flat. The project site is not located near a body of water and would not be affected by seiches. Therefore, landslides and seiches would have no impact on the project site.

Floodplains

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 would be considered during the design of project facilities, including the site grading and drainage plans. However, no other development is expected within the floodplain area. Should the final design contain elements that encroach on the floodplain, a floodplain permit would be obtained from Kern County to mitigate potential impacts. The floodplain permit application would include any necessary supporting studies (ESHD 2024i).

Subsidence

The project is located in an area that has experienced land subsidence (a gradual lowering of surface elevation). Subsidence results, primarily, from over-pumping ground water. Subsidence monitoring would be managed by the Department of Water Resource

approved Groundwater Sustainability Agencies (GSA). Subsidence monitoring would be conducted continuously, bi-annually, and annually.

CEC staff has proposed COCs to ensure the project complies with Fresno County's Mult-Jurisdiction Hazard Plan for subsidence. See **Section 5.16, Water Resources,** in the forthcoming complete PSA for further discussion. Therefore, subsidence would have a less than significant impact on reliability.

Comparison with Existing Facilities

The equivalent availability factor (availability factor) of WRESC is considered the amount of time the plant is able to store and produce electricity annually, minus the time period for which planned and unplanned outages would occur. The project's expected availability factor would be 95 percent. This availability factor is higher than most other existing power plant facilities. According to the North American Electric Reliability Corporation (NERC), the average availability factor for all fossil-fueled, hydroelectric, pump storage, geothermal, and nuclear-fueled power plants in North America in 2022 was approximately 80 percent (NERC 2022).

4.2.3 Applicable LORS and Project Conformance

No federal, state, or local regulations related to facility reliability apply to the project.

4.2.4 Conclusions and Recommendations

Staff concludes that the project would be built to operate in a manner consistent with industry norms for reliable operation and would be expected to demonstrate a high availability factor. No conditions of certification are proposed for power plant reliability.

4.2.5 Proposed Conditions of Certification

There are no proposed conditions of certification for facility reliability.

4.2.6 References

CDOC 2015 – California Department of Conservation. California Geological Survey (CGS). Fault Activity Map of California. 2015. Accessed on: December 26, 2024. Accessed online at: https://maps.conservation.ca.gov/cgs/fam

ESHD 2024i – Ellison Schneider Harris & Donlan LLP (TN 254806). Willow Rock Energy Storage Center SAFC, Volume 1, Part A, dated March 1, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

ESHD 2024o – Ellison Schneider Harris & Donlan LLP (TN 254812). Willow Rock Energy Storage Center SAFC Volume II-Appendix 1A-51F, dated March 4, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

USGS 2017 – United States Geological Survey. Quaternary fault and fold database for the United States. In cooperation with California Department of Conservation (CDOC), California Geological Survey (CGS). Accessed December 18, 2024. Accessed online at: https://www.usgs.gov/natural-hazards/earthquake-hazards/faults.

4.3 Transmission System Engineering

Laiping Ng and Mark Hesters

4.3.1 Setting

The applicant has proposed to interconnect the 520-megawatt (MW) gross (500 MW net output), and 4160 MW-hour (MWh) gross (4000 MWh net) Willow Rock Energy Storage Center (WRESC) to the Southern California Edison's (SCE's) Whirlwind Substation with a proposed commercial operation by approximately February 2030.

The WRESC would be using Hydrostor's advanced compressed air energy storge (A-CAES) technology. The WRESC facility consists of eight electric-motor-driven air compressors configured in four trains, four 130-MW air-powered turbine generators, onsite 230 kV substation, an underground compressed air storage cavern, and miscellaneous aboveground support facilities.

Existing Conditions

The project would be located in unincorporated Kern County, approximately 4 miles north of Rosamond, California. WRESC would be connected to the SCE Whirlwind Substation.

Regulatory

Federal/Regional

- The North American Electric Reliability Council's (NERC) Reliability Standards for the bulk electric transmission systems of North America provide national policies, standards, principles and guides to assure the adequacy and security of the electric transmission system. NERC is the Electric Reliability Organization (ERO) for North America, subject to oversight by the Federal Energy Regulatory Commission (FERC). The NERC planning standards provide for system performance levels for both normal and contingency conditions. With regard to power flow and stability simulations, while these standards are similar to NERC and Western Electricity Coordinating Council (WECC) planning standards, certain aspects of the NERC/WECC standards are either more stringent or more specific than the NERC standards for transmission system contingency performance. The NERC's planning standards apply not only to interconnected system operation but to individual service areas as well (NERC 2024 and ongoing).
- NERC/WECC Planning Standards: The WECC Planning Standards are integrated with the NERC Reliability Standards to provide the system performance standards used to assess the reliability of the interconnected system. The first priority of the standards is the uninterrupted continuity of service and the second priority is the preservation of interconnected operation. Analysis of the WECC system is based to a large degree upon Section I.A of the standards, *NERC and WECC Planning Standards with Table I*

and WECC Disturbance-Performance Table and on Section I.D, *NERC and WECC Standards for Voltage Support and Reactive Power.* These standards require that the results of power flow and stability simulations verify defined performance levels including: allowable variations in thermal loading, voltage and frequency, and the loss of load that could occur on systems during various disturbances (WECC 2014 and ongoing).

State

- California Public Utilities Commission (CPUC) General Order 95 (GO-95*), Rules for Overhead Electric Line Construction,* sets forth uniform requirements for the construction of overhead lines. Compliance with this order ensures both adequate service and the safety of both the public and the people who build, maintain, and operate overhead electric lines.
- CPUC General Order 128 (GO-128), *Rules for Construction of Underground Electric Supply and Communications Systems*, sets forth uniform requirements and minimum standards for underground supply systems to ensure adequate service and the safety of both the public and the people who build, maintain, and operate underground electric lines.
- California Independent System Operator (California ISO) Planning Standards also provide standards and guidelines that assure the adequacy, security and reliability during the planning process of the California ISO's electric transmission facilities. The California ISO Planning Standards incorporate both NERC and WECC Planning Standards. With regard to power flow and stability simulations, the California ISO's Planning Standards are similar to those of the NERC and WECC and to the NERC Planning Standards for transmission system contingency performance. However, the California ISO's standards also provide additional requirements that are not found in the NERC, WECC, or NERC planning standards. The California ISO standards apply to all participating transmission owners that interconnect to both the California ISO-controlled transmission grid and to neighboring grids not operated by the California ISO (California ISO 2023a).
- California ISO and Federal Energy Regulatory Commission (FERC) electric tariffs provide guidelines for the construction of all transmission additions and upgrades (projects) within the California ISO-controlled grid. The California ISO also determines the "need" for the proposed project where it will promote economic efficiency and maintain system reliability. The California ISO also determines the cost responsibility of the proposed project and provides operational review for all facilities that are to be connected to the California ISO grid (California ISO 2024a).

General

- National Electric Safety Code, 2023, provides electrical, mechanical, civil, and structural requirements for overhead electric line construction and operation.

Cumulative

The transmission system engineering analysis focuses on whether a proposed project would meet required codes and standards. At all times, the transmission grid must remain in compliance with reliability standards, whether one project or many projects interconnect. Potential cumulative impacts on the transmission network are identified through the California ISO and utility generator interconnection process. In cases where a significant number of proposed generation projects could affect a particular portion of the transmission grid, the interconnecting utility or the California ISO can study the cluster of projects to identify the most efficient means to interconnect all of them.

4.3.2 Impacts

This analysis evaluates whether the proposed project's interconnection conforms to all LORS required for safe and reliable electric power transmission. Additionally, under CEQA, the Energy Commission (CEC) must conduct an environmental review of the "whole of the action," which may include facilities not licensed by the CEC (Title 14, California Code of Regulations §15378).

For the interconnection of either a proposed generating unit or transmission facility to the grid, the interconnecting utility (SCE in this case) is responsible for ensuring the grid's reliability. To ensure grid reliability, SCE determines the transmission system impacts of the proposed project and any mitigation measures needed to ensure system conformance with utility reliability criteria, NERC planning standards, WECC reliability criteria, and the California ISO reliability criteria for potential impacts to their system. California ISO Queue Cluster 13 Phase I (Phase I Study Report), Phase II Interconnection Study Reports (Phase II Study Report), and Generator Reassessment Report from the California ISO (Reassessment Report) are used to determine the impacts of the proposed project on the transmission grid. CEC staff relies on these studies and any review conducted by the SCE to determine the project's effect on the transmission grid and to identify whether downstream impacts or indirect project impacts would require additional equipment or strategies to bring the transmission network into compliance with applicable reliability standards.

The Interconnection Study Report analyze the grid both with and without the proposed project, under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds through which grid reliability is determined. The studies must analyze the impact of the project for the proposed first year of operation, and are thus based upon a forecast of loads, generation, and transmission. Generation and transmission forecasts are established by an interconnection queue. The studies are focused on thermal overloads, voltage deviations, system stability (excessive oscillations in generators and transmission system, voltage collapse, loss of loads, or cascading outages), and short circuit duties.

The Generator Reassessment Reports evaluate the impacts on Network Upgrades previously identified in earlier interconnection studies due to modifications that have occurred.

If these studies show that the interconnection of the project could cause the grid to be out of compliance with reliability standards, then the study will identify mitigation alternatives or ways in which the grid could be brought into compliance with reliability standards. If the mitigation identified by the California ISO or interconnecting utility includes transmission modifications or additions that require CEQA review, these additions could be considered part of the "whole of the action," in conjunction with the proposed power plant. The CEC must then analyze the environmental impacts of these modifications or additions.

Switchyards and Interconnection Facilities

The WRESC electrical power would be generated using four triple pressure condensing turbine/generator trains with four air-powered turbine generators. Power would be stepped up to 230 kV by generator step-up (13.8/230 kV) transformers rated at 96/128/160 MVA.

The project would include a 230 kV substation and power distribution center and an approximately 19-mile-long, 230 kV single-circuit double-bundle conductor overhead generator tie-line and underground line segments.

The overhead generator tie-line would be supported by 90 feet high steel poles with a span of approximately 600 to 900 feet. The underground segment would cross the Los Angeles Department of Water and Power (LADWP) high voltage transmission corridor and in other locations where transmission corridor is congested with existing facilities. The underground line segment would be constructed with an underground cable which runs through a continuous underground duct bank.

The project substation is shown in Figure 1-1 of the WRESC Supplemental Application for Certification. For each train, low sides of the three winding 13.8-230 kV transformer rated at 96/128/160 MVA would tie into the 13.8 kV buses via a dedicated 4000 Ampere (A) breaker. High side of each train transformer would connect with the high side of the generator 13.8/230 kV step-up transformer rated at 96/128/160 MVA via a common bus. The 13.8 kV generator rated at 152.9 MVA with power factor of 0.85 would be connected to the generator step-up transformer via a disconnect switch and a breaker through a 7000 A, 13.8 kV isolated phase busduct. The same common bus would tie into the substation via each train's motor operated 230 kV disconnect switch and a breaker rated at 2000 A.

A 230 kV generator tie-line would connect to the project's common tubular bus bar where the project's four trains connect to the SCE Whirlwind Substation via approximately 19-mile-long generator tie-line. The Whirlwind Substation would need to install a new 230 kV switchrack position to terminate the new generator tie-line. Power

would be delivered to the SCE transmission system from the Whirlwind Substation (ESHD 2024i: TN 254806, WSP 2024aa: TN 259675).

4.3.2.1 Methodology and Thresholds of Significance

The Phase II Study Report (California ISO 2021b: TN 247171) was performed in November 2021 by California ISO at the project owner's request. The Reassessment Report (California ISO 2022 TN: 256825) was performed in July 2022. The Phase II Study Report identify the transmission system impacts from the proposed WRESC project in SCE's Queue Cluster 13 and determined mitigation measures needed to ensure system conformance with utility reliability criteria, NERC planning standards, WECC reliability criteria, and the California ISO reliability criteria for potential impacts to their system. The interconnection of the generator might impact the utility system and result in incompliance with regulatory reliability requirements. The mitigation measures to ensure this compliance can vary from as little as adjusting the operation of the generator to new transmission lines. The Reassessment Report evaluated the impacts on Network Upgrades previously identified in earlier interconnection studies due to several modifications that have occurred. The Reassessment Report results may drive the need for modifications to scope and/or cost allocation to the generating facility.

Detailed study assumptions are described in the Phase II Interconnection Study Report. The Power Flow study assessed the project's impact on the thermal loading of the transmission lines and equipment. The Transient Stability study and the Post-Transient Voltages Stability study were conducted to determine whether the proposed project would create any instability in the system following certain selected outages. The Short Circuit study was conducted with all the transmission upgrades projects and the Proposed project. The Short Circuit study is to determine if the interconnection could overstress the existing substation facilities.

Thermal and voltage performance of the system was evaluated for base cases under normal (P0), single element outage (P1, P2), and selected multiple element outages (P3-P7).

Normal overloads are those that exceed 100 percent of normal facility rating under Category P0 normal conditions (no contingency). Normal overloads are identified in deliverability assessment and reliability study power flow analyses in accordance with Reliability Standard TPL-001-5. It is required that loading of all transmission system facilities be within their normal ratings under the Category P0 conditions.

Emergency overloads are those that exceed 100 percent of emergency ratings under Category P1 to P7 contingency conditions. Emergency overloads are identified in the deliverability assessment and reliability study power flow analyses in accordance with Reliability Standards TPL-001-5. It is required that loading of all transmission system facilities be within their emergency ratings under the Category P1 to P7 contingency conditions.

All buses within the California ISO Controlled Grid that cannot meet the requirement in Table 4.3-1 will be further investigated. Exceptions to this voltage standard granted by the California ISO will be observed in the Phase II Study (California ISO 2021c: TN 247183).

TABLE 4.3-1 VOLTAGE CRITERIA

(Bus voltages are relative to the nominal bus voltages of the system under study)

Voltage Level*	Normal Conditions** (P0)		Contingency Conditions (P1~P7)		Voltage Deviation***
	V_{min} (P.U.)	V_{max} (P.U.)	V_{min} (P.U.)	V_{min} (P.U.)	P1 and P3
≤ 200 kV	0.95	1.05	0.90	1.1	≤8%
200 – 500 kV	0.95	1.05	0.90	1.1	≤8%
≥ 500 kV	1.0	1.05	0.90	1.1	≤8%

*Real-time operating system voltages in this area range from 520-535 kV for 500 kV systems and 225-240 kV for 220 kV systems.
&&All 500 kV and 220/230 kV buses that cannot meet the requirements specified in Table C.1 based on equipment limitations or operating procedures have filed for exemptions that can be found in Table 2-5 of the California ISO Planning Standards. The general Vmin and Vmax in this table apply to buses that do not have equipment limitations or operating procedures that are specified otherwise.
*** This voltage deviation criterion is for load buses only.

What follows, excerpted from these study reports, constitute the methodology used and identifies thresholds whereby the SCE determines if the proposed project impacts the reliability of their network and if transmission upgrades are required. The study is designed to determine financial responsibility for transmission upgrades required for the mitigation of reliability impacts.

The Queue Cluster 13 Phase II Interconnection Study Report, nine generation projects, including the WRESC, totaling over 2215 MW were seeking interconnection into the Northern area of the SCE transmission system.

The power flow study cases were developed from the California ISO transmission expansion base cases series representing the Year of 2025 load forecast both On-Peak and Off-Peak conditions. The base cases included all California ISO approved transmission projects in the area that are not yet fully constructed and placed into service, earlier queued Serial Group and cluster generation projects with associated Network Upgrades regardless of in-service date and Remedial Action Schemes (RAS).

Due to project schedule delays, California ISO and SCE performed a Generator Reassessment Report to the Cluster 13 Phase II Interconnection Study Report Dated July 29, 2022. The Reassessment did not identify any scope modification related to power flow or deliverability that impact the proposed project (Reassessment report page 5).

The Phase II Interconnection Study consists of two major assessments: Power Flow Reliability Assessment and Deliverability Assessment.

Power Flow Reliability Assessment

The Power Flow Reliability Assessment included both discharging and charging analysis. The discharging analysis included:

- Steady State Power Flow Analyses
- Power Factor Evaluation
- Transient Stability Evaluation
- Post-Transient Stability Analyses
- Short Circuit Duty Analyses

Deliverability Assessment

The Deliverability Assessment consists of On-Peak Deliverability Assessment and Off-Peak Deliverability Assessments to identify network upgrades required for the proposed project. No Delivery Network Upgrades would be required for the WRESC (California ISO 2021b: TN 247171).

4.3.2.2 Direct and Indirect Impacts

A: Reliability Assessment

Discharging Analysis

Steady State Power Flow Study Results

The Steady State analysis showed that the interconnection queue cluster including the proposed project would overload the following transmission facilities:

Thermal Overloads Under Normal Conditions (N-0):

- Whirlwind 500/220 kV No.1 and No.3 and No.4 AA Transformer Bank

Under Single Contingency with Congestion Management Conditions (N-1):

Single Contingency with Congestion Management

- Whirlwind 500/220 kV No.1 AA Transformer Bank under the loss of the Whirlwind 500/220 kV No.3 or No. 4 AA Transformer Bank.
- Whirlwind 500/220 kV No.3 AA Transformer Bank under the loss of the Whirlwind 500/220 kV No.1 or No. 4AA Transformer Bank
- Whirlwind 500/220 kV No.4 AA Transformer Bank under the loss of the Whirlwind 500/220 kV No.1 or No. 3AA Transformer Bank

Under Multiple Contingency with Congestion Management Conditions (N-2):

- Antelope-Vincent No.1 500 kV Transmission Line under loss of Antelope-Vincent No.2 and Vincent-Whirlwind 500 kV Transmission Lines

- Antelope-Vincent No.2 500 kV Transmission Line under loss of Antelope-Vincent No.1 and Vincent-Whirlwind 500 kV Transmission Lines
- Antelope-Whirlwind 500 kV Transmission Line under loss of Whirlwind-Vincent and Whirlwind-Midway 500 kV Transmission Lines
- Mesa-Vincent 500 kV Transmission Line under loss of Lugo-Vincent No.1 and No.2 500 kV Transmission Lines

Required Mitigation

To bring the SCE system into compliance with reliability standards after the interconnection of the project, the following transmission upgrades are required.

a. Participate in the proposed Tehachapi Centralized Remedial Action Schemes (CRAS) to trip generation under the following outages:
    - Under loss of Antelope-Vincent No.2 and Vincent-Whirlwind 500 kV Transmission Lines.
    - Under loss of Antelope-Vincent No.1 and Vincent-Whirlwind 500 kV Transmission Lines.
    - Under loss of Whirlwind-Vincent and Whirlwind-Midway 500 kV Transmission Lines.
b. Participate in the proposed Whirlwind CRAS to trip generation under the following outages:
    - Under the loss of the Whirlwind 500/220 kV No.1 AA Transformer Bank.
    - Under the loss of the Whirlwind 500/220 kV No.3 AA Transformer Bank.
    - Under the loss of the Whirlwind 500/220 kV No.4 AA Transformer Bank.
c. Participate in the proposed New South of Vincent CRAS to trip generation under the following outages:
    - Under the loss of the Lugo-Vincent No.1 and No.2 500 kV Transmission Lines.

Power Factor Evaluation Results

The WRESC would not meet the 0.95 power factor requirement. Additional synchronous generator to provide reactive power would need to be installed to address the reactive power deficiencies.

Transient Stability Results

The Generating Facility Performance and the System Performance analysis indicated that the projects would not cause transmission instabilities.

Post-Transient Stability Results

With all the transmission upgrades, use of the identified RAS/CRAS, and assuming all the proposed projects meet the power factor requirements, the post-transient study are acceptable.

Short Circuit Study Results and Mitigations

Short Circuit studies were conducted to determine the degree to which the addition of the projects in SCE's queue, including the proposed WRESC project, and all necessary transmission upgrades increases fault duties at SCE's substations, adjacent utility substations, and other 230 kV and 500 kV busses within the study area.

The study indicated the WRESC would contribute to overstressing the following circuit breakers. WRESC would be responsible for upgrading these circuit breakers.

- Pardee 220 kV Substation circuit breakers
- Midway Substation 500 kV circuit breakers CB 712, CB 722, CB 822 (California ISO 2022: TN 256825).
- The Vincent 500 kV Substation short circuit duty upgrade would still be needed, however the Vincent 500 kV SCD mitigation was recently identified in SCE's 2021 Annual Transmission Reliability Assessment and as such, conditionally assigned Network upgrade are no longer applicable to WRESC (California ISO 2022: TN 256825).

Charging Analysis:

The Phase II Study Report indicated that there would not be adverse impact to the transmission system with the addition of the proposed project.

B: Deliverability Assessment

No Delivery Network Upgrades would be required for the WRESC (California ISO 2021b: TN 247171).

4.3.2.3 Cumulative Impacts

The Phase II Study Report and the Reassessment Report modeled nine generation projects, including the WRESC, totaling over 2215 MW. Both Reports identified the transmission cumulative impacts to the SCE transmission system.

4.3.3 Applicable LORS and Project Conformance

Table 4.3-1 contains CEC staff's determination of conformance with applicable general, local, state and federal/regional LORS, including any proposed Conditions of Certification (COC) to ensure the project would comply with LORS. As shown in this table, staff concludes that with implementation of specific COCs, the proposed project would be consistent with all applicable LORS. The subsection at the end of this section, "Proposed Conditions of Certification," contains the full text of the referenced COCs.

TABLE 4.3-1 CONFORMANCE WITH APPLICABLE LORS	
Applicable LORS	**Conformance and Basis For Determination**
Federal/Regional	
Federal Energy Regulatory Commission (FERC) /North American Electric Reliability Council (NERC)	**Yes.** The proposed interconnection facilities would comply with Federal/Regional regulations. COCs TSE-5 would require the submittal of any updates to the Large Generator Interconnection Agreement (LGIA) at least 30 days prior to the start of construction of transmission facilities.
NERC/WECC Planning Standards: The Western Electricity Coordinating Council (WECC) Planning Standards	**Yes.** The proposed interconnection facilities would comply with Federal/Regional regulations. COC TSE-5 would require the submittal of any updates to the LGIA at least 30 days prior to the start of construction of transmission facilities.
State	
California Public Utilities Commission (CPUC) General Order 95 (GO-95)	**Yes.** The proposed overhead collector lines and generator tie-line would comply with CPUC GO-95. Compliance with COC TSE-4 requires power plant switchyard, outlet line, and termination compliance with GO-95.
CPUC General Order 128 (GO-128)	**Yes.** The proposed underground collector lines would comply with CPUC GO-128. Compliance with COC TSE-4 requires power plant switchyard, outlet line, and termination compliance with GO-128.
California ISO Planning	**Yes.** The proposed interconnection of the project would comply with California ISO planning standards. Conditions of Certification (COC) TSE-5 would require the submittal of any updates to the LGIA at least 30 days prior to the start of construction of transmission facilities.
General	
National Electric Safety Code 2023 (NESC)	**Yes.** The proposed overhead collector lines, underground collector lines, and generator tie-line would comply with NESC. Compliance with COC TSE-4 requires power plant switchyard, outlet line, and termination compliance with NESC.

4.3.4 Conclusions and Recommendations

As discussed above, with implementation of the proposed TSE COCs, the project would be reliably and safely interconnected to the transmission grid. CEC staff recommends adopting the COCs as detailed in subsection "4.3.5 Proposed Conditions of Certification" below.

4.3.5 Proposed Conditions of Certification

The following proposed COCs include measures to ensure project conformance with applicable LORS and that the WRESC is reliably and safely interconnected to the SCE transmission grid.

TSE-1 The project owner shall furnish to the Compliance Project Manager (CPM) and to the Delegate Chief Building Official (DCBO) a schedule of transmission facility design submittals, a Master Drawing List, a Master Specifications List, and a Major Equipment and Structure List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by CEC staff, the project owner shall provide designated packages to the CPM when requested.

Verification: Prior to the start of construction, the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the DCBO and to the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see a list of major equipment in **Table 1**: Major Equipment List below). Additions and deletions shall be made to the table only with CPM and DCBO approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

TABLE 1 MAJOR EQUIPMENT LIST
Breakers
Step-up transformer
Switchyard
Busses
Surge arrestors
Disconnects
Take-off facilities
Electrical control building
Switchyard control building
Transmission pole/tower
Grounding system

TSE-2 Before the start of construction, the project owner shall assign to the project an electrical engineer and at least one of each of the following:

a. a civil engineer;

b. a geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering;

c. a design engineer who is either a structural engineer or a civil engineer and fully competent and proficient in the design of power plant structures and equipment supports; or

d. a mechanical engineer (Business and Professions Code Sections 6704 et seq. require state registration to practice as either a civil engineer or a structural engineer in California).

The tasks performed by the civil, geotechnical, mechanical, electrical, or design engineers may be divided between two or more engineers as long as each engineer is responsible for a particular segment of the project, e.g., proposed earthwork, civil structures, power plant structures, or equipment support. No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer. The civil, geotechnical, or civil and design engineer, assigned as required by Facility Design COC **GEN-5**, may be responsible for design and review of the TSE facilities.

The project owner shall submit to the DCBO, for review and approval, the names, qualifications, and registration numbers of all engineers assigned to the project. If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned engineer to the DCBO for review and approval. The project owner shall notify the CPM of the DCBO's approval of the new engineer. This engineer shall be authorized to halt earth work and require changes; if site conditions are unsafe or do not conform with the predicted conditions used as the basis for design of earth work or foundations.

The electrical engineer shall:

1. be responsible for the electrical design of the power plant switchyard, outlet, and termination facilities; and
2. sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: Prior to the start of rough grading, the project owner shall submit to the DCBO for review and approval, the names, qualifications, and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify the CPM of the DCBO's approvals of the engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the DCBO for review and approval. The project owner shall notify the CPM of the DCBO's approval of the new engineer within five days of the approval.

TSE-3 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone DCBO design review and approval, the project owner shall document the discrepancy and recommend corrective action. The discrepancy documentation shall become a controlled document and shall be submitted to the DCBO for review and approval and refer to this condition of certification.

Verification: The project owner shall submit a copy of the DCBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days of receipt. If disapproved, the project owner shall advise the CPM, within five days, the reason for the disapproval, along with the revised corrective action required to obtain the DCBO's approval.

TSE-4 For the power plant switchyard, outlet line and termination, the project owner shall not begin any construction until plans for that increment of construction have been approved by the DCBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the DCBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the monthly compliance report:

a. receipt or delay of major electrical equipment;

b. testing or energization of major electrical equipment; and

c. the number of electrical drawings approved, submitted for approval, and still to be submitted.

Verification: Prior to the start of each increment of construction, the project owner shall submit to the DCBO for review and approval the final design plans, specifications and calculations for equipment and systems of the power plant switchyard, and outlet line and termination, including a copy of the signed and stamped statement from the responsible electrical engineer verifying compliance with all applicable LORS, and send the CPM a copy of the transmittal letter in the next monthly compliance report.

TSE-5 The project owner shall ensure that the design, construction, and operation of the proposed transmission facilities will conform to all applicable LORS, and the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations, as determined by the DCBO. Once approved, the project owner shall inform the CPM and DCBO of any anticipated changes to the design and shall submit a detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change to the CPM and DCBO for review and approval.

a. The power plant outlet line shall meet or exceed the electrical, mechanical, civil, and structural requirements of CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the High Voltage Electric Safety Orders, National Electric Code (NEC) and related industry standards.

b. Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.

c. Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner's standards.

d. The project conductors shall be sized to accommodate the full output of the project.

e. Termination facilities shall comply with applicable SCE interconnection standards.

f. The project owner shall provide to the CPM:

   i. The Special Protection System sequencing and timing if applicable,

   ii. A letter stating that the mitigation measures or projects selected by the transmission owners for each reliability criteria violation, for which the project is responsible, are acceptable, if applicable,

   iii. Any updates to the executed LGIA signed by the SCE and the project owner.

   iv. Approval from LADWP indicating that the WRESC generator tie-line underground section can be built in the LADWP transmission corridor and that the construction and operation of the underground generator tie-line will have no adverse impact to LADWP's operation.

Verification: Prior to the start of construction or start of modification of transmission facilities, the project owner shall submit to the DCBO for approval:

a. Design drawings, specifications, and calculations conforming with CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, National Electric Code (NEC) and related industry standards, for the poles/towers, foundations, anchor bolts, conductors, grounding systems, and major switchyard equipment.

b. For each element of the transmission facilities identified above, the submittal package to the DCBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on "worst case conditions"[1] and a statement signed and sealed by the registered engineer in responsible charge, or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, California ISO standards, National Electric Code (NEC), and related industry standards.

c. Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in charge, a route map, and an engineering description of the equipment and configurations covered by requirements COC **TSE-5** a) through f).

d. Generator Special Facilities Agreement shall be provided concurrently to the CPM and DCBO. Substitution of equipment and substation configurations shall be identified and justified by the project owner for DCBO and CPM approval.

e. Any changes or updates to the executed LGIA signed by the SCE and the project owner.

f. Prior to the start of construction of any project modification requiring approval of the SCE, provide the interconnection approval to the CPM. Interconnectional approval for modification of existing facilities can be in the form of an approved Material Modification or approval of the proposed changes to project and the existing interconnection facilities. Within 15 days after cessation of construction the project owner shall provide a statement to the CPM from the registered engineer in responsible charge (signed and sealed) that the switchyard and transmission facilities conform to the above listed requirements.

g. A signed letter from LADWP indicated that the construction of the underground WRESC generator tie-line in the LADWP transmission corridor is acceptable.

TSE-6 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM and DCBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC, Title 8, CCR, Articles 35, 36 and 37 of the, "High Voltage Electric Safety Orders", applicable interconnection standards, NEC and related industry standards. In case of non-conformance, the project owner shall inform the CPM and DCBO in writing, within 10 days of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM and DCBO:

a. "As built" engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders", and applicable interconnection standards, NEC, related industry standards.

b. An "as built" engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. "As built" drawings of the electrical, mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the "Compliance Monitoring Plan".

4.3.6 References

California ISO 2023a - California ISO Grid Planning Standards, February 2, 2023, ongoing.

California ISO 2024a - California ISO, Fifth Replacement FERC Electric Tariff, January 1, 2024, ongoing.

California ISO 2021a – California ISO (TN 247170). Queue Cluster 13 Phase II – Attachment 1, filed on October 13, 2022. *Confidential Report on File.*

California ISO 2021b – California ISO (TN 247171). Appendix A-Q1782 Queue Cluster 13 Phase II, filed on October 13, 2022. *Confidential Report on File.*

California ISO 2021c – California ISO (TN 247183). Queue Cluster 13 Phase II Interconnection Study Report, SCE Northern Area Report, filed on October 13, 2022. *Confidential Report on File.*

California ISO 2022 – California ISO (TN 256825). 2022 Generator Reassessment Report for Q1782 Gem Energy Storage, filed on May 2, 2024. *Confidential Report on File.*

California Public Utilities Commission (CPUC) General Order 95 (GO-95), Rules for Overhead Electric Line Construction, revised January 15, 2020, ongoing.

California Public Utilities Commission (CPUC) General Order 128 (GO-128), Rules for Construction of Underground Electric Supply and Communications Systems, revised January 2006, ongoing.

ESHD 2024i – Ellison Schneider Harris & Donlan LLP (TN 254806). Willow Rock Energy Storage Center SAFC, Volume 1, Part A, dated March 1, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

NERC (North American Electric Reliability Council) 2024 Reliability Standards for the Bulk Electric Systems of North America, Updated January 1, 2024 and ongoing.

WECC (Western Electricity Coordinating Council) ongoing, WECC Regional Reliability Standards, ongoing.

WSP 2024aa – Williams Sale Partnership (TN 259675). Willow Rock Data Request Set 3 Response, dated October 23, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

WSP 2024cc – Williams Sale Partnership (TN 260808). Willow Rock Data Request Set 5 Response, dated December 23, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

4.3.7 Definition of Terms

ACSR	Aluminum conductor steel-reinforced
Ampacity	Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is

nonexistent or deemed acceptable based on economic, safety, and reliability considerations

Ampere — The unit of current flowing in a conductor

Bus — Conductors that serve as a common connection for two or more circuits

Conductor — The part of the transmission line (the wire) that carries the current.

Congestion Management

A scheduling protocol that ensures dispatched generation and transmission loading (imports) will not violate criteria

Double Contingency

Also known as emergency or N-2 condition, occurs when a forced outage of two system elements occurs -- usually (but not exclusively) caused by one single event. Examples of an N-2 contingency include loss of two transmission circuits on single tower line or loss of two elements connected by a common circuit breaker due to the failure of that common breaker

Emergency Overload

See Single Contingency condition. This is also called an N-1.

Kcmil or KCM

Thousand circular mil. A unit of the conductor's cross sectional area; when divided by 1,273, the area in square inches is obtained.

Kilovolt (kV)

A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground

Loop — An electrical cul de sac. A transmission configuration that interrupts an existing circuit, diverts it to another connection, and returns it back to the interrupted circuit, thus forming a loop or cul de sac

Megavar — One megavolt ampere reactive

Megavars — Mega-volt-ampere-reactive. One million volt-ampere-reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system

Megavolt Ampere (MVA)

A unit of apparent power, equals the product of the line voltage in kilovolts, current in amperes, the square root of 3, divided by 1,000

Megawatt (MW)

A unit of power equivalent to 1,341 horsepower

N-0 Condition

See Normal Operation/Normal Overload, below

Normal Operation/ Normal Overload (N-0)

When all customers receive the power they are entitled to without interruption and at steady voltage, and no element of the transmission system is loaded beyond its continuous rating

N-1 Condition

See Single Contingency, below

N-2 Condition

See Double Contingency, above

Outlet Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities with the main grid

Power Flow Analysis

A power flow analysis is a forward-looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers, and other equipment and system voltage levels

Reactive Power

Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system

Remedial Action Scheme

A remedial action scheme is an automatic control provision that, as one example, will trip a selected generating unit when a circuit overloads

Single Contingency

Also known as emergency or N-1 condition, occurs when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service

Special Protection Scheme/System

Detects a transmission outage (either a single or credible multiple contingency) or an overloaded transmission facility and then trips or runs back generation output to avoid potential overloaded facilities or other criteria violations

Switchyard

A power plant switchyard is an integral part of a power plant that is used as an outlet for one or more electric generators

Thermal Rating See ampacity

TSE Transmission System Engineering

Section 5

Environmental Impact Assessment

Under the California Environmental Quality Act (CEQA), the environmental setting of a project is generally the physical environmental conditions in the vicinity of the project as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced (CEQA Guidelines, § 15125(a)(1)). The environmental setting described in an EIR by the lead agency will normally constitute the baseline physical conditions by which the lead agency determines whether an impact is significant (CEQA Guidelines, § 15125(a)).

5.5 Efficiency and Energy Resources

Kenneth Salyphone

5.5.1 Environmental Setting

Existing Conditions

The project site is currently proposed on undeveloped land in an area zoned Exclusive Agriculture (A-1) District. The area surrounding the project boundary is largely undeveloped with very sparse residential development; the nearest residence is approximately 0.8 miles northwest of the northwest corner of the project site.

Regulatory

Federal

There are no applicable federal laws, ordinances, regulations, and standards (LORS) that govern the efficiency of the utilization of compressed air energy storage facilities.

State

California 2022 Energy Efficiency Standards for Residential and Nonresidential Buildings—Green Building Standards Code, California Code of Regulations, Title 24. The California Green Building Standards Code (California Code of Regulations, Title 24, Part 11) applies to the planning, design, operation, construction, use, and occupancy of newly constructed power plants and their ancillary facilities and requires the installation of energy efficient indoor infrastructure.

Senate Bill 100—The 100 Percent Clean Energy Act of 2018. Senate Bill (SB) 100 (Chapter 312, Statutes of 2018) requires that retail sellers and local publicly owned electric utilities procure a minimum quantity of electricity products from eligible renewable energy resources so that the total kilowatt-hours of those products sold to their retail end-use customers achieve 44 percent of retail sales by December 31, 2024, 52 percent by December 31, 2027, and 60 percent by December 31, 2030. The bill also requires the Public Utilities Commission, California Energy Commission, and State Air Resources Board to utilize programs authorized under existing statutes to meet the state policy goal of 100 percent of total retail sales of electricity in California provided by eligible renewable energy resources and zero-carbon resources by December 31, 2045 (Pub. Util. Code, § 454.53).

Local

Kern County General Plan—Energy Element. The Energy Element defines energy related goals, policies, and measures to protect Kern County's energy resources and encourage development. It principally includes the following:

- The processing of all discretionary energy project proposals shall comply with California Environmental Quality Act (CEQA) Guidelines directing that the environmental effects of a project must be taken into account as part of project consideration.

Cumulative

Section 15130 of the California Environmental Quality Act (CEQA) Guidelines (Cal. Code Regs., tit. 14) requires a discussion of cumulative environmental impacts. Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts. The CEQA Guidelines require that the discussion reflect the severity of the impacts and the likelihood of their occurrence but need not provide as much detail as the discussion of the impacts attributable to the project alone.

Pursuant to CEQA, a cumulative impacts analysis can be performed by either 1) summarizing growth projections in an adopted general plan or in a prior certified environmental document, or 2) compiling a list of past, present, and probable future projects producing related or cumulative impacts. The second method has been utilized for the purposes of this PSA.

5.5.2 Environmental Impacts

EFFICIENCY AND ENERGY RESOURCES Would the project:	**Significant and Unavoidable Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

Environmental checklist established by Cal. Code Regs., tit. 14, Div. 6, Ch. 3, Appendix G, energy

5.5.2.1 Methodology and Thresholds of Significance

Methodology

In addition to the above environmental checklist, staff used the following methodology and thresholds of significance to evaluate the project.

The methodology consists of comparing the energy that would be consumed by the proposed project with the available energy resources.

Thresholds of Significance

There is no specific threshold of significance. However, the project would have a significant impact if its construction and operation significantly impact the available energy resources.

5.5.2.2 Direct and Indirect Impacts

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

Construction

Less Than Significant Impact. Construction of the project would take approximately 60 months to complete. Construction activities would include, grading, reservoir excavation, shaft drilling, cavern construction, and cleanup (ESHD 2024I). Throughout these construction activities, various equipment, such as bulldozers, excavators, cranes, and trucks would consume nonrenewable energy resources, primarily fossil fuels such as gasoline and diesel. It is anticipated that fossil fuels used by the equipment during construction would be used efficiently and would not result in significant long-term depletion of these energy resources or permanently increase the project's reliance on them.

The project would restrict idling of compression engines (ESHD 2024I). The project would also implement construction waste management methods, such as recycling and waste characterization, to reduce the amount of construction waste going to the landfill (ESHD 2024I).

Therefore, construction would create a less than significant impact on local and regional energy supplies and a less than significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources.

Operation

Less Than Significant Impact. The proposed Willow Rock Energy Storage Center (WRESC or project) would generate electricity utilizing an advanced compressed air energy storage process and air-powered turbine generators. The project would consist of four power trains. Each train includes an electric motor-driven air compressor and air-powered turbine generator, in addition, the project would include a heat exchanger (to transfer thermal energy) and ancillary equipment. Moreover, the trains share six thermal storage tanks and an air storage cavern (excavated from granite). Air is an abundant resource that cannot be depleted.

The project would utilize the electrical grid, during off-peak hours, to power the air compressors which would compress and inject air into the storage caverns. When the project is dispatched to provide electricity to the electrical grid, air would be discharged

from the cavern and heated by the stored thermal energy within the heat exchanger before entering the turbine expander to generate electricity. The net generating capacity of the project, from all four trains, would be approximately 500 megawatts (MW) for a maximum duration of eight hours, or a maximum of 4,000 megawatt-hours (MWh).

The project would utilize three 2.5-MW diesel fuel-fired generators (genset) for emergency backup generation and one 343-kilowatt genset for the fire pump.

The project has two modes of operation: 1.) Charge mode, which consists of compressing air energy and storing it, and 2.) Discharge mode, which consists of utilizing the compressed air to power the turbine generators.

Charge mode would require electricity from the electrical grid to power the four compression trains. The project would operate for up to 13.5 hours per day (4,960 hours per year maximum) during charge mode.

The project would operate in discharge mode when the electrical grid requires additional load demand support. This mode of operation requires compressed air, stored in the caverns, to be discharged to four trains of air-powered turbine generators. The turbine generators could provide the electrical grid with up to 500 MW of electricity for up to eight hours per day (2,976 hours per year).

The project's round-trip efficiency would be approximately 60 percent. The efficiency is the ratio of useful energy output divided by useful energy input. The inefficiency can be attributed to ancillary electrical loads (facility's in-house power demand), heat loss due to heat transfer (heat input into exchangers versus useful heat injected into the turbine), and electrical transmission losses.

In light of the project's projected efficiency rating of 60 percent coupled with the fact that air is an abundant resource that cannot be depleted, WRESC would not result in potentially significant impact due to wasteful, inefficient, or unnecessary consumption of energy resources.

For reliability purposes (i.e., readiness testing and maintenance) the project would include four gensets. The gensets would be expected to operate for no more than 50 hours (each) per year (ESHD 2024I). At this rate, the total quantities of diesel fuel used for the three gensets operating at full load would be approximately 652 barrels per year (bbl/yr).[1] California has a diesel fuel supply of approximately 298,771,000 bbl/yr.[2] The project's use of fuel would constitute a small fraction (less than 0.00022 percent) of

1 Calculated as: (175 gal/hr x 3 generators + 22.5 gal/hr) x 50 hours per year = 27,375 gallons per year = 652 bbl/yr.

2 This is the sum of the annual production of 102,480,000 bbl and available stocks of 196,291,000 bbl obtained from the Energy Commission's Weekly Fuels Watch Report for 2022 (latest annual report available).

available resources, and the state's supply is more than sufficient to meet necessary demand. For these reasons, the project's use of fuel would be less than significant.

Staff concludes that energy consumed by the project would not create significant adverse effects on energy supplies or resources, nor would it consume energy in a wasteful or inefficient manner.

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

Construction

No Impact. The project is committed to energy-efficient construction and would implement measures to reduce energy consumption during construction process. The project would recycle construction and demolition debris in compliance with Assembly Bill 341 and State Bill 1018. See **Section 5.12, Solid Waste Management,** in the forthcoming complete PSA for further discussion. Moreover, the project would also comply with the California Green Building Code.

Operation

Less Than Significant Impact. The project would utilize electricity from the electrical grid during charge mode, to compress and store air. In addition, air-powered turbine generators would provide up to 500 MW of electricity to the electrical grid during discharge mode. The project would deliver and receive electricity though an interconnect with South California Edison's (SCE) Whirlwind substation. SCE is the electricity service provider in Kern County. SCE has committed to meeting California's Renewable Portfolio Standard through its Integrated Resource Plan (SCE 2022). SCE's 2022 Power Content Label's Power Mix includes 33.2 percent Eligible Renewable, which includes 0.1 percent biomass and biowaste, 5.7 percent geothermal, 0.5 percent eligible hydroelectric, 17 percent solar, and 9.8 percent wind (SCE 2022a). The project would increase renewable energy generation capacity in SCE and the State's portfolio. Furthermore, the project would be consistent with SB 100.

The project would comply with the California Green Building Code through conformance with the California Building Standard Codes.

The project's use of diesel for emergency generators would not obstruct or inhibit the state from achieving its energy-related goals. These generators would be limited in use. Furthermore, the project's primary goal is to provide capacity and energy to California's electric markets and subsequently contribute to the state's commitment to establishing an environmentally clean and reliable electrical system.

Through energy-efficient design and increased renewable electricity generation, the project would neither conflict with nor obstruct state or local plans for renewable energy or energy efficiency and, therefore, would have no impact on those plans.

5.5.2.3 Cumulative Impacts

SCE currently has around 3 gigawatts of energy storage capacity, with plans to add another 8.1 gigawatts to enhance grid reliability. The project's projected maximum energy demand would be nearly 992,000 MWh per year (MWh received from the grid minus MWh sent back to the grid). This would constitute a small fraction of SCE's current resource capacity and even smaller fraction of its future capacity. Therefore, the project would have no cumulative energy and energy resource impact with past, present, or probable future projects.

5.5.3 Project Conformance with Applicable LORS

Table 5.5-1 staff's determination of conformance with applicable local and state LORS to ensure the project would comply with LORS. As shown in this table, staff concludes that the proposed project would be consistent with all applicable LORS.

TABLE 5.5-1 CONFORMANCE WITH APPLICABLE LORS

Applicable LORS	Conformance and Basis for Determination
Local	
Kern County	
Kern County General Plan – Energy Element	**Yes**. The project would comply with the County's General Plan through compliance with energy related goals, policies, and measures to protect the energy resources.
State	
Senate Bill 100—The 100 Percent Clean Energy Act of 2018.	**Yes**. The project would comply with SB100 through its energy-efficient design and increasing renewable electricity generation.
California 2022 Energy Efficiency Standards for Residential and Nonresidential Buildings—Green Building Standards Code, California Code of Regulations, Title 24.	**Yes**. The project would comply with the California Green Building Code through conformance with the California Building Standard Codes.

5.5.4 Conclusions and Recommendations

As discussed above, the project would have a less than significant impact related to energy efficiency and energy resources and would conform with applicable LORS.

5.5.5 Proposed Conditions of Certification

There are no proposed conditions of certification for efficiency and energy resources.

5.5.6 References

ESHD 2024h – Ellison Schneider Harris & Donlan LLP (TN 254805). Willow Rock Energy Storage Center SAFC, Volume 1, Part B, dated March 1, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

ESHD 2024i – Ellison Schneider Harris & Donlan LLP (TN 254806). Willow Rock Energy Storage Center SAFC, Volume 1, Part A, dated March 1, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

SCE 2022 – Southern California Edison (SCE). 2022 Integrated Resource Plan. Accesses on: January 3, 2024. Available online at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M498/K072/498072233.PDF

SCE 2022a – Southern California Edison (SCE). 2022 Power Content. Accesses on: November 15, 2024. Available online at: chrome-https://www.energy.ca.gov/filebrowser/download/6072

5.9 Noise and Vibration

Ardalan Raisi Sofi

5.9.1 Environmental Setting

Existing Conditions

The Willow Rock Energy Storage Center (WRESC or project) area consists primarily of exclusive agricultural land use (ESHD 2024h, Section 5.6.3.3.1, and ESHD 2024i). The proposed project would be located on 29 parcels encompassing approximately 169.7 acres (ESHD 2024i, Section 2.0, and Section 5.2.3).

The project is located in the Mojave Desert region of Kern County (ESHD 2024i, Section 5.4.1.1). It lies near the intersection of two major transportation routes, State Route 14 (SR-14) and Sierra Highway (ESHD 2024h, Section 5.7.2.1). The nearest residential receptor, represented by Noise Sensitive Area-1 (NSA-1), is located approximately 4,200 feet to the northwest of the project site (ESHD 2024i, Section 1.2, ESHD 2024h, Section 5.7.2.2). The predominant ambient noise sources are traffic on SR-14 and Sierra Highway (ESHD 2024h, Section 5.7.2.2).

A 25-hour long-term ambient noise monitoring survey was conducted from May 22nd to May 24th, 2023, at Continuous Monitoring Location-6 (CML-6), which is located within the project site (ESHD 2024h, Section 5.7.2.2). Furthermore, a 25-hour long-term ambient noise monitoring survey was conducted from May 24th to May 25th, 2023, at CML-1, which is adjacent to NSA-1. The average ambient sound levels measured at both CML-1 and CML-6 were approximately 56 decibels on the A-weighted scale (dBA) L_{dn}[1] (ESHD 2024h, Section 5.7.2.2).

In addition, short-term noise measurements were conducted at four locations near residential receptors around the project area from May 22nd to May 25th, 2023. The measurements were taken during both daytime and nighttime hours at intervals of 15 minutes each. The short-term noise levels during daytime hours ranged from 43 dBA L_{eq}[2] located west of the project site along 30th Street SW, to 53 dBA L_{eq} located north of the project site along Sopp Road. The short-term noise levels during nighttime hours ranged from 36 dBA L_{eq} located west of the project site along 30th Street SW, to 47 dBA L_{eq} located north of the project site along Sopp Road.

1 L_{dn} is day-night average sound level, which is the 24-hour average sound pressure level calculated with a 10 dBA penalty added to nighttime hours (10 P.M. to 7 A.M.).

2 L_{eq} is a measurement of average energy level intensity of noise over a given period of time.

Regulatory

Federal

Occupational Safety and Health Act (OSHA). The Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations (29 C.F.R. Section 1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed. The regulations further specify a hearing conservation program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

State

Cal-OSHA. Cal-OSHA has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, Sections 5095-5099) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards.

Local

Kern County General Plan Noise Element. The Kern County General Plan Noise Element establishes noise control standards to protect public health, minimize economic impacts, and reduce noise-related annoyance. It identifies sensitive receptors, including residential areas, schools, hospitals, parks, and churches, and outlines specific performance standards for new developments. The General Plan limits outdoor noise levels in sensitive areas to 65 dBA L_{dn}. Furthermore, the Noise Element emphasizes compatibility between new developments and existing noise levels, particularly in areas near significant noise sources such as airports, highways, and railroads. It also encourages the use of sound barriers and acoustical insulation to maintain these standards (Kern County 2009).

The General Plan also includes several policies that aim to protect residential and other noise-sensitive uses from exposure to harmful or annoying noise levels. The following are General Plan policies applicable to the project:

Policy-1: Review discretionary industrial, commercial, or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses.

Policy-2: Require noise level criteria applied to all categories of land uses to be consistent with the recommendations of the California Division of Occupational Safety and Health (DOSH).

Policy-5: 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 65 dBA L_{dn} or less in outdoor activity areas.

Policy-7: Employ the best available methods of noise control.

Kern County Municipal Code. Chapter 8.36 (Noise Control) of the Kern County Municipal Code regulates noise levels in unincorporated areas by prohibiting certain activities that generate disruptive sounds. Section 8.36.020 of the General Plan prohibits the operation of public address systems (e.g., loudspeakers, amplifiers, or megaphones) that produce loud noises beyond the confines of permanent buildings or on public property in a way that produces "loud and raucous" noise. The ordinance further restricts sound equipment use to specified distances and hours, prohibiting sounds audible beyond 150 feet from the source on public property, beyond 150 feet from the property line on private property, and up to 1,000 feet during permitted short-term events between 8:00 A.M. and midnight (Kern County 2024).

Additionally, Section 8.36.020 of the Municipal Code restricts construction noise near residential areas to specific hours: construction noise that is audible within 150 feet of the site is prohibited between 9:00 P.M. and 6:00 A.M. on weekdays and between 9:00 P.M. and 8:00 A.M. on weekends if the site is within 1,000 feet of an occupied residential dwelling. Exemptions to this restriction may be granted by the development services agency director or a designated representative for a limited time and for good cause. Additionally, emergency work is exempt from this restriction.

Chapter 19.80 (Special Development Standards) of the Kern County Municipal Code includes specific noise control requirements for commercial and industrial developments near residential areas. Section 19.80.030 mandates that non-mobile noise sources from commercial and industrial uses, except those in Heavy Industrial (M-3) districts, located within 500 feet of residential zones, must not exceed an average noise level of 65 dBA during the daytime (7:00 A.M. to 10:00 P.M.) and must not exceed 65 dBA or increase ambient noise levels by 5 dBA or more at night (10:00 P.M. to 7:00 A.M.). In consultation with the Kern County Department of Environmental Health Services, the planning director may authorize deviations and require noise attenuation measures if necessary.

Cumulative

Section 15130 of the CEQA Guidelines (Cal. Code Regs., tit. 14) requires a discussion of cumulative environmental impacts. Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts. The CEQA Guidelines require that the discussion reflect the severity of the impacts and the likelihood of their occurrence but need not provide as much detail as the discussion of the impacts attributable to the project alone.

Pursuant to CEQA, a cumulative impacts analysis can be performed by either 1) summarizing growth projections in an adopted general plan or in a prior certified environmental document, or 2) compiling a list of past, present, and probable future projects producing related or cumulative impacts. The second method has been utilized for the purposes of this staff assessment.

However, WRESC would have no cumulative noise impacts with past, present, or probable future projects, because there are no other projects located within a distance where their noise could combine with that of the WRESC to create a cumulative impact (this distance is typically one mile).

5.9.2 Environmental Impacts

NOISE AND VIBRATION	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b. Would the project result in generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Environmental checklist established by Cal. Code Regs., tit. 14, Div. 6, Ch. 3, Appendix G, noise.

5.9.2.1 Methodology and Thresholds of Significance

The construction and operation of any power plant and large industrial facilities create noise, or undesired sound. The character and loudness of this noise, the times of day or night that it occurs, and the proximity of the facility to sensitive receptors (humans) combine to determine whether the facility would meet applicable noise control laws and ordinances, and whether it would cause significant adverse environmental impacts.

In addition, vibration may be produced as a result of construction practices, such as blasting or pile driving. The ground-borne energy of vibration has the potential to cause structural damage and annoyance to humans.

In addition to the above environmental checklist, staff used the following methodology and thresholds of significance to evaluate the project.

Methodology

The California Environmental Quality Act (CEQA) Guidelines state that a project would normally be considered to have a significant impact if noise levels conflict with adopted

environmental standards or plans (County's noise level threshold), or if noise levels generated by the project would substantially increase existing ambient noise levels at noise-sensitive receivers on a permanent or temporary basis.

Thresholds of Significance

Generally, an increase of 3 dBA is noticeable and an increase of 5 dBA is distinct. Other factors, such as the frequency of occurrence of the noise and time of day/night it occurs, are also commonly considered in determining if such an increase is clearly significant or not.

There are no adopted thresholds for an increase in dBA level to be considered a significant impact for construction activities. Noise due to construction activities are considered to be less than significant if the construction activity is temporary and the use of heavy equipment and noisy activities is limited to daytime hours. However, an increase of 10 dBA or more during the day can be perceived as noisy (triggering a community reaction) and warrant additional measures to address the noise levels. An increase of 10 dBA corresponds to a doubling of loudness or dBA level and is generally considered to be the starting point at which significant noise impacts may occur (triggering a community reaction). It is very difficult to identify the exact level of noise resulting from construction because it fluctuates based on many factors over the course of a week, day, or even hour. It also depends on other factors, such as intervening structures, land topography and land cover. For example, intervening structures block or impede sound waves, and undulating topography and land roughness would play a role in attenuating the propagation of noise waves. Therefore, performance standards (i.e., a complaint and redress process) are ultimately used as a backstop measure to address any impacts that are perceived by the community.

Kern County General Plan Noise Element establishes noise level thresholds and noise limitations for new projects.

In September 2013, the California Department of Transportation (Caltrans) released the Transportation and Construction Vibration Guidance Manual. This manual includes the Federal Transit Administration's (FTA) methods and findings. The Caltrans manual states that for construction activities that generate vibration, the threshold of human response begins at a peak particle velocity (PPV) of 0.16 inch per second (in/sec). This is characterized by Caltrans as a "distinctly perceptible" event with an incident range of transient to continuous (Caltrans 2013). A level of 0.20 in/sec has been found to be annoying to people in buildings and can pose a risk of architectural damage to buildings.

5.9.2.2 Direct and Indirect Impacts

a. Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the

project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction

Less Than Significant Impact with Mitigation Incorporated. The Kern County General Plan does not establish noise level thresholds for construction activities. However, the County's Municipal Code limits construction noise near residential areas to certain hours. Specifically, construction noise that can be heard within 150 feet of the site is prohibited between 9:00 PM and 6:00 AM on weekdays, and between 9:00 PM and 8:00 AM on weekends, if the site is located within 1,000 feet of an occupied residential dwelling (Kern County 2024). The project has proposed that construction activities would occur from 7 A.M. to 9 P.M. on weekdays and 8 A.M. to 9 P.M. on weekends when within 1,000 feet of an occupied residential dwelling (ESHD 2024h, Section 5.7.5.3).

Construction activities for the project would occur in several phases and take approximately 60 months to complete (ESHD 2024i, Section 2.1.20.1). The construction phases include:

- grading
- reservoir excavation
- air and water shafts drilling and excavation
- above ground equipment installation
- cavern construction

For certain tasks, such as cavern work located further from sensitive receptors (more than 5,000 feet), construction may operate up to 24 hours a day as needed for critical activities (limited activities that cannot be interrupted).

Pile driving is anticipated to be used during surface work (ESHD 2024h, Section 5.7.3.2). Moreover, the project would utilize rock blasting to excavate the underground storage cavern. Blasts are scheduled every 10 to 12 hours at a depth of approximately 2,000 ft to minimize impact to surrounding areas (ESHD 2024i, Section 2.1.11). Blasting activities are not continuous and are scheduled to occur twice per day during daytime hours.

Construction activities would likely utilize equipment that could generate noise levels that exceed ambient noise, such as rollers, cranes, telehandlers, front-end loader, hopper, and pile driver hammer. Construction equipment typically produce noise levels between 64 dBA (i.e., conveyor) and 128 dBA (pile driver hammer) at 50 feet.

The loudest construction activities would take place during shafts drilling and excavation, and above ground equipment installation construction phases. The daytime construction noise during these phases would involve various types of heavy machinery,

such as pile drivers and excavators (ESHD 2024h, Section 5.7.3.2). In contrast, nighttime construction noise would be significantly reduced, as only essential equipment would operate to support 24-hour cavern work.

As mentioned above, the nearest residential receptor to the project site, located at NSA-1, is approximately 4,200 feet from the project site, and would be just over a mile from the loudest construction activities. At NSA-1, noise levels during the loudest construction phases, including pile driving but excluding short duration blasting (addressed separately below), would reach 46 dBA (ESHD 2024h, Section 5.7.3.2). The average ambient noise level at NSA-1 is 56 dBA L_{dn}. Therefore, noise generated during the loudest construction phases would be below both the ambient noise level and the County standard for noise sensitive areas.

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. The nighttime construction noise contour shows that construction noise level during nighttime hours at NSA-1 would be 33 dBA, which is substantially lower than the average nighttime ambient sound level of 49 dBA L_{eq} at this location.

Furthermore, each blasting event for underground cavern excavation would last only a few seconds. Typically, rock blasting produces a maximum noise level of 130 dBA. considering this level is produce at the ground surface where the shaft would be installed, the projected noise levels at closest residence 5,400 feet away, NSA-1, is approximately 65 dBA. This is 9 dBA above the ambient noise level of 56 dBA L_{dn} at NSA-1 (ESHD 2024h, Section 5.7.3.2.2.2). The impact would be less than significant because the blasting activities would occur during the day and on an infrequent basis for short durations.

To address additional noise impacts that might be perceived noisy by the surrounding community, staff proposes COCs **NOISE-1** through **NOISE-3**, **NOISE-5**, and **NOISE-6**. These conditions would provide the public with notification of construction, and noise complaint and redress process (**NOISE-1** and **NOISE-2**), would require construction workers and employees noise protection (**NOISE-3** and **NOISE-5**), and would place restrictions on construction activities (**NOISE-6**).

With implementation of COCs **NOISE-1** through **NOISE-3**, **NOISE-5** and **NOISE-6**, project construction activities would not result in generation of a substantial increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies and would not create a significant adverse noise impact.

Operation

Less Than Significant Impact. The proposed project and its linear facilities would consist of aboveground energy storage infrastructure (including air turbines, compressors, transformers, and pump motors), an underground cavern at a depth of approximately 2,000 to 2,500 feet, water supply systems, and administration buildings (ESHD 2024i, Section 2.1.4, and ESHD 2024h, Section 6.1 and 6.2).

The County's General Plan, along with the County Municipal Code establish noise level standards to control noise impact. The General Plan identifies sensitive receptors and limits outdoor noise in sensitive areas to 65 dBA L_{dn}. It also includes policies to promote compatibility between new development and existing noise levels (Kern County 2009).

According to the County's Municipal Code (Chapter 19.80), non-mobile noise sources from commercial and industrial uses within 500 feet of residential zones must not exceed 65 dBA during daytime hours or increase ambient noise by more than 5 dBA at night. However, since the nearest residence is located approximately 5,400 ft away from the project's operational equipment, this noise restriction would not be applicable to the project.

Concurrent operation of all major noise-producing equipment, including low-pressure compressors, transformers, and pump motors, would result in a combined operational noise level of 50 dBA at NSA-1. This is less than the daytime ambient level of 50 dBA L_{eq} and nighttime ambient level of 49 dBA L_{eq} at NSA-1. it would not exceed the daytime ambient noise level and would only exceed the nighttime noise level by 1 dBA (not discernable). The operational noise level of 50 dBA at NSA-1 would also be below the General Plan's threshold.

Furthermore, staff proposes COC **NOISE-4** to ensure the project would not distinctly increase the ambient noise level at NSA-1 and would comply with the county's noise thresholds. **NOISE-4** would ensure measurement and verification that operational noise performance criteria are met at the project's noise sensitive receptors.

With implementation of COC **NOISE-4,** project operations would not result in generation of a substantial increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or municipal code, or applicable standards of other agencies and would not create a significant adverse noise impact.

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

Construction

Less Than Significant Impact. The primary source of vibration during the construction process would be blasting activities. These controlled detonations would be used to excavate the underground cavern required for compressed air storage at depths of

approximately 2,000 feet. This analysis relies on the vibration thresholds identified by Caltrans to determine the significance of vibration impacts related to adverse human reactions. The threshold of human response begins at a PPV of 0.16 in/sec. Caltrans characterizes this as a "distinctly perceptible" event (Caltrans 2013). A level of 0.20 in/sec has been found to be annoying to people in buildings and can pose a risk of architectural damage to buildings.

Jackhammers can cause a groundborne vibration rate of 0.035 in/sec at 25 feet (less than the threshold of human response), and underground blasting can cause a groundborne vibration of 0.4 in/sec at 1,280 feet (Caltrans 2013 and ESHD 2024h, Section 5.7.3.2.2.2). However, vibration rates dissipate rapidly with distance. The closest structures to the blasting site are the Dawn Road/CA-14 overpass, located approximately 2,500 feet away, and NSA-1 (the nearest residence to the project), located approximately 5,400 feet away from blasting activities. The vibration rate generated by blasting drops from 0.4 in/sec to 0.14 in/sec at the overpass 2,500 feet away. This vibration intensity is lower than the threshold of human response, or 0.16 in/sec. Therefore, vibration impacts from blasting are expected to be less than significant.

The controlled detonation activities would be conducted by a mining company using personnel certified by the federal Bureau of Alcohol, Tobacco, and Firearms. Moreover, as required by California Code of Regulations (CCR) Title 8 (344.20), these controlled detonations would be performed by licensed lead construction personnel (ESHD 2024i, Section, 5.5.2.3.4). All activities would comply with federal OSHA regulations, Cal-OSHA, Mine Safety and Health Administration requirements, and any other applicable LORS (ESHD 2024h, Section 5.7.3.2.2.2).

Operation

No Impact. Sources of groundborne vibration associated with project operation would include the air turbine, compressors, transformers, and various motors. These pieces of equipment would be well-balanced, as they are designed to produce very low vibration levels (less than the threshold of human response) throughout the life of a project. In most cases, even when there is an imbalance, they could contribute to ground vibration levels only in the vicinity of the equipment and would be dampened within a short distance. Furthermore, vibration monitoring systems would be installed to ensure the equipment remains balanced (ESHD 2024h, Section 5.7.3.3.4). An imbalance would prompt a system equipment shut down. Therefore, vibration impacts due to project operation would be less than significant.

c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the

project expose people residing or working in the project area to excessive noise levels?

Construction and Operation

No Impact. The nearest airport to the project site is the Rosamond Skypark Airport, located approximately **4** miles southwest of the project site. The airport is too far from the project site to result in exposure of people residing or working in the project area to excessive noise levels.

5.9.2.3 Cumulative Impacts

WRESC would have no cumulative noise impacts with past, present, or probable future projects, because there are no other projects located within a distance where their noise could combine with that of the WRESC to create a cumulative impact (this distance is typically one mile).

5.9.3 Applicable LORS and Project Conformance

Table 5.9-1 staff's determination of conformance with applicable local, state and federal LORS, including any proposed Conditions of Certification, where applicable, to ensure the project would comply with LORS. As shown in this table, staff concludes that with implementation of specific conditions of certification, the proposed project would be consistent with all applicable LORS. The subsection below, "Staff Proposed Conditions of Certification," contains the full text of the referenced conditions of certification.

TABLE 5.9-1 CONFORMANCE WITH APPLICABLE LORS

Applicable LORS	**Conformance and Basis For Determination**
Federal	
Occupational Health and Safety Act (OSHA)	**Yes**. **COCs NOISE-3** and **NOISE-5**
State	
Cal-OSHA	**Yes**. **COCs NOISE-3** and **NOISE-5**
Local	
Kern County General Plan Noise Element	**Yes**. **COC NOISE-1** through **NOISE-6**
Kern County Municipal Code	**Yes**. **COC NOISE-1** through **NOISE-6**

5.9.4 Conclusions and Recommendations

As discussed above, with implementation of conditions of certification, the project would have a less than significant impact related to noise and vibration and would conform with applicable LORS. Staff recommends adopting the conditions of certification as detailed in subsection "5.9.5 Proposed Conditions of Certification" below.

5.9.5 Proposed Conditions of Certification

COC NOISE-1 Prior to the start of ground disturbance, the project owner shall notify residences within one mile of the project site and linear facilities, by mail, or by other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction, and operation of the project. If the telephone is not staffed 24 hours a day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This or a similarly effective telephone number shall be posted at the project site during construction where it is visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

Verification: At least 15 days prior to ground disturbance, the project owner shall transmit to the compliance project manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed, and describing the method of that notification. This communication shall also verify that the telephone number has been established and posted at the site and shall provide that telephone number.

NOISE COMPLAINT PROCESS

COC NOISE-2 Throughout the construction and operation of the project, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints.[3] The project owner or its authorized agent shall:

- use the Noise Complaint Resolution Form (shown below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to the noise complaint;
- attempt to contact the person(s) making the noise complaint within 24 hours;
- conduct an investigation to determine the source of noise in the complaint;
- if the noise is project related, take all feasible measures to reduce the source of the noise; and
- submit the Noise Complaint Resolution Form to the CPM documenting the complaint and actions taken. The form shall include: a complaint summary, including the final results of noise reduction efforts and, if obtainable, a signed statement by the complainant that states that the noise problem has been resolved to the complainant's satisfaction.

3 A project-related noise complaint is a complaint about noise that is caused by the project as opposed to another source and may constitute a violation by the project of any noise condition of certification, which is documented by an individual or entity affected by such noise.

Verification: Within five days of receiving a noise complaint, the project owner shall file with the CPM the Noise Complaint Resolution Form, that documents the resolution of the complaint. If mitigation is required to resolve the complaint, and the complaint is not resolved within three business days, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

EMPLOYEE NOISE CONTROL PROGRAM

COC NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program. The noise control program shall be used to reduce employee exposure to high (above permissible) noise levels during construction in accordance with Title 8, California Code of Regulations, Sections 5095-5099, and Title 29, Code of Federal Regulations, Section 1910.95.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit the noise control program to the CPM for review and approval. The project owner shall make the program available to Cal-OSHA upon request.

OPERATIONAL NOISE RESTRICTIONS

COC NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that noise due to the operation of the project will not exceed 50 dBA L_{eq} at NSA-1.

No new pure-tone components may be introduced. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints.

When the project first achieves a sustained output of 85 percent or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at NSA-1 by someone who represents the project owner and is qualified to conduct noise surveys. This survey during project's operation shall also include measurement of one-third octave band sound pressure levels at the above location to ensure that no new pure-tone noise components have been introduced.

If the results from the noise survey indicate that the power plant noise levels at the affected receptors exceed the above value for any given hour during the survey, mitigation measures shall be implemented to reduce noise to a level of compliance with this limit.

If the results from these noise survey indicate that pure tones are present, mitigation measures shall be implemented to eliminate the pure tones.

Verification: The survey shall take place within 45 days of the project first achieving a sustained output of 85 percent or greater. Within 30 days after completing the survey, the project owner shall submit a summary report of the survey to the CPM. Included in the survey report will be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limits, and a schedule, subject to CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

Within 15 days of completion of the new survey, the project owner shall submit to the CPM a summary report of the new noise survey, performed as described above and showing compliance with this condition.

OCCUPATIONAL NOISE SURVEY

COC NOISE-5 Following the project's attainment of a sustained output that produces the highest noise level, the project owner shall conduct an occupational noise survey to identify any noise hazardous areas within the power plant.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations, Sections 5095-5099 and Title 29, Code of Federal Regulations, Section 1910.95(g)(3). The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures to be employed in order to comply with the above regulations.

Verification: Within 30 days after completing each survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to Cal-OSHA upon request from Cal-OSHA.

CONSTRUCTION NOISE RESTRICTIONS

COC NOISE-6 Heavy equipment operation and noisy[4] construction work relating to any project features, including linear facilities and pile driving within 1,000 feet of an occupied residential dwelling, and blasting shall be restricted to the times delineated below:

Mondays through Fridays:	6:00 A.M. to 9:00 P.M.
Saturdays and Sundays:	8:00 A.M. to 9:00 P.M.

Construction work, pile driving, and blasting shall be performed in a manner that ensures excessive noise (noise that draws a project-related complaint) is prohibited and the potential for noise complaints is reduced as much as

4 "Noisy" means noise that has the potential to cause project-related noise complaints (for the definition of "project-related noise complaint", see the footnote in condition of certification NOISE-2)

practicable. Haul trucks and other engine-powered equipment shall be equipped with adequate mufflers and other state-required noise attenuation devices. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use (jake braking) shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

Willow Rock Energy Storage Center (21-AFC-02)
NOISE COMPLAINT LOG NUMBER _____ Complainant's name and address: Phone number: _____
Date complaint received: _____ Time complaint received: _____
Nature of noise complaint:
Definition of problem after investigation by plant personnel: Date complainant first contacted: _____
Initial noise level at 3 feet from noise source: _____dBA Date: _____ Initial noise level at complainant's property: _____dBA Date: _____ Final noise levels at 3 feet from noise source: _____dBA Date: _____ Final noise level at complainant's property: _____dBA Date: _____
Description of corrective measures taken: Complainant's signature: _____ Date: _____
Date installation completed: _____ Date first letter sent to complainant: _____ (copy attached) Date final letter sent to complainant: _____ (copy attached)
This information is certified to be correct: Plant Manager's Signature: _____

5.9.6 References

Caltrans 2013 – California Department of Transportation (Caltrans). Technical Noise Supplement to the Caltrans Traffic Noise Analysis Protocol, A Guide for Measuring, Modeling, and Abating Highway Operation and Construction Noise Impacts, Division of Environmental Analysis, Environmental Engineering, September 2013. Report No. CT-HWANP-RT-13069.25.3. Accessed on May 19, 2023. Accessed online at: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/traffic-noise-protocol-april-2020-a11y.pdf

ESHD 2024h – Ellison Schneider Harris & Donlan LLP (TN 254805). Willow Rock Energy Storage Center SAFC, Volume 1, Part B, dated March 1, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

ESHD 2024i Ellison Schneider Harris & Donlan LLP (TN 254806). Willow Rock Energy Storage Center SAFC, Volume 1, Part A, dated March 1, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

Kern 2009 – Kern County General Plan. Accessed on: November 21, 2024. Accessed online at: https://psbweb.kerncounty.com/planning/pdfs/kcgp/KCGP_Complete.pdf

Kern 2024 – Kern County Municipal Code. Accessed on: November 21, 2024. Accessed online at: https://library.municode.com/ca/kern_county/codes/code_of_ordinances?nodeId=TIT8HESA_CH8.36NOCO

5.13 Transmission Line Safety and Nuisance

Sudath Edirisuriya

This section describes the environmental and regulatory setting, and discusses impacts associated with the construction and operation of the project and project conformance with applicable laws, ordinances, regulations, and standards (LORS) specific to transmission line safety and nuisance. The project components and their operation that could result in impacts associated with transmission line safety and nuisance and are regulated by applicable LORS include the proposed 230 kilovolt (kV) generator tie-line and the 230 kV project substation.

5.13.1 Environmental Setting

The proposed project would change the environmental setting by adding a 230 kV above-ground generator tie-line (gen-tie) to interconnect the proposed Willow Rock Energy Storage Center (WRESC or project) to the first point of interconnection, at the existing Southern California Edison's Whirlwind Substation. The gen-tie would be approximately 19 miles long, 230 kV single circuit. The WRESC would be a nominal 520-megawatt (MW) and 4,160 megawatt-hour (MWh) energy storage facility, which utilizes advanced compressed air energy storage technology. The WRESC would be owned and operated by the GEM A-CAES LLC's (applicant), along with the associated gen-tie. The project would be on approximately 88.6 acres of private land immediately north of Dawn Road and between State Route 14 and Sierra Highway within unincorporated, southern Kern County, California.

Regulatory

The national, federal, state, and local laws and policies in the next section apply to the control of the field and non-field impacts of electric power lines. Staff's analysis examines the project's compliance with these requirements. There are different versions of the National Electrical Code (NEC) enforced throughout the United States, and this is because the Code does not actually fall under federal law. Instead, it is a "uniform code", a set of guidelines which each state may adopt and apply as they see fit.

National

Institute of Electrical and Electronics Engineers (IEEE). IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. IEEE and its members inspire a global community through its highly cited publications, conferences, technology standards, and professional and educational activities.

American National Standards Institute (ANSI). ANSI is a private, non-profit organization that administers and coordinates the U.S. voluntary standards and conformity assessment system.

National Electrical Safety Code (NESC). NESC is a United States standard of the safe installation, operation, and maintenance of electric power and communication utility systems including power substations, power and communication overhead lines, and power and communication underground lines.

Federal

Code of Federal Regulations (CFR)

Title 47, CFR, section 15.205, Federal Communications Commission (FCC)

Prohibits operation of devices that can interfere with radio- frequency communication.

State

California Public Utilities Commission General Order 52 (GO-52)

Governs the construction and operation of power and communications lines to prevent or mitigate interference.

CPUC, General Order-131-D" Rules for Planning and Construction of Electric Generation, Line, and Substation Facilities in California"

Specifies application and noticing requirements for new line construction including EMF reduction.

CPUC, General Order 95 (GO-95), "Rules for Overhead Electric Line Construction"

Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.

CPUC, General Order 128 (GO-128), "Rules for construction of underground electric supply and communication systems"

The order formulates uniform requirements for underground electric supply and communication line construction in California.

California Code of Regulations

Title 8, California Code of Regulations, section 2700 et seq. "High Voltage Safety Orders"

Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.

Title 14, California Code of Regulations, sections 1250-1258, "Fire Prevention Standards for Electric Utilities"

Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

Cumulative

The project could have cumulative impact associated with Transmission Line Safety and Nuisance (TLSN) if other power-generating facilities are sited adjacent to the WRESC and share the gen-tie line to transmit electricity to the grid.

5.13.2 Environmental Impacts

TRANSMISSION LINE SAFETY AND NUISANCE Would the project's transmission line either physically or electrically (via its electromagnetic field):	**Significant and Unavoidable Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Affect aviation safety?	☐	☐	☒	☐
b. Interfere with radio frequency communication?	☐	☐	☒	☐
c. Be a source of audible noise?	☐	☐	☒	☐
d. Be a fire hazard?	☐	☒	☐	☐
e. Be a source of hazardous shock?	☐	☒	☐	☐
f. Be a source of nuisance shock?	☐	☒	☐	☐
g. Affect public health?	☐	☒	☐	☐

Environmental checklist established by Cal. Code Regs., tit. 20, Div. 2, Ch. 5, Powerplant and Transmission Line Jurisdictional Investigations, Appendix B, Transmission System Safety and Nuisance

Transmission System Components

The project's maximum continuous rating is approximately 520 MW gross output, with an expected net output of approximately 500 MW. WREC is a 4,000 MWh net compressed air energy storage facility. The energy stored at the WRESC will be delivered to SCE's Whirlwind substation. The applicant provided a map showing the entire preferred gen-tie route from the WRESC site to the existing SCE's 230-kV Whirlwind substation. (WRESC SAFC-Volume 1, part A, Chapter 3, Section 3, Page 6-18)

Gen-tie line – The 230-kV, 19 miles long transmission interconnection for the proposed project facility would consist of a single-circuit, double-bundle gen-tie line connection, which would require overhead and underground line segments. The overhead line segment would construct with 90-foot steel transmission poles, spaced approximately 600 to 900 feet apart. The underground line segment would construct with an underground cable which runs through a continuous underground duct bank. Several alternative interconnections are described in the AFC, section 5.6, including two that could potentially interconnect to the future LADWP Rosamond substation (Route 2A and 2B). Two alternatives which have been selected by the applicant requires additional gen-tie line length of approximately 2.5 to 3.5 miles. The gen-tie line, plant substation, and its components would be owned, operated, and maintained by the applicant. (WRESC SAFC-Volume 1, part A, Chapter 3, Figure 3-1a through 3-1c and figure 3-3, Data Request set 1,3, 1B response report)

Compressor unit electrical configuration – The project gross output would be 520 MW with an auxiliary load of 20 MW. The project would generate power by utilizing four air compressor units. Each compressor unit would connect with two, 3.63 kV-13.8 kV, 22.75 MVA three winding transformers that would step up generated voltage to 13.8 kV. Each unit, both transformer high sides are connected to the two separate 13.8 kV, 4000 Ampere bus bars via 1200 breakers. These two separated 13.8 kV buses provide power into its own unit air compressor motors. Each unit possess two separate compressor motors. (WRESC SAFC-Volume 1, part A, Chapter 3, Figure 3-1a through 3-1c and figure 3-2 and 3-3)

Project substation electrical configuration – Each unit, low sides of the three winding 13.8-230 kV, 96/128/160 MVA transformer would tie into 13.8 kV buses via a dedicated 4000 Ampere breaker. High side of each unit transformer would connect with 230 kV bus bar via a motor operated disconnect switch. The same common bus bar would link with project 152.9 MVA, .85 PF, 13.8 kV ,60 HZ project generator via a 230-13.8 kV, 96/128/160MVA transformer, disconnect switch and a breaker through a 7000 A, 13.8 kV isolated phase busduct. The same common bus would tie into outgoing bus of the substation via each unit's, a motor operated disconnect switch and a breaker. Outgoing SCE grid connected 230 kV gen-tie line would connect to the project's common tubular bus bar where project's four units connected. The project substation consists with capacitor banks to provide var support, surge arrestors to mitigate voltage spikes, lighting arrestors to mitigate lighting strike, grounding substation components to dissipate fault current and provide electrical connection for plant auxiliary loads. (WRESC SAFC-Volume 1, part A, Chapter 3, Figure 3-1a through 3-1c and figure 3-2 and 3-3)

Specific gen-tie right-of-away (ROW) requirements depend on the project-selected structure type, height, span, and conductor configuration. The single steel poles for the WRESC lines would range from 90 feet in height, spaced approximately 600 feet to 900 feet apart, with an overall ROW width of 125 feet. The phase conductors will be arranged vertically on three side arms for each circuit, as shown in Figures 3.1-b and 3.1-c. The 19-mile-long gen-tie line overhead line segment would be built with ACSR double bundle 1590 kcmil 54/19 "Falcon" conductors. The conductor's current carrying capacity is approximately 1,359 amperes per conductor. One shield wire with an integrated fiber optic cable will be installed with the new gen-tie line associated with the project. The fiber optic cable will be used for any necessary communications within SCE's transmission system. The underground line segment of the gen-tie constructs with 2000 kcmil parallel single conductor coper shielded cables. The cable's current carrying capacity is approximately 741.6 amperes per cable. (WRESC SAFC-Volume 1, part A, Chapter 3, Figure 3-1a through 3-1c and Figure 3-2 and 3-3, Data Response submitted by the applicant December 13th,2024).

Grounding safety is imperative for site personnel and electrical equipment. The electrical system is protected (protection schemes by utilizing Supervisory Control and Data Acquisition (SCADA)) against ground faults that result in unit ground potential

rises. The station grounding system provides a path to dissipate unsafe ground fault currents and reduces the ground potential rise. The grounding conductor will be sized for sufficient capacity to reduce the most severe fault conditions within allowable limits. The project's onsite substation electrical components, underground duct banks and each pole of the gen-tie line would be grounded according to the National Electrical Safety Code (NESC), California Public Utilities Code (CPUC) G.O. 95, and 128 standards and guidelines.

The CEC staff has concluded that the first point of grid interconnection would be the dead-end structure adjacent to the SCE's Whirlwind substation as proposed by the applicant and therefore staff must analyze the impacts accordingly. For a more detailed discussion regarding the first point of grid interconnection, as well as a discussion of potential environmental impacts associated with transmission facilities necessary for the project, not licensed by the CEC, please see **Section 4.3, Transmission System Engineering**.

5.13.2.1 Methodology and Thresholds of Significance

With the exception of the above environmental checklist, no other methodology or thresholds of significance were used.

5.13.2.2 Direct and Indirect Impacts

a. Would the project's transmission line either physically or electrically (via its electromagnetic field) affect aviation safety?

Less Than Significant Impact. For WRESC, any potential hazard to the area aircraft would potentially cause a collision in the navigable airspace. The requirements in the LORS listed in **Table 5.13.1** establish the standards for assessing the potential for obstruction hazards within the navigable airspace. The requirements also establish the criteria for determining when to notify the Federal Aviation Administration (FAA) about such hazards. For example, FAA notification is required in cases of structures over 200 feet above ground level, or if the structure were to be less than 200 feet in height but within the restricted airspace in the approaches to public or military airports and heliports. Moreover, for airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as an area of space that extends 20,000 feet (3.3 nautical miles) from the runway. For airports with runways of 3,200 feet or less, the restricted airspace is defined as a space that extends 10,000 feet from the runway. For heliports, the restricted space is an area of space that extends 5,000 feet (0.8 nautical miles) from the landing site.

CEC staff has assessed the potential for a civil aviation hazard regarding the height of the proposed project transmission lines. The project transmission system would be 90 feet in height, which is less than the 200-foot height of concern to the FAA. The nearest airport (Meadows Field Municipal Airport) to the project site is 28 miles distant. Therefore, CEC staff concludes that the transmission lines would not pose a significant collision hazard to civil aviation or aircraft. Thus, an FAA "Notice of Proposed

Construction or Alteration" (Form 7460) for an obstruction hazard would not be necessary. (WRESC SAFC-Volume 1, part A, Chapter 3, section 3, Figure 3-1a through 3-1c)

b. Would the project's transmission line either physically or electrically (via its electromagnetic field) interfere with radio-frequency communication?

Less Than Significant Impact. Transmission line-related radio-frequency interference is one of the indirect effects of line operation. It is produced by the physical interactions of line electric fields. More specifically, such interference is due to radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as *corona discharge* but is referred to as *spark gap electric discharge* when it occurs within gaps between the conductor and insulators or metal fittings. Corona from a transmission line may result in radio and television reception interference, audible noise, light, and the production of ozone. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication.

Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration, and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts therefore would be minimized by reducing the line's electric fields and by locating the line away from inhabited areas.

The WRESC transmission lines would be built and maintained according to standard practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345 kV and above, and not for 230 kV lines such as the proposed line of the WRESC. The proposed project's gen-tie line is rated at less than 345 kV (Figure 1.4, chapter 1), therefore CEC staff does not expect any corona-related radio-frequency interference or complaints and does not recommend any related condition of certification (COC).

c. Would the project's transmission line either physically or electrically (via its electromagnetic field) be a source of audible noise?

Less Than Significant Impact. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line's electric field, the potential for perception would be assessed by estimating the field strengths during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345 kV or higher. Audible noise is, therefore, not generally expected at significant levels from lines of less than 345 kV as proposed for the WRESC. Research by the Electric Power

Research Institute (EPRI 1982) has validated this by showing that the fair-weather audible noise from modern transmission lines is generally indistinguishable from background noise at the edge of a ROW of 100 feet or more. A more detailed discussion of the proximity of potentially sensitive receptors is found in **Section 5.9, Noise and Vibration.** Since the proposed line ROW would fall mainly within the boundaries of the WRESC boundary and Edison service area, CEC staff does not expect the proposed line operation to add significantly to current background noise levels in the project area. (WRESC SAFC-Volume 1, part A, Figure 3-1a through 3-1c, Chapter 3, section 3)

The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulations in terms of specific noise limits. Instead, such audible noise is limited through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts online safety, efficiency, maintainability, and reliability. Since these designs are also aimed at minimizing field strengths, CEC staff does not expect the proposed line operation to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed project and related facilities, please refer to staff's analysis in **Section 5.9, Noise and Vibration.**

d. Would the project's transmission line either physically or electrically (via its electromagnetic field) be a fire hazard?

Less Than Significant with Mitigation Incorporated. The fire hazards addressed in **Table 5.13.1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between a line and nearby trees and other combustible objects.

The requirements of the existing Edison fire prevention and suppression program would be implemented for the proposed project line. The applicant would comply with Title 14, California Code of Regulations, Section 1250, Article 4, which establishes fire prevention standards for electric power generation facilities. Also, CPUC GO-95 establishes rules and guidelines for transmission line construction including clearances from other manmade and natural structures, and tree-trimming requirements to mitigate fire hazards. Therefore, the applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Although the new line would be located within the WRESC's gen-tie right away area, condition of certifications **TLSN-1** and **TLSN-2** are recommended to ensure compliance with these program requirements. (WRESC SAFC-Volume 1, part A, Figure 3-1a through 3-1c, Chapter 3, section 3)

e. Would the project's transmission line either physically or electrically (via its electromagnetic field) be a source of hazardous shock?

Less Than Significant with Mitigation Incorporated. Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line,

whether overhead or underground. Such shocks are capable of serious physiological harm or death. Hazard shocks remain a driving force in the design and operation of transmission and other high-voltage lines.

No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry from compliance with the requirements specifying the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

Potentially hazardous shocks could result from electrical faults from the new WRESC equipment of the substation, gen-tie line, or the Edison high-voltage transmission system. The existing Edison 230-kV transmission system is within a secured area under Edison's access control. The Edison substation and plant substation would be fenced to keep individuals from entering the area where they could be exposed to associated hazardous shocks. The new WRESC's 230-kV generation tie line would be designed in accordance with applicable LORS. Implementing the GO-95 and 128 related measures against direct contact with the energized line would serve to minimize the risk of hazardous shocks. Because the lines would be constructed in conformance with the requirements of CPUC GO-95 and Title 8 California Code of Regulations (CCR) 2700, hazardous shocks are highly unlikely to occur because of the project's construction and operation. CEC staff's recommended conditions of certification **TLSN-1** and **TLSN-3** would be adequate to ensure the implementation of the necessary mitigation measures. (WRESC SAFC-Volume 1, part A, Figure 3-1a through 3-1c, Chapter 3, section 3)

f. Would the project's transmission line either physically or electrically (via its electromagnetic field) be a source of nuisance shock?

Less Than Significant with Mitigation incorporated. Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electromagnetic field (EMF).

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding practices and procedures specified in the NESC and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE).

For the proposed project line, the project owner would be responsible in all cases for ensuring compliance with these grounding-related practices within the ROW. Staff recommends condition of certification **TLSN-3** to ensure such grounding for WRESC. (WRESC SAFC-Volume 1, part A, Figure 3-1a through 3-1c, Chapter 3, section 3)

g. Would the project's transmission line either physically or electrically (via its electromagnetic field) affect public health?

Less Than Significant with Mitigation Incorporated. EMF is created whenever electricity flows, and exposure to them together is generally referred to as EMF exposure. There is public concern regarding the possibility of health effects from EMF exposure.

The electrical transmission interconnection and other electrical devices that would be constructed as part of the project emit EMF when in operation. These fields are typically measured near ground level, where they are encountered by people. EMF fields, to the extent they occur, could impact receptors on the properties adjacent to the project site (Appendix 1, Section 3.6.1).

As previously stated, the project electrical substation and other interconnection electrical devices would be mainly within the WRESC site and SCE's transmission system. There are no receptors adjacent to the project site. Site access is restricted and would be limited to station workers, incidental construction and maintenance personnel, other company personnel, regulatory inspectors, and approved guests. Because access would not be available to the public, public exposure to EMF is not expected to occur from WRESC or the transmission facilities to be constructed as part of the project (WRESC SAFC-Volume 1, part A, Figure 3-1a through 3-1c, Chapter 3, section 3)

Industries and Applicant's Approach to Reducing EMF Exposures

The present focus of EMF exposure concern is on the magnetic field. This is because, unlike electric fields, magnetic fields would penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of health concerns. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case.

In comparison to the strong magnetic fields from the more visible high-voltage power lines, CEC staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields from high-voltage lines while using some common household appliances (National Institute of Environmental Health Sciences 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short-term duration, while the exposures from power lines are lower level, but long-term duration. Scientists have not established which of these exposure types would be more biologically meaningful in the individual. CEC staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with WRESC project lines, specific field strength-reducing measures would be incorporated into the proposed line design to ensure the field strength minimization currently required by the CPUC given the concern over EMF exposure and health.

The field reduction measures that could be applied include the following:

1. increasing the distance between the conductors and the ground to an optimal level.
2. reducing the spacing between the conductors to an optimal level.
3. minimizing the current in the line; and
4. arranging current flow to maximize the cancellation effects from interacting of conductor fields.

The field strengths of most significance would be encountered within the boundaries of the proposed WRESC, and an SCE-controlled area. These field intensities would depend on the effectiveness of the applied field-reducing measures. The requirements in condition of certification **TLSN-4** for field strength measurements are intended to assess the applicant's assumed field reduction efficiency. The actual contribution to the area's field exposure levels would be documented for the proposed route from the results of the field strength measurements required in **TLSN-4,** for field strength measurements are intended to assess the applicant's assumed field reduction efficiency.

5.13.2.3 Cumulative Impacts

No Impact. There are no additional generating facilities identified above in the "Environmental Setting" subsection and are not adjacent to WRESC. Additionally, there are no generating facilities share a common gen-tie line with the WRESC to transmit power from the plant to Edison's substation. For these reasons, no adverse impacts are anticipated due to WRESC combined with the other projects.

5.13.3 Project Conformance with Applicable LORS

TABLE 5.13-1 CONFORMANCE WITH APPLICABLE LORS

Applicable LORS	Conformance and Basis for Determination
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR)," Objects Affecting the Navigable Air Space". Describes the criteria for determining the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.	**Yes.** The Project's overhead gen-tie line structures would be 90 feet in height, which is less than the 200-feet height of concern to the FAA.
Title 47, CFR, section 15.205, Federal Communications Commission (FCC). Prohibits the operation of devices that can interfere with radio-frequency communication.	**Yes.** The applicant would not use any equipment that emits restricted frequency bands given under section 15.205 of FCC.
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52). Governs the construction and operation of power and communications lines to prevent or mitigate interference.	**Yes.** The applicant would not construct or operate transmission or communication lines for the prevention or mitigation of inductive interference.

TABLE 5.13-1 CONFORMANCE WITH APPLICABLE LORS

Applicable LORS	Conformance and Basis for Determination
California Public Utilities Commission (CPUC) General Order (GO-95 and GO-128), "Rules for Overhead and Underground Electric Line Construction". Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.	**Yes.** The applicant would construct Gen-tie line structures with a height of less than 90 feet to satisfy the G.O 95 requirement. All gen-tie structures, components of the substation, and switchyard would be constructed according to the G.O. 95 and 128 electrical grounding standards. Underground circuits of the project would utilize the duct banks to minimize the EMF effects. Thereby satisfy the G.O.128 standards. The applicant would utilize the lighting and surge arresters in the substations, switchyard as it is necessary. Thereby dissipating the fault currents and voltages due to lighting and voltage surges.
Title 8, California Code of Regulations (CCR) section 2700 et seq. "High Voltage Safety Orders". Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.	**Yes.** All gen-tie structures, circuits overhead/underground, substations, and switchyard components would be constructed according to "High Voltage Safety Orders".
National Electrical Safety Code (NESC). Specifies grounding procedures to limit nuisance shocks. It also specifies minimum conductor ground clearances.	**Yes.** All Gen-tie structures, components of the substation, and switchyard would be constructed according to the NESC standards and G.O. 95 and 128 grounding standards. Overhead and underground grounding circuits will be designed with proper conductor sizes to dissipate the fault current. The applicant will select proper conductor sizes to satisfy the NESC standards. All the components of the substation or switchyard would be grounded by utilizing the underground grounding grid. The applicant will assess the soil resistivity test for the project's substation, switchyard sites, and transmission line path.
GO-131-D, CPUC "Rules for Planning and Construction of Electric Generation, Line, and Substation Facilities in California" specifies application and noticing requirements for new line construction including EMF reduction.	**Yes.** The project would be built with proper transmission line clearance with the ground and satisfy G.O.95 Transmission paths Right-of-way requirements. Underground circuits would utilize duct banks to minimize the EMF and de-rated ampacity of conductors.

TABLE 5.13-1 CONFORMANCE WITH APPLICABLE LORS	
Applicable LORS	**Conformance and Basis for Determination**
CPUC Decision D.93-11-013. Specifies CPUC requirements for reducing electric and magnetic fields.	**Yes.** The CPUC required the utilities to undertake no-cost EMF mitigation measures and implement low-cost mitigation measures to the extent approved as part of a project's certification process. "Low-cost" was defined to be within the range of 4% of the total project cost but the Commission specified that this 4% benchmark is not an absolute cap.
CPUC Decision D.06-01-042. Re-affirms CPUC EMF Policy in D.93-11-013.	**Yes.** Re-affirms stated above requirement.
Title 14, Cal. Code Regs., sections 1250-1258, "Fire Prevention Standards for Electric Utilities". Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.	**Yes.** The applicant should refer to the Fire Prevention Standards under 1250-1258 (design, construction, and operation phases).
Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations". Specifies the guidelines for grounding-related practices within the ROW and substations.	**Yes.** Having a fence around the substation or switchyard and proper Transmission line clearance would facilitate a safety clearance zone. All the components of the substation or switchyard and fence would be grounded by utilizing the underground grounding grid. Maintain the proper ROW of the transmission paths, and substations to minimize the flashover and EMF effects.
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines. Specifies standard procedures for measuring electric power frequency electric and magnetic fields from an operating electric line.	**Yes.** Having a fence around the substation or switchyard and proper Transmission line clearance would facilitate a safety clearance zone. All the components of the substation or switchyard and fence would be grounded by utilizing the underground grounding grid. Maintain the proper ROW of the transmission paths, and substations to minimize the flashover and EMF effects.

Facility Closure

If the proposed WRESC project were to be closed and decommissioned, and all related structures are removed as described in **Section 3, Project Description**, the minimal electric shocks and fire hazards from the physical presence of this gen-tie line would be eliminated. Decommissioning and removal would also eliminate the transmission lines' field and non-field impacts assessed in this analysis in terms of nuisance shocks, radio-frequency impacts, audible noise, and electric and magnetic field exposure, and aviation safety. Since the lines would be designed and operated according to existing CPUC G.O.95 guidelines, these impacts would be as expected for SCE lines of the same

voltage and current-carrying capacity and therefore, at levels reflecting compliance with existing health and safety LORS.

5.13.4 Conclusions and Recommendations

CEC staff has identified the following conclusions and with the implementation of COCs as detailed in subsection 5.13.5, the project would have a less than significant impact related to TLS&N and would conform with applicable LORS.

- The proposed gen-tie line would lie mainly within the boundaries of the WRESC's gen-tie line ROW and maintained according to the standard procedures of the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) guidelines for line safety and field management. The lines would conform to all applicable laws, ordinances, regulations, and standards.
- Construction and operation of the WRESC's new gen-tie line and onsite substation do not contribute to EMF levels, corona, audible noise, or radio and television interference, beyond the acceptable standards.
- The long-term, mostly residential, magnetic exposure would be insignificant for the proposed gen-tie line given the absence of residences along the proposed route. On-site worker or public exposure would be short-term and at levels expected for SCE lines of similar design and current-carrying capacity.
- The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current utility standards and guidelines.
- With the four proposed COCs, safety and nuisance impacts from construction and operation of the proposed gen-tie line would be less than significant.

5.13.5 Proposed Conditions of Certification

The following proposed COCs include measures to both mitigate environmental impacts and ensure conformance with applicable LORS. The conditions below are enforceable as part of the CEC's certificate for the portions of the projects constituting the site and related facility.

For purposes of the facility certification issued by CEC, the following COCs must be complied with by the applicant on the jurisdictional site and related facilities as delineated in **Section 3, Project Description**.

TLSN-1 The project owner shall construct the proposed 230-kV transmission lines according to the requirements of California PUC's GO- 95, GO-52, GO-131-D, Title 8, and Group 2, High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and SCE's EMF reduction guidelines**.**

Verification: At least 30 days prior to the start of construction of the transmission lines or related structures and facilities, the project owner shall submit to the compliance project manager (CPM) a letter signed by a California licensed and registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall ensure that the route of the proposed transmission lines is kept free of combustible material, as required under the provisions of GO-95 and section 1250 of Title 14 of the California Code of Regulations.

Verification: During the first five years of plant operation, the project owner shall provide a summary of inspection results, and any fire prevention activities carried out along the proposed route and provide such summaries in the Annual Compliance Report on transmission line safety and nuisance-related requirements.

TLSN-3 The project owner shall ensure that all permanent metallic objects within the proposed route are grounded according to industry standards.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

TLSN-4 The project owner shall measure the maximum strengths of the line EMF at the edge of the ROW to validate the estimates the applicant has provided for these fields. These measurements shall be made (a) according to the standard procedures of the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) and (b) before and after energizing. The measurements shall be completed no later than six months after the start of operations.

Verification: The project owner shall file copies of the pre-and post-energizing measurements with the CPM within 60 days after completion of the measurements.

5.13.6 References

CEC 2021b – California Energy Commission (TN 241097). Staff's Data Adequacy Recommendation, dated December 30, 2021. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

CEC 2022d – California Energy Commission (TN 241982). Notice of Receipt of Application for Certification, dated February 28, 2022. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

CEC 2022bb – California Energy Commission (TN 244399). Applicant's Response to CEC Staff's Issues Identification Report and Proposed Schedule, dated August 9, 2022. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

CEC 2024x – California Energy Commission (TN 260789). Report of Conversation_Willow Rock Energy Storage Center_TLSN Information Gathering, dated December 23, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

EPRI 1982 – Electric Power Research Institute 1982. Transmission Line Reference Book: 345 kV and above. Accessed online at: https://www.academia.edu/41079824/EPRI_Transmission_Line_Reference_Book_345_kV_and_above

NIEHS 1998 – National Institute of Environmental Health Sciences (NIEHS). 1998. An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields, Working Group Report. Accessed online at: http://www.niehs.nih.gov/health/assets/docs_a_e/emf1.pdf

NIEHS 2002 – National Institute of Environmental Health Sciences (NIEHS). 2002. Electric and Magnetic Fields Associated with the Use of Electric Power. https://www.niehs.nih.gov/sites/default/files/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf

WHO 2002 – World Health Organization (WHO). 2002, Establishing a Dialogue on Risks from Electromagnetic Fields. Accessed online at: http://www.who.int/peh-emf/publications/EMF_Risk_ALL.pdf

WHO 2024 – World Health Organization (WHO). 2024 Electromagnetic fields (EMF). Accessed online at: https://www.who.int/news-room/questions-and-answers/item/radiation-electromagnetic-fields

Section 9

Compliance Conditions and Compliance Monitoring Plan

9 Compliance Conditions and Compliance Monitoring Plan

Ashley Gutierrez

9.1 Introduction

The Willow Rock Energy Storage Center (WRESC) Compliance COCs (COC's), including a Compliance Monitoring Plan (Compliance Plan), are established as required by Public Resources Code section 25532. The Compliance Plan provides a means for assuring that the facility is constructed, operated, and closed in compliance with public health and safety and environmental law; all other applicable laws, ordinances, regulations, and standards (LORS); and the conditions adopted by the California Energy Commission (CEC) Final Decision (Decision) on the project's Application for Certification (AFC), or otherwise required by law.

The Compliance Plan is composed of elements that:

- set forth the duties and responsibilities of the compliance project manager (CPM), the project owner or operator, delegate agencies, and others;
- set forth the requirements for handling confidential records and maintaining the compliance record;
- state procedures for settling disputes and making post-certification changes;
- state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all Energy Commission-approved COC's;
- establish contingency planning, facility non-operation protocols, and closure requirements; and
- establish a tracking method for the technical area COC's that contain measures required to mitigate potentially adverse project impacts associated with construction, operation, and closure below a level of significance; each technical COC also includes one or more verification provisions that describe the means of assuring that the condition has been satisfied.

9.2 Key Project Event Definitions

The following terms and definitions help determine when various COC's are implemented.

Project Certification

Project certification occurs on the day the CEC dockets its decision after adopting it at a publicly noticed Business Meeting or hearing. At that time, all CEC COC's become binding on the project owner and the proposed facility. Also at that time, the project enters the compliance phase. It retains the same docket number it had during its siting

review, but the letter "C" is added at the end (for example, 19-AFC-8C) to differentiate the compliance phase activities from those of the certification proceeding.

Site Assessment and Pre-Construction Activities

The below-listed site assessment and pre-construction activities may be initiated or completed prior to the start of construction, subject to the CPM's approval of the specific site assessment or pre-construction activities.

Site assessment and pre-construction activities include the following, but only to the extent the activities are minimally disruptive to soil and vegetation and will not affect listed or special-status species or other sensitive resources:

1. the installation of environmental monitoring equipment;
2. a minimally invasive soil or geological investigation;
3. a topographical survey;
4. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility;
5. any minimally invasive work to provide safe access to the site for any of the purposes specified in 1 through 4, above; and
6. removal of small surface structures and equipment that is minimally invasive such as sheds, trailers, and similar sized structures.

Site Mobilization and Construction

When a COC requires the project owner to take an action or obtain CPM approval prior to the start of construction, or within a period of time relative to the start of construction, that action must be taken, or approval must be obtained, prior to any site mobilization or construction activities, as defined below.

Site mobilization and construction activities are those necessary to provide site access for construction mobilization and facility installation, including both temporary and permanent equipment and structures, as determined by the CPM.

Site mobilization and construction activities include, but are not limited to:

1. ground disturbance activities like grading, boring, trenching, leveling, mechanical clearing, grubbing, and scraping;
2. site preparation activities, such as access roads, temporary fencing, trailer and utility installation, construction equipment installation and storage, equipment and supply laydown areas, borrow and fill sites, temporary parking facilities, chemical spraying, and controlled burns; and
3. permanent installation activities for all facility and linear structures, including access roads, fencing, utilities, parking facilities, equipment storage, mitigation and landscaping activities, and other installations, as applicable.

Commissioning

Commissioning activities test the functionality of the installed components and systems to ensure the facility operates safely and reliably. Commissioning provides a multistage, integrated, and disciplined approach to testing, calibrating, and proving all of the project's systems, software, and networks. For compliance monitoring purposes, examples of commissioning activities include interface connection and utility pre-testing, "cold" and "hot" electrical testing, system pressurization and optimization tests, grid synchronization, and combustion turbine "first fire" and tuning.

Start of Commercial Operation

For compliance monitoring purposes, "commercial operation" or "operation" begins once commissioning activities are complete, the certificate of occupancy has been issued, and the power plant has reached reliable steady-state electrical production. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager. Operation activities can include a steady state of electrical production.

Non-Operation and Closure

Non-operation is time limited and can encompass part or all of a facility. Non-operation can be a planned event, usually for equipment maintenance or repair, or unplanned, usually the result of unanticipated events or emergencies.

Closure is a facility shutdown with no intent to restart operation. It may also be the cumulative result of unsuccessful efforts to restart over an increasingly lengthy period of non-operation. Facility closures can occur due to a variety of factors, including, but not limited to, irreparable damage and/or functional or economic obsolescence.

9.3 Roles and Responsibilities

Provided below is a generalized description of the compliance roles and responsibilities for CEC staff (staff) and the project owner for the construction and operation of the Stanton project.

Compliance Project Manager Responsibilities

The CPM's compliance monitoring and project oversight responsibilities include:

1. ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of the Decision;
2. resolving complaints;
3. processing post-certification project amendments for changes to the project design, operation or performance requirements, COC's, ownership or operational control, and requests for extension of the deadline for the start of construction (see COC **COM-10** for instructions on filing a Petition to Amend (PTA) or to extend a construction start date);

4. documenting and tracking compliance filings; and
5. ensuring that the compliance files are maintained and accessible.

The CPM is the central contact person for the CEC during project preconstruction, construction, operation, emergency response, and closure. The CPM will consult with the appropriate responsible parties when handling compliance issues, disputes, complaints, and amendments.

All project compliance submittals are submitted to the CPM for processing. Where a submittal requires CPM approval required by a condition of certification, the approval will involve appropriate CEC staff and management. All submittals must include searchable electronic versions (.pdf, MS Word, or equivalent files).

Pre-Construction and Pre-Operation Compliance Meeting

The CPM usually schedules pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. These meetings are used to assist the CEC and the project owner's technical staff in the status review of all required pre-construction or pre-operation conditions of certification, and facilitate staff taking proper action if outstanding conditions remain. In addition, these meetings shall ensure, to the extent possible, that CEC's conditions of certification do not delay the construction and operation of the plant due to last-minute unforeseen issues, or a compliance oversight. Pre-construction meetings held during the certification process must be publicly noticed unless they are confined to administrative issues and processes.

Energy Commission Record

The CEC maintains the following documents and information as public record, in either the Compliance file or Dockets Unit files, for the life of the project (or other period as specified):

1. all documents demonstrating compliance with any legal requirements relating to the construction, operation, and closure of the facility;
2. all Monthly and Annual Compliance Reports (MCRs, ACRs) and other required periodic compliance reports (PCRs) filed by the project owner;
3. all project-related formal complaints of alleged noncompliance filed with the CEC; and
4. all petitions for project or condition of certification changes and the resulting action by staff or the CEC.

Chief Building Official Delegation and Agency Cooperation

Public Resources Code section 25532 requires the CEC to establish a monitoring system to assure that any facility it certifies is constructed and operated in a manner consistent with law and the CEC's Decision. In carrying out these responsibilities through

monitoring construction and operation of the project, the CEC has the responsibilities of the chief building official (CBO) consistent with Health and Safety Code section 18949.27 and Title 24, part 2, section 104 (commonly referred to as the California Building Code, or CBC). Staff may delegate some CBO responsibility to either an independent third-party contractor or a local building official, as per section 103.3 of part 2 of the CBC. However, staff retains CBO authority when selecting a delegate CBO (DCBO), including the interpretation and enforcement of state and local codes, and the use of discretion, as necessary, in implementing the various codes and standards. (See section 104.1 of part 2 of the CBC).

The DCBO will be responsible for the implementation of all appropriate codes, standards, and CEC requirements. The DCBO will conduct on-site (including linear facilities) reviews and inspections at intervals necessary to fulfill these responsibilities. The project owner will pay all DCBO fees necessary to cover the costs of these reviews and inspections.

Project Owner Responsibilities

Should the project be approved, the project owner is responsible for ensuring that all COCs and applicable LORS in the project Decision are satisfied. The project owner will submit all compliance submittals to the CPM for processing unless the conditions specify another recipient. The Compliance COCs regarding post-certification changes specify measures that the project owner must take when modifying the project's design, operation, or performance requirements, or to transfer ownership or operational control. Failure to comply with any of the COCs or applicable LORS may result in a notice of violation, an administrative fine, certification revocation, or any combination thereof, as appropriate.

9.4 Compliance Enforcement

The CEC's legal authority to enforce the terms and conditions of its Decision are specified in Public Resources Code sections 25534 and 25900. The CEC may amend or revoke a project certification and may impose a civil penalty for any significant failure to comply with the terms or conditions of the Decision. The CEC's actions and fine assessments would take into account the specific circumstances of the incident(s).

Periodic Compliance Reporting

Many of the COC's require submittals in the MCRs and ACRs. All compliance submittals assist the CPM in tracking project activities and monitoring compliance with the terms and conditions of the project Decision. During construction, the project owner or an authorized agent will submit compliance reports on a monthly basis. During operation, compliance reports are submitted annually; though reports regarding compliance with various technical area COC's may be required more often (e.g. Biological Resources), and if the project is operating with a temporary permit to occupy. Further detail regarding the MCR/ACR content and the requirements for an accompanying compliance matrix are described below.

Investigation Requests and Complaint Procedures

Any person may file a Request for Investigation alleging non-compliance with the COCs, CEC regulations, or orders. Such a request shall be filed with and reviewed by the Executive Director. The provisions setting forth the Request for Investigation process can be found in Title 20, California Code of Regulations, sections 1230 through 1232.5. The Request for Investigation may result in the Executive Director bringing a complaint against the alleged violator under section 1233 and seeking administrative penalties. The California Office of Administrative Law provides on-line access to the California Code of Regulations at http://www.oal.ca.gov/.

9.5 Post-Certification Changes to the Energy Commission Decision

The project owner must petition the CEC pursuant to Title 20, California Code of Regulations, section 1769, to amend the Decision in order to modify the design, operation, or performance requirements of the project and/or the linear facilities, or to transfer ownership or operational control of the facility. It is the responsibility of the project owner to contact the CPM to determine if a proposed project change should be considered a project modification pursuant to section 1769, and the CPM will determine whether staff approval will be sufficient, or whether CEC approval will be necessary.

A project owner is required to submit a $5,000 fee for every PTA the license for a previously certified facility, pursuant to Public Resources Code section 25806(e). If the actual amendment processing costs exceed $5,000, the total petition reimbursement fees owed by a project owner will not exceed the maximum filing fee for an AFC, which is $1,068,853, adjusted annually. Current amounts for PTA fees are available at http://www.energy.ca.gov/siting/filing_fees.html. Implementation of a project modification without first securing CEC approval may result in an enforcement action including civil penalties in accordance with Public Resources Code, section 25534.

Below is a summary of the criteria for determining the type of approval process required, reflecting the provisions of Title 20, California Code of Regulations, section 1769, at the time this compliance plan was drafted. If the CEC modifies this regulation, the language in effect at the time of the requested change shall apply. Upon request, the CPM can provide sample formats of these submittals.

Amendment

The project owner shall submit a petition to amend the CEC Decision, pursuant to Title 20, California Code of Regulations, section 1769(a), when proposing modifications to the design, operation, or performance requirements of the project and/or the linear facilities. If a proposed modification results in an added, changed, or deleted COC, the changes causing noncompliance with any applicable LORS, or creates a significant

environmental impact, the petition will be processed as a formal amendment to the Decision and must be approved by the full Commission.

Change of Ownership and/or Operational Control

Change of ownership or operational control also requires that the project owner file a petition pursuant to section 1769 (b). This process requires public notice and approval by the full Commission, but does not require submittal of an amendment processing fee.

Staff-Approved Project Modification

Pursuant to section 1769(a)(3), staff shall approve a project change where staff determines the following:

1. there is no possibility that the change may have a significant effect on the environment, or the change is exempt from the California Environmental Quality Act;
2. the change would not cause the project to fail to comply with any applicable LORS; and
3. the change will not require a change to, or deletion of, a condition of certification adopted by the commission in the final decision or subsequent amendments.

Staff, in consultation with the air pollution control district where the project is located, may approve any change to a condition of certification regarding air quality, provided:

4. that the criteria in subdivisions 1759(a)(3)(A)(i) and (ii) are met; and
5. that no daily, quarterly, annual or other emission limit will be increased as a result of the change.

Once the CPM files a statement summarizing its actions taken pursuant to subdivisions Title 20, CCR section 1769(a)(1), any person may file an objection to a staff action taken pursuant to subdivisions (a)(3)(A) or (B) within 14 days of the filing of staff's statement. Any such objection must make a showing supported by facts that the change does not meet the criteria in this subdivision. Speculation, argument, conjecture, and unsupported conclusions or opinions are not sufficient to support an objection to staff approval.

If there is a valid objection to a staff action, the petition must be processed as a formal amendment to the Decision and must be considered for approval by the full Commission at a publicly noticed Business Meeting.

Staff and Project Owner Jointly Initiated Amendments

Staff and a project owner may jointly initiate an amendment to a final decision adopted pursuant to section 1769.1, provided that the purpose of the proposed amendment is to update the decision to reconcile the COCs with other legal requirements or changes to compliance protocols or methodologies, or to modify a condition that is moot,

impossible, or otherwise unnecessary to avoid potentially significant effects and remain in compliance with all applicable LORS. An amendment jointly initiated by staff and the project owner shall include the information specified in section 1769(a)(1) and be accompanied by a summary of the amendment consistent with the requirements of section 1769(a)(2). The amendment shall be considered by the commission in a manner consistent with the process set forth in section 1769(a)(4). The amendment shall not be approved by the commission unless the agreement of the project owner with the proposed amendment is reflected in the joint proposal presented to the commission for approval.

Verification Change

Pursuant to section 1770(d), a verification may be modified by the CPM, after giving notice to the project owner, if the change does not conflict with any condition of certification.

9.6 Emergency Response Contingency Planning and Incident Reporting

To protect public health and safety and environmental quality, the COC's include contingency planning and incident reporting requirements to ensure compliance with necessary health and safety practices. A well-drafted contingency plan avoids or limits potential hazards and impacts resulting from serious incidents involving personal injury, hazardous spills, flood, fire, explosions or other catastrophic events and ensures a comprehensive timely response. All such incidents must be reported immediately to the CPM and documented. These requirements are designed to protect the public, build from "lessons learned," limit the hazards and impacts, anticipate and prevent recurrence, and provide for the safe and secure shutdown and restart of the facility.

9.7 Facility Closure

The CEC cannot reasonably foresee all potential circumstances in existence when a facility permanently closes. Therefore, the closure conditions provided herein strive for the flexibility to address circumstances that may exist at some future time. Most importantly, facility closure must be consistent with all applicable CEC COCs and the LORS in effect at that time.

Prior to submittal of the facility's Final Closure Plan to the CEC, the project owner and the CPM will hold a meeting to discuss the specific contents of the plan. In the event that significant issues are associated with the plan's approval, the CPM will hold one or more workshops and/or the CEC may hold public hearings as part of its approval procedure.

With the exception of measures to eliminate any immediate threats to public health and safety or to the environment, facility closure activities cannot be initiated until the CEC approves the Final Closure Plan and Cost Estimate, and the project owner complies with

any requirements the CEC may incorporate as conditions of approval of the Final Closure Plan.

9.8 Compliance Conditions of Certification

COM-1 Unrestricted Access. The project owner shall take all steps necessary to ensure that the CPM, responsible CEC staff, and delegate agencies or consultants have unrestricted access to the facility site, related facilities, project-related staff, and the records maintained on site for the purpose of conducting audits, surveys, inspections, or general or closure-related site visits. Although the CPM will normally schedule site visits on dates and times agreeable to the project owner, the CPM reserves the right to make unannounced visits at any time, whether such visits are by the CPM in person or through representatives from CEC staff, delegated agencies, or consultants.

COM-2 Compliance Record. The project owner shall maintain electronic copies of all project files and submittals on site, or at an alternative site approved by the CPM, for the operational life and closure of the project. The files shall also contain at least one hard copy of:

1. the facility's Application of Certification;
2. all amendment petitions and CEC orders;
3. all site-related environmental impact and survey documentation;
4. all appraisals, assessments, and studies for the project;
5. all finalized original and amended structural plans and "as-built" drawings for the entire project;
6. all citations, warnings, violations, or corrective actions applicable to the project, and
7. the most current versions of any plans, manuals, and training documentation required by the COC's or applicable LORS.

The CEC staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files maintained pursuant to this condition.

COM-3 Compliance Verification Submittals. Verification lead times associated with the start of construction may require the project owner to file submittals during the certification process, particularly if construction is planned to commence shortly after certification. The verification procedures, unlike the conditions, may be modified as necessary by the CPM after notice to the project owner.

A cover letter from the project owner or an authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. The cover letter subject line shall identify the project by AFC number, cite the appropriate condition of certification number(s), and give a brief description of the subject of the submittal. When submitting supplementary or corrected information, the project owner

shall reference the date of the previous submittal and the condition(s) of certification applicable.

All reports and plans required by the project's COCs shall be submitted in a searchable electronic format (.pdf, MS Word or Excel, etc.) and include standard formatting elements such as a table of contents identifying by title and page number each section, table, graphic, exhibit, or addendum. All report and/or plan graphics and maps shall be adequately scaled and shall include a key with descriptive labels, directional headings, a bar scale, and the most recent revision date.

The project owner is responsible for the content and delivery of all verification submittals to the CPM and that the actions required by the verification were satisfied by the project owner or an agent of the project owner. All submittals shall be submitted electronically by email.

COM-4 Pre-Construction Matrix and Tasks Prior to Start of Construction. Prior to construction, the project owner shall submit to the CPM a compliance matrix including only those conditions that must be fulfilled before the start of construction. The matrix shall be included with the project owner's first compliance submittal or prior to the first pre-construction meeting, whichever comes first, and shall be submitted in a format similar to the description below.

Site mobilization and construction activities shall not start until the following have occurred:

1. the project owner has submitted the pre-construction matrix and all compliance verifications pertaining to pre-construction COC's; and
2. the CPM has issued an authorization-to-construct letter to the project owner.

The deadlines for submitting various compliance verifications to the CPM allow staff sufficient time to review and comment on, and, if necessary, also allow the project owner to revise the submittal in a timely manner. These procedures help ensure that project construction proceeds according to schedule. Failure to submit required compliance documents by the specified deadlines may result in delayed authorizations to commence various stages of the project.

If the project owner anticipates site mobilization immediately following project certification, it may be necessary for the project owner to file compliance submittals prior to project certification. In these instances, compliance verifications can be submitted in advance of the required deadlines and the anticipated authorizations to start construction. The project owner must understand that submitting items required in compliance verifications prior to these authorizations is at the owner's own risk. Any approval by CEC staff prior to project certification is subject to change based upon the Decision, or amendment thereto, and early staff compliance approvals do not imply that the CEC will certify the project for actual construction and operation.

COM-5 Compliance Matrix. The project owner shall submit a compliance matrix to the CPM with each MCR and ACR. The compliance matrix shall identify:

1. the technical area (e.g., biological resources, facility design, etc.);
2. the condition number;
3. a brief description of the verification action or submittal required by the condition;
4. the date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.);
5. the expected or actual submittal date;
6. the date a submittal or action was approved by the Delegate Chief Building Official (DCBO), CPM, or delegate agency, if applicable;
7. the compliance status of each condition (e.g., "not started," "in progress" or "completed" (include the date)); and
8. if the condition was amended, the updated language and the date the amendment was proposed or approved.

The CPM can provide a template for the compliance matrix upon request.

COM-6 Monthly Compliance Report. The first MCR is due 30 days following the docketing of the project's Decision unless otherwise agreed to by the CPM. The first MCR shall include the AFC number and an initial list of dates for each of the events identified on the Key Events List. (The Key Events List form is found at the end of this **Compliance Conditions and Compliance Monitoring Plan** section.) During pre-construction, construction, or closure, the project owner or authorized agent shall submit an electronic searchable version of the MCR to the CPM within 10 business days after the end of each reporting month.

MCRs shall be submitted each month until construction is complete and the final certificate of occupancy is issued by the DCBO. MCRs shall be clearly identified for the month being reported. The MCR shall contain, at a minimum:

1. a summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;
2. documents required by specific conditions to be submitted along with the MCR. Each of these items shall be identified in the transmittal letter, as well as the conditions they satisfy, and submitted as attachments to the MCR;
3. an initial, and thereafter updated, compliance matrix showing the status of all COC's;
4. a list of conditions that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition;

5. a list of any submittal deadlines that were missed, accompanied by an explanation and an estimate of when the information will be provided;
6. a cumulative listing of any approved changes to COC's;
7. a listing of any filings submitted to, and permits issued by, other governmental agencies during the month;
8. a projection of project compliance activities scheduled during the next two months; the project owner shall notify the CPM as soon as any changes are made to the project construction schedule that would affect compliance with COC's;
9. a listing of the month's additions to the on-site compliance file; and
10. a listing of incidents, complaints, notices of violation, official warnings, and citations received during the month; a list of any incidents that occurred during the month, a description of the actions taken to date to resolve the issues; and the status of any unresolved actions noted in the previous MCRs.

COM-7 Periodic and Annual Compliance Reports. After construction is complete, the project must submit searchable electronic ACRs to the CPM, as well as other periodic compliance reports (PCRs) required by the various technical disciplines. ACRs shall be completed for each year of commercial operation and are due each year on a date agreed to by the CPM. Other PCRs (e.g. quarterly reports, etc. to monitor closure compliance), may be specified by the CPM. The searchable electronic copies may be filed on an electronic storage medium or by e-mail, subject to CPM approval. Each ACR must include the AFC number, identify the reporting period, and contain the following:

1. an updated compliance matrix which shows the status of all COC's (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);
2. a summary of the current project operating status and an explanation of any significant changes to facility operations during the year;
3. documents required by specific conditions to be submitted along with the ACR; each of these items shall be identified in the transmittal letter with the condition(s) it satisfies, and submitted as an attachment to the ACR;
4. a cumulative list of all post-certification changes approved by the Energy Commission or the CPM;
5. an explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;
6. a listing of filings submitted to, or permits issued by, other governmental agencies during the year;
7. a projection of project compliance activities scheduled during the next year;
8. a listing of the year's additions to the on-site compliance file;

9. an evaluation of the Site Contingency Plan, including amendments and plan updates; and
10. a listing of complaints, incidents, notices of violation, official warnings, and citations received during the year, a description of how the issues were resolved, and the status of any unresolved complaints.

COM-8 Confidential Information. Any information that the project owner designates as confidential shall be submitted to the Energy Commission's Executive Director with an application for confidentiality, pursuant to Title 20, California Code of Regulations, section 2505(a). Any information deemed confidential pursuant to the regulations will remain undisclosed, as provided in Title 20, California Code of Regulations, section 2501 *et seq*.

COM-9 Annual Energy Facility Compliance Fee. Pursuant to the provisions of section 25806 (b) of the Public Resources Code, the project owner is required to pay an annually adjusted compliance fee. Current compliance fee information is available on the CEC's website at http://www.energy.ca.gov/siting/filing_fees.html. The project owner may also contact the CPM for the current fee information. The initial payment is due on the date the CEC dockets its final Decision. All subsequent payments are due by July 1 of each year in which the facility retains its certification.

COM-10 Amendments, Staff-Approved Project Modifications, Ownership/Operational Control Changes, Staff and Project Owner Jointly Initiated Amendments and Verification Changes. The project owner shall petition the CEC, pursuant to title 20, California Code of Regulations, section 1769, to modify the design, operation, or performance requirements of the project or linear facilities, or to transfer ownership or operational control of the facility. The CPM will determine whether staff approval will be sufficient, or whether Commission approval will be necessary. It is the project owner's responsibility to contact the CPM to determine if a proposed project change triggers the requirements of section 1769. Section 1769 details the required contents for a petition to amend a CEC Decision.

A project owner is required to submit a $5,000 fee for every petition to amend a previously certified facility, pursuant to Public Resources Code section 25806 (e). If the actual amendment processing costs exceed $5,000, the total PTA reimbursement fees owed by a project owner will not exceed the AFC cap of $1,050,850, adjusted annually. Current amendment fee information is available on the CEC's website at http://www.energy.ca.gov/siting/filing_fees.html.

Staff and Project Owner Jointly Initiated Amendments, and Verification Changes, are exempt from 25806(e) and, therefore, do not require a filing fee.

COM-11 Reporting of Complaints, Notices, and Citations. Prior to the start of construction or closure, the project owner shall send a letter to property owners within one mile of the project, notifying them of a telephone number to contact project

representatives with questions, complaints or concerns. If the telephone is not staffed 24 hours per day, it must include automatic answering with date and time stamp recording.

The project owner shall respond to all recorded complaints within 24 hours or the next business day. The project owner shall post the telephone number onsite and make it easily visible to passersby during construction, operation, and closure. The project owner shall provide the contact information to the CPM and promptly report any disruption to the contact system or telephone number change to the CPM, who will provide it to any persons contacting him or her with a complaint.

Within five business days of receipt, the project owner shall report, and provide copies to the CPM, all complaints, including, but not limited to, noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the Noise and Vibration conditions of certification. All other complaints shall be recorded on the complaint form at the end of this compliance plan. Additionally, the project owner must include in the next MCR, ACR or PCR, copies of all complaints, notices, warnings, citations and fines, a description of how the issues were resolved, and the status of any unresolved or ongoing matters.

COM-12 Emergency Response Site Contingency Plan. No less than 60 days prior to the start of construction (or other CPM-approved) date, the project owner shall submit, for CPM review and approval, an Emergency Response Site Contingency Plan (Contingency Plan). Subsequently, no less than 60 days prior to the start of commercial operation, the project owner shall update (as necessary) and resubmit the Contingency Plan for CPM review and approval. The Contingency Plan shall evidence a facility's coordinated emergency response and recovery preparedness for a series of reasonably foreseeable emergency events. The CPM may require Contingency Plan updating over the life of the facility. Contingency Plan elements include, but are not limited to:

1. a site-specific list and direct contact information for persons, agencies, and responders to be notified for an unanticipated event;
2. a detailed and labeled facility map, including all fences and gates, the windsock location (if applicable), the on and off-site assembly areas, and the main roads and highways near the site;
3. a detailed and labeled map of population centers, sensitive receptors, and the nearest emergency response facilities;
4. a description of the on-site, first response and backup emergency alert and communication systems, site-specific emergency response protocols, and procedures for maintaining the facility's contingency response capabilities, including a detailed map of interior and exterior evacuation routes, and the planned location(s) of all permanent safety equipment;

5. an organizational chart including the name, contact information, and first aid/emergency response certification(s) and renewal date(s) for all personnel regularly on-site;
6. a brief description of reasonably foreseeable, site-specific incidents and accident sequences (on- and off-site), including response procedures and protocols and site security measures to maintain twenty-four-hour site security;
7. procedures for maintaining contingency response capabilities; and
8. the procedures and implementation sequence for the safe and secure shutdown of all non-critical equipment and removal of hazardous materials and waste (see also specific conditions of certification for the technical areas of **Public Health, Waste Management, Hazards, Hazardous Materials Management, and Wildfire and Worker Safety and Fire Protection**).

COM-13 Incident-Reporting Requirements. The project owner shall notify the CPM within one hour after it is safe and feasible, of any incident at the facility that results in any of the following:

1. An event of any kind that causes a "Forced Outage" as defined in the CAISO tariff;
1. The activation of onsite emergency fire suppression equipment to combat a fire;
2. Any chemical, gas or hazardous materials release that could result in potential health impacts to the surrounding population; or create an offsite odor issue; and
3. Notification to, or response by, any off-site emergency response federal, state or local agency regarding a fire, hazardous materials release, onsite injury, or any physical or cyber security incident.

Notification shall describe the circumstances, status, and expected duration of the incident. If warranted, as soon as it is safe and feasible, the project owner shall implement the safe shutdown of any non-critical equipment and removal of any hazardous materials and waste that pose a threat to public health and safety and to environmental quality (also, see specific conditions of certification for the technical areas of **Hazards, Hazardous Materials Management and Wildfire and Waste Management**).

Within six business days of the incident, the project owner shall submit to the CPM a detailed incident report that includes, as applicable, the following information:

1. A brief description of the incident, including its date, time, and location;
2. A description of the cause of the incident, or likely causes if it is still under investigation;
3. The location of any off-site impacts;
4. Description of any resultant impacts;
5. A description of emergency response actions associated with the incident;

6. Identification of responding agencies;
7. Identification of emergency notifications made to federal, state, and local agencies;
8. Identification of any hazardous materials released and an estimate of the quantity released;
9. A description of any injuries, fatalities, or property damage that occurred as a result of the incident;
10. Fines or violations assessed or being processed by other agencies;
11. Name, phone number, and e-mail address of the appropriate facility contact person having knowledge of the event; and
12. Corrective actions to prevent a recurrence of the incident.

The project owner shall maintain all incident report records for the life of the project, including closure. After the submittal of the initial report for any incident, the project owner shall submit to the CPM copies of incident reports within 48 hours of a request.

If the project owner requests that an incident notification or report be designated as a confidential record and not publicly disclosed, the project owner shall submit copies of notices or reports with an application for confidential designation in accordance with CEC regulations.

COM-14 Non-Operation and Repair/Restoration Plans.

a. If the facility ceases operation temporarily (excluding planned and unplanned maintenance for longer than one week (or other CPM approved date), but less than three months (or other CPM-approved date), the project owner shall notify the CPM. Notice of planned non-operation shall be given at least two weeks prior to the scheduled date. Notice of unplanned non-operation shall be provided no later than one week after non-operation begins.

   For any non-operation, a Repair/Restoration Plan for conducting the activities necessary to restore the facility to availability and reliable and/or improved performance shall be submitted to the CPM within one week after notice of non-operation is given. If non-operation is due to an unplanned incident, temporary repairs and/or corrective actions may be undertaken before the Repair/Restoration Plan is submitted. The Repair/Restoration Plan shall include:

   1. Identification of operational and non-operational components of the plant;
   2. A detailed description of the repair and inspection or restoration activities;
   3. A proposed schedule for completing the repair and inspection or restoration activities;
   4. An assessment of whether or not the proposed activities would require changing, adding, and/or deleting any COC's, and/or would cause noncompliance with any applicable LORS; and

5. Planned activities during non-operation, including any measures to ensure continued compliance with all COC's and LORS.

b. Written monthly updates (or other CPM-approved intervals) to the CPM for non-operational periods, until operation resumes, shall include:

   1. Progress relative to the schedule;
   2. Developments that delayed or advanced progress or that may delay or advance future progress;
   3. Any public, agency, or media comments or complaints; and
   4. Projected date for the resumption of operation.

c. During non-operation, all applicable COC's and reporting requirements remain in effect. If, after one year from the date of the project owner's last report of productive repair/restoration plan work, the facility does not resume operation or does not provide a plan to resume operation, the Executive Director may assign suspended status to the facility and recommend commencement of permanent closure activities. Within 90 days of the Executive Director's determination, the project owner shall do one of the following:

   1. If the facility has a closure plan, the project owner shall update it and submit it for CEC review and approval; or
   2. If the facility does not have a closure plan, the project owner shall develop one consistent with the requirements in this Compliance Plan and submit it for CEC review and approval.

COM-15: Facility Closure Planning. To ensure that a facility's eventual permanent closure and maintenance do not pose a threat to public health and safety and/or to environmental quality, the project owner shall coordinate with the CEC to plan and prepare for eventual permanent closure.

Final Closure Plan and Cost Estimate

a. No less than one year (or other CPM-approved date) prior to initiating a permanent facility closure, or upon an order compelling permanent closure, the project owner shall submit for CEC review and approval a Final Closure Plan and Cost Estimate, which includes any site maintenance and monitoring.

   Prior to submittal of the facility's Final Closure Plan to the CEC, the project owner and the CPM will hold a meeting to discuss the specific contents of the plan. In the event that significant issues are associated with the plan's approval, the CPM will hold one or more workshops and/or the CEC may hold public hearings as part of its approval procedure.

b. Final Closure Plan and Cost Estimate contents include, but are not limited to:

   1. a statement of specific Final Closure Plan objectives;

2. a statement of qualifications and resumes of the technical experts proposed to conduct the closure activities, with detailed descriptions of previous power plant closure experience;
3. identification of any facility-related installations or maintenance agreements not part of the CEC certification, designation of who is responsible for these, and an explanation of what will be done with them after closure;
4. a comprehensive scope of work and itemized budget for permanent plant closure and site maintenance activities, with a description and explanation of methods to be used, broken down by phases, including, but not limited to:
    a. dismantling and demolition;
    b. recycling and site clean-up;
    c. impact mitigation and monitoring;
    d. site remediation and/or restoration;
    e. exterior maintenance, including paint, landscaping and fencing;
    f. site security and lighting; and
    g. any contingencies.
5. a final cost estimate for all closure activities, by phases, including site
    a. monitoring and maintenance costs, and long-term equipment;
    b. replacement;
6. a schedule projecting all phases of closure activities for the power plant site and all appurtenances constructed as part of the CEC-certified project;
7. an electronic submittal package of all relevant plans, drawings, risk assessments, and maintenance schedules and/or reports, including an above and below-ground infrastructure inventory map and registered engineer's or DCBO's assessment of demolishing the facility;
8. additionally, for any facility that permanently ceased operation prior to submitting a Final Closure Plan and Cost Estimate and for which only minimal or no maintenance has been done since, a comprehensive condition report focused on identifying potential hazards;
9. all information additionally required by the facility's COC's applicable to plant closure;
10. an equipment disposition plan, including:
    a. recycling and disposal methods for equipment and materials; and
    b. identification and justification for any equipment and materials that will remain on-site after closure.

11. a site disposition plan, including but not limited to proposed rehabilitation, restoration, and/or remediation procedures, as required by the conditions of certification and applicable LORS, and site maintenance activities;
12. identification and assessment of all potential direct, indirect, and cumulative impacts and proposal of mitigation measures to reduce significant adverse impacts to a less-than-significant level. Potential impacts to be considered shall include, but not be limited to:
    a. traffic;
    b. noise and vibration;
    c. soil erosion;
    d. air quality degradation;
    e. solid waste;
    f. hazardous materials;
    g. waste water discharges; and
    h. contaminated soil;
13. identification of all current conditions of certification, LORS, federal, state, regional, and local planning efforts applicable to the facility, and
14. proposed strategies for achieving and maintaining compliance during closure;
15. updated mailing list and Listserv of all responsible agencies, potentially interested parties, and property owners within one mile of the facility;
16. identification of alternatives to plant closure and assessment of the feasibility and environmental impacts of these; and
17. description of and schedule for security measures and safe shutdown of all non-critical equipment and removal of hazardous materials and waste (see COC's **Public Health, Waste Management, Hazards, Hazardous Materials Management, and Wildfire and Worker Safety and Fire Protection**).

If the CEC-approved Final Closure Plan and Cost Estimate procedures are not initiated within one year of the plan approval date, it shall be updated and re-submitted to the CEC for supplementary review and approval. If a project owner initiates but then suspends closure activities, and the suspension continues for longer than one year, the CEC may initiate corrective actions against the project owner to complete facility closure. The project owner remains liable for all costs of contingency planning and closure.

KEY EVENTS LIST

PROJECT: Willow Rock Energy Storage Center

DOCKET #: 21-AFC-02

COMPLIANCE PROJECT MANAGER: Ashley Gutierrez

EVENT DESCRIPTION	DATE
SAFC Certification Date	
Obtain Site Control	
On-line Date (Commercial Operation Date)	
PRE-CONSTRUCTION	
Start Preliminary Site Assessments/Pre-Construction Activities (Biological and Cultural)	
Start Engineering Review & Pre-Approval with Kern County and CBO (Grading Plan/Dawn Road Improvement/Water Supply Line)	
SITE ACTITIES	
Start Site Assessment/Pre-construction (Land Survey)	
Start Site Mobilization/Construction	
Start Grading	
Start Reservoir Excavation	
Start Shaft Construction	
Begin Pouring Major Foundation Concrete (Spheres Piles)	
Start Cavern Construction	
Begin Installation of Major Equipment	
Completion of Installation of Major Equipment	
First Plant Synchronization (Startup)	
TRANSMISSION LINE ACTIVITIES	
Start Transmission Line Construction	
Complete Transmission Line Construction	
Energization and Interconnection Tests	
WATER SUPPLY LINE ACTIVITIES	
Start Water Supply Line Construction	
Complete Water Supply Line Construction	
Start Filling Reservoir	
Complete Filling Reservoir	

COMPLAINT LOG NUMBER:_____ DOCKET NUMBER:_____

PROJECT NAME:_____

COMPLAINANT INFORMATION

NAME:_____ PHONE NUMBER:_____

ADDRESS:_____

COMPLAINT

DATE COMPLAINT RECEIVED:_____ TIME COMPLAINT RECEIVED:_____

COMPLAINT RECEIVED BY: _____ ☐ TELEPHONE ☐ IN WRITING (COPY ATTACHED)

DATE OF FIRST OCCURRENCE:_____

DESCRIPTION OF COMPLAINT (INCLUDING DATES, FREQUENCY, AND DURATION):_____

FINDINGS OF INVESTIGATION BY PLANT PERSONNEL:_____

DOES COMPLAINT RELATE TO VIOLATION OF A CEC REQUIREMENT? ☐ YES ☐ NO

DATE COMPLAINANT CONTACTED TO DISCUSS FINDINGS:_____

DESCRIPTION OF CORRECTIVE MEASURES TAKEN OR OTHER COMPLAINT RESOLUTION:_____

DOES COMPLAINANT AGREE WITH PROPOSED RESOLUTION? ☐ YES ☐ NO

IF NOT, EXPLAIN:_____

CORRECTIVE ACTION

IF CORRECTIVE ACTION NECESSARY, DATE COMPLETED:_____

DATE FIRST LETTER SENT TO COMPLAINANT (COPY ATTACHED):_____

DATE FINAL LETTER SENT TO COMPLAINANT (COPY ATTACHED):_____

OTHER RELEVANT INFORMATION:_____

"This information is certified to be correct."

PLANT MANAGER SIGNATURE: DATE: _____

Section 10

Authors and Reviewers

10 Authors and Reviewers

Lead Agency—California Energy Commission

Section Authors

Kenneth Salyphone (Efficiency and Energy Resources and Facility Reliability)
Ardalan Raisi Sofi (Noise and Vibration)
Laiping Ng (Transmission System Engineering)
Mark Hesters (Transmission System Engineering)
Sudath Edirisuriya (Transmission Line Safety and Nuisance)
Ashley Gutierrez (Compliance Conditions and Compliance Monitoring Plan)

Supervision and Management

Shahab Khoshmashrab, Facility Design Unit Supervisor
Brett Fooks, Safety & Reliability Branch Manager
Joseph Hughes, Engineering Branch Manager
Kaycee Chang, CEQA Project Management Unit Supervisor
Eric Knight, Siting and Environmental Branch Manager
Dian Vorters, Deputy Director - Siting, Transmission, and Environmental Protection Division
Elizabeth Huber, Director - Siting, Transmission, and Environmental Protection Division

Project Assistant

Marichka Haws

Project Management/Legal

Eric Veerkamp, Project Manager
Erika Giorgi, Staff Counsel
Anthony Cusato, Staff Counsel

Appendix A

Cumulative Scenario

Appendix A Cumulative Impacts

Preparation of the cumulative impact analysis is required under the California Environmental Quality Act (CEQA). In the CEQA Guidelines, "a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts" (Cal. Code Regs., tit. 14, § 15130(a)(1)). Cumulative impacts must be addressed if the incremental effect of a project, combined with the effects of other projects, is "cumulatively considerable," and therefore potentially significant (Cal. Code Regs., tit. 14, § 15130(a)(2)). Such incremental effects are to be "viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects" (Cal. Code Regs., tit. 14, § 15164(b)(1)). Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis.

The discussion of cumulative impacts must reflect the severity of the impacts, as well as the likelihood of their occurrence, yet the discussion need not be as detailed as the discussion of environmental impacts attributable to the project alone. When the combined cumulative impact associated with the project's incremental effect and the effects of other projects is not significant, the EIR shall briefly indicate why the cumulative impact is not significant and is not discussed in further detail in the EIR. (Cal. Code Regs., tit. 14, § 15130(a)(2)).

The cumulative impact discussion is intended to be guided by the standards of practicality and reasonableness (Cal. Code Regs., tit. 14, § 15130(b)). CEQA Guidelines sections applicable to a cumulative impact analysis state the following:

- CEQA Section 15355: "Cumulative impacts" refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.

  (a) The individual effects may be changes resulting from a single project or a number of separate projects.

  (b) 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. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.
- CEQA Guidelines Section 15130 (a)(1): As defined in Section 15355, a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts. An EIR should not discuss impacts which do not result in part from the project evaluated in the EIR.
- CEQA Guidelines Section 15064(h)(4): The mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable.

Cumulative Projects Scenario

Under CEQA, there are two commonly used methodologies for establishing the cumulative impact scenario—the "list approach" and the "projections approach." The list approach uses a "list of past, present, and probable future projects producing related or cumulative impacts" (Cal. Code Regs., tit. 14, § 15130(b)(1)(A)). The projections approach uses a "summary of projections contained in an adopted local, regional or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect" (Cal. Code Regs., tit. 14, § 15130(b)(1)(B)).

This staff assessment utilizes the list approach to provide an understanding and context for analyzing the potential cumulative effects related to the proposed project. The project list supplements the cumulative scenario with information on specific projects that are proposed or under construction in the surrounding communities.

Review of the Environmental Documents and Renewable Energy webpages of the Kern County Planning and Natural Resources website provided several past, present, or probable future projects located within 6 miles of the proposed project that would potentially be constructed within one year before or after the proposed project. A list of these projects is shown in **Table A-1** along with an identification number, a brief description, distance from the project site, and status. Although **Table A-1** lists only those cumulative projects located within a six-mile radius of the proposed project site, the cumulative impacts analysis for each resource area included in this document considers a geographic area appropriate for each technical area.

The analysis of cumulative effects considers several variables including geographic (spatial) limits, time (temporal) limits, and the characteristics of the resource being evaluated. For each resource area, this staff assessment evaluates the cumulative impacts as follows:

- Defines the geographic scope of cumulative impact analysis for each discipline, based on the likely geographic extent in which proposed project impacts could combine with those of other projects.
- Evaluates the effects of the proposed project in combination with past and present (existing) projects within the geographic scope defined for each discipline.
- Evaluates the effects of the proposed project with foreseeable future projects that occur within the geographic scope defined for each discipline.

Staff's cumulative impact analysis considers environmental effects associated with those projects identified in **Table A-1** in conjunction with the impacts identified for the project. **Table A-1** provides information on cumulative projects that could combine with the effects of the proposed project. Applicable cumulative projects consist of projects that are reasonably foreseeable or currently operational and would be constructed or operated during the life of the proposed project. Cumulative projects include land development or public works projects that are planned or approved and, given their physical proximity to the project area or an overlap in the transportation

routes used during construction, could potentially contribute to the same environmental effects as the proposed project.

The detailed analysis of the cumulative impacts on individual environmental resources is provided within the respective technical sections of the environmental impact assessment.

Map Id Number	Project Name	Description	Location	Distance to Project (miles)	Status
1	Edwards Air Force Base Solar Project	Photovoltaic (PV) solar project on 4,000-acre Edwards Air Force Base (AFB) property and generation tie (gen-tie) line approximately 16 miles in length. Greater than 100 megawatts (MW) but not more than 750 MW, with the generated energy distributed to investor owned utilities, municipalities, other energy off-takers and/or Edwards AFB	Located on Edwards AFB, approximately 6 miles northeast of the community of Rosamond and 6 miles south of Mojave	2.5 miles northeast of the project site	Construction completed 2023
2	Investment Concepts Inc	Conditional Use Permit (CUP) 118 multi-unit apartment complex	County Assessor's Parcel Numbers (APN) 471-112-06	2.8 miles south of the project site	Applied
3	Dewalt Corp for Rosamond 5 properties	Construct 89-unit multifamily project	APN 473-022-23	4.1 miles south of the project site	Approved
3	Dewalt Corp	Precise development of 87 duplex structures (174 units)	APN 473-022-23	4.1 miles south of the project site	Approved
4	Investment Concepts Inc	CUP for apartment complex	APN 252-161-49	3.9 miles northwest of the project site	Approved
4	Kern County Planning Dept	Kern County Housing Element Implementation 2022, zone change to R-3 Site No.6	APN 252-161-49	3.9 miles northwest of the project site	Approved
5	Westpark LLC, Howard Field	Proposed hotel development	APN 471-022-07	1.8 miles south of the project site	Applied
6	Halterty development	Develop plan for mixed commercial, retail development	APNs 251-181-145, 251-181-152	3.0 miles south of the project site	Approved
7	BHT Developers, LLC	Auto Auction Facility	APNs 473-023-042, 473-023-059, 473-023-067, 473-023-061	4.1 miles south of the project site	Applied
8	Golden Queen Mining Company, LLC	Addendum to EIR approved for surface mining and reclamation plan	APN 429-190-69	5.5 miles north of the project site	Approved

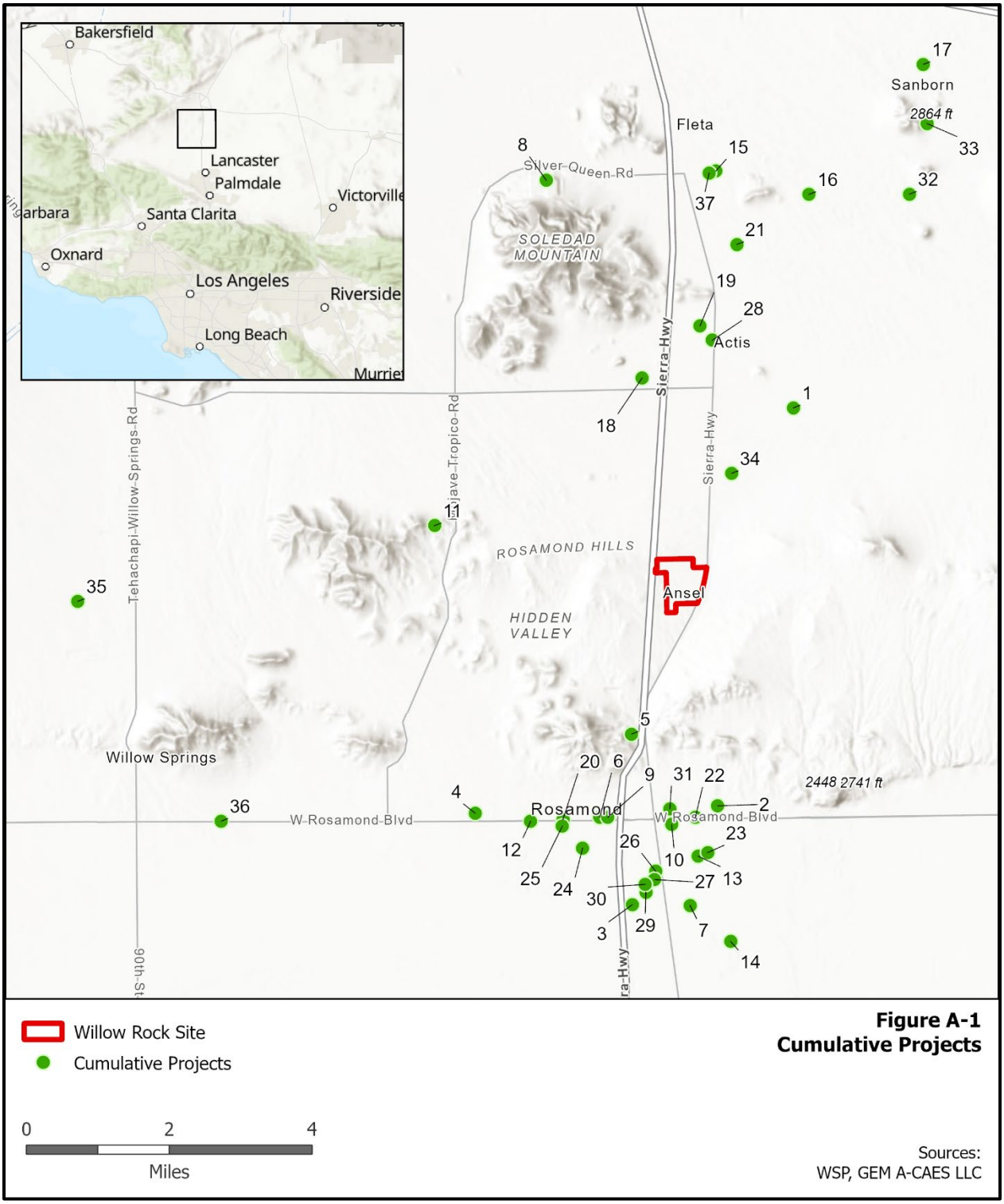
Map Id Number	Project Name	Description	Location	Distance to Project (miles)	Status
9	Interex Property advisors	Development plan for auto service station, motel, retail, and restaurants	APN 251-120-010	3 miles south of the project site	Applied
10	RE McCollum, LLC	Self-storage development plan	APN 258-090-02	3 miles south of the project site	Applied
11	GEM Hill Quarry (CalPortland Company)	Surface mining operation and development of a reclamation plan on approximately 82.2 acres, 15 MM tons of volcanic tuff GEM Hill	APNs 345-294-17, 345-032-05, 345-032-31, 345-031-02 and 345-032-02	3.1 miles west of the project	Approved
12	FH II LLC / Frontier Communities	Change zoning to allow for 120-unit single family residential development	APN 472-100-63	3.6 miles southwest of the project site	Approved
13	Garo Karakoulian	CUP for auto dismantling and recycling facility	APN 258-160-26	3.5 miles south of the project site	Applied
14	SSI Rosamond Solar, LLC	Solar array accessory to water treatment facility	APN 471-040-01	3.4 miles north of the project site	Approved
15	True North Renewable Energy	Amendments to Kern County General Plan and Willow Springs Specific Plan to designate the site as Solid Waste Disposal Facility and CUP to allow a renewable energy facility on 117 acres.	APNs 429-101-30 through 429-101-37	5.4 miles north of the project site	Approved
16	Capella Solar	Approximate 5 MW modular commercial concentrating solar power plant with a supercritical CO2 power cycle and solid media thermal, which is comprised of an approximately 117-acre field of computer-controlled heliostat mirrors focusing solar energy on receiver apertures on top of an approximate 330-foot-tall, centralized power tower, and	APNs 429-060-13 through 429-060-19	5.4 miles north of the project site	Processing

Map Id Number	Project Name	Description	Location	Distance to Project (miles)	Status
		ancillary. The project would be operated as a test facility.			
17	Enterprise Solar	Construction and operation of a solar PV facility and associated infrastructure necessary to generate 600 MWs of renewable electrical energy with up to 4,000 megawatt-hours (MWh) of energy storage capacity (approximately 1,000 MW) on approximately 2,320 acres. Infrastructure includes laydown yards, a meteorological station, and a substation. PV panels, inverters, converters, foundations, and transformers will be installed onsite.	Cross Streets: SR14 and SR58	7.6 miles northeast of the project site	Approved
18	Castellanos Truck Parking and Storage	General Plan Amendment, Zone Classification Change, Precise Development plan to allow a Truck Parking and Storage Facility	APN 430-053-08	2.5 miles north of the project site	Applied
19	Babkan Safarian & Denise Rodriguez	General Plan Amendment, Zone Classification Change, Precise Development plan to allow vehicle and cargo container storage	APN 430-141-27	3.2 miles north of the project site	Applied
20	Irvine Camillo	Precise Development Plan for commercial development	APN 472-100-15	3.2 miles southeast of the project site	Applied
21	Antonio & Jeanette Vergara	CUP for construction materials recycling facility	APN 429-010-02	4.4 miles north of the project site	Applied
22	Carl Wood	Precise Development Plan for new retail development	APNs 258-170-16, 258-170-17	2.9 miles south of the project site	Applied

Map Id Number	Project Name	Description	Location	Distance to Project (miles)	Status
23	Walter DeBoer, BRPH	Modification to Precise Development Plan for change of occupancy to manufacturing.	APN 258-160-42	3.4 miles south of the project site	Applied
24	Silvia Valdez	CUP for installation of mobile home greater than 10 years	APN 251-191-13	3.5 miles southeast of the project site	Applied
25	Aaron Rivani by Cindy Parra	Zone classification change from A-1 to R-1	APN 472-100-16	3.2 miles southeast of the project site	Applied
26	Kern County Planning Dept	Kern County Housing Element Implementation 2022, Zone change to R3 Site No, 4	APNs 258-120-12, 258-130-16, 258-150-02, 258-130-23	3.6 miles south of the project site	Approved
27	Kern County Planning Dept	Kern County Housing Element Implementation 2022, plan amendment to 5 1/2.5 and zone classification change to R3, Site No.9	APN 473-031-03	3.7 miles South of the project site	Approved
28	Kern County Planning Dept	Kern County Housing Element Implementation 2022, Zone change to R3 Site No.2	APN 430-030-10	3.1 miles north of the project site	Approved
29	Kern County Planning Dept	Kern County Housing Element Implementation 2022, Zone change to R3 Site No.7	APN 473-031-09	3.9 miles south of the project site	Approved
30	Kern County Planning Dept	Kern County Housing Element Implementation 2022, Zone change to R3 Site No.5	APN 473-031-27	3.8 miles south of the project site	Approved
31	Matthew McCormick	CUP for single family residence in C-2	APN 251-025-09	2.7 miles south of the project site	Applied
32	Sanborn Solar	Solar PV power generating facilities and associated facilities that would generate up to a combined total of 300 MW of renewable electrical energy and up to 3 GWh of energy storage capacity	Cross Streets: SR 14 and Silver Queen Road and SR 58 (Business) and Lone Butte Road	5.9 miles northeast of the project site	Approved

Map Id Number	Project Name	Description	Location	Distance to Project (miles)	Status
33	Bellefield Solar Project	Solar PV facility and energy storage system along with associated infrastructure necessary to generate up to 1,500 MW of alternating current and up to 1,500 MWh energy storage capacity	Cross Streets: Altus Avenue & State Route 58	6.9 miles northeast of the project site	Approved
34	Mojave Micro Mill	Construct and operate a micro mill facility and associated infrastructure necessary to produce rebar from scrap metal through various recycling processes. Development would include an approximate 475,800 square-foot steel mill facility with an additional 51,221 square feet of accessory buildings and structures, as well as an approximate 63-acre accessory solar array on 174 total acres of privately owned land. Outdoor storage for scrap materials and staging is proposed as part of the project.	Cross streets: Sopp Road and Sierra Highway	1.3 miles north of the project site	Completed in 2025
35	Bullhead Solar	olar PV facility with associated infrastructure on approximately 1,343.2 acres. Preferred and optional generation-tie (gen-tie) routes to the Rosamond and Whirlwind substations, only one of which would be constructed. The project also includes laydown yards, a meteorological station, a microwave/ communication tower, and a substation.	Along Dawn Road off Sierra Hwy 14 between 105th Street West and 75th Street West, north of Favorito Avenue Dawn Road and South of Champagne Avenue.	8.1 miles west of the project	Approved

Map Id Number	Project Name	Description	Location	Distance to Project (miles)	Status
36	Gettysburg Solar/AV Apollo	Approximately 30t MW photovoltaic (PV) electric generating facility, including approximately 30 MW of energy storage capacity, on approximately 158 acres of privately-owned land in unincorporated Kern County.	Rosamond, ¼ miles east of intersection of Rosamond Blvd and 80th	6.9 miles southwest of the project site	Approved
37	Organics Energy Solar	High solids anaerobic digestion (HSAD) facility with incidental advanced composting for the management and processing of residential, commercial, and industrial organic waste and green material. The Project would provide organics processing infrastructure and organic materials diversion from regional landfills and generate renewable energy through the HSAD process	Silver Queen Road and United Street	5.4 miles north of the project site	Processing


Bakersfield
Lancaster
Palmdale
Victorville
Santa Clarita
Oxnard
Los Angeles
Riverside
Long Beach
Fleta
Sanborn
2864 ft
Silver Queen Rd
SOLEDAD MOUNTAIN
Sierra Hwy
Actis
Ansel
ROSAMOND HILLS
HIDDEN VALLEY
Tehachapi-Willow Springs Rd
Mojave-Tropico Rd
Willow Springs
W Rosamond Blvd
Rosamond
2448 2741 ft
Willow Rock Site
Cumulative Projects
0
2
4
Miles
Figure A-1
Cumulative Projects
Sources:
WSP, GEM A-CAES LLC

References

ESHD 2024i – Ellison Schneider Harris & Donlan LLP (TN 254806). Willow Rock Energy Storage Center SAFC, Volume 1, Part A, dated March 1, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-AFC-02

Kern 2025a – Kern County Planning and Natural Resources Department (Kern). Environmental Documents. Accessed online at: https://kernplanning.com/planning/environmental-documents/

Kern 2025b - Kern County Planning and Natural Resources Department (Kern). Renewable Energy Projects. Accessed online at: https://kernplanning.com/planning/renewable-energy/