DOCKETED	
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Filer:	Kari Miller
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1.0 INTRODUCTION

GEM A-CAES LLC (Gem LLC) proposes to construct, own, and operate the 500-megawatt (MW) Gem Energy Storage Center (GESC or Gem), an Advanced Compressed Air Energy Storage (A-CAES) facility, in Kern County, California. The Gem Energy Storage Center will deploy proprietary Hydrostor technology consisting of five (5) 100 MW all-electric air compressor and associated power turbine trains, underground compressed air storage cavern, miscellaneous aboveground support facilities and a 10.9-mile interconnection to the Southern California Edison (SCE) Whirlwind Substation. The main elements of the Gem project are further summarized in Section 1.3 below. A detailed project description is included in Section 2 of this Application for Certification (AFC). Gem provides unique operation and reliability characteristics that neither other conventional or renewable power plant technologies or batteries can provide on their own. Figure 1-1 is a depiction of the existing project site, and Figure 1-2 provides an architectural rendering of the same area after construction of Gem.

1.1 Project Objectives

Gem's primary goal is to be a state-of-the-art energy storage and reliability resource. Gem has been designed to deliver up energy and reliability services with no fossil fuel combustion or related air quality impacts. The project will be one of the first commercial applications of Hydrostor's A-CAES technology at this scale. Gem will combine dispatchable, operationally flexible, and efficient energy generation with state-of-the-art A-CAES technology to facilitate the integration of variable renewable energy on the grid and to meet California and regional needs for reliability services.

The Gem project's objectives are as follows:

- 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 the renewable energy into the electrical grid in satisfaction of California's Renewable Portfolio Standard (RPS) and climate objectives, by displacing older and less efficient generation.
- Interconnect the project to CAISO-controlled Southern California Edison (SCE) Whirlwind Substation, a major substation in or near the Tehachapi Renewable Wind Resource Area, to facilitate the integration of onshore and offshore renewable energy development.
- Implement a proven sustainable energy storage technology that provides improved technological diversity, non-combustible energy storage, minimal residual hazardous waste at asset retirement, long term commercial lifespan of 30 years or greater and non-degrading energy storage.
- Use advanced compressed air energy storage (A-CAES) technology to provide dispatchable long-duration storage and energy delivery for a minimum 8 hours, fossil fuel and greenhouse gas emissions-free operation, flexible capacity with minimal response time, 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.
- Locate on a site with adequate geologic characteristics for the underground facilities for compressed air storage, including, suitable overburden characters (limited thickness, constructable soil type); deep subsurface geological formation of sufficient quality and definition at the required depth for construction of the excavated storage cavern; ultra low hydraulic conductivity and permeability in deep subsurface

geological formation to retain water and air under pressure within the excavated storage cavern; and competent geological structural integrity to sustain an excavated storage cavern at depth intact indefinitely, allowing for repeated compressed air injection and discharge cycles over the life of the project without eroding or collapsing.

- Site the project in close proximity to an adequate fresh water supply.
- Site the project on flat land and with adequate access and size for construction of aboveground facilities, at least 60 acres.
- Identify a site that is available to provide adequate site control, through long-term lease or purchase.
- 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 and avoiding lengthy generation tie lines.
- Create jobs in Kern County and the State of California through both construction and operation of the facility.
- Be a good corporate citizen and respected member of the community through the lifecycle of the project.

Figure 1-1 Existing Site Conditions
Gem Energy Storage Center

Figure 1-2 Architectural Rending of Gem Energy Storage Center

1.2 Project Location

The Gem project will be located on an approximately 71-acre project site consisting of two adjacent parcels in unincorporated Kern County (County), approximately 1 mile northeast of the community of Willow Springs and 7 miles west of Rosamond, California (Figure 1-3).

The project site is located on two adjacent parcels, an approximately 10-acre parcel with Assessor's Parcel Number (APN) 315-081-01 and an approximately 61-acre parcel with APN 315-08-09, the latter located at 8684 Sweetser Road, Rosamond, CA, 93560. The site is bounded on the north by Sweetser Road and on the west by Tehachapi Willow Springs Rd (90th Street West). The project site is located about 0.25-mile northwest of Willow Springs Butte. The site is within Section 8 of Township 9 North, Range 13 West.

The site is currently undeveloped desert land located in an area that is zoned E-District (Estate 2.5 Acres I, Residential Suburban Combining (RS)). The area to the southeast of the site, including Willow Springs Butte, is public land administered by the U.S. Department of the Interior, Bureau of Land Management (BLM). The area to the north of the site across Sweetser Road is used for irrigated agriculture. The site is not under a Williamson Act Contract.

Appendix 1A contains a copy of the Assessor's Parcel Map for the site parcels. A list of the owners of property within 1,000 feet of the Gem project and 500 feet of the linear facilities is provided in Appendix 1B.

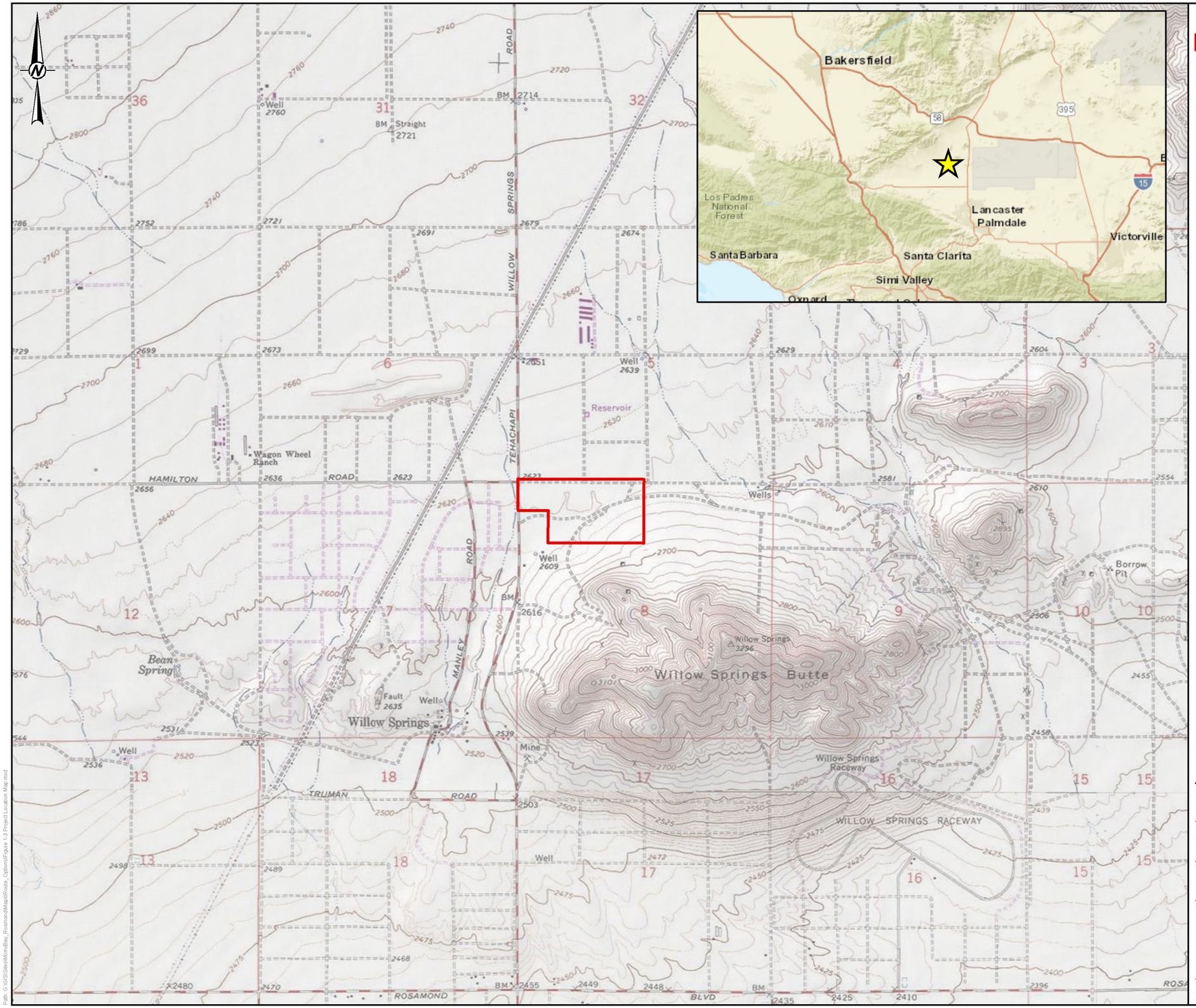
1.3 Project Elements

Figure 1-4 shows the Gem project location and linear facilities. The main project elements, including linear facilities and construction laydown areas, are as follows:

- Five all-electric 100 MW air compressor and power generation turbine trains housed inside a 100-foot tall by 65-foot-wide by 1,365-foot-long main Turbine Hall and compressor building.
- Underground (approximately 2,000 feet deep) purpose-built compressed air storage cavern. To build the cavern, approximately 1.1 million cubic yards of rock will be excavated using conventional mining techniques and hauled by truck to the Ridgeline Materials quarry as the preferred alternative located approximately 5 miles north of the site where it will be recycled for beneficial uses.
- Approximately 31-acre by 50 feet deep (average) hydrostatic compensation surface reservoir with approximately 6 to 40-foot-high earthen berms and approximately 565 acre-feet capacity and floating cover to reduce evaporative loss.
- Air conduit (sealed) to facilitate cyclic injection/storage of compressed air and release of compressed air for power generation.
- Water conduit (sealed) to facilitate inflow/outflow of hydrostatic compensation water to/from the surface reservoir and underground storage cavern.
- Above ground heat exchangers and thermal storage equipment (including four 83 feet diameter by 90 feet tall spherical tanks).
- Control house (40 feet high by 60 feet wide), electrical gallery (28 feet high by 48 feet wide) and maintenance building (70 feet high by 52 feet wide) connected to the Turbine Hall.

- Two groundwater extraction wells (one primary, one backup) to provide facility water (basin water rights will be contracted with a third-party water rights holder), with the primary water use being the initial filling and subsequent water makeup for the compensating surface reservoir. Onsite groundwater for the initial reservoir filling may be supplemented with water supplied and trucked to the site from local water purveyors.
- Two diesel-fired emergency backup generators up to 5MW each to support critical facility load in the event of a power interruption (not normally operated except for monthly reliability testing).
- Secure perimeter chain link fencing with four site access points, a main entrance gate on Sweetser Road, two secondary access gates on Sweetser Road, and a secondary access gate on Tehachapi Willow Springs Road.
- A Gas Insulated Switchgear (GIS) Building (70 feet high by 85 feet wide by 130 feet long) and 230 kilovolt (kV) onsite switchyard.
- An approximately 10.9-mile 230 kV transmission line interconnected at SCE's Whirlwind substation. Alternatively, Gem may be interconnected to a future LADWP Rosamond substation via an approximately 3.5-mile 230 kV transmission line.
- Two stormwater retention ponds, a south pond (150 feet long by 260 feet wide) and a north pond (245 feet long by 180 feet wide), served by perimeter stormwater culverts to manage stormwater onsite.
- Industrial wastewater will be treated and recycled onsite with a very small quantity directed to one of the stormwater ponds. Any process wastewater collected during maintenance activities will be collected in a holding tank and periodically removed by a licensed hauler.
- Approximately 40-acre temporary construction laydown and parking facilities located on the parcel located directly to the north of the site, across Sweetser Road.

Section 2, Project Description of this AFC provides detailed elements of the project.



LEGEND

PROJECT SITE

0 1,000 2,000 Feet

1:24,000

REFERENCE

COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET

CLIENT
HYDROSTOR INC.

PROJECT
GEM ENERGY STORAGE CENTER

TITLE
PROJECT LOCATION MAP

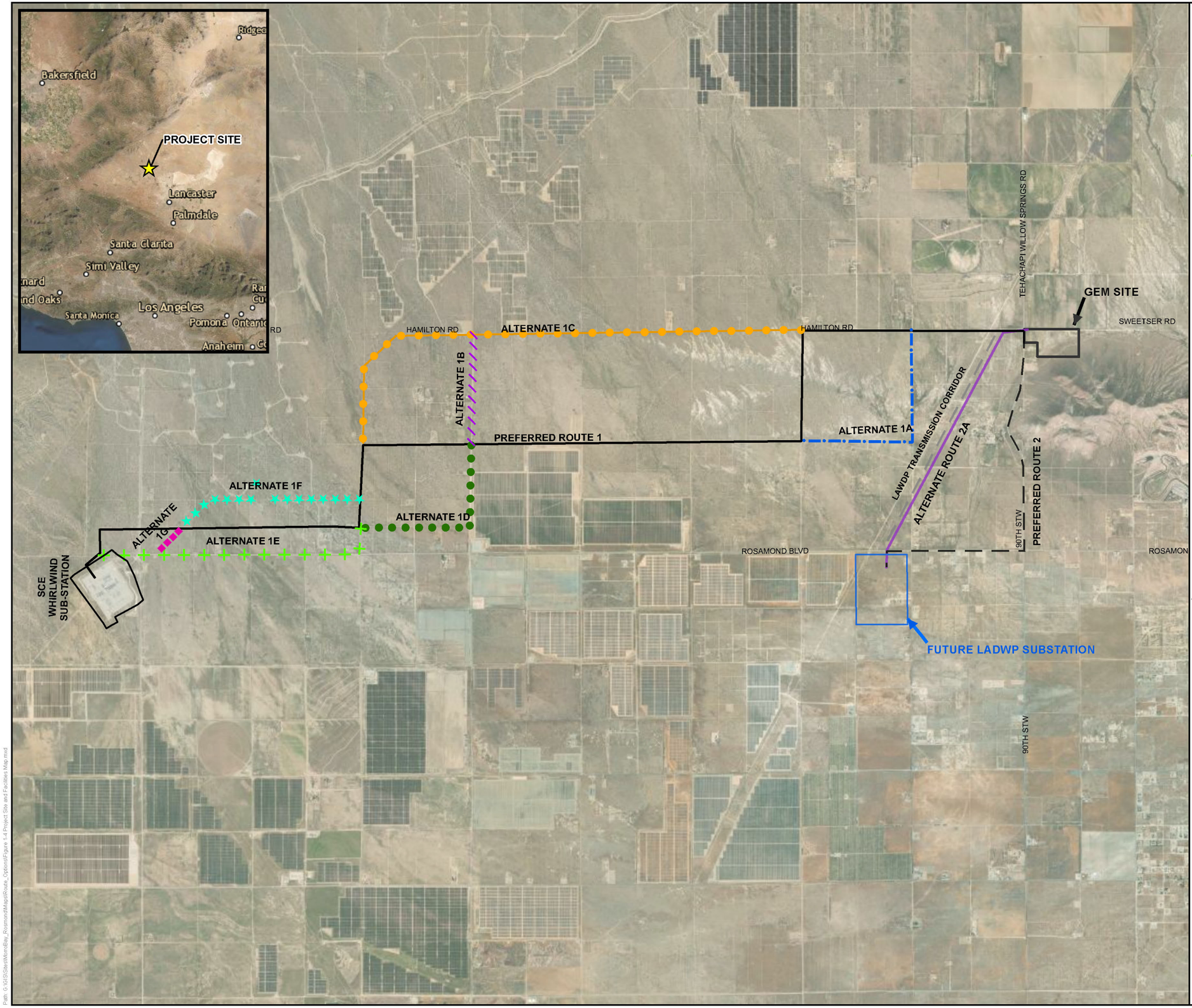
CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-08-17
PREPARED	MR
DESIGN	MR
REVIEW	GW
APPROVED	GW

PROJECT No.	CONTROL	Rev.	FIGURE
20449449	---	---	**1-3**

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

Path: G:\GIS\Sites\MontoBay, Rosmond\Maps\Route_Options\Figure 1-3 Project Location Map.mxd



LEGEND

ROUTE_NAME

- ALTERNATE 1A
- ALTERNATE 1B
- ALTERNATE 1C
- ALTERNATE 1D
- ALTERNATE 1E
- ALTERNATE 1F
- ALTERNATE 1G
- PREFERRED ROUTE 1
- SCE WHIRLWIND SUB-STATION
- PREFERRED ROUTE 2
- ALTERNATE ROUTE 2A
- LADWP TRANSMISSION CORRIDOR
- LADWP ROSAMOND SUBSTATION
- GEM SITE

NOTES

SOURCE DATA FOR ROAD, CITY AND TRANSMISSION LINE: HTTPS://GEODAT-KERNCO.OPENDATA.ARCGIS.COM/

0 3,000 6,000 Feet

REFERENCE

COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET

CLIENT
HYDROSTOR, INC.

PROJECT
GEM ENERGY STORAGE CENTER

TITLE
PROJECT SITE AND FACILITIES MAP

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-08-17
PREPARED	MR
DESIGN	MR
REVIEW	GW
APPROVED	GW

PROJECT No.	CONTROL	Rev.	FIGURE
20449449	---	---	**1-4**

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

Path: G:\GIS\Sites\MonoBay_Rosmond\Maps\Route_Options\Figure 1-4 Project Site and Facilities Map.mxd

1.4 Project Benefits

Gem Energy Storage Center will provide the following key environmental and economic benefits:

- The Gem project site is located strategically to provide enhanced integration of variable renewable energy resources located in the Tehachapi Renewable Resource Area and to meet California and regional electric grid reliability needs.
- Uses the Hydrostor A-CAES technology that provides the following:
  - Fossil fuel emissions-free spinning reserve
  - Flexible capacity with minimal start time
  - Peaking energy for local contingencies
  - Voltage support and primary frequency response without burning fossil fuel
  - Superior transient response attributes
  - Superior round-trip thermodynamic efficiency
- Minimized Land Use Impacts: Gem is sited on compatibly zoned parcels in an a sparsely populated area. There are no schools, parks or recreational areas, or other sensitive land uses immediately adjacent to the site. The project is consistent with the applicable local land uses and land use plans.
- Key Project for Integrating Renewables: Gem will provide rapid-response delivery of energy and synchronous condenser voltage support services that are essential to provide reliability support and stability to the grid and integrate intermittent renewable energy sources into the electrical grid.
- Substantial Construction Jobs: Gem will provide approximately 200-550 construction jobs (average to peak) with an expected construction payroll of between $450-500 million over the 63-month construction and commissioning period.
- Permanent Local Jobs: Gem will provide between 30-40 full time jobs for operation of the facility.
- Substantial Property Tax Revenue to Kern County and Local Schools: With its sizeable capital cost (estimated to range between $950 million - $1.05 billion), Gem will generate significant income in the form of annual property tax payments, and therefore, will provide a robust boost to the Kern County economy and local schools.
- Local Economic Benefits: In addition to the direct employment benefit, the Gem project will require and use the services of local or regional firms for major maintenance and overhauls, plant supplies, and other support services throughout the life of the Gem facility. The Gem project will not significantly impact local housing, educational, or emergency response resources.
- Supportive Community Participant: GEM A-CAES LLC is committed to working collaboratively with the local community and the County to be a beneficial contributor to community programs and to earn recognition as an active and supportive community participant.

1.5 Project Operation

The Gem project will be designed to operate 24 hours per day, 7 days per week with an annual capacity factor of up to 85 percent. The facility will typically cycle between Charging Mode (compression/energy storage) lasting approximately 14 hours and Discharging Mode (decompression/power production) lasting 8hours at nameplate capacity. During Charging Mode electric power will be drawn from the grid (typically off-peak) to run five all-electric air compressors. Compressed air will be injected into a water-filled subterranean cavern displacing the cavern water upward into the hydrostatically compensating reservoir. Heat generated during the compression process will be recovered to heat water in a closed loop thermal storage system, with hot water stored in aboveground spherical tanks (spheres). Upon completion of the charging cycle, the system will be available to generate electricity. During the Discharge Mode, water from the hydrostatically compensating reservoir will be allowed to flow down into the subterranean cavern, displacing the stored compressed air which will be expanded in power turbines to generate electricity for up to 8 or more hours. Hot water recovered and stored in the aboveground spheres during the charging cycle will be used to reheat the expanding air at intermediate turbine stages to facilitate higher efficiency power generation. During the compression process, water vapor entrained in the compressed air will be condensed and recycled. Dry air exiting the power turbines will be discharged to the atmosphere through five stacks, one serving each power generation train. No fossil fuels will be required to operate the Gem project.

1.6 Project Ownership

- **Project Applicant, Owner and Operator**

GEM A-CAES LLC is the applicant, owner, and operator of the Gem project including all aboveground and underground power plant facilities, the onsite substation, and the interconnecting transmission line. GEM A-CAES LLC will be owned by Hydrostor, Inc. or its designated wholly owned subsidiaries.

Hydrostor is a private company based in Toronto, Canada, and the world's leading developer of utility-scale energy storage facilities deploying its proprietary Advanced Compressed Air Energy Storage (A-CAES) product.

- **Project Site Owner**

The Gem project will be located on an approximately 71-acre site consisting of two adjoining parcels as described in Section 1.2. The approximately 10-acre parcel assigned APN 315-081-01 is owned by Strickland Properties. The approximately 61-acre parcel assigned APN 315-081-09 is owned by Adbelhak Mahmoud. GEM A-CAES LLC has obtained site control of the 61-acre parcel by virtue of a long-term lease and is expecting to obtain site control for the 10-acre parcel.

1.7 Project Schedule

GEM A-CAES LLC is filing this AFC under the California Energy Commission's 12-month licensing process. Construction of the Gem project is expected to begin no later than 2nd Quarter 2023. Pre-operational testing of the power plant is expected to begin by 2nd Quarter 2028, and full-scale commercial operation is expected to begin by 3rd Quarter 2028.

1.8 Persons Who Prepared the AFC

Appendix 1C contains a listing of the persons involved in preparation of the AFC including their roles and responsibilities.