DOCKETED	
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Document Title:	Section 5_1_Air Quality_Gem Energy Storage Center
Description:	This section presents the methodology and results of an analysis performed to assess potential impacts of airborne emissions from the construction and operation of the Gem Energy Storage Center (GESC or Gem) and the Project's compliance with applicable air quality requirements.
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5.1 Air Quality

5.1.1 Introduction

This section presents the methodology and results of an analysis performed to assess potential impacts of airborne emissions from the construction and operation of the Gem Energy Storage Center (GESC or Gem) and the Project's compliance with applicable air quality requirements. The report was prepared following the Kern County Planning Department's Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports (Kern County 2006) and Eastern Kern Air Pollution Control District's (EKAPCD) Guidelines for Implementation of the California Environmental Quality Act (CEQA) (EKAPCD 1999).

Section 5.1.1 presents the introduction, applicant information, and the basic EKAPCD rules applicable to GESC. Section 5.1.2 presents data on the emissions of criteria and air toxic pollutants from GESC. Section 5.1.3 presents the Gem project description, both current and proposed. Section 5.1.4 presents emissions evaluation data. Section 5.1.5 discusses the best available control technology (BACT) evaluations for GESC. Section 5.1.6 presents the air quality impact analysis for GESC. Section 5.1.7 discusses the meteorological data selection process required to analyze the impacts of GESC. Section 5.1.8 presents applicable laws, ordinances, regulations, and standards (LORS). Section 5.1.8.1 presents specific LORS, Section 5.1.8.3 presents agency contacts, and Section 5.1.8.4 presents permit requirements and schedules. Section 5.1.9 contains references cited or consulted in preparing this section. Appendices 5.1A to 5.1G contain the emissions calculations, air quality impact analysis for construction and operation phases, regional emissions inventory data, and the mitigation strategy support data.

GESC will be a 500-megawatt (MW) (net) advanced compressed air energy storage (A-CAES) process that includes above-ground electric air compression and power generation equipment, an underground air storage cavern, heat exchangers, and two diesel fuel-fired internal combustion engines driving 5 MW emergency generators. A detailed description of the GESC is presented in Section 2, Project Description.

Air will be the dominant pathway for public exposure to chemical substances released by GESC. Emissions to the air will consist primarily of combustion by-products produced by internal combustion engines driving emergency generators. Potential health risks from combustion emissions will occur almost entirely by direct inhalation.

During construction, regulated air emissions will be emitted to the atmosphere due to combustion of fuel in reciprocating internal combustion engines (off-road and mobile sources), traffic on unpaved roads, bulldozing, wind erosion, grading, and material movement.

During normal operation, GESC will not routinely operate combustion units or emit regulated pollutants to the atmosphere. Regulated emission of air pollutants will only occur from the stationary internal combustion engines for maintenance and readiness testing or in the emergency event of a fire or power outage. Only one engine is required to support critical loads; the second engine is redundant and only one engine is assumed to operate at any given time.

5.1.2 Regulatory Items Affecting New Source Review

Regulated air emissions from Gem operations will not exceed federal major source thresholds under nonattainment New Source Review (NSR) or Prevention of Significant Deterioration (PSD) and, therefore, federal NSR will not apply to this project. Because nonattainment NSR does not apply, emission offsets are not required.

The Gem project site is located in an area that is considered severe nonattainment for 8-hr ozone (2008), moderate nonattainment for 8-hr ozone (2015), and serious nonattainment for PM-10 (1987) (EKAPCD. 2017 Ozone Attainment Plan).

Eastern Kern APCD has an NSR process with lower limits than the federal program which is organized into New Stationary Source Review (NSSR) under APCD Rule 210.1 and Major New Stationary Source Review (MNSSR) under APCD Rule 210.1A.

NSSR identifies a “major” source to have potential emissions at or above 50 tons per year of any affected pollutant. The GESC potential emissions will not exceed this major source level. The NSSR process requires the following considerations:

- Emission units must meet Best Available Control Technology (BACT). BACT will be met by purchasing engines that conform to the United States Environmental Protection Agency (EPA) Tier 4 emission standards and combust diesel fuel that contains no more than 15 parts per million ppm sulfur.
- The operation of the GESC will not require air emission offsets because all proposed emission units that are defined as “emergency equipment” and under APCD Rule 210.1(III)(B)(2)(a), emission offsets are not required for emergency equipment not operated more than 200 hours per year.

MNSSR only applies to sources identified as “major” which is defined as a new source that has potential emissions at or above 100 tons per year of any affected pollutant. Operations at the GESC will not be a major source and are not subject to the requirements of MNSSR.

The GESC will include two reciprocating internal combustion engines that will vent regulated pollutants to the atmosphere and must obtain an air permit to construct and operate. The following steps summarize the air permitting process:

- Gem A-CAES LLC (Gem LLC) will prepare and submit an authority to construct application (one application for each engine). Each application will include APCD forms PER-01, CEQA, and PER-07.
- EKAPCD will issue an authority to construct
- The authorized emission units can be constructed and commissioned
- GEM LLC will prepare and submit an “intent to use” on APCD form PER-04
- The APCD will schedule an inspection and subsequently issue a permit to operate allowing commercial operation of the authorized emission units.

To date the applicant has yet to obtain the air construction or operating permits described above. It is anticipated that the process to obtain the air permits will begin approximately 1 year before the desired construction date.

The proposed emission units will likely use catalytic oxidation and/or selective catalytic reduction to meet Tier 4 standards. These control technologies are an integral part of the engine and cannot be bypassed by the operator and so they are considered integral to the emission unit and are therefore not considered to be add-on pollution control equipment.

The direct construction and operation emissions impacts associated with the Project are analyzed according to APCD and California Energy Commission (CEC) modeling requirements. An air quality analysis was conducted to demonstrate that impacts from nitrogen oxides (NOx), carbon monoxide (CO), sulfur dioxide ($SO_{2)}$, particulate

matter (PM)10, and PM2.5 will comply with the California and National Ambient Air Quality Standards (CAAQS/NAAQS) for the applicable averaging periods. Impacts from nearby sources are not anticipated to be significant but will be assessed for criteria pollutants under separate cover if requested by EKAPCD or the CEC. The need for a cumulative source analysis will be assessed after the CEC data adequacy review. A search of the California Air Resource Board (CARB) Pollution Mapping Tool shows that the closest tracked source is a cement plant located approximately 9 miles to the north-northwest of the GESC; this is outside of the CEC's suggested radius of 6 miles to consider nearby sources, therefore, no cumulative air quality modeling protocol is provided in this study.

Worst-case annual emissions for operation are summarized in Table 5.1-1.

Table 5.1-1: Facility PTE Summary and Major Source/Attainment Status for Operation

Pollutant	Gem PTE (tpy)	Federal Attainment	State Attainment	APCD Rule 210.1 Major Source Threshold (tpy)	APCD Rule 210.1A Major Source Threshold (tpy)	Federal NA NSR Major Source Threshold (tpy)	Federal PSD Major Source Threshold (tpy)
NOx	0.825	Y	Y	50	50 (severe for ozone)	50 (severe for ozone)	250
CO	4.289	Y	Y	50	100	N/A	250
VOC	0.947	N/A	N/A	50	50 (severe for ozone)	50 (severe for ozone)	250
SO_2	0.009	Y	Y	50	100	N/A	250
PM10	0.033	N, serious	N, serious	50	70 (serious for PM10)	70 (serious for PM10)	250
PM2.5	0.033	Y	Y	50	100	N/A	250
GHG (CO_2e)	777.09	N/A	N/A	N/A	N/A	N/A	75,000
Ozone	N/A	N, severe	N, severe	N/A	N/A	N/A	N/A

Note: Greenhouse Gas (GHG) can only be a major source under PSD if another regulated pollutant is major for PSD.

tpy = tons per year; APCD = air pollution control department; N/A = not applicable; NSR = new source review; SD = prevention of significant deterioration; NOx = nitrogen oxides; CO = carbon monoxide; VOC = volatile organic compounds; SO_2 = sulfur dioxide; PM10 = particulate matter less than 10 microns; PM2.5 = particulate matter less than 2.5 microns; GHG (CO_2e) = greenhouse gas.

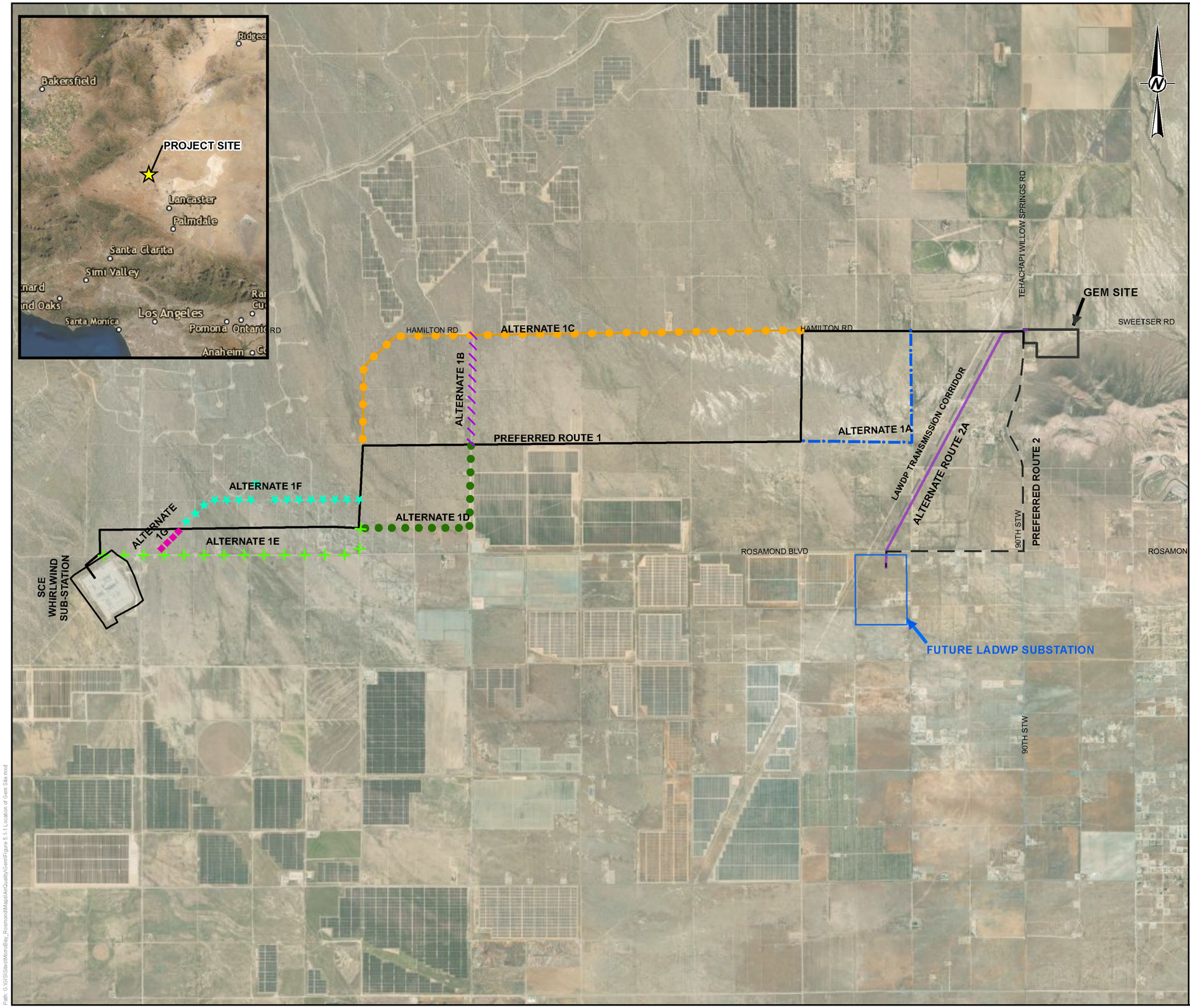
Source: Attainment Status (EKAPCD 2018)

5.1.3 Project Description

The following sections describe the project.

5.1.3.1 Gem Site Location

The GESC will be in Kern County at the intersection of Sweetser Road and Tehachapi Willow Spring Road to the northeast of Willow Springs, California within the Eastern Kern Air Pollution Control District.
Figure 5.1-1 shows the Gem site and immediate vicinity.



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
- LAWDP TRANSMISSION CORRIDOR
- LADWP ROSMOND 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
LOCATION OF GEM SITE

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-09-19
PREPARED	MR
DESIGN	MR
REVIEW	GW
APPROVED	GW

PROJECT No. 20449449 | CONTROL --- | Rev. --- | FIGURE **5.1-1**

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

Path: G:\GIS\Sites\MonoBay_Rosmond\Maps\AirQuality\Gem\Figure 5.1-1 Location of Gem Site.mxd

5.1.3.2 Project Equipment Specifications

The GESC will consist of the following major equipment and operation:

- Two up to 5 MW diesel-fired internal combustion engines driving generators for emergency use (only one engine will operate at a given time)

All power from the facility will be delivered to either the Southern California Edison Whirlwind substation or to a proposed Los Angeles Department of Water and Power Rosamond substation.

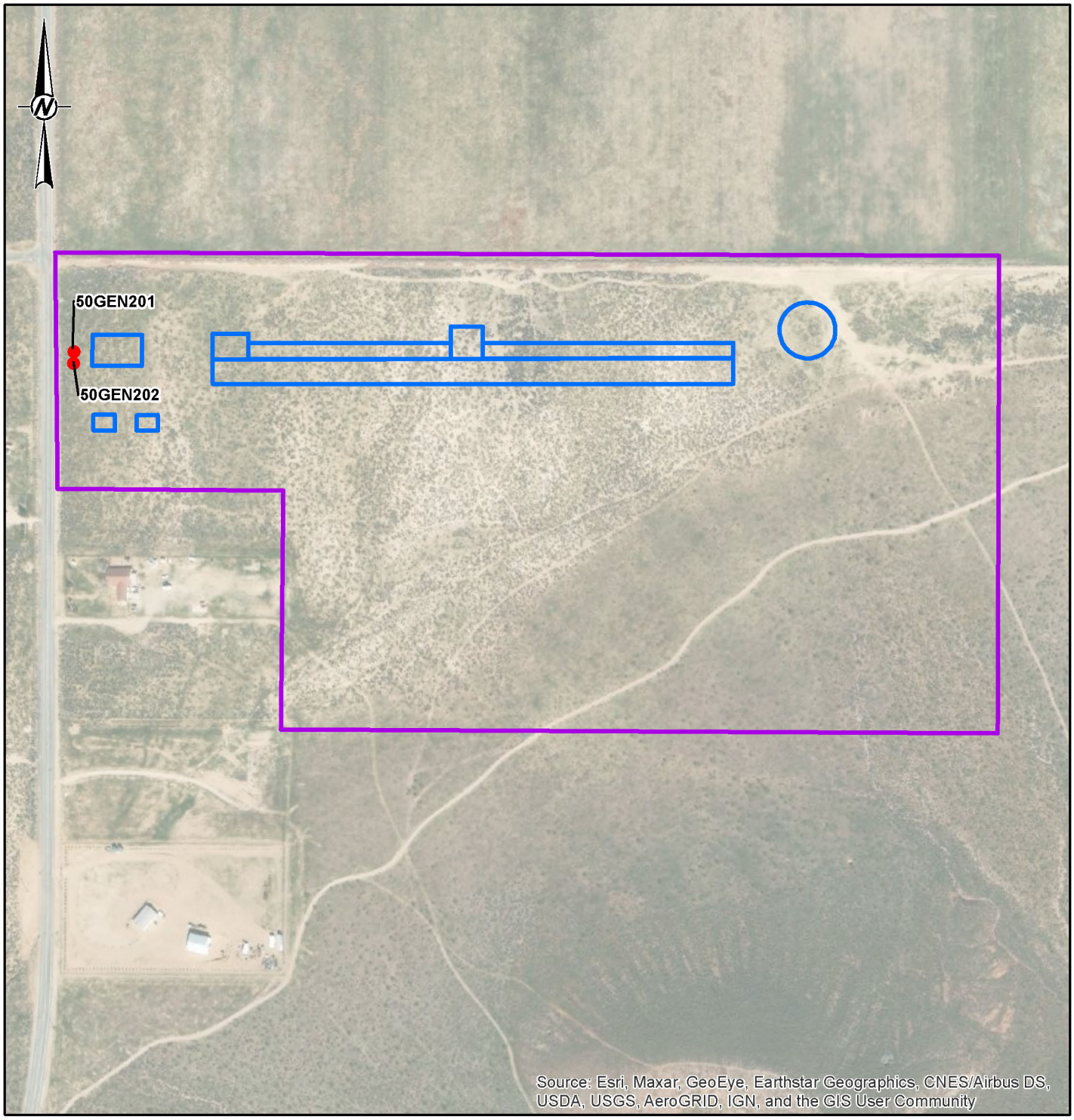
Equipment specifications are summarized in Table 5.1-2.

Table 5.1-2: Equipment Specification

Parameter	Two identical Emergency Diesel Generators
Manufacturer	Caterpillar
Model	Standby DM5417-06
Engine Power	5,580 bkW
Fuel	Ultra-low sulfur diesel
Maximum Fuel Consumption	197.3 g/bkw-hr
Annual Limits	200 hours per year
Exhaust flow, acfm	42,896.7
Exhaust temperature, Fahrenheit (°F)	718.5

bkW = brake kilowatt; G/bkw-hr= grams per brake kilowatt-hour; acfm = actual cubic feet per minute; °F= Fahrenheit
Source: Caterpillar Technical Specifications (CAT 2012)

During the operational phase, the diesel generators will supply emergency power for critical loads. These generators are the only stationary sources that will combust fossil fuel and are anticipated to operate for 50 hours (each) per year for testing and maintenance but will be limited to 200 hours per year each in an air permit. This analysis includes emissions from the operation of the two emergency diesel generators. Table 5.1-3 provides the location and source characteristics for each generator stack. Figure 5.1-2 shows the site property boundary and location of the two emission sources.



LEGEND

- POINT SOURCE
- STRUCTURE
  ONLY STRUCTURES THAT CAN HAVE INFLUENCE AIR DISPERSION FROM POINT SOURCES WERE INCLUDED IN THE MODEL
- GEM SITE - PROPERTY BOUNDARY

0 500 1,000
Feet

CLIENT
HYDROSTOR, INC

REFERENCE(S)
COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET

PROJECT
GEM ENERGY STORAGE CENTER

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	9/27/2021
DESIGNED	MR
PREPARED	MR
REVIEWED	MS
APPROVED	DS

TITLE
LOCATION OF GEM EMISSION SOURCES DURING OPERATION PHASE

PROJECT NO.	CONTROL	REV.	FIGURE
20449449	–	–	**5.1-2**

Table 5.1-3: Emission Unit Specification

Source ID	Description	UTM Easting Coordinate (m)	UTM Northing Coordinate (m)	Stack Height from grade (ft)	Stack Inside Diameter (ft)	Stack Elevation (m)	Exhaust Gas Temperature (°F)	Exhaust Gas Flowrate (actual cfm)	Exhaust Velocity (m/s)
50GEN201	Emergency Diesel Generator 5MW	382,048.8	3,861,827.2	20.0	1.5	799.6	718.5	7525	123.3
50GEN202	Emergency Diesel Generator 5MW	382,048.4	3,861,817.5	20.0	1.5	799.5	718.5	7692	123.3

Coordinate datum = UTM Zone 11, NAD83 North.

m = meters, f = feet, °F = Fahrenheit, cfm = cubic feet meters, m/s = meters per second.

Source: TWD (August 2021), and Caterpillar Technical Specifications (CAT 2012).

5.1.3.2.1 Fuels

Fuel use at the GESC will be limited to ultra-low sulfur diesel fuel. For this application, diesel fuel is assumed to have a heating value of 137,000 (British Thermal Units per gallon (Btu/gallon) as referenced in the calculations. (Appendix 5.1A and 5.1B)

5.1.4 Emissions Evaluation

5.1.4.1 Facility Emissions and Permit Limitations

The approximate 71-acre proposed Gem site is currently vacant and there are no current air pollution sources. Figure 5.1-1 shows the Gem site and immediate vicinity.

5.1.4.2 Facility Emissions

Operation of the GESC will not result in stationary source emissions greater than 250 tpy for any criteria pollutants, as such, the GESC will be considered a minor NSR source for NOx, CO, VOC, and PM10/PM2.5 under the federal regulations. The GESC will not trigger the requirements of the Federal PSD program since the emissions of one or more criteria pollutants will not exceed the 250 tpy major source applicability thresholds. The facility is expected to be a minor source under the APCD NSR rules. Criteria pollutant emissions from the emission units are presented in the following sections, while emissions of hazardous air pollutants are presented in Section 5.9, Public Health. Detailed calculations for criteria air pollutant emission calculations are provided in Appendix 5.1A.

Hourly, daily, and annual emissions for criteria pollutants are based upon the highest emissions for each pollutant considering that the emission units are classified as emergency use and are limited to 200 hours per year of operation.

5.1.4.3 Normal Operations

Operation of the emergency engines at GESC will result in emissions to the atmosphere of both criteria and toxic air pollutants. Criteria pollutant emissions will consist primarily of NOx, CO, VOCs, SOx, PM10, PM2.5, and CO_2e. Air toxic pollutants will consist of a combination of hazardous air pollutants and other compounds which are commonly generated from the combustion of fuel. Table 5.1-4 lists the pollutants that may potentially be emitted from GESC. Other than the operation of the generators for testing and maintenance, there are no additional significant sources of air emissions from the maintenance of the GESC. Commissioning of emergency generators is not anticipated to take a significant amount of time and will result in emissions that are characteristically like normal operation; no air emission testing is anticipated for commissioning.

Table 5.1-4: Chemical Substances Potentially Emitted to the Air from the GESC

Criteria Pollutants	Greenhouse Gasses	Other Compounds	
Particulate Matter (PM)	Carbon Dioxide (CO_2)	Acenaphthene Acenaphthylene Acetaldehyde Acrolein Anthracene Benzo(a)anthracene Benzene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,l)perylene Benzo(k)fluoranthene Chrysene	Dibenz(a,h)anthracene Fluoranthene Fluorene Formaldehyde Indeno(1,2,3-cd)pyrene Naphthalene Phenanthrene Propylene Pyrene Toluene Xylene
PM less than 10 microns (PM10)	Methane (CH_4)		
PM less than 2.5 microns (PM2.5)	Nitrous Oxide (N_2O)		
Carbon Monoxide (CO)			
Nitrogen Oxides (NOx)			
Volatile Organic Compounds (VOC)			

PM = particulate matter; CO_2 = Carbon Dioxide; CH_4 = Methane; PM10/PM 2.5 = particulate matter less than 10 or less than 2.5 microns; N_2O = Nitrous Oxide; CO = carbon monoxide; NOx = Nitrogen Oxides

Source: Section 5.1, Air Quality, Appendix 5.1A, and 5.1B, and Section 5.9, Public Health, Appendix 5.9C

5.1.4.4 Criteria Pollutant Emissions

Table 5.1-5 presents a summary of the maximum short-term and annual criteria pollutant emissions for the worst-case operational scenario during operation. Detailed calculations for criteria air pollutant emission calculations for operation are provided in Appendix 5.1A.

Table 5.1-5: Facility Maximum Emission Rate and PTE Summary for Operation of One Generator

Pollutant	Maximum Emission Rate (lb/hr)	Potential to Emit (tpy)
NOx	8.25	1.650
CO	42.892	8.578
VOC	9.472	1.894
SO_2	0.091	0.018
PM10	0.330	0.066
PM2.5	0.330	0.066
GHG (CO2e)	7,770.88	1,554.18

Note(s): Emissions in the table represent one generator, both generators are identical. Only one generator will operate at a time, but both generators are assumed to operate 200 hours per year.

lb/hr = pound per hour; tpy = tons per year; NOx = nitrogen oxides; CO = carbon monoxide; VOC = volatile organic compounds; SO_2 = sulfur dioxide; PM10/PM 2.5 = particulate matter less than 10 or less than 2.5 microns; GHG (CO_2e) = greenhouse gas

Source: Section 5.1, Air Quality, Appendix 5.1A.

5.1.4.4.1 GHG Emissions

GHG emissions have been estimated for both the Construction and Operation Phases of the GESC. Table 5.1-5 of Section 5.1.4.4 presents the GHG emissions for Operation. Appendix 5.1C shows the GHG emissions for on and off-site Construction.

5.1.4.5 Hazardous Air Pollutants

See Section 5.9, Public Health, for a detailed discussion and quantification of hazardous air pollutant (HAP) emissions from the GESC and the results of the health risk assessment (HRA).

5.1.4.6 Construction

The construction phase of the Gem is expected to take approximately 63 months (followed by several months of start-up and commissioning). Construction-related emissions are based on the 12-month period during the construction process which has activities that will produce the highest emissions. Construction emissions at the Gem site are consistent with emissions encountered at most construction sites including:

- Combustion of fuel in vehicles onsite (direct)
- Fugitive dust from vehicle travel on unpaved roads onsite (direct)
- Fugitive dust from wind erosion, land clearing, and material movement onsite (direct)
- Combustion of fuel in vehicles and equipment offsite (indirect)
- Fugitive dust from vehicle travel on paved and unpaved roads offsite (indirect)

Detailed construction emissions used to establish construction related impacts are in Appendix 5.1B.

Emissions used in annual dispersion models are based on the worst-case consecutive 12-month period, which was identified as months 18 through 29. Some construction activities that occur in a given month do not occur in all 12 months, so emissions used in dispersion models with 24-hour and shorter averaging periods were entered for the two worst-case individual months, which were identified as months 18 and 26. The worst-case month was chosen to represent the modeled ambient air concentration. Additional details are contained in Appendix 5.1C.

The applicant commits to the incorporation of the following for this site as described in the air pollutant mitigation measures for construction sites for EKAPCD:

- Land Preparation, Excavation and/or Demolition Activities
  - All soil excavated or graded should be sufficiently watered to prevent excessive dust. Watering should occur as needed with complete coverage of disturbed soil areas. Watering should, performed at a minimum of twice daily on unpaved/untreated roads and on disturbed soil areas with active operations.
  - All clearing, grading, earth moving, and excavation activities should cease
    - during periods of winds greater than 20 miles per hour mph (averaged over one hour), if disturbed material is easily windblown, or
    - when dust plumes of 20 percent or greater opacity impact public roads, occupied structures, or neighboring property.

- All fine material transported offsite should be sufficiently watered or securely covered to prevent excessive dust.
- If more than 5,000 cubic yards of fill material will be imported or exported from the site, all haul trucks should be required to exit the site via an access point where a gravel pad or grizzly has been installed.
- Areas disturbed by clearing, earth moving, or excavation activities should be minimized at all times.
- Stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust.

- Where acceptable to the fire department, weed control should be accomplished by mowing instead of discing, thereby, leaving the ground undisturbed and with a mulch covering.
- Building Construction Activities
  - Once initial leveling has ceased, all inactive soil areas within the construction site should either be seeded and watered until plant growth is evident, treated with a dust palliative, or watered twice daily until soil has sufficiently crusted to prevent fugitive dust emission.
  - All active disturbed soil areas should be sufficiently watered to prevent excessive dust, but no less than twice per day.
- Vehicular Activities
  - Onsite vehicle speed should be limited to 15 mph.
  - All areas with vehicle traffic should be paved, treated with dust palliatives, or watered a minimum of twice daily.
  - Streets adjacent to the project site should be kept clean and accumulated silt removed.
  - Access to the site should be by means of an apron into the project from adjoining surfaced roadways. The apron should be surfaced or treated with dust palliatives. palliatives If operating on soils that cling to the wheels of the vehicles, a grizzly or other such device should be used on the road exiting the project, immediately prior to the pavement, to remove most of the soil material from the vehicle's tires.
  - Properly maintain and tune all internal combustion engine powered equipment.
  - Require employees and subcontractors to comply with California's idling restrictions for compression ignition engines.
  - Use low sulfur (CARB) diesel fuel.

Based on the temporary nature, and the time frame for construction, these measures will reduce construction emissions and impacts to levels that are less than significant. Appendix 5.1C presents the evaluation of construction related emissions as well as data on the construction related ambient air quality impacts.

Guidelines for Implementation of CEQA for EKAPCD dated July 11, 1996, identifies those projects meeting the following requirements are determined to not have a significant impact as defined by CEQA Section 21068:

1) Emit less than nonattainment offset triggers of:
    a. NOx – 25 tpy
    b. VOCs – 50 tpy
    c. PM10 – 70 tpy
2) Emit less than 137 pounds per day of NOx or Reactive Organic Compounds from motor vehicle trips (indirect sources only)
3) Not cause or contribute to an exceedance of any CAAQS or NAAQS
4) Not exceed the EKAPCD health risk public notification thresholds (See Section 5.9, Public Health)
5) Be consistent with adopted federal and state air quality attainment plans

Construction emissions, from onsite and offsite activities are not expected to exceed the EKAPCD CEQA significant impact thresholds. Mitigations typically imposed by the CEC as well as the construction modeling analysis indicates these emissions, as well as emissions from other criteria pollutants, will result in less than significant impacts to air quality.

This project will not require a federal air permit does not require the Federal Government to engage in, support in any way or provide financial assistance for, license or permit, or approve this project, therefore; the provisions of general conformity under 40 CFR Part 93 Subpart B and EKAPCD Rule 210.7 do not apply to the GESC.

5.1.5 Best Available Control Technology Evaluation

5.1.5.1 Current Control Technologies

BACT will be met by purchasing engines certified to meet EPA Tier 4 emissions for the applicable size and type of engine. Based on the proposed engines for Gem operation, the following emission limits must be met (Bay Area Air Quality Management District BACT Guideline):

- NOx ≤ 0.5 grams per brake horsepower-hour (g/bhp-hr)
- SO2: combust diesel fuel with a sulfur content no greater than 15 ppm
- CO ≤ 2.6 g/bhp-hr
- PM ≤ 0.02 g/bhp-hr
- Non-Methane Hydrocarbons (NMHC) ≤ 0.14 g/bhp-hr

5.1.5.2 Proposed Best Available Control Technology

The emergency generators installed at GESC will conform to EPA Tier 4 emission standards noted in the previous section. Meeting BACT is considered appropriate mitigation for emissions for emergency generators. The EKAPCD permit that will be required for construction and operation of these generators will include conditions/monitoring requirements such as logging hours of operation, keeping records of sulfur content of the

fuel combusted, and performing manufacturer-recommended maintenance to verify that the emissions are mitigated.

5.1.6 Air Quality Impact Analysis

This section describes the results, in both magnitude and spatial extent of ground level concentrations resulting from emissions from GESC. The maximum-modeled concentrations were added to the maximum background concentrations to calculate a total impact.

Dispersion modeling methods follow EPA approved methods established in 40 CFR Part 51 Appendix W. Detailed description of the air modeling process, model options and parameters are presented in Appendix 5.1D. Modeling input and output files have is presented in Appendix 5.1E (electronic modeling files on CD-ROM). It will be provided to the APCD and CEC Staff under separate cover.

5.1.6.1 Climate and Meteorology

The climate of the area surrounding the GESC is influenced by the local terrain and geography. The terrain surrounding GESC is relatively flat with some local elevated areas including Willow Springs Butte immediately to the southeast. The southern end of the Sierra Nevada Mountain Range is located approximately 20 kilometers (km) to the northwest. Summers are hot, arid, and clear. Winters are cold and partly cloudy. The average high temperatures range from 98°F in the summer to 56°F in the winter, and average low temperatures range from 69°F in the summer to 33°F in the winter. The area is arid with the wetter season occurring from the end of November to the beginning of April. The dew point generally does not exceed 60°F. Wind is most often out of the west and averages between 7.1 and 9.7 mph (weatherspark). More specific details on wind direction are presented in the wind rose in Appendix 5.1D. Meteorological data obtained from the CARB website for Mojave Airport is representative of the Gem site and was used in the air quality modeling analyses (See Appendix 5.1E).

5.1.6.2 Dispersion Modeling

The AERMOD model (version 21112) was used to estimate ground level concentrations for the GESC. Base elevations and receptor hill heights were determined using USGS Digital Elevation Map data with a resolution of 1 arcsecond and processed using AERMAP (version 18081). Building downwash was included in the model and processed using Building Profile Input Program (BPIP) version 04274. The purpose of the AERMOD modeling analysis was to evaluate compliance with the Significant Impact Levels SILs and/or CAAQS and NAAQS.

AERMOD is a steady-state plume dispersion model that simulates transport and dispersion from multiple point, area, or volume sources based on updated characterizations of the atmospheric boundary layer. AERMOD uses Gaussian distributions in the vertical and horizontal for stable conditions, and in the horizontal for convective conditions; the vertical distribution for convective conditions is based on a bi-Gaussian probability density function of the vertical velocity. For elevated terrain AERMOD incorporates the concept of the critical dividing streamline height, in which flow below this height remains horizontal, and flow above this height tends to rise over terrain. The PRIME algorithm is used to account for building wake effects.

AERMOD input data options will be set to default. The “rural” option was selected for the modeling as the predominant land use around the Gem site because the area within 3 km is less than 50 percent medium and high intensity land use based on a visual observation of aerial photos.

Default model options for temperature gradients, wind profile exponents, and calm processing, which includes final plume rise, stack-tip downwash, and elevated receptor (complex terrain) heights option (AERMOD Implementation Guide).

5.1.6.2.1 NO_2 Modeling Procedures

All NO_2 concentrations were estimated using the Ambient Ratio Method Version 2 (ARM2), which is a regulatory default option and commonly used in practice. The default minimum NO_2/NOx conversion ratio of 0.5 and maximum conversion ratio of 0.9 were used for both 1-hr and annual averaging periods.

5.1.6.3 Additional Model Selection

Additional models/programs described below were used to quantify pollutant impacts on the surrounding environment based on the emission sources operating parameters and their locations.

- The Building Profile Input Program for PRIME (BPIP-PRIME, current version 04274) was used to incorporate the concepts and procedures expressed in the Good Engineering Practice (GEP) technical support document by incorporating building downwash and projected building widths.
- HARP Air Dispersion Modeling and Risk Tool (version 21081) was used to estimate human health risks related to cancer, chronic non-cancer, and acute health effects. More discussion about HARP is contained in Section 5.9, Public Health.

5.1.6.4 Good Engineering Practice Stack Height Analysis

Good Engineering Practice (GEP) stack height represents the stack height above which the associated building does not influence the plume and is estimated as the greater of 65 meters or the height based on EPA formulas for the various onsite and offsite structures and their locations and orientations to the GESC stacks. GEP stack heights were calculated for each proposed stack and were all such that building downwash will be applied to the stacks.

BPIP-PRIME was used to generate the wind-direction-specific building dimensions for input into AERMOD. Figure 5.1-2 shows the structures included in the BPIP-PRIME downwash analysis.

5.1.6.5 Receptor Grid Selection and Coverage

Receptor, building, and source base elevations and receptor hill heights were determined from the U.S. Geological Survey (USGS) National Elevation Dataset (NED) using 1-arcsecond (approximately 30-meter) spacing. All coordinates were referenced to Universal Transverse Mercator (UTM) North American Datum 1983 (NAD83), Zone 11. The NED files used with AERMAP extended beyond the receptor grid boundaries as appropriate for calculating the hill slope factors.

Cartesian coordinate receptor grids are used to provide adequate spatial coverage surrounding the Gem area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations. The receptor grids used in this analysis are listed below.

- Receptors were placed along the proposed GESC ambient boundary (fence line) with 10-meter spacing.
- Receptors extending outwards from the ambient boundary in all directions at least 500 meters from with 50-meter receptor spacing.
- Receptors extending from 500 meters to 2 kilometers with 100-meter spacing.
- Receptors extending from 2 kilometers to 5 kilometers with 200-meter spacing.
- Receptors extending from 5 kilometers to 10 kilometers with 500-meter spacing.

In addition, sensitive and residential receptors in the vicinity of Gem were located as describe below:

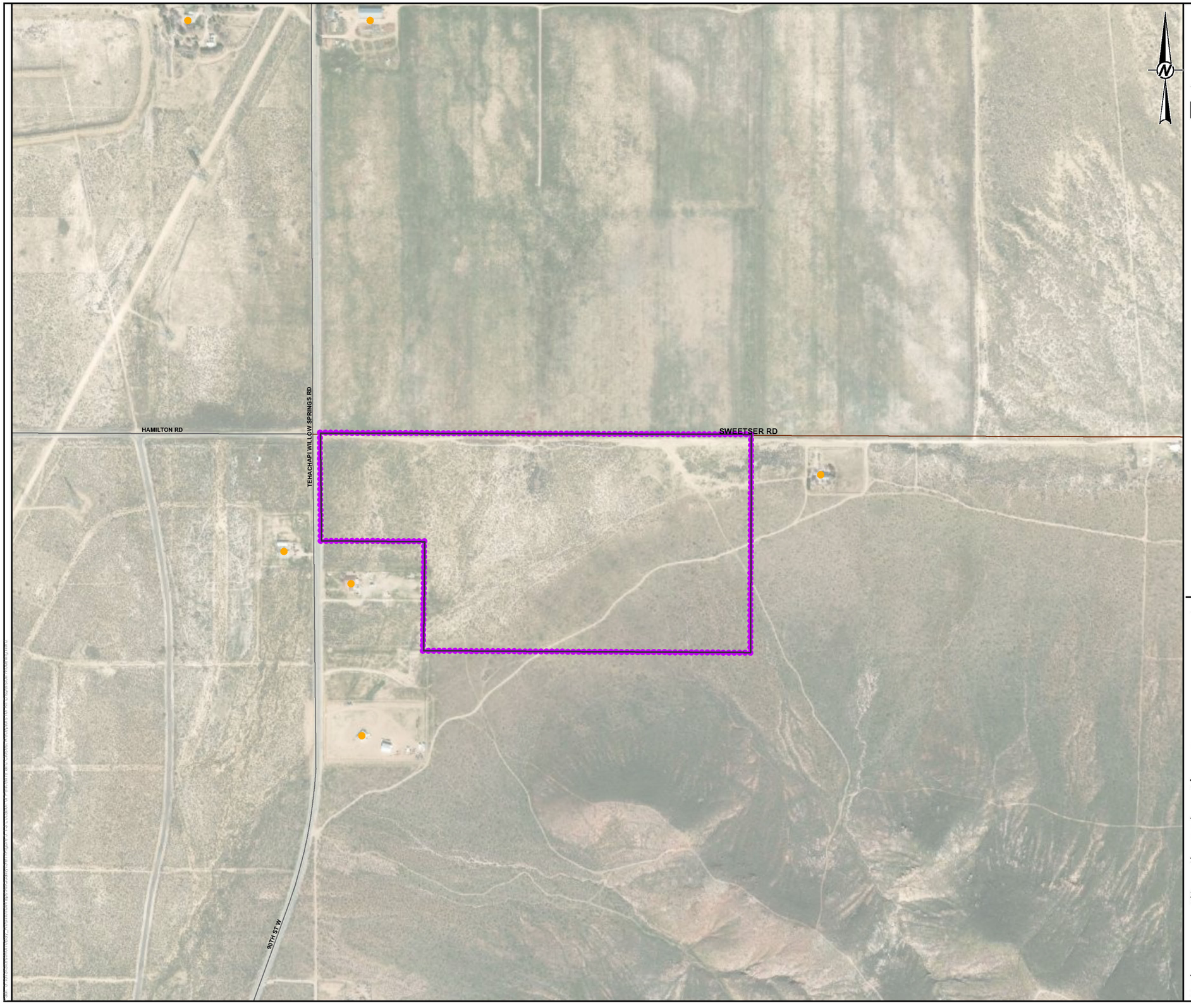
- Sensitive Receptors: Sensitive receptors were placed where the population is potentially more susceptible to adverse effects from emitted pollutants. Sensitive receptor locations include schools [kindergarten through grade 12 (K-12)], daycare centers, nursing homes, retirement homes, health clinics, hospitals, playgrounds, and athletic facilities. Twenty-two sensitive receptors were identified within 10 kilometers of the GESC. The nearest sensitive receptor SR-GEM-21 (Walt James Stadium) is approximately 1.6 miles from the GESC site.
- Residential Receptors: Discrete receptors were located at the nearest residences to Gem site. Google Maps was used to identify the locations of residential receptors. The nearest residential receptor is RD-GEM-06 located approximately 70 meters from the property line of the GESC.

A total of 7,905 receptors were included in one combined AERMOD run. Table 5.1-6 shows the distribution of the four types of receptors mentioned above.

Table 5.1-6: Air Dispersion Modeling Receptors

Receptor #	ID	Type of Receptor	Number of Receptors
1 to 22	SR-GEM-01 to SR-GEM-22	Sensitive Receptors	22
23 to 157	RD-GEM-01 to RD-GEM-135	Residential Receptors	135
158 to 402	FC-GEM-01 to FC-GEM-245	Ambient Boundary Receptors	245
403 to 7905	GR-GEM-01 to GR-GEM-7503	Grid Receptors	7,503

Concentrations within the ambient boundary are not estimated. Figures 5.1-3 and 5.1-4 display the receptor grids used in the modeling assessment within a 10km radius of the site. All receptors included in this analysis are presented in Appendix 5.1F.



LEGEND

- RESIDENTIAL RECEPTORS
- FENCELINE RECEPTORS
- ROAD
- GEM SITE

NOTES

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0 500 1,000 Feet

REFERENCE

COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET

CLIENT
HYDROSTOR, INC.

PROJECT
GEM ENERGY STORAGE CENTER

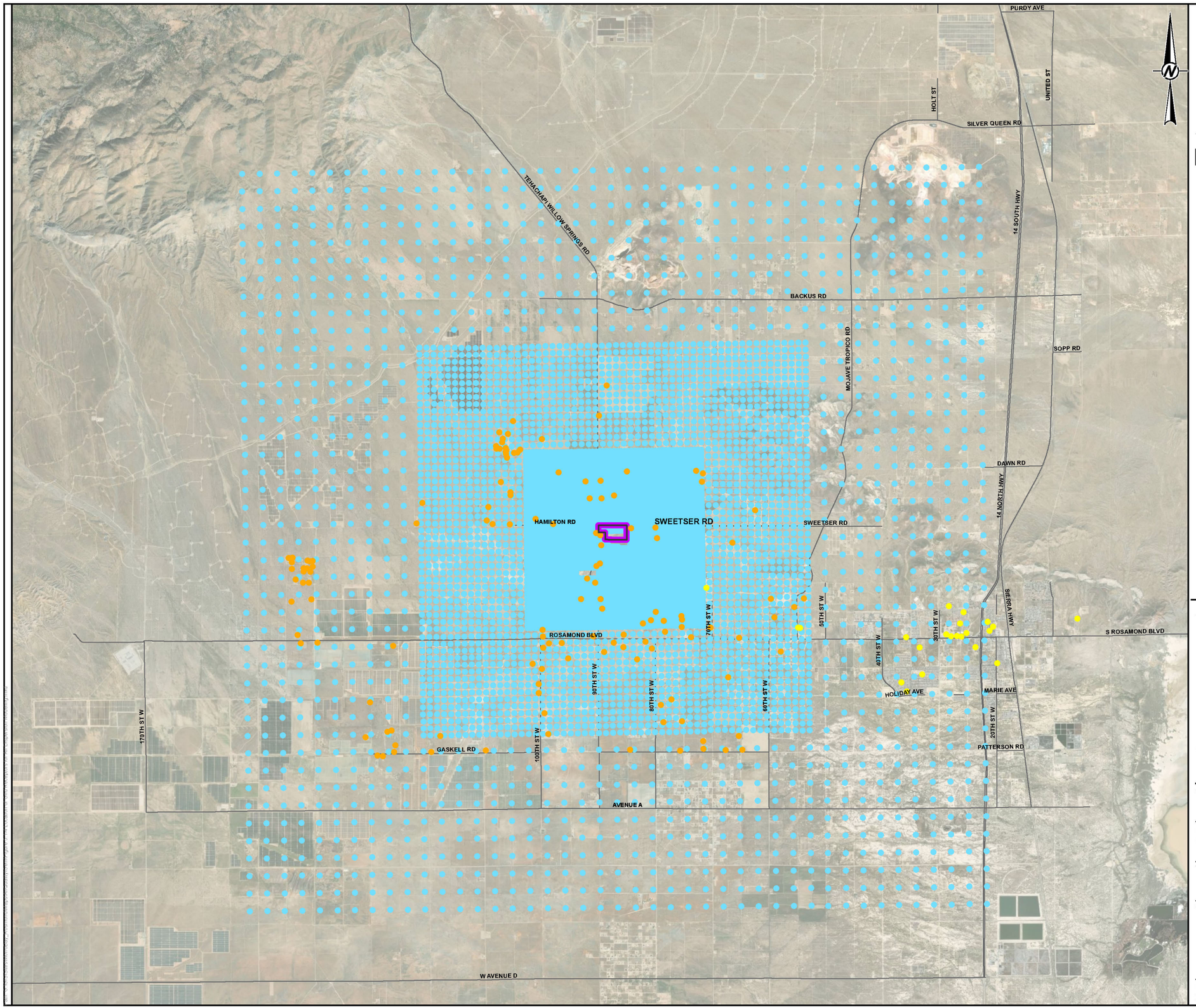
TITLE
LOCATION OF FENCELINE AND CLOSEST RECEPTORS FOR AIR DISPERSION MODELING

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-09-14
PREPARED	MR
DESIGN	MR
REVIEW	DH
APPROVED	DH

PROJECT No.	CONTROL	Rev.	FIGURE
20449449	---	---	**5.1-3**

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



LEGEND

- SENSITIVE RECEPTORS
- RESIDENTIAL RECEPTORS
- FENCELINE RECEPTORS
- GRID RECEPTORS
- ROAD
- GEM SITE

NOTES

--

0 5,000 10,000 Feet

REFERENCE

COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET

CLIENT
HYDROSTOR, INC.

PROJECT
GEM ENERGY STORAGE CENTER

TITLE
LOCATION OF GRID RECEPTORS FOR AIR DISPERSION MODELING

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-09-14
PREPARED	MR
DESIGN	MR
REVIEW	DH
APPROVED	DH

PROJECT No. 20449449 | CONTROL --- | Rev. --- | FIGURE **5.1-4**

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

5.1.7 Meteorological Data Selection

The proposed GESC site is in southeastern Kern County in the Eastern Kern APCD. GESC is about 70 miles from the Pacific Ocean in the northern end of the Antelope Valley in the westernmost part of the Mojave Desert. Terrain surrounding the GESC is mostly flat or rolling and gradually increases toward the north and west. Locally there is an elevated landmass (Willow Springs Butte) to the southeast of the GESC. The Sierra Nevada Mountain Range is approximately 12 miles to the northwest of the GESC. Land use characteristics along with terrain considerations were considered to determine which meteorological and air quality data set is most representative of the project area.

Meteorological data used for this model was obtained from the CARB. The data set represents surface data for the period 2009-2013 collected at the Mojave Airport which is located at a base elevation of 849.5 meters and approximately 21 km to the northeast of the GESC. This location was selected due to proximity and similar surface terrain. The surface and upper air data were processed by CARB using AERMET version 14134.

5.1.7.1 Background Air Quality

In 1970, the U.S. Congress instructed EPA to establish standards for air pollutants, which were of nationwide concern. This directive resulted from the concern of the impacts of air pollutants on the health and welfare of the public. The resulting CAA set forth air quality standards to protect the health and welfare of the public. Two levels of standards were promulgated, primary standards and secondary standards. Primary NAAQS are “those which, in the judgment of the administrator [of EPA], based on air quality criteria and allowing an adequate margin of safety, are requisite to protect the public health (state of general health of community or population).” The secondary NAAQS are “those which in the judgment of the administrator [of EPA], based on air quality criteria, are requisite to protect the public welfare and ecosystems associated with the presence of air pollutants in the ambient air.” To date, NAAQS have been established for seven criteria pollutants as follows: SO_2, CO, ozone, NO_2, PM10, PM2.5, and lead.

Criteria pollutants are those that have been demonstrated historically to be widespread and have a potential to cause adverse health effects. EPA developed comprehensive documents detailing the basis of, or criteria for, the standards that limit the ambient concentrations of these pollutants. The State of California has also established Ambient Air Quality Standards (AAQS) that further limit the allowable concentrations of certain criteria pollutants. Review of the established air quality standards is undertaken by both EPA and the State of California on a periodic basis. As a result of the periodic reviews, the standards have been updated and amended over the years following adoption.

Each NAAQS or CAAQS is comprised of two basic elements: a numerical limit expressed as an allowable concentration, and an averaging time that specifies the period over which the concentration value is to be measured. Table 5.1-7 presents the current standards.

Table 5.1-7: California and National Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS (form)	NAAQS (form)
Ozone	1-hr	0.09 ppm	N/A
Ozone	8-hr	0.07 ppm	0.07 ppm
PM10	24-hr	50 µg/m^3 (H1H)	150 µg/m^3 (H6H)
PM10	Annual	20 µg/m^3	N/A

Pollutant	Averaging Time	CAAQS (form)	NAAQS (form)
PM2.5	24-hr	N/A	35 µg/m^3 (98th percentile)
PM2.5	Annual	50 µg/m^3	12 µg/m^3 (3-year average)
CO	1-hr	20 ppm (H1H)	35 ppm (H2H)
CO	8-hrs	9.0 ppm (H1H)	9 ppm (H2H)
NO_2	1-hr	180 ppb (H1H)	100 ppb (98th percentile)
NO_2	Annual	30 ppb	53 ppb (3-year average)
SO_2	1-hr	250 ppb (H1H)	75 ppb (99th percentile)
SO_2	3-hrs	N/A	500 ppb (H2H)
SO_2	24-hrs	40 ppb (H1H)	N/A
SO_2	Annual	N/A	N/A
Lead	30-days	1.5 µg/m^3	N/A
Lead	3-months	N/A	0.15 µg/m^3
Sulfates	24-hr	25 µg/m^3	N/A
Hydrogen Sulfide	1-hr	0.03 ppm	N/A
Vinyl Chloride	24-hr	0.01 ppm	N/A

CAAQS = California Ambient Air Quality Standards; NAAQA = National Ambient Air Quality Standards; hr = hour; ppm = parts per million; PM10 = particulate matter less than 10 microns; µg/m^3 = micrograms per cubic meter; H1H = highest first high; N/A = not applicable; H6H = highest sixth high; PM2.5 = particulate matter less than 2.5 microns; CO = carbon monoxide; H2H = highest second high; NO_2 = nitrous oxide; ppb = parts per billion; SO_2 = sulfur dioxide.

Source: Ambient Air Quality Standards (CARB 2016)

Brief descriptions of health effects for the main criteria pollutants are as follows.

Ozone (O_3): Ozone is a reactive pollutant that is not emitted directly into the atmosphere, but rather is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving volatile organic compounds (VOC) and NOx. VOC and NOx are therefore known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources but is formed downwind of sources of VOC and NOx under the influence of wind and sunlight. Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. In addition to causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

Carbon Monoxide (CO): CO is a non-reactive pollutant that is a product of incomplete combustion. Ambient CO concentrations generally follow the spatial and temporal distributions of vehicular traffic and are also influenced by meteorological factors such as wind speed and atmospheric mixing. Under inversion conditions, CO concentrations may be distributed more uniformly over an area out to some distance from vehicular sources. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues.

This condition is especially critical for people with cardiovascular diseases, chronic lung disease or anemia, as well as fetuses.

Particulate Matter (PM10 and PM2.5): Both PM10 and PM2.5 represent fractions of particulate matter, which can be inhaled into the air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, combustion, and atmospheric photochemical reactions. Some of these operations, such as demolition and construction activities, contribute to increases in local PM10 concentrations, while others, such as vehicular traffic, affect regional PM10 concentrations.

The EPA acknowledges that particulate matter can potentially cause the following health effects: premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms.

Nitrogen Dioxide and Sulfur Dioxide: (NO_2 and SO_2)**:** NO_2 and SO_2 are two gaseous compounds within a larger group of compounds, NOx, and SOx, respectively, which are products of the combustion of fuel. NOx and SOx emission sources can elevate local NO_2 and SO_2 concentrations, and both are regional precursor compounds to particulate matter. As described above, NOx is also an ozone precursor compound and can affect regional visibility. (NO_2 is the “whiskey brown-colored” gas readily visible during periods of heavy air pollution.) Elevated concentrations of these compounds are associated with increased risk of acute and chronic respiratory disease.

SO_2 and NO_2 emissions can be oxidized in the atmosphere to eventually form sulfates and nitrates, which contribute to acid rain. Large power facilities with high emissions of these substances from the use of coal or oil are subject to emissions reductions under the Phase I Acid Rain Program of Title IV of the 1990 CAA Amendments. Power facilities, with individual equipment capacity of 25 MW or greater that use natural gas or other fuels with low sulfur content, are subject to the Phase II Program of Title IV. The GESC will not be required to obtain an acid rain permit because the only power generation units that emit regulated air pollutants are less than 25 MW.

Lead: Gasoline-powered automobile engines used to be the major source of airborne lead in urban areas. Excessive exposure to lead concentrations can result in gastrointestinal disturbances, anemia, and kidney disease, and, in severe cases, neuromuscular and neurological dysfunction. The use of lead additives in motor vehicle fuel has been eliminated in California and lead concentrations have declined substantially as a result.

CARB has established and maintains a network of sampling stations, called State and Local Air Monitoring Stations (SLAMS) network, that work in conjunction with local air pollution control districts and air quality management districts to monitor ambient pollutant levels. The SLAMS network in Kern County consists of eight stations that monitor various pollutant concentrations. EKAPCD is responsible for monitoring air quality in the Kern County portion of the Mojave Desert Air Basin to determine whether pollutant concentrations meet CAAQS and NAAQS.

Mojave- Poole Street (Kern County), Lancaster (Los Angeles County) and Victorville-Park Avenue (San Bernardino County) monitoring stations are the closest stations and have the most representative monitoring data to the Gem site, approximately 13.5, 17 and 63 miles away, respectively. Note the three stations belong to the Mojave Desert Air Basin. The mentioned monitored stations register the following parameters:

- Mojave- Poole Street: O_3, PM10, and PM2.5.

- Lancaster: O_3, CO, NO_2, PM10, and PM2.5.
- Victorville-Park Avenue: O_3, CO, NO_2, SO_2, PM10, and PM2.5.

Due to its proximity to the GESC, the Mojave station data was used to summarize ambient concentrations of O_3, PM10, and PM2.5 near the project site. Lancaster station was used to summarize CO and NO_2 concentrations. Victorville station was used to summarize SO_2 concentrations because the other two stations don't monitor this pollutant. Appendix 5.1G provides a summary of measured ambient air quality concentrations by year and site for the period 2018-2020.

The maximum representative background concentrations for the most recent 3-year period (2018-2020) are summarized in Table 5.1-8. Data from these sites are a reasonable representation of background air quality for the project area. The background values represent the highest values reported for the most representative air quality monitoring site during any single year of the most recent three-year period for the CAAQS assessments. These CAAQS maxima are conservatively used for some of the NAAQS modeling assessments (CO and SO_2), while the appropriate values for the NAAQS, according to the format of the standard, are used for the remainder of the NAAQS modeling assessments (NO_2, PM10, and PM2.5).

Table 5.1-8: Measured Ambient Air Quality (Background)

Pollutant	Basis	Averaging Time	Value	Units	Measured Background (µg/m^3)
O_3	CAAQS-1st High	1-hr	0.11	ppm	217.2
	CAAQS-1st High	8-hr	0.10	ppm	203.5
	NAAQS-4th High	8-hr	0.09	ppm	182.0
NO_2	CAAQS-1st High	1-hr	52.00	ppb	97.8
	NAAQS-98th percentile	1-hr	40.00	ppb	75.2
	CAAQS/NAAQS	Annual	8.66	ppb	16.3
CO	CAAQS/NAAQS -1st High	1-hr	1.60	ppm	1828.6
	CAAQS/NAAQS -1st High	8-hr	1.10	ppm	1222.2
SO_2	CAAQS/NAAQS -1st High	1-hr	9.90	ppb	25.9
	NAAQS -1st High	3-hr	9.90	ppb	25.9
	CAAQS/NAAQS -1st High	24-hr	3.40	ppb	8.9
PM10	CAAQS-1st High	24-hr	248.00	µg/m^3	248.0
	NAAQS -2nd High	24-hr	192.00	µg/m^3	192.0
	CAAQS	Annual	35.32	µg/m^3	35.3
PM2.5	NAAQS-98th percentile	24-hr	24.33	µg/m^3	24.3
	CAAQS/NAAQS	Annual	7.33	µg/m^3	7.3

µg/m^3 = micrograms per cubic meter; O_3 = ozone; CAAQS = California Ambient Air Quality Standards; hr = hour; ppm = parts per million; NAAQS = National Ambient Air Quality Standards; NO_2 = nitrogen dioxide; ppb = parts per billion; CO = carbon monoxide, SO_2 = sulfur dioxide, PM10 PM2.5

Source: All background values were measured at Mojave- Poole Street (Kern County), Lancaster (Los Angeles County) and Victorville-Park Avenue (San Bernardino County) monitoring stations (2018-2020). See Appendix 5.1G for details on which readings are associated with the listed sites.

5.1.7.1.1 Air Quality Analyses

The following sections present the analyses for determining the changes to ambient air quality concentrations in the region of GESC. These analyses are comprised of a screening assessment to determine the worst-case emissions and stack parameters for the two engines. Cumulative multisource modeling assessments, which are used to analyze the GESC plus nearby existing sources, is not proposed because the only air emission sources present are intended for emergency use. After consultation with the CEC and appropriate agencies, if such an analysis is required, it will be performed later during the air permitting process. The screening analysis for construction operations is included in Appendix 5.1C.

5.1.7.1.2 Screening Analysis

Operational characteristics of the engines, such as emission rate, exit velocity, and exit temperature were obtained from manufacturer's specifications. The modeling process includes modeling project emissions and comparing the estimated concentration to the SILs. If the SILs are not exceeded, then it is concluded that the project impacts are insignificant and no further analysis is typically required; however, this analysis also compares project emissions to the CAAQS and NAAQS for completeness.

The following averaging times and forms were used to compare to the SILs:

- NO_2 1-hr & PM2.5 24-hr: 5-year average of the 100th percentile (H1H)
- NO_2 and PM2.5 annual: 5-year average of the annual maximum
- CO 1-hr & 8-hr, PM10 24-hr, SO2 1-hr & 3-hr & 24-hr: highest first high

The following averaging times and forms were used to compare to the CAAQS:

- NO_2 1-hr, CO 1-hr & 8-hr, SO2 1-hr & 24-hr, and PM10 24-hr: highest first high
- NO_2, PM10, and PM2.5 annual: highest annual value in 5 years

The following averaging times and forms were used to compare to the NAAQS:

- NO_2 1-hr and PM2.5 24-hr: 5-year average of the 98th percentile (H8H)
- SO_2 1-hr: 5-year average of the 99th percentile (H4H)
- NO_2 and PM2.5annual: 5-year average of the annual maximum
- CO 1-hr & 8-hr, SO2 3-hr & 24-hr: highest second high
- PM10 24-hr: 6th highest across 5 years.

Table 5.1-9 shows the stack parameters and emission rates for each emergency diesel generator. Detailed emission calculations are included in Appendix 5.1A.

Table 5.1-9: Stack Parameters and Emission Rates for Each Generator

Source	Stack Height (m)	Exhaust Gas Temperature (K)	Exhaust Velocity (m/s)	Stack Inside Diameter (m)	Emission Rates (g/s)			
					PM10/PM2.5	NOx	SO2	CO
Each Emergency Diesel Generator 5MW	6.096	654.550	123.315	0.457	0.0416 0.00095 (annual emissions)	1.0393 0.02373 (annual emissions)	0.0114	5.4043

m = meter; K = Kelvin; PM10 = particulate matter less than 10 microns; PM2.5 = particulate matter less than 2.5 microns; NOx = nitrogen dioxides; SO_2 = sulfur dioxide; CO = carbon monoxide

Source: Section 5.1, Air Quality, Appendix 5.1A and 5.1D.

5.1.7.2 Operations Impact Analysis

Modeled concentrations are compared to the SILs in Table 5.1-10. All maximum facility impacts occurred at the ambient boundary and the estimated concentrations are all below the applicable SILs. For annual averaging periods, each engine was assumed to be capable of operating up to its assumed 200 hour per year limit. For 24-hr and shorter averaging periods, only one engine is assumed to be operating.

Table 5.1-10: Air Quality Impact Results - Significant Impact Levels

Pollutant	Basis	Averaging Time	Maximum Concentration ($\mu g/m^3$)	Class II SIL ($\mu g/m^3$)
NO_2	NAAQS -1st High [a]	1-hr	-	7.5
	NAAQS-Maximum	Annual	0.28	1.0
CO	NAAQS -1st High	1-hr	414.93	2,000.0
	NAAQS -1st High	8-hr	307.86	500.0
SO_2	NAAQS-1st High, 5-year average	1-hr	0.82	7.86
	NAAQS-1st High	3-hr	0.78	25.0
	NAAQS -1st High	24-hr	0.41	5.0
PM10	NAAQS-1st High	24-hr	1.48	5.0
	NAAQS- Maximum	Annual	0.012	1.0
PM2.5	NAAQS-1st High, 5-year average	24-hr	1.12	1.2
	NAAQS-5-year average	Annual	0.009	0.3

Note(s): CAAQS are not listed because the SIL does not apply to CAAQS.

[a] Emergency diesel generators will operate for less than 200 hours total (per both) generators during a single year, impacts were not assessed for the 1-hour NO2 NAAQS SIL per EPA guidance due to classification as intermittent sources.
µg/m3 = micrograms per cubic meter; NO_2 = nitrogen dioxide; NAAQS = National Ambient Air Quality Standards; hr = hour; CO = carbon monoxide SO_2 = sulfur dioxide; PM10 = particulate matter less than 10 microns; PM2.5 = particulate matter less than 2.5 microns.

Source: Section 5.1, Air Quality, Appendix 5.1D.

Maximum GESC concentrations are compared to the CAAQS and NAAQS in Table 5.1-11. Maximum combined concentrations (modeled + background) are less than all the CAAQS and NAAQS except for the PM10 CAAQS. The exceedances of the CAAQS for PM10 are due to high background concentrations, which already exceed the CAAQS (the area is already designated as State nonattainment for the PM10 CAAQS). As noted above, the facility is projected to have maximum impacts less than the SILs for both 24-hour and annual PM10 (the only pollutant with background concentrations above the AAQS). Thus, GESC would not significantly contribute to current exceedances of the PM10 CAAQS.

Table 5.1-11: Air Quality Impact Results - Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	Ambient Air Quality Standards (µg/m³)	
					CAAQS	NAAQS
NO_2	1-hr (highest)	71.82	97.76	169.58	339	-
	1-hr (98th percentile)[a]	-	97.76	-	-	188
	Annual Maximum	0.28	16.28	16.56	57	100
CO [b]	1-hr (highest)	414.93	1,828.57	2,243.50	23,000	40,000
	8-hr (highest)	307.86	1,222.22	1,530.08	10,000	10,000
SO_2[b]	1-hr (highest)	0.88	25.87	26.75	655	--
	1-hr (99th percentile)	0.79	25.87	26.70	--	196
	3-hr (highest)	0.78	25.87	26.65	--	1,300
	24-hr (highest)	0.41	8.89	9.29	105	--
PM10	24-hr (highest)	1.48	248.00	249.48	50	--
	24-hr (6th highest)	1.21	192.00	193.21	-	150
	Annual maximum	0.012	35.32	35.33	20	-
PM2.5	24-hr (98th percentile)	0.76	24.33	25.09	-	35
	Annual maximum	0.012	7.33	7.35	12	-
	5-year average annual	0.009	7.33	7.34	-	12

Note(s): [a] Modeling for 1-hr NO_2 NAAQS is not required because these units are emergency generators and are therefore classified as "intermittent", EPA Memorandum, March 1, 2011.

[b] Results for SO_2 and CO are reported as the H1H even though the NAAQS allows other forms of compliance. Using the H1H is a more conservative approach.
µg/m3 = micrograms per cubic meter; NO_2 = nitrogen dioxide; NAAQS = National Ambient Air Quality Standards; hr = hour; CO = carbon monoxide; SO_2 = sulfur dioxide; PM10 = particulate matter less than 10 microns; PM2.5 = particulate matter less than 2.5 microns.

Source: Section 5.1, Air Quality, Appendix 5.1D and 5.1G.

5.1.7.3 Gem Commissioning Impact Analysis

Commissioning of the engines is not anticipated to have any additional impacts beyond what has been considered for operation, so a separate commissioning impact analysis is not provided.

5.1.7.3.1 Fumigation Analysis

The GESC is located approximately 100 km from the nearest large body of water (Pacific Ocean). Shoreline fumigation analysis are not relevant more than 3 km from a large body of water, so shoreline fumigation was not run. Inversion break-up fumigation was considered; however, the AERSCREEN model will only consider fumigation for point sources with release heights 10 meters or more above ground level. Because the emergency generator stacks (6.096 m) are less than 10 meters above ground level, an inversion break-up fumigation model cannot be run.

5.1.8 Laws, Ordinances, Regulations, and Statutes

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

5.1.8.1 Specific LORS Discussion

5.1.8.1.1 Federal LORS

Federal LORS applicability is discussed in the list below. Parts of Title 40 of the Code of Federal Regulations (40 CFR) Subchapter C that have no practical applicability to GESC are not discussed.

- 40 CFR Part 50 (NAAQS): All stationary sources of emission are required to meet the National Ambient Air Quality Standards (NAAQS). GESC modeling discussed in Section 5.1.7.2 demonstrates compliance with the NAAQS.
- 40 CFR Part 52.21 (PSD): GESC will not be considered a major source under Prevention of Significant Deterioration.
- 40 CFR Part 60 (NSPS): The following New Source Performance Standard(s) (NSPS) apply to GESC:
  - Subpart A (General Provisions) apply to the GESC if any of the listed subparts apply. Because NSPS Subpart IIII applies, portions of Subpart A apply which are listed in NSPS Subpart IIII Table 8.
  - Subpart IIII (Standards for Stationary Compression Ignition Internal Combustion Engines) applies to the two diesel engines proposed that will drive emergency generators. Compliance will be demonstrated by purchasing an engine that is certified to applicable emission standards and by following applicable operating and best management practices. Operation will be limited to 100 hours per year for maintenance and readiness testing. Fuel must contain no more than 15 ppm sulfur. The air permitting process described in Section 5.1.2 will document compliance with this rule.
  - No other NSPSs apply
- 40 CFR Part 61 (NESHAP): No Part 61 National Emission Standards for Hazardous Air Pollutants (NESHAP) apply to GESC.
- 40 CFR Part 63 (NESHAP for Source Categories): The following Part 60 NESHAPs apply to GESC:
  - Subpart A (General Provisions) apply to the GESC if any of the listed subparts apply. Because NESHAP Subpart ZZZZ applies, portions of Subpart A apply but due to the limited nature of compliance requirements of Subpart ZZZZ, Subpart A has no practical applicability.
  - Subpart ZZZZ (NESHAP for Stationary Reciprocating Internal Combustion Engines) applies to the two diesel engines proposed that will drive emergency generators. The only requirement under Subpart

ZZZZ is that the units comply with the requirements of NSPS Subpart IIII. The air permitting process described in Section 5.1.2 will document compliance with this rule.

- 40 CFR Part 63 (CAM): Compliance Assurance Monitoring (CAM) does not apply because no emission unit has an uncontrolled pollutant specific emission rate above Part 70 major source thresholds and no add-on pollution control equipment is proposed.
- 40 CFR Part 68 (RMP): GESC will not require a Risk Management Plan.
- 40 CFR Part 70 (Operating Permits): Because GESC will not have permitted emissions from stationary sources that exceed Part 70 major source thresholds, a major source operating permit under Part 70 is not required (sometimes referred to as a Title V permit).
- 40 CFR Part 71 (Federal Operating Permits): The Eastern Kern APCD has delegated permitting authority over the geographic region GESC is proposed, therefore Part 71 does not apply.
- 40 CFR Part 72-75 (Acid Rain): GESC will not require an acid rain permit.
- 40 CFR Part 82 (Protection of Stratospheric Ozone): GESC anticipates having a licensed third party handle any ozone depleting substances, if applicable. Proper documentation will be kept for such activity.
- 40 CFR Part 93 (General Conformity): As discussed in Section 5.1.4.6, this project is not subject to general conformity.
- 40 CFR Part 98 (Mandatory GHG Reporting): GESC is not anticipated to have actual GHG emission from operations that exceed 25,000 metric tons per year, therefore reporting will not be required under Part 98.

5.1.8.1.2 State LORS

- California Health & Safety Code (CHSC) Part 6 Sections 44360 – 44366 [Air Toxics “Hot Spots” Information and Assessment]: The GESC will be subject to Part 6 because it will release substances listed in the rule from the combustion of diesel fuel from the emergency generators. Gem will participate in the requirement to prepare an inventory and health risk analysis (as applicable). Analysis presented in the Section 5.9, Public Health shows that emissions from the GESC will be below the significance levels for operation and that the cancer burden is reasonable for risk due to construction activities.
- CHSC 41700 [public nuisance]: Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or which endanger the comfort, repose, health, or safety of the public, or that damage business or property. The project will acquire permits from EKAPCD for emergency generators that will not operate for more than 50 hours per year. The operations of these generators are not expected to generate a public nuisance.
- California Code of Regulations (CCR) Title 17 Section 70200 [California Ambient Air Quality Standards]: Emissions from Gem operations and construction show compliance with the CAAQS using air dispersion models. GESC modeling discussed in Section 5.1.7.2 demonstrates compliance with the NAAQS.

5.1.8.1.3 Air Pollution Control District LORS

Eastern Kern Air Pollution Control District (EKAPCD) LORS applicability is discussed in the list below.

- EKAPCD Regulation II Rule 201[permits required]: The reciprocating engines proposed for the operating phase of the GESC must obtain an air authority to construct and a permit to operate as described in Section 5.1.2.
- EKAPCD Regulation II Rule 201.1 [Title V]: The GESC will not be considered a major source under Title V and will not be required to obtain a Title V air permit to operate.
- EKAPCD Regulation II Rule 201.2 & 201.3 [synthetic minor and federally enforceable limits on potential to emit]: The GESC will accept enforceable limits on annual operation in the air permit such that the facility will be considered a synthetic minor source.
- EKAPCD Regulation II Rule 210.1 [minor new source review]: The GESC emission units will be subject to new source review for minor sources. The process will require application of BACT. Offsets will not be required because the emission units are for emergency use only and will limit operation to no more than 200 hours per year (excluding maintenance and readiness testing). See Section 5.1.2 and 5.1.5 for compliance measures.
- EKAPCD Regulation II Rule 210.1A [major new source review]: The GESC emission units will not be subject to prevention of significant deterioration review due to the potential to emit.
- EKAPCD Regulation II Rule 210.4 [prevention of significant deterioration]: The GESC emission units will not be subject to major new source review due to the potential to emit.
- EKAPCD Regulation II Rule 210.7 [federal general conformity]: As discussed in Section 5.1.4.6, this action will not be subject to federal general conformity.
- EKAPCD Regulation IV Rule 401 [visible emissions]: The reciprocating engines proposed for the operating phase of the GESC must obtain an air permit which will contain conditions that require compliance with the visible emission limits.
- EKAPCD Regulation IV Rule 407 [sulfur compounds]: Reciprocating engines in the operating GESC will comply by combusting diesel fuel that contains not more than 15 ppm sulfur.
- EKAPCD Regulation IV Rule 409 [fuel burning equipment]: The engines at GESC do not meet the definition of fuel burning equipment, therefore this rule does not apply.
- EKAPCD Regulation IV Rules 411 & 413 [storage of organic liquids and loading]: The GESC will include diesel fuel storage tanks; however, Rules 411 & 413 only apply to petroleum distillates that have a true vapor pressure greater than 1.5 psia. Diesel fuel has a vapor pressure less than this threshold, so Rules 411 & 413 do not apply.
- EKAPCD Regulation IV Rule 419 [nuisance]: The engines at the GESC are not anticipated to emit quantities of air contaminants that would qualify as a nuisance.
- EKAPCD Regulation IV Rule 422 [NSPS]: The engines at the operational GESC will comply with applicable NSPS Subpart IIII.
- EKAPCD Regulation IV Rule 423 [NESHAP]: The only requirement under Subpart ZZZZ will be for the engine to comply with NSPS Subpart IIII.

- EKAPCD Regulation IV Rule 427 [piston engines]: The engines for the proposed GESC will be for emergency use so this rule does not apply.

5.1.8.2 Agency Jurisdiction and Contacts

Table 5.1-12 presents data on the following:

- Air quality agencies that may or will exercise jurisdiction over air quality issues resulting from the power facility
- The most appropriate agency contacts for Gem
- Contact address and phone information
- The agency involvement in required permits or approvals

Table 5.1-12: Agency, Contacts, Jurisdictional Involvement, Required Permits for Air Quality

Regulatory Agency	Regulatory Contact	Jurisdictional Area	Permit Status
CEC	CEC-TBD 1516 Ninth Street Sacramento, CA 95814	Primary reviewing and certification agency.	Will certify the facility under the energy siting regulations and CEQA. Certification will contain a variety of conditions pertaining to emissions and operation.
EKAPCD	Glen Stephens, P.E., Air Pollution Control Officer 2700 M Street, Suite 302 Bakersfield, CA 93301 (661) 862-5250	Prepares DOC for CEC, Issues EKAPCD ATC and Permit to Operate, Primary air regulatory and enforcement agency.	DOC will be prepared after AFC submittal.
CARB	Mike Tollstrup Chief, Project Assessment Branch 1001 I Street, 6th Floor Sacramento, CA 95814 (916) 322-6026	Oversight of APCD stationary source permitting and enforcement program	CARB staff will provide comments on applicable AFC sections affecting air quality and public health. CARB staff will also have opportunity to comment on draft ATC.
EPA Region 9	La Weeda Ward, Permits Section EPA Region 9 75 Hawthorne St. San Francisco, CA 94105 (213) 244-1812	Oversight of all APCD programs, including permitting and enforcement programs. PSD permitting authority for EKAPCD.	EPA Region 9 staff will receive a copy of the DOC. EPA Region 9 staff will have opportunity to comment on draft ATC

5.1.8.3 Permit Requirements and Schedules

A description of the air permitting process is in Section 5.1.2.

5.1.9 References

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