Appendix F Energy Impact Analysis

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MEMORANDUM

Date: November 10, 2023

To: Signal Hill Petroleum, Inc.

From: Graham Stephens – Sespe Consulting, Inc.

Re: Energy Impact Assessment
Conditional Use Permit (CUP 97-03) Extension – Signal Hill, California

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SUMMARY

Sespe Consulting, Inc. ("Sespe") has prepared the following Energy Impact Assessment memorandum on behalf of Signal Hill Petroleum, Inc. (SHP), to determine the potential energy effects associated with the proposed continuance of the City of Signal Hill ("City") Conditional Use Permit 97-03 ("CUP 97-03") for twenty (20) years beyond its current term which ends in 2023 (the "Project"). CUP 97-03 covers seven (7) existing consolidated "Oil Operation Sites" and "Drill Sites", as defined in the City of Signal Hill – Municipal Code (collectively referred to herein as the "CUP Sites"). No change to the existing CUP Site boundaries or scope of the existing operations from current and historical norms is proposed as part of the Project, with the exception of certain natural gas processing redundancy and efficiency modifications planned at CUP Site #2. Figure 1 (Attachment A) shows the location of the seven (7) existing CUP Sites located throughout the City.

The California Environmental Quality Act (CEQA) requires an environmental analysis, including of energy resources, of projects requiring discretionary approval by the local lead agency with land use authority, which in this case is the City. Pursuant to CEQA, this memorandum describes and analyzes the proposed Project's estimated energy resource consumption and associated impacts. Table 1 summarizes the applicable CEQA Appendix G – Environmental Checklist Form questions that are used as criteria against which to evaluate the significance of the Project impacts related energy resources, as well as the corresponding significance thresholds determinations. The full analysis supporting the significance levels for each of the threshold criteria defined in Table 1 is detailed in the sections that follow. Based on the impact assessment provided herein and the significance determinations in Table 1, the Project would have less than significant impacts in terms of energy resources.

Table 1: CEQA Significance Determinations

CEQA Threshold	Impact
ENERGY-1: Would the Project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	Less Than Significant.
ENERGY-2: Would the Project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	Less Than Significant.

PROJECT SUMMARY

CEQA analyses, including those related to energy resources, take into account the existing physical setting or "baseline" against which the proposed project changes that would occur are measured. In such cases, energy consumption occurring in the existing setting are subtracted from the proposed project energy consumption to determine the extent of change or delta from the baseline. The delta is then evaluated to determine if the implementation of the project would result in one of the following impacts:

- No Impact;
- Less Than Significant Impact;
- Less Than Significant Impact with Mitigation;
- Significant Impact; or
- Significant with Overriding Considerations.

Projects that are determined to have potentially significant impacts must mitigate the impact to a less than significant level or to the maximum extent feasible.

In general, a project's energy consumption and/or generation is evaluated using the following three (3) sources: 1) Diesel and gasoline fuel use and associated vehicle trips generated (i.e., transportation sources); 2) Natural gas usage; and 3) Electricity consumption. The baseline for this Project would be SHP's existing and ongoing oil and gas extraction and processing operations, currently occurring at each of the seven (7) CUP Sites. Currently, electricity, fuel and natural gas are both generated and consumed as part of SHP's normal ongoing operations under CUP 97-03. The following sections describe SHP's existing (i.e., baseline) energy use and generation, as well as the potential new energy resource consumption that would result due to implementation of the proposed Project.

Existing Operations

Existing operations under CUP 97-03 typically include water-injection wells and producing wells, which serve as gathering locations for oil, gas and water production, distribution sites for water injection, and control centers for the electrical system. CUP Sites #2, #5 and #6 have and would continue to serve as the centralized processing and storage facilities for oil production and water-injection operations. All production (oil, water and gas) from the CUP Site wells is received at these central processing facilities where the raw materials are separated, treated, and shipped to various purchasers.

Additionally, an existing gas processing and turbine power plant located at CUP Site #2 generates electric power directly, by recycling natural gas produced at SHP's extraction sites. Specifically, the gas plant processes and removes liquids from the gas produced at SHP's wells covered under CUP 97-03, in addition to produced gas from other local wells operated by SHP and third parties. This electricity is then used to power the CUP Sites and SHP's other offsite operations to the extent feasible, reducing the need to purchase power from offsite producers. The gas processing plant also allows SHP to collect excess natural gas not consumed onsite for sale directly to third parties through an existing delivery pipeline. Currently, the majority of produced natural gas is consumed onsite within the power plant at CUP Site #2. Specifically, approximately 70% of the processed natural gas is consumed directly within the onsite power turbine. The remaining quantity of gas produced is sold through the onsite sales meters to the City of Long Beach and/or SoCal Gas.

As discussed above, the Project is primarily the continuance of SHP's existing consolidated oil and gas operations at the seven CUP Sites covered under CUP 97-03 for the proposed 20-year term. With the exception of the

proposed gas system modifications proposed at CUP Site #2 (see description below), SHP would continue to operate the existing oil and gas facilities in the same manner and with the same equipment/personnel as they have historically, consistent with current and historical norms. The existing facility boundaries would not change or expand, and all operations (existing and proposed) would continue to occur within the existing permitted CUP footprint(s). Specifically, SHP would continue the following general operations at their seven CUP Sites:

- Well servicing and maintenance;
- Drilling and redrilling operations;
- Oil processing, storage and transfer;
- Natural gas and natural gas liquids processing, storage and transfer;
- Produced water separation, and injection facilities; and
- Electrical production from a natural gas turbine powered generator.

In accordance with CUP 97-03, as well as applicable City and CalGEM requirements, SHP would also continue to drill new wells and redrill existing wells (both production and injection wells) at the seven CUP Sites on an as needed basis. Although cyclical fluctuations are a natural aspect of the oil and gas industry, the Project is a continuation of existing operations, and as such the level of future drilling for the proposed 20-year term of the Project is forecasted to be consistent with historical operations. Specifically, wells would continue to be drilled/redrilled during the life of the CUP to replace lost production capacity, and therefore the total quantity of oil, natural gas, and water produced by extraction operations are not expected to change or increase above existing levels. Continue drilling/redrilling would also not require the installation of additional ancillary equipment, as SHP's existing storage, transmission, and processing facilities located within the seven CUP sites have sufficient capacity to continue to serve extraction operations throughout the proposed 20-year life of the CUP. See Attachment B which for a summary of SHP's historical drilling and redrilling activity that occurred between 2009 and 2021.

In addition to the production levels or methods, the Project would also not modify the existing hours of operation, materials to be extracted, processed and sold, the number or type of onsite equipment (mobile equipment, drilling rigs, etc.), or the number of onsite employees. As such, these existing operations are the "baseline" against which the Project's potential energy impacts have been analyzed to determine whether the Project will result in a potentially significant environmental impact under CEQA.

Existing Energy Consumption/Generation

As stated above, fuels (i.e., gasoline and diesel), natural gas, and electricity are both generated and consumed as part of SHP's existing and ongoing oil and gas operations occurring at the seven CUP Sites under CUP 97-03.

Fuel**:** On a typical operating day, employee and contractor vehicles (i.e., automobiles, light- and heavy-duty trucks) travel between the CUP Sites to conduct routine maintenance, safety inspections, well servicing/testing, and other ancillary activities to ensure the extraction, processing and transmission equipment is operating properly. Specifically, a total of approximately 12 to 14 employees using light-duty vehicles would continue to work at the seven CUP Sites during the course of normal operating day. Additionally, up to four miscellaneous heavy-duty trucks would also continue to travel to, from, and between the CUP Sites, as needed, each day. With the exception of additional gasoline consumed during temporary Project construction activities (i.e., construction of the gas system modification at CUP Site #2 and/or new well cellar construction) described in greater detail below, on a permanent basis the Project would not change or increase the total quantity of gasoline fuel consumed in on-road vehicles and work trucks. SHP's heavy-duty vehicles and equipment are powered by diesel. There are two existing permitted aboveground diesel tanks (2,000 gallons total) located at CUP Site #5 (see Figure 2, Attachment A).

Other than temporary additional diesel fuel consumed during temporary construction activities (i.e., gas system modifications at CUP Site #2, new well cellar construction), no permanent changes or increases in diesel fuel use would result. Additionally, there would be no changes to the existing fuel storage or handling as a result of the Project. Because the Project is primarily a continuation of existing operations, the total fuel energy consumed per day within light- and heavy-duty vehicles and equipment throughout the life of the Project is forecasted to be consistent with historical operations. Nonetheless, although future well cellar construction activities are forecasted to be consistent with existing operations, these existing activities are treated as "new" and therefore considered a part of the proposed Project. Specifically, fuel consumed within on-road vehicles and offroad equipment as a result of the construction of 20 new well cellars was quantified and attributed to the Project.

Additionally, minimal quantities of diesel fuel are also consumed as part of SHP's ongoing drilling/redrilling operations. SHP currently uses two (2) company-owned drilling rigs for their drilling/redrilling operations, depending on the depth to be drilled. Rig #5 is mostly electrified, however minimal amounts of diesel fuel are required to power the drawworks engine (i.e., 2008 Cameron/Hubbard C-500 drawworks and mast powered by a 450 horsepower (hp) EPA Tier 4 clean burn engine). The remainder of Rig #5's equipment is eclectically power. Note that Rig #6 is fully electrically powered (i.e., no fuel consumed during drilling/redrilling operations). In accordance with the existing CUP 97-03, as well as applicable City and CalGEM requirements, SHP has and would continue to drill new wells and redrill existing wells (both production and injection wells) at the seven CUP Sites on an as needed basis. Because the Project is a continuation of existing operations, and as such the level of future drilling for the proposed 20-year term of the Project is forecasted to be consistent with historical operations. Although drilling and redrilling operations have and would continue to occur at the same activity levels, because new well drilling and re-drilling/reworking would require a discretionary CalGEM permit, these existing activities are treated as "new" and therefore considered part of the proposed Project. Therefore, diesel fuel consumed as a result of drilling/redrilling activities using Drill Rig #5, is quantified as part of the Project analysis.

Natural Gas**:** As stated above, an existing gas processing and turbine power plant located at CUP Site #2 generates electric power directly by recycling natural gas produced at SHP's extraction sites. Specifically, the gas plant processes and removes liquids from the gas produced at SHP's wells covered under CUP 97-03, in addition to produced gas from other local wells operated by SHP and third parties. This electricity is then used to power the CUP Sites and SHP's other offsite operations to the extent feasible, reducing the need to purchase power from offsite producers. The gas processing plant also allows SHP to collect excess natural gas not consumed onsite for sale directly to third parties through an existing delivery pipeline.

Currently, the majority of produced natural gas is consumed onsite within the power plant at CUP Site #2. Specifically, approximately 70% of the processed natural gas is consumed directly within the onsite power turbine. The remaining quantity of gas produced is sold through the onsite sales meters to the City of Long Beach and/or SoCal Gas. In total, SHP's existing operations under CUP 97-03 produces approximately 79,371 thousand standard cubic feet ("mscf") of natural gas per year (based upon historical production records from 2010 to 2021), the majority of which is processed within the current natural gas processing facility located at CUP Site #2.

Electricity**:** The majority of SHP's existing electricity supply comes directly from the existing gas processing and turbine power plant located at CUP Site #2. Specifically, this existing facility provides 70% of the electricity required to power SHP's broader oil operations in the Long Beach Oil Field (including those occurring within the seven CUP Sites). In total, the gas turbine produces approximately 41,383,152 kilowatt-hours (kWh) annually (based upon data collected during 2020), while approximately 12,414,946 kWh of additional electrical power is purchased from Southern California Edison (SCE) per year. Because the electricity generating facility is powered directly by natural

gas produced by SHP's extraction sites, this further reduces SHP's carbon footprint and adds to the sustainability of their overall operations (i.e., reduces SHP's need to purchase offsite power).

Proposed Natural Gas System Modification

As part of the Project, SHP is proposing to modify its current natural gas processing system at CUP Site #2 by adding a backup low temperature separation ("LTS") unit and a backup membrane unit for the removal of inert gas. SHP will also connect to a new gas sales meter and pipeline provided by the SoCal Gas Company ("SCG"). The SCG sales outlet will be in addition to and provide backup to the current Long Beach Energy gas sales outlet. A booster compressor will to be added to provide the line pressure required to move gas into the SCG system. Finally, SHP will add a "CEB" technology clean burning combustion unit to handle waste gas streams that currently are cycled back through the facility. The proposed modifications at CUP Site #2 will give SHP operational flexibility and back-up capacity for its critical gas processing equipment.

The current natural gas processing facility located at CUP Site #2 processes up to 2,000 MCF of natural gas per day. The natural gas produced in the mature Long Beach Oilfield has a high content of natural gas liquids (butane, propane, etc.) and inert gases (principally nitrogen and carbon dioxide). The current LTS unit and related membrane unit are critical to process this gas to meet utility pipeline specifications. The gas processing facility also provides gas vacuum to production tanks and other facilities which is called "vapor recovery" and is a requirement of SHP's South Coast Air Quality Management District's ("South Coast AQMD") permits to operate. The current LTS and membrane units are the only mission critical components in the facility that are not backed-up, and therefore installation the redundant system will ensure the facility can maintain safe operation during periods of maintenance of repairs.

The proposed LTS unit will be sized to process 2,000 MCF/day and the membrane unit sized to process 1,500 MCF/day. Both pieces of equipment will be sized at lower process rates than the current equipment, which will ensure operational efficiency. The current LTS capacity is 4,000 MCF/day and the membrane unit is 2,500/day. Ultimately, the addition of the back-up LTS and membrane units to facilitate the SCG connection will allow for improved operational efficiency and flexibility for the entire natural gas processing system at CUP Site #2; however, the gas system modification would not increase the total quantity of natural gas produced/extracted under CUP 97-03 (i.e., would remain approximately 79,371 mscf).

The booster compressor and CEB burner will be installed in Phase 1 following approval of the Project. The LTS and membrane units will be installed in Phase 2, estimated to occur sometime in 2023. The construction process and timing will be virtually identical for the two phases, with each spanning approximately 12 weeks. Construction activities will be restricted to Monday through Friday between the hours of 7:00 a.m. and 6:00 p.m., consistent with Section 9.16.050 of the City's Municipal Code (City of Signal Hill, 2021).

Per information provided by SHP, mobile equipment (e.g., backhoe, crane, etc.) and other smaller tools (e.g., concrete saw, welder/torch, drum mixer, etc.) would operate onsite to prepare the surface foundations, install/anchor the new equipment (e.g., compressor, LTS unit, CO2 unit, burner, etc.), and conduct ancillary construction activities as needed. Additionally, it is estimated that up to six (6) additional contractor light-duty vehicles would travel to and from CUP Site #2 each day. Additionally, one-time deliveries of ready-mix concrete (RMC), and equipment/materials would require the use of larger heavy-duty trucks. It's estimated that a maximum of four (4) additional heavy-duty trucks (flatbed equipment deliveries, and RMC trucks) would travel to CUP Site #2 on a given construction day.

Proposed Well Cellar Construction

While SHP would primarily continue drilling/redrilling operations within the existing well cellars at each CUP Site, however at times a new ancillary well cellar may need to be created. As with SHP's current protocols, new well cellars are created by excavating a shallow hole (approximately 6-feet wide, 6-feet long, and 5-feet deep) using a backhoe type excavator (new well cellars can be excavated within a single day). Once excavation is complete, a pre-cast concrete box or a large diameter galvanized round steel pipe is placed into the excavation hole to secure the new well cellar. Per information provided by SHP, it's estimated that no more than 20 new well cellars would be constructed over the 20-year life of the Project.

Project well cellar construction would occur during daytime hours only (7:00 a.m. and 6:00 p.m.), Monday through Friday, consistent with Section 9.16.050 of the City's Municipal Code (City of Signal Hill, 2021). At most, a single backhoe would have to operate at the given CUP Site for no more than 4 hours to excavate the necessary well cellar depression. Additionally, well cellar construction would require an estimated two (2) additional onsite employees/contractors (equivalent to four [4] additional daily vehicle trips), and one (1) additional heavy-duty truck (needed to transport equipment).

Future Drilling/Redrilling Activity

In accordance with the existing CUP 97-03, as well as applicable City and CalGEM requirements, SHP has and would continue to drill new wells and redrill existing wells (both production and injection wells) at the seven CUP Sites on an as needed basis. As with current operations, these activities would continue to occur entirely within the existing CUP boundaries. For the purposes of this CEQA energy assessment, all future drilling and redrilling proposed to occur during the 20-year life of the Project, and the resulting energy consumption, has been included as part of the proposed Project impact analysis.

SHP currently owns two drilling rigs, one with a Tier 4 diesel engine (i.e., SHP Drill Rig #5) and one fully electric rig (i.e., SHP Drill Rig #6). Note that SHP confirmed the diesel Drill Rig #5 is only utilized 10% of the time during drilling/redrilling, while the all -electric Drill Rig #6 would continue to be utilized for 90% of future drilling/redrilling operations.

Table 2 below summarizes SHP's forecasted future drilling/redrilling activity that would occur during the life of the Project, which is consistent with SHP's existing baseline operations between 2009 and 2014. Energy consumption associated with this level of future drilling/redrilling activity level is evaluated within this memorandum.

Table 2: Forecasted Project Drilling/Redrilling Activity

Parameters	Drilling (new wells)	Redrilling (existing wells)
Forecasted Annual Average	2	1
Forecasted Annual Maximum	5	6
Forecasted Total (20-Year Permit Term)	46	28

METHODOLOGY

As discussed above, the Project is primarily the continuation of SHP's existing oil and gas operations at the seven consolidated CUP Operations Sites permitted under CUP 97-03 for the request permit term of 20 years. Other than the proposed redundancy and flexibility modifications to the existing gas system at CUP Site #2 and new well cellar construction at the other CUP Sites, the Project would include no substantial changes to SHP's existing operations. As stated above, the Project would not modify the existing production levels, hours of operation, materials to be extracted, processed and sold, the number or type of onsite equipment (mobile equipment, drilling rigs, etc.), production methods, or the number of onsite employees. Other than minimal additional vehicles traveling to and from the CUP Sites to facilitate construction of the natural gas system modifications/well cellars, the Project would also not change or increase the number of on-road trucks or vehicles that would travel to and from the CUP Sites onto public roadways on a permanent basis. As such, the primary "new" sources of energy consumption associated with the proposed Project would be associated with temporary construction activities. The Project activities that consume energy resources are quantified and considered in this memorandum.

In addition to energy consumed during temporary onsite construction activities described above, diesel fuel (Drill Rig #5) and electrical energy (Drill Rig #6) would also continue to be consumed onsite to facilitate future drilling/redrilling activities. New pumpjacks would also consume electrical energy once the new wells are placed into production. Energy resources consumed by these future operational Project activities are also quantified and considered in this memorandum.

Fuel Energy

The Project would consume additional fuel energy (diesel and gasoline) in the form of off-road equipment activity (construction equipment) and on-road vehicular traffic (i.e., delivery trucks, contractor vehicles) during construction of the gas system modifications at CUP Site #2, as well as construction of new well cellars on an as needed basis. Diesel fuel would also be consumed by Drill Rig #5 during periodic drilling/redrilling operations.

As stated above, construction of the gas system modification is expected to take up to six months to complete, and would involve the use of various pieces of onsite construction equipment as well as employee/contractor trucks and vehicles travel to and from CUP Site #2. Table 3 and Table 4 summarizes the applicable off-road construction equipment and associated activity levels, as well as the on-road vehicle trip rates. In instances where Project-specific information was not available, default values described in the appendices of the California Emissions Estimator Model (CalEEMod) User Guide are utilized.[1] See the calculations sheets in Attachment B for additional detail.

In addition to construction of the gas system modifications, well cellar construction would also require minimal off-road equipment and on-road activity levels. Construction of new well cellars can generally be completed in a single day, using a a single backhoe operating at a given CUP Site for no more than 4 hours to excavate the necessary well cellar depression. In addition to off-road equipment (i.e., the backhoe), well cellar construction would also require an estimated two (2) additional onsite employees/contractors (equivalent to four [4] additional daily vehicle trips), and one (1) additional heavy-duty truck (needed to transport equipment). Table 3 and Table 4 below summarizes the applicable off-road construction equipment and associated activity levels, as well as the on-road vehicle trip rates, associated with well cellar construction. In instances where Project-specific information was not available, default values described in the appendices of the CalEEMod User Guide are utilized. As noted above, SHP would construct no more than 20 new well cellars at the CUP Sites over the 20-year life of the Project.

[1] www.aqmd.gov/caleemod/home

Table 3: Construction – Off-Road Equipment Activity Summary

Off-Road Equipment	Total Operating Hours	Horsepower (HP)	Load Factor (LF)
Gas System Modification			
Backhoe	40	97	0.37
Dump Truck	32	402	0.38
Water Truck	40	402	0.38
Crane	104	231	0.29
Welder	144	46	0.45
Concrete/Pavement Saw	16	81	0.73
Ready-Mix Concrete (RMC) Truck	64	402	0.38
Well Cellar Construction			
Backhoe	80	97	0.37

See Attachment B for additional details.

Table 4: Construction – On-Road Vehicle Activity Summary

On-Road Vehicle Type	Round Trips per Day	Miles per Trip	Total Operating Days	Total VMT
Gas System Modification				
Contractor/Gear Trucks	6	3	48	864
Heavy-Duty Trucks (Equipment/Deliveries)	2	5	48	480
Ready-Mix Concrete (RMC) Trucks	2	10	173	3,460
Well Cellar Construction				
Employee/Contractor Trucks	2	3	20	120
Heavy-Duty Trucks (Equipment/Deliveries)	1	5	20	100

See Attachment B for additional details.

Lastly, diesel fuel would also be consumed within the 450-horsepower generator attached to Drill Rig #5 during future drilling redrilling operations. As discussed above, the diesel Drill Rig #5 is only utilized approximately 10% of the time during drilling/redrilling, while the all-electric Drill Rig #6 would continue to be utilized for 90% of future drilling/redrilling operations. Therefore, the total quantity of diesel consumed within Drill Rig #5 was estimate for the life of the Project, assuming 10% of the total 46 new wells would be drilled and 28 existing wells would be redrilled using Drill Rig #5 over the 20-year life of the Project. See Table 2 above as well as the calculation in Attachment B for additional detail.

Off-road equipment, Drill Rig #5, fuel usage during the Project activities describe above were calculated using of the Project-specific information summarize above, applicable assumptions/default values obtained from CalEEMod, and the fuel usage calculations provided in the 2017 Off-Road Diesel Emission Factors spreadsheet, prepared by the California Air Resources Board (CARB).[2] CARB's spreadsheet provides the following formula to calculate fuel usage from off-road equipment activity:

[2] https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road

$$Fuel\ Used\ (gal) = Load\ Factor\ (LF) \times Horsepower\ (hp) \times Total\ Operating\ Hours \times \frac{BSFC}{Unit\ Conversion}$$

Where:

Load Factor (LF): Obtained from CalEEMod default values.

Horsepower (hp): Obtained from CalEEMod default values.

Total Operational Hours: Project-specific information/activity levels provided by SHP.

BSFC: Brake Specific Fuel Consumption (pounds per horsepower-hour) = 0.408 lb/hp-hr

Unit Conversion: Convert pounds to gallons = 7.109 lb/gal

Using the above formula and the activity levels summarized in **Table** 3, Table 3, Table 5 below summarizes the estimated total fuel consumed by off-road equipment during construction of both the gas system modification and new well cellars, as well as future drilling/redrilling using Drill Rig #5. As shown, the off-road equipment is estimated to consume approximately 69,007 gallons of total fuel energy, of which an estimated 1,900 gallons would be consumed during temporary construction of the gas system modification, up to 165 gallons would be consumed as a result of well cellar construction, and approximately 66,942 would be consumed during drilling/redrilling with Drill Rig #5 during the life of the Project.

The Project's on-road construction-related vehicle trip fuel usage associated with the gas system modification and well cellar construction was also calculated using the on-road vehicle activity levels summarized in Table 4 above. For instances where Project-specific information was unavailable, assumptions/default values from CalEEMod were utilized. Using this data, along with the fleet average miles per gallon rates calculated using CARB's EMFAC model (see attachments), total on-road fuel consumption was calculated.[3] Table 5 shows the on-road construction vehicle trips and the associated fuel usage calculations. In total, on-road construction-related vehicle trips are estimated to consume a total of 1,108 gallons of fuel, of which an estimated 1,071 gallons would be consumed during temporary construction of the gas system modification, and up to 37 gallons would be consumed as a result of well cellar construction of the life of the Project.

Table 5: Project Fuel Consumption (20-Year Totals)

Project Activity/Operations	Off-Road Equipment Fuel Consumption (gallons)	On-Road Vehicle Fuel Consumption (gallons)
Gas System Modification	1,900	1,071
Well Cellar Construction (20-year term of CUP)	165	37
Drilling/Redrilling (Drill Rig #5) [A]	66,942	N/A
Total Fuel Consumed (gallons):	**69,007**	**1,108**

Source: Air Quality Report (Trinity Consultant, 2023)/CalEEMod (version 2020.4.0). See Attachment B for additional detail.
A – Note, existing onsite employees/employee vehicles would conduct drilling/redrilling during the course of their typical/ongoing workdays. Because there would be no change in on-road vehicle activity during drilling/redrilling, no additional fuel would be consumed.

In total, based upon the information and assumptions summarized above, the Project is estimated to consume a total of 70,115 gallons of additional fuel energy. Note that this represents a conservative estimation of total new fuel energy consumption associated with the Project, as it was assumed 20 new well cellars could be constructed. In reality, SHP estimates that between 10 and 20 well cellars could be constructed. Additionally, the maximum rate of drilling/redrilling was also conservatively assumed.

[3] https://arb.ca.gov/emfac/

Electricity & Natural Gas

As discussed above, the Project would neither generate nor consume additional quantities of natural gas beyond those currently associated with SHP's existing operations. While the proposed modifications at CUP Site #2 will give SHP greater operational flexibility and back-up capacity for its critical gas processing equipment, it would not increase the total quantity of natural gas produced at the CUP Sites. As such, no additional natural gas energy resources would be consumed as a result of the Project.

Minimal quantities of additional electricity energy resources may be required to operate the gas system modification system. Specifically, the new LTS and backup membrane units would be electrically powered, and would therefore consume an additional quantity of electricity. The Project property, including the gas system at CUP Site #2, would continue to be powered by SHP's existing onsite power turbine, with supplemental power provided by SCE.

While the gas system modification would consume electric energy on an ongoing basis, this additional consumption is expected to be minimal. Additionally, installation of the redundant LTS and membrane units will ensure the facility can maintain safe operations during periods of maintenance of repairs, which in turn would ensure the gas turbine Can continue to operate at full capacity. Any minimal quantity of additional electricity consumed by the new LTS and membrane system during ongoing operations is expected to be offset by the increased efficiency of the existing onsite power turbine. As such, no additional electrical energy resources would be consumed as a result of the Project, and the effects of the gas system modification would be de minimis.

The Project would also consume electricity due to future drilling/redrilling using the all-electric Drill Rig #6. Minimal amounts of electricity would also be required to power any new pumpjacks installed onsite as new wells go into production. Therefore, the total quantity of electrical energy consumed within Drill Rig #6 was estimate for the life of the Project, assuming 90% of the total 46 new wells would be drilled and 28 existing wells would be redrilled using Drill Rig #6 over the 20-year life of the Project. Additional electricity required to power 46 new pumpjacks was also accounted for. As shown in Table 6, in total drilling/redrilling using Drill Rig #6 and new pumpjacks are estimated to consume approximately 49,815,743 kWh of additional electricity over the 20-year life of the Project. See Attachment B for additional detail.

Table 6: Project Electricity Consumption

Project Activity/Operation	Annual Maximum kWh	Project Total kWh (20-Years)
Drilling/Redrilling (Drill Rig #6)	4,783,814.6	34,791,379.2
New Pumpjacks	1,633,083.0	15,024,363.6
Total Electricity Consumed (kWh):	**6,416,897.6**	**49,815,742.8**

See Attachment B for additional detail.

APPLICABLE REGULATIONS

Each local land use agency determines its own significance thresholds under CEQA, and the City of Signal Hill has yet to establish specific numeric criteria related to energy resources. As such, the CEQA Guidelines Appendix G Environmental Checklist Form is a primary resource in determining significance of this Project and/or general thresholds of significance to be used for projects within the City's jurisdiction; however, the following section presents other applicable federal, state and local regulations and agency guidance connected to energy resources.

Federal

Corporate Average Fuel Standards

First enacted by the U.S. Congress in 1975, the Corporate Average Fuel Economy (CAFE) standards reduce energy consumption by increasing the fuel economy of cars and light trucks. The National Highway Traffic Safety Administration (NHTSA) and United States Environmental Protection Agency (USEPA) jointly administer the CAFE standards. The U.S. Congress has specified that CAFE standards must be set at the "maximum feasible level" with consideration given for: 1) technological feasibility; 2) economic practicality; 3) effect of other standards on fuel economy; and 4) need for the nation to conserve energy.

Fuel efficiency standards for medium- and heavy-duty trucks have been jointly developed by USEPA and NHTSA. The Phase 1 heavy-duty truck standards apply to combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles for model years 2014 through 2018, and result in a reduction in fuel consumption from 6 to 23 percent over the 2010 baseline, depending on the vehicle type. USEPA and NHTSA have also adopted the Phase 2 heavy-duty truck standards, which cover model years 2021 through 2027 and require the phase-in of a 5 to 25 percent reduction in fuel consumption over the 2017 baseline depending on the compliance year and vehicle type (USEPA and NHTSA, 2016).

Energy Policy Act of 2005

The Energy Policy Act of 2005 addresses energy efficiency; renewable energy requirements; oil, natural gas and coal; alternative-fuel use; tribal energy, nuclear security; vehicles and vehicle fuels; hydropower and geothermal energy; and climate change technology. The act provides revised annual energy reduction goals (two percent per year beginning in 2006), revised renewable energy purchase goals, federal procurement of Energy Star or Federal Energy Management Program designated products, federal green building standards, and fuel cell vehicle and hydrogen energy system research and demonstration.

State

Assembly Bill 1575 (AB 1575)

In 1975, largely in response to the oil crisis of the 1970s, the California State Legislature adopted Assembly Bill (AB) 1575, which created the California Energy Commission (CEC). The statutory mission of the CEC is to forecast future energy needs, license thermal power plants of 50 megawatts or larger, develop energy technologies and renewable energy resources, plan for and direct state responses to energy emergencies, and, perhaps most importantly, promote energy efficiency through the adoption and enforcement of appliance and building energy efficiency standards. AB 1575 also amended Public Resources Code Section 21100(b)(3) to require Environmental Impact Reports (EIRs) to consider the wasteful, inefficient, and unnecessary consumption of energy resources caused by a project. Since the passage of AB 1575, the California Natural Resources Agency finalized updates to the CEQA Guidelines in December 2018. New CEQA Guidelines Section 15126.2(b) treats "wasteful, inefficient, or unnecessary" energy consumption as a significant environmental impact. As a result, the following energy thresholds have been incorporated into Appendix G of the CEQA Guidelines (see Table 1):

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?*

As discussed above, this technical memorandum has been prepared to assess energy impacts in accordance with these CEQA Appendix G of criteria specific to energy resources.

Senate Bill 1389

Senate Bill (SB) 1389 (Public Resources Code Sections 25300–25323; SB 1389) requires the CEC to prepare a biennial integrated energy policy report that assesses major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety (Public Resources Code Section 25301[a]). The most recent 2021 Integrated Energy Policy Report provides the results of the CEC's assessments of a variety of energy issues facing California, including energy efficiency and reliability, decarbonizing buildings and California's natural has system, as well as forecasting California's energy demand and quantifying the benefits of clean transportation programs, such as California's transition to zero-emission vehicles (ZEVs). The 2021 Report also provides updates on trends in California's sources of crude oil, update on California's nuclear plants, and other energy issues.

Senate Bill 350

SB 350 was approved on October 7, 2015. SB 350 will: 1) increase the standards of the California Renewables Portfolio Standard (RPS) program by requiring that the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be increased to 50 percent by December 31, 2030; 2) require the State Energy Resources Conservation and Development Commission to establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas final end uses of retail customers by January 1, 2030; 3) provide for the evolution of the Independent System Operator into a regional organization; and 4) require the state to reimburse local agencies and school districts for certain costs mandated by the state through procedures established by statutory provisions. Among other objectives, the State legislature intends to double the energy efficiency savings in electricity and natural gas final end uses of retail customers through energy efficiency and conservation.

California Assembly Bill 1493 (AB 1493, Pavley)

In response to the transportation sector accounting for more than half of California's greenhouse gas (GHG) emissions, Assembly Bill (AB) 1493 (commonly referred to as CARB's Pavley regulations), enacted in 2002, requires CARB to set GHG emission standards for new passenger vehicles, light-duty trucks, and other vehicles manufactured in and after 2009 whose primary use is non-commercial personal transportation. Phase 1 of the legislation established standards for model years 2009-2016 and Phase 2 established standards for model years 2017-2025 (CARB, 2017).

Local

City of Signal Hill – General Plan

The City's General Plan, specifically the Environmental Resource Element (adopted 1986), generally addresses resource conservation issues, including those pertaining to energy.[4] While the majority of the General Plan policies, goals, and implementation measures related to energy are general in nature and not specific, the following policies are potentially applicable to the Project:

[4] https://www.cityofsignalhill.org/85/General-Plan

Goal 7 – *Maintain and provide information to the community on environmental problems, opportunities, progress and issues.*

POLICY 7.1 – *Disseminate information about the values of alternative energy technology, including use of solar energy in Signal Hill.*

Signal Hill Sustainability Programs

While the City does not have a specific Sustainability Plan, the City does implement a variety of programs and frameworks meant to promote sustainable practices within the City, include those related to reduced fossil fuel consumption and increased use of renewable energy sources.[5] The City's Sustainable City Committee (SCC) promotes environmentally sound and financially practical objectives and promotes sustainability through an ongoing award program. Specific sustainability policies promoted by the City include the "Municipal Green Building Policy" (adopted 2021), the "Electrical Vehicle Charging Station Policy" (adopted 2018), and the "Sustainable Purchasing" policy (adopted 2010). As with the General Plan, the goals and policies outlined within the City's sustainability programs are generalized and not specific to the Project; however, as described below, the Project would continue to incorporate energy saving infrastructure and operational procedures as feasible, to reduce the existing and future energy consumption associated with CUP 97-03, as applicable and required by City regulations.

CEQA IMPACT ASSESSMENTS

As previously noted, when assessing the Project's energy impacts, the following CEQA threshold criteria apply:

CEQA Guidelines Appendix G, Energy Threshold Criteria (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?*

As discussed above, new energy use associated with the Project would be consumed in the form of fuel (diesel and gasoline) and electricity. Note as discussed above, there would be no change or increase in the quantity of natural gas generated or consumed as a result of the Project. This section will review whether these proposed Project operations have the potential to increase energy consumption above existing levels and/or create new energy inefficiencies or wastefulness.

The Project is primarily the continuation of SHP's existing (i.e., baseline) operations under CUP 97-03, energy consumption would generally not change or increase. Specifically, the proposed Project would not result in any changes or increases to the existing facility throughputs or increases in total oil and natural gas production above historical levels, nor change the number of onsite employees/contractors or hours of operation. Therefore, as discussed above, the following Project components have the potential to consume additional energy resources:

1. Construction at operation of the modified gas system modification at CUP Site #2.
2. Construction of new well cellars.
3. Future drilling new wells and redrilling of existing wells during the 20-year life of the Project.
4. Operation of new pumpjacks.

[5] https://www.cityofsignalhill.org/418/Sustainable-City-Committee

Fuel Energy: During construction of the gas system modification there would be a temporary consumption of energy resources required for the movement of equipment and materials, and the operation of onsite equipment at CUP Site #2. Compliance with local, state, and federal regulations would reduce short-term energy demand during the Project's construction to the extent feasible (construction phase estimated to last approximately 6 months total), and Project construction would not result in a wasteful or inefficient use of energy. As summarized in Table 5 above, energy use during Project construction would be in the form of fuel consumption to operate off-road heavy equipment and on-road vehicles. Temporary power may also be provided to electric construction equipment (e.g., small hand tools, saws, etc.); however, minimal electricity used during Project construction is expected to be de minimis.

Fuel energy would also be consumed as a result of well cellar construction. As stated above, SHP's continued compliance with local, state, and federal regulations would reduce short-term energy demand during well cellar construction to the extent feasible (construction of well cellars over the life of the Project would require a maximum of 20 additional days of equipment/vehicle activity), and well cellar construction would also not result in a wasteful or inefficient use of energy. See Table 5 for the total fuel energy estimated to be consumed as a result of well cellar construction.

Lastly, additional fuel energy would be consumed within the diesel-powered Drill Rig #5 during future drilling/redrilling operations. However, Drill Rig #5 is used infrequently, and due to its smaller size, is generally only used in instances where equipment access is limited. As such, Drill Rig #5 would continue to only be utilized for approximately 10% of future drilling/redrilling operations (90% of drilling/redrilling is accomplished using the all-electric Drill Rig #6), therefore minimizing diesel fuel consumption to the extent feasible.

As shown in Table 5, total additional fuel resource consumption over the 20-year life of the Project is estimated to result in a worst-case net increase of approximately 70,115 additional gallons of fuel total in excess of SHP's existing (i.e., baseline) fuel consumption. In addition to the 20-year total, the annual maximum new fuel consumption was also calculated (assuming all construction activities and maximum rate of drilling/redrilling were to occur in the same year). As shown in Attachment B, the maximum annual fuel consumption associated with the Project was estimated to be 12,196 gallons total. Comparing this annual maximum consumption to the California Energy Commission's (CEC's) Retail Fuel Outlet Annual Reporting (CEC-A15) Results, which shows that approximately 295 million gallons of diesel fuel was sold in the greater Los Angeles County during the most recent 2022 reporting year, the Project's estimated increase in fuel consumption would constitute an approximate 0.004% increases in total annual fuel energy consumption within the County.[6] As such, Project activities would have a minimal effect on the local and regional fuel energy supplies and availability.

Electricity: Once constructed, the modified gas system would also use electrical energy resources to power individual components (e.g., compressors, pumps, etc.). However, as discussed above, any additional electricity resources consumed by the modified gas system itself is expected to be de minimis, and would most likely be offset by the increased efficiencies and redundancies (i.e., would reduce operational downtime) of the existing power turbine, which would be realized once the new LTS/membrane units are operational.

Additional electricity would also be consumed over the life of the Project through drilling/redrilling using the all-electric Drill Rig #6, and through the operation of new pumpjacks. To quantify the quantity electrical consumption resulting from these activities, the maximum rate of drilling/redrilling (see Table 2), as well as the maximum

[6] https://www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-retail-fuel-outlet-annual-reporting

number of new pumpjacks (i.e., 46 total) was assumed. Based upon these assumptions, total additional electricity consumption over the 20-year life of the Project is estimated to result in a wort-case net increase of approximately 49,815,743 additional kWh of electricity consumption, with a calculated annual maximum of new electricity consumption 6,416,898 kWh total per year. Comparing this annual maximum consumption to the California Energy Commission's (CEC's) Energy Consumption Database, which shows that approximately 45 billion kWh of electrical energy was consumed in the greater Los Angeles County by non-residential consumers during the most recent 2022 reporting year. As such, the Project's estimated increase in energy consumption would constitute an approximate 0.014% increase in total annual non-residential electrical energy consumption within the County.[7] As such, Project activities would have a minimal effect on the local and regional electrical energy supplies and availability, and SCE's existing generation capacity would sufficiently serve the Project. Furthermore, by ensuring the existing power turbine at CUP Site #2 can continue to operate efficiently, the Project would help ensure that SHO could continue to provide a local electrical supply for their ongoing operations.

Conclusion: As stated above, there are no unusual Project characteristics or processes involved during construction or operations that would require the use of equipment or vehicles that would be more energy intensive than is used for comparable activities (including SHP's existing operations), or the use of equipment that would not conform to current emissions standards and related fuel efficiencies. Additionally, as required by the City, SHP would continue to utilize water and energy efficiency features as applicable, including water efficient landscaping, LED light fixtures, and other facility features meant to reduce energy use. In addition, development of the gas system modification would ensure SHP's existing natural gas turbine/power station could continue to function efficiently, further reducing SHP's carbon footprint and adding to its sustainability (i.e., reduced SHP's need to purchase offsite power). For these reasons, the construction and operation activities associated with the proposed Project (i.e., gas system modification, and well cellar construction) would not require the creation of a new source of energy, and continued compliance with applicable state and local requirements would ensure the Project would not result in wasteful, inefficient, or unnecessary consumption of energy resources.

Lastly, both existing and future equipment and vehicles used by Project workers and vendors would be subject to increasingly stringent federal and state fuel efficiency standards, which would minimize the potential for inefficient fuel usage. The Project would be required to comply with the provisions of 13 CCR Sections 2449 and 2485, which prohibit diesel-fueled commercial motor vehicles and off-road diesel vehicles from idling for more than five minutes. Heavy equipment would also be subject to the U.S. Environmental Protection Agency's (USEPA's) Construction Equipment Fuel Efficiency Standard (40 Code of Federal Regulations Parts 1039, 1065, and 1068) and CARB's AB 1493 (i.e., Pavley) regulations, which would also minimize inefficient fuel consumption and ensure that the fuel efficiency of equipment and vehicles operating on- and off-site would continue to improve over time. In the interest of cost efficiency and in accordance with federal and state requirements, SHP's onsite staff and third-party vendors would not utilize fuel in a manner that is wasteful or unnecessary during Project construction and operation phases.

For the reasons outlined above, the proposed Project would not result in a potential impact due to wasteful, inefficient, or unnecessary consumption of energy resources, and impacts would be less than significant with no mitigation required.

[7] https://ecdms.energy.ca.gov/elecbycounty.aspx

CEQA Guidelines Appendix G, Energy Threshold Criteria (b): *Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?*

As discussed above, in the case of energy impacts assessment in the City of Signal Hill, there is not yet a specific threshold of significance. At this time, other than the generalized policies found within the General Plan, the City has not adopted local programs or policies that support energy efficiency and/or sustainability that would apply to the Project (see lack of "City of Signal Hill" listings at https://eecoordinator.info/ee-sustainability-progress-by-city-and-county/#Kern).

As discussed under CEQA Guidelines Appendix G, Energy Threshold Criteria a) above, the Project's mobile equipment and vehicles, including Drill Rig #5 which currently has a Tier 4 diesel engine, would also comply with federal, state, and regional requirements where applicable. Specifically, the USEPA and the NHTSA have adopted fuel efficiency standards for medium- and heavy-duty trucks which apply to truck fleet operators, such as the Project proponent. The California Air Resources Board (CARB) has also adopted cleaner technology and fuel standards pursuant to AB 1493. While Phase 1 and Phase 2 regulation published by both the USEPA/NHTSA and CARB primarily apply to manufacturers of on-road vehicles and not the end user, SHP and off-site vendors will ensure engines purchased are certified in accordance with the appropriate state and federal regulations. This will ensure that efficiency of mobile equipment and vehicles would continue to improve over the 20-year life of the Project through compliance with increasingly stringent standards adopted by applicable regulatory agencies. The energy modeling for trucks does not take into account specific fuel reductions from these regulations, as they would apply to fleets as they incorporate newer trucks meeting the regulatory standards; however, these regulations would have an overall beneficial effect on reducing fuel consumption from trucks over time as older trucks are replaced with newer models that meet the standards.

The State of California's Energy Efficiency Strategic Plan (adopted 2008, updated January 2011) outlines specific goals and strategies to help promote energy efficiency in California's industrial sector in three (3) areas: 1) Support industry adoption of energy efficiency by integrating energy efficiency savings with achievement of greenhouse gas (GHG) goals; 2) Build market value of and demand for energy efficiency; and 3) Provide technical and public policy guidance for resource efficiency.[8] The Energy Efficiency Strategic Plan promotes reductions in energy consumption through compliance with GHG emission reductions, water conservation, and proper waste disposal. As applicable, the Project would continue to utilize the best available equipment to improve diesel fuel efficiency, and equipment that uses energy would implement modern design and technology to maximize efficiency improvements.

Lastly, the Project is expected to have no effect on local population growth, as the Project would require no additional permanent onsite employees, and the 2020 Strategic Plan contains no additional control measures with which the Project may conflict. As discussed above, other than temporary additional contractors and vendors required to construct the gas system modification (estimate to be completed in 6 months), SHP's 12 to 14 existing onsite employees would continue to work at the CUP Sites, and no additional employees would be required. Additionally, the Project would continue implementing existing rules and conform with fleet turnover, further reducing the Project's fuel energy consumption over time.

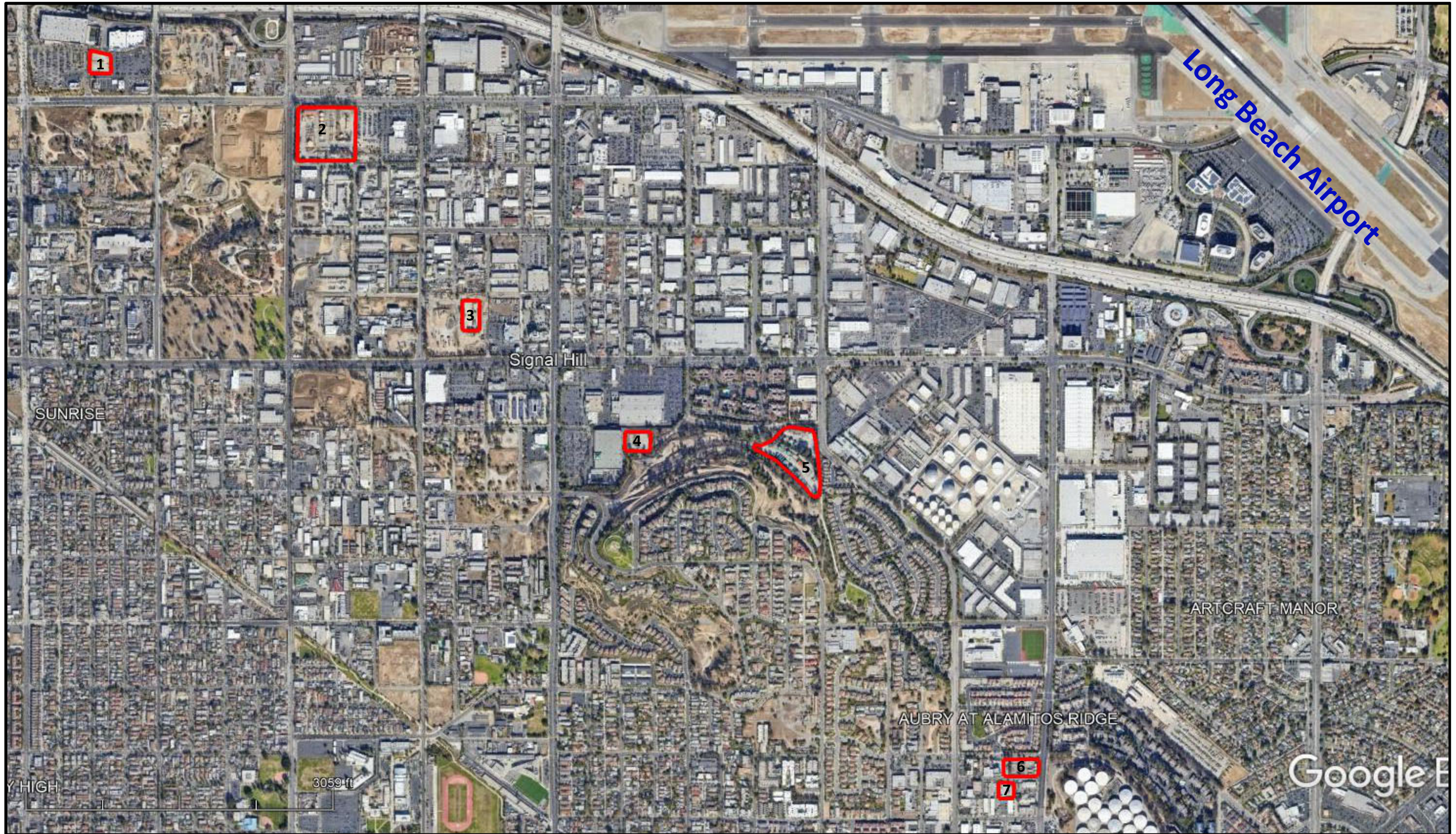
In summary, the Project construction and operations activities would not result in significant increase in energy consumption over the existing environmental baseline, and would not conflict with or obstruct a state or local

[8] https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/energy-efficiency/energy-efficiency-strategic-plan

plan for renewable energy or energy efficiency. Therefore, the Project impacts are less than significant, with no mitigation required.

ATTACHMENT A

Figures



Source: Google Earth™ (2022)

CUP 97-03/Property Boundaries (approximate)

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SESPE CONSULTING, INC.
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FIGURE 1	PROJECT OVERVIEW / NOISE SUMMARY Signal Hill Petroleum, Inc. 2633 Cherry Avenue Signal Hill, California 90755		
PROJECT #:	210509.0416	DATE:	5/20/22
SCALE:	See Above	DRAWN BY:	GPS

CUP Site No.5
Central Site

Legend

APN:7214-010-006
APN:7214-010-007
APN:7214-011-002
APN:7214-011-009
APN:7214-011-011
APN:7214-011-013

2700 Combellack Dr.
Entrance Gate Combellack Dr.

Legend

- Active Producers = 1
- Idle Producers = 5
- Active Injectors = 2
- Idle Injectors = 1
- Drill Site Boundary
- Containment Wall
- Gate
- Well Chemical
- 1 Tank Crude Oil 5,000 bbls
- 2 Tank Crude Oil 5,000 bbls
- 3 Wash Tank Crude Oil Brine Wtr 5,000 bbls
- 4 Raw Blend Tank Brine Wtr 5,000bbls
- 5 Brine Tank Brine Wtr 3,000 bbls
- 6 Skim Tank Crude Oil 3,000bbls
- 7 Clean Brine Tank Brine Wt 5,000bbls
- 8 Filter Wash Tank Brine Wtr 3,000bbls
- 9 Overflow Tank Crude Oil 7200bbls
- 10 2x 1,000 Gal Diesel Storage Tanks
- 11 Free water knockout oil/water/gas 795bbls
- 12 Free water knockout oil/water/gas 795bbls
- 13 Free water knockout oil/water/gas 800bbls
- 14 Injection Pump House
- 15 Field Office
- 16 Edison 66KV Substation
- 17 12KV Switch Gear

SESPE CONSULTING, INC.
A Trinity Consultants Company

FIGURE 2	CUP SITE #5 - SITE PLAN Signal Hill Petroleum, Inc. 2633 Cherry Avenue Signal Hill, California 90755		
PROJECT #:	210509.0416	DATE:	7/6/22
SCALE:	See Above	DRAWN BY:	GPS

ATTACHMENT B

Project Energy Calculations & Summary Data

Project Fuel Energy Summary

Project Fuel Energy Summary				
Project Activity	Annual Maximum		Project Total (20-Years)	
	Off-Road Equipment Fuel Consumption (gallons)	On-Road Vehicle Fuel Consumption (gallons)	Off-Road Equipment Fuel Consumption (gallons)	On-Road Vehicle Fuel Consumption (gallons)
Gas System Modification Construction	1,900.0	1,071.4	1,900.0	1,071.4
Well Cellar Construction	16.5	3.7	164.8	37.0
Drilling/Redrilling (Drill Rig #5)	9,204.5	---	66,942.1	---
Total Fuel Consumed (gallons):	**11,121.0**	**1,075.1**	**69,006.8**	**1,108.4**
Total Fuel Consumed (gallons):		**12,196.1**		**70,115.2**

Annual Maximum Project Fuel Consumption:	12,196.1	gallons
Total CEC Retail Sales (Diesel Fuel) - Los Angeles County (2022):	295,000,000	gallons
Annual Project Percent (%) Increase:	0.004%	

Project Electricity Consumption		
Project Activity	**Annual kWh**	**Project Total kWh (20-Years)**
Drilling/Redrilling (Drill Rig #6)	4,783,814.6	34,791,379.2
New Pumpjacks	1,633,083.0	15,024,363.6
Totals (kWh):	**6,416,897.6**	**49,815,742.8**

Annual Maximum Project Electricity Consumption:	6,416,897.6	kWh
:EC Electricity Consumption (Non-Residential) - Los Angeles County (2022):	45,229,473,269	kWh
Annual Project Percent (%) Increase:	0.014%	

Gas System Modification

Fuel Energy Summary

Gas System Modification - Off-Road Construction Equipment					
Equipment	Total Operating Hours	Default HP [1]	Load Factor [1]	Total Fuel Consumed (gal)	
Backhoe	40	97	0.37	82.4	
Dump Truck [2]	32	402	0.38	280.6	
Water Truck [2]	40	402	0.38	350.7	
Crane	104	231	0.29	399.8	
Welder	144	46	0.45	171.1	
Concrete/Pavement Saw	16	81	0.73	54.3	
Ready-Mix Concrete (RMC) Truck [2]	64	402	0.38	561.1	
			Total Fuel Energy Consumed:	**1,899.95**	**gallons**

Footnotes:

1. Default HP and load factor based on CalEEMod 2020.4.0 User Guide Appendix D, Table 3.3, *OFFROAD Default Horsepower and Load Factors*.

2. Dump truck, water truck, and concrete truck are using the "Off-Highway Trucks" category from CalEEMod and OFFROAD.

Gas System Modification - On-Road Vehicle Trips						
Vehicle Type	Round Trips per Day [1]	Miles per Trip	Day per Year	Total VMT [1]	Miles per Gallon [2]	Total Fuel Consumed (gal)
Contractor/Gear Trucks	6	3	48	864	10	86.4
Heavy-Duty Trucks (Equipment/Deliveries)	2	5	48	480	4	120.0
Ready-Mix Concrete (RMC) Trucks	2	10	173	3,460	4	865.0
				Total Fuel Energy Consumed:		**1,071.40** **gallons**

Footnotes:

1. Provided by SHP in "SHP CUP 97-03 - Supplemental AQ Data.xlsx". Round trips per day is pulled from "PCE Equivalent Roundtrips".

2. Based upon a 2010 National Highway Traffic Safety Administration (NHTSA) study (https://www.nhtsa.gov/sites/nhtsa.gov/files/nhtsa_study_trucks.pdf)

Well Cellar Construction

Fuel Energy Summary

Well Cellar Construction - Off-Road Construction Equipment					
Equipment	Total Operating Hours [3]	Default HP [1]	Load Factor [1]	Total Fuel Consumed (gal)	
Backhoe	80	97	0.37	164.8	
			Total Fuel Energy Consumed:	**164.8**	**gallons**

Footnotes:

1. Default HP and load factor based on CalEEMod 2020.4.0 User Guide Appendix D, Table 3.3, *OFFROAD Default Horsepower and Load Factors*.

2. Dump truck, water truck, and concrete truck are using the "Off-Highway Trucks" category from CalEEMod and OFFROAD.

3. Total operating hours = maximum number of new well cellars (20 total) x hours of operation per well cellar (4 hours).

Well Cellar Construction - On-Road Vehicle Trips							
Vehicle Type	Round Trips per Day	Miles per Trip	Day per Year	Total VMT [1]	Miles per Gallon [2]	Total Fuel Consumed (gal)	
Employee/Contractor Trucks	2	3	20	120	10	12.0	
Heavy-Duty Trucks (Equipment/Deliveries)	1	5	20	100	4	25.0	
				Total Fuel Energy Consumed:		**37.0**	**gallons**

Footnotes:

1. Provided by SHP in "SHP CUP 97-03 - Supplemental AQ Data.xlsx". Round trips per day is pulled from "PCE Equivalent Roundtrips".

2. Based upon a 2010 National Highway Traffic Safety Administration (NHTSA) study (https://www.nhtsa.gov/sites/nhtsa.gov/files/nhtsa_study_trucks.pdf)

Drilling/Redrilling and Pumpjacks

Fuel and Electricity Consumption

Historical Drilling/Redrilling Activity - CUP 97-03 Sites					
Year	Well Type		Drilling / Redrilling		Total Wells
	Production	Injection	New Wells (Drill)	Existing Wells (Redrilling)	
2009	2	0	2	0	2
2010	3	0	2	1	3
2011	1	3	1	3	4
2012	2	4	2	4	6
2013	3	0	3	0	3
2014	2	0	2	1	3
2015	0	0	0	0	0
2016	0	0	0	0	0
2017	0	0	0	0	0
2018	0	0	0	0	0
2019	1	0	0	1	1
2020	0	0	0	0	0
2021	0	0	0	0	0
Annual Average (2009 – 2014):			**2**	**2**	**4**
Annual Maximum (2009 – 2014):			**3**	**4**	**6**

Forecasted Project Drilling/Redrilling Activity – CUP 97-03 Sites			
Parameters	Drilling (new wells)	Redrilling (existing wells)	Total Wells (Drill & Redrill)
Forecasted Annual Average:	2	1	4
Forecasted Annual Maximum:	5	6	9
Forecasted Total (20-Year Permit Term):	46	28	74

Annual Drilling/Redrilling - Activity Summary				
Activity	Max Number of Wells per Year	Days per Well [1]	Hours per Day [1]	Total Annual Operating Hours
Redrilling	6	27	24	3,888
Drilling	5	27	24	3,240

1. Consistent with existing operations, redrilling of an existing well and drilling of new wells can take up to one month (27 days). Redrilling and drilling requires operations of up to 24-hours per day.

Annual Drilling/Redrilling - HP/Hours per Drill Rig								
Drill Rig	HP	Power Source	Usage Breakdown	Redrilling		Drilling		Total HP Hours
				Max Hours per Year	Total Annual HP Hours	Max Hours per Year	Total Annual HP Hours	
Rig #5	450	Diesel Generator	10%	388.8	174,960.0	324.0	145,800.0	320,760.0
Rig #6	1,000	Fully Electric	90%	3499.2	3,499,200.0	2,916.0	2,916,000.0	6,415,200.0

Drilling/Redrilling and Pumpjacks

Fuel and Electricity Consumption

Rig #5 - Diesel Fuel Consumption			
Activity Metric	**Total HP/Hours**	**Offroad Load Factor [1]**	**Total Fuel Consumed (gal)**
Annual Maximum Consumption [2]	320,760	0.5	9,204.5
Total Consumption (20-Year Project Life) [2]	2,332,800	0.5	66,942.1

1. Default HP and load factor based on CalEEMod 2020.4.0 User Guide Appendix D, Table 3.3, *OFFROAD Default Horsepower and Load Factors*.

2. No more than 28 total wells would be redrilled, and 46 total new wells would be drilled throughout the life of the Project.

Rig #6 - Electricity Consumption		
Activity Metric	**Total HP/Hours**	**Total Electricity (kWh) [2]**
Annual Average Maximum	6,415,200	4,783,814.6
Total Consumption (20-Year Project Life) [1]	46,656,000	34,791,379.2

1. No more than 28 total wells would be redrilled, and 46 total new wells would be drilled throughout the life of the Project.

2. kWh = Total HP/Hours * 0.7457

New Pumpjacks - Electricity Consumption					
Activity Metric	**Total New Pumpjacks**	**HP per Pumpjack [1]**	**Hours per Year [2]**	**Total HP Hours**	**Total Electricity (kWh) [3]**
Annual Maximum Consumption	5	50	8,760	2,190,000	1,633,083.0
Total Consumption (20-Year Project Life)	46	50	8,760	20,148,000	15,024,363.6

1. Per information provided by SHP. Each new pumpjack would have a 50 HP electric motor.

2. Conservatively assume new pumpjacks could operate continuously all year long (365 days * 24 hours/day).

3. kWh = Total HP/Hours * 0.7457

SHP Baseline Data

Electricity Production

The natural gas-powered turbine/electric generation facility provides 70% of the electricity required to power SHP's oil operations in the Long Beach Oil Field.

Electricity Production Summary (Power Turbine)			
Date	**Input - Fuel**	**Output - Electricity**	
	Natural Gas (scf)	**Electricity (kWh)**	
Jan-20	43,510.50	3,745,464.00	
Feb-20	40,379.04	3,493,440.00	
Mar-20	41,203.36	3,744,024.00	
Apr-20	39,805.63	3,569,328.00	
May-20	40,215.19	3,666,600.00	
Jun-20	43,568.77	3,339,672.00	
Jul-20	49,038.08	3,103,800.00	
Aug-20	48,748.98	3,367,536.00	
Sep-20	46,064.60	3,366,456.00	
Oct-20	48,677.88	3,451,440.00	
Nov-20	42,375.98	3,022,776.00	
Dec-20	44,058.65	3,512,616.00	
Annual Total (2020):	**527,646.65**	**41,383,152.00**	**kWh**
Monthly Average (2020):	**43,970.55**	**3,448,596.00**	**kWh**

Assumed additional electricity (kWh) purchased from SCE (30% of quantity produced):	12,414,945.60	kWh
Purchased Electricity (kWh) - SHP Data:	11,845.85	kWh

SHP Baseline Data

Crude Oil Natural Gas Production

CUP Site	Energy Production	
	Crude Oil (bbls)	Natural Gas (mscf)
CUP Site #1	50,412	28,886
CUP Site #2	24,076	6,396
CUP Site #3	28,816	10,309
CUP Site #4	80,296	28,824
CUP Site #5	3,024	631
CUP Site #6	14,992	3,724
CUP Site #7	2,416	601
Total Annual Average:	**204,032**	**79,371**

Quantities above based on SHP's historical production records from 2010 to 2021. These average annual production levels are representative of the average annual production levels that would continue during the proposed 20-year term of the Project.