



EMERGENCY GENERATOR PLANNING

EXISTING DIESEL GENERATORS AND FUEL CONSUMPTION

The Sunland Water District has existing backup generators at Wells 1 and 2 and the Water Reclamation Facility as shown in the following chart:

Location	Generator Size	Fuel Capacity	Runtime Duration (@100% load)
Well 1 – Upper Res	80 kW	256 gallons	40 hours @100% *Up to 50 hrs. @75% - Conservative. (With one booster pump and well pump set to run only). And assuming at least 160 gals. In tank at any time.
Well 2 – Lower Res	60 kW	40 gallons	8 hours @ 100% *Up to 52 hrs. if 200 gals of stored diesel are considered. (We store 275 gals of diesel), and 75% load, such as only two boosters enabled and well pump. Also, the upper reservoir would be shut down to achieve the maximum run time for lower reservoir.
Water Reclamation Facility	125 kW	120 gallons	13 hours @ 100%
Taylor Generator lift #3	30 kW	180 gallons	Up to 90 hrs. at 50 % (only 1 pump at a time)
Main lift generator #1	60 kW	500 gallons	
Spare Fuel @ The Barn		275 gallons	

The runtimes shown above are calculated for the generators running at 100% of stated capacity. This scenario is very unlikely and as such the runtime estimates are inherently conservative. A diesel generator fuel usage chart is included below to illustrate the difference in runtime between minimum and maximum generator output. The chart shows fuel usage in gallons per hour at various load percentages:

Generator Size	25% Load (gal/hr.)	50% Load (gal/hr.)	75% Load (gal/hr.)	100% Load (gal/hr.)
60 kW	1.8	2.9	3.8	4.8
75 kW	2.4	3.4	4.6	6.1
125 kW	3.1	5.0	7.1	9.1
30 kW	1.3	1.8	2.4	2.9



POWER OUTAGE RUNTIME AND MAX DURATION

With the existing diesel generators and spare fuel, the District can operate normally without power for a maximum of 24 hours at full generator load capacity. In a realistic conservative approach, SunLand could achieve one day for all stations if barrel reserves are close to full. In the case of an extended outage, Well No. 2 (Lower Reservoir) would be shut down and Well No. 1 (Upper Reservoir) would provide water service to SunLand.

In the event of a major catastrophe such as an earthquake or tsunami, Sunland (and possibly most of the peninsula) could be without power for as long as 2 weeks. The district would need to store 7392 gallons of fuel to supply the existing generators for that amount of time. Diesel fuel has a usable storage life of 12 months according to the BP oil industry. After 12 months of storage, the diesel forms a fine sediment and gum which clogs fuel filters and forms carbon and soot deposits. Not only would the district need to store over 7000 gallons of diesel, we would need to burn it all every year. This would increase generator runtimes significantly, resulting in more wear on the equipment and significantly higher fuel costs.

The City of Sequim stores enough fuel to power their water system generators for 48 hours and their treatment plant for 72 hours. They have a combination of diesel and propane generators.

If the District were to adopt a 48-hour outage max duration, a total of 1056 gallons of diesel fuel would be needed at the start of the outage. Not including the generator fuel tanks, around 781 gallons of spare fuel would need to be stored at the start of the outage. As the generators are exercised weekly and some diesel fuel is needed for the backhoe, the District would actually need to have the capacity to store roughly twice this amount or 1,680 gallons (1,380 gallons of spare fuel storage). Burning 1,680 gallons of fuel annually would cost roughly \$9,441/yearly (based on the US EIA current (5/10/22) rate of \$5.62/gallon for #2 diesel.)



PROPANE VS DIESEL GENERATORS

There are pros and cons for both propane and diesel generators. Although the District purchased a new generator for Lift Station No. 1 and is in the process of purchasing a new generator for Lift Station No. 3, they will be differently sized units. For the purposes of this comparison, 60kW gensets were chosen.

1. Diesel

a. Pros

- i. The district currently has 4 diesel generators and is familiar with them.
- ii. Diesel engines are inherently reliable.
- iii. If the District decided to choose a max outage runtime longer than 61 hours (2.5 days,) diesel is the only feasible fuel to use.
- iv. Diesel generators can be had with base-mounted fuel tanks that will hold up to a 5-day supply of fuel.
- v. If we have spare storage of diesel fuel, then we can fill up the generator tanks during an emergency.
- vi. Running a 60 kW diesel generator at full load costs approximately \$26.98/hour or \$647.52/daily for fuel. (Based on the US EIA current rate of \$5.62/gallon for #2 diesel)

b. Cons

- i. Diesel engines are louder than propane engines.
- ii. Diesel fuel is more likely to be spilled than propane.
- iii. Diesel fuel deteriorates over time and can only be kept for 12 months.
- iv. Diesel generators have a larger visual impact than propane generators because of the base-mounted fuel tanks.
- v. Every diesel generator added means more spare fuel that needs to be stored and burned annually.

2. Propane

a. Pros

- i. Propane never goes bad. We can store up to 61 hours-worth (60kW genset @ 100% power, 600-gallon propane tank) on



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site and not need to burn it all every year. This would save on fuel costs and generator wear.

- ii. Propane generators are smaller than diesel generators of a similar rating and therefore have a smaller visual impact.
 - iii. Propane engines are quieter than diesel engines.
 - iv. We can bury the propane tank on site, creating less visual disturbance.
 - v. We do not need to add more spare fuel storage when adding propane generators, all required fuel is stored on site.
- b. Cons
- i. We will not be able to fill up the on-site tanks during an emergency. When we run out of fuel, the generator will shut down.
 - ii. Propane engines are not reported to be as reliable as diesel engines.
 - iii. Propane generators are more expensive than diesel generators.
 - iv. Running a 60kW propane generator at full load costs approximately \$19.60/hour or \$470.40/daily for fuel (based on the US EIA current rate of \$2/gallon for propane).