

## **5.15 ENERGY SUPPLY, NATURAL RESOURCES, AND SUSTAINABLE DESIGN**

This section presents the assessment of the potential impacts on the supply of energy and natural resources available at the Gness Field Airport (DVO or Airport) under the Sponsor's Proposed Project and its alternatives. This section will also include a discussion of the Federal Aviation Administration (FAA) policy supporting airport development that demonstrates environmental sustainability. The objective of the assessment is to determine whether the Sponsor's Proposed Project and its alternatives would have the potential to exceed the local energy supply. The assessment also determines whether there would be a requirement for the use of rare natural resources that could potentially deplete the supply of natural resources in the area.

For airport projects, energy and natural resources are consumed through the operation of stationary facilities and aircraft operations, and to some extent, during construction. Stationary facilities require electricity and natural gas (utility power) for lighting, cooling, and heating. Electricity provides cooling and lighting for buildings, lighting for aircraft and vehicle parking areas, and lighting systems for the airfield (runway, taxiways, and aircraft aprons). Natural gas provides heat and hot water for airport buildings. Consequently, airport development projects may result in a change in the demand for utility energy when modifications to stationary sources and aircraft operations are proposed.

Aircraft operations consume fuel energy (Jet A fuel for jets and turboprops, and AvGas for piston aircraft) to operate aircraft and require unleaded gasoline and diesel fuel to power ground support equipment (GSE). As such, an airport development project may result in a change in the demand for fuel energy due to modifications of aircraft movements or the type and number of aircraft operations.

Natural resources may be impacted by a construction project. Proposed construction may require the acquisition of land or require the removal of dirt, rock, or gravel that could diminish or deplete a supply of those and other natural resources.

### **5.15.1 REGULATORY SETTING**

An analysis of impacts to energy supplies and natural resources should provide details sufficient to fully explain the degree of the problem and measures to be taken to minimize the impact when significant impacts are expected.<sup>1</sup> For most airport improvement projects, changes in energy demands or other natural resource consumption will not result in significant impacts, which are defined as major changes in demand that would exceed supply. Natural resources (other than

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<sup>1</sup> FAA, Order 1050.1E, *Environmental Impacts: Policies and Procedures (including Change 1)*, Appendix A, Section 13, *Natural Resources and Energy Supply*, Paragraph 13.3, *Analysis of Significant Impacts*, March 20, 2006.

fuel) are evaluated only if the project involves a need for unusual materials or those in short supply. If the analysis indicates the demand for energy or natural resources would not exceed supply, it may be assumed that impacts are not significant.<sup>2</sup>

The impact on energy and natural resources was determined by evaluating projected supply and demand based on the guidelines provided in FAA Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures*<sup>3</sup>. The evaluation of demand was further based on operations that consume, produce, and/or conserve measurable amounts of energy (utility power and fuel) and natural resources during construction. The evaluation of available fuel supply was determined through coordination with the various distributors. The power company, Pacific Gas and Electric (PG&E), was contacted to determine the ability of the company to meet the increase in demand for electricity under the Sponsor's Proposed Project and its alternatives.

While there are no specific measurable thresholds that define significant impacts to the supply of energy and natural resources, FAA provides guidelines for airport actions. FAA guidelines state that potential significant impacts would occur if the projected demand for energy and natural resources due to the construction, operation, or maintenance of an airport action would exceed available or future energy or natural resource supplies, and would:

- Cause a substantial increase in demand for energy or natural resource supplies;
- Cause a significant increase in fuel consumption when compared to future no action conditions due to changes in aircraft movements or ground vehicle use;
- Require rare consumable natural resources for construction; and,
- Not be consistent with smart growth requirements of the FAA.

With regard to sustainable design, Executive Order 13123, *Greening the Government Through Efficient Energy Management*,<sup>4</sup> encourages each Federal agency to expand the use of renewable energy in its facilities and for its actions.

Further, FAA directs a review of a Federal action to discern the conservation of resources, use of pollution prevention strategies, minimization of aesthetic effects, and address public (both local and traveling) sensitivity to these concerns.

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<sup>2</sup> FAA, Order 1050.1E, *Environmental Impacts: Policies and Procedures (including Change 1)*, Appendix A, Section 13, *Natural Resources and Energy Supply*, Paragraph 13.2b, *FAA Responsibilities*, March 20, 2006.

<sup>3</sup> FAA, Order 1050.1E, *Environmental Impacts: Policies and Procedures (including Change 1)*, Appendix A, Section 13, *Natural Resources and Energy Supply*, March 20, 2006.

<sup>4</sup> Executive Order 13123, *Greening the Government Through Efficient Energy Management*, 64 FR 30851, June 8, 1999.

The remainder of this section provides an evaluation of the potential for significant impacts on the supply of energy and natural resources under the Existing Conditions (2008) and the future (2018) conditions for each of the alternatives: Alternative A (No Action), Alternative B (Sponsor's Proposed Project), and Alternative D. The information provided in this evaluation is supported by the procedures and methodology described in Appendix K, *Energy Supply, Natural Resources, and Sustainable Design*.

**5.15.2 EXISTING CONDITIONS**

**Table 5.15-1** and the following paragraphs describe the current use of utility and fuel energy and natural resources at DVO.

**Table 5.15-1  
ANNUAL UTILITY POWER AND FUEL DEMAND  
EXISTING CONDITIONS (2008)  
Gross Field Airport**

UTILITY ENERGY		FUEL ENERGY			
Electricity	Natural Gas	Jet A	AvGas	Unleaded Gasoline	Diesel
222 MMBtu (65,148 kWh)	150 MMBtu (157,895 ft <sup>3</sup> )	167,918 gallons	75,258 gallons	500 gallons	500 gallons

Note: MMBtu is million British thermal units per year; kWh is kilowatt hours; and ft<sup>3</sup> is cubic feet. Jet A is jet fuel; AvGas is low-lead (100 octane) aviation gasoline for general aviation aircraft; unleaded gasoline (average 87 octane) and diesel fuel is used for GSE.

Source: Marin County Public Works, 2009; Landrum & Brown analysis, 2009.

**Local Supplier:** In May 2010, the Marin Energy Authority gained the ability to buy electricity on the free market and have it delivered to its residents over the existing infrastructure owned by the local utility company. This is made possible by Community Choice Aggregation, which results from a State of California law passed in 2002. The electricity provided to Marin County customers is largely generated from renewable sources.<sup>5</sup> Fuel, including Jet A, AvGas, unleaded gasoline, and diesel fuel are provided through contracts with various distributors.

**Other Natural Resources:** There would be no requirement for construction or use of natural resources of any kind under the Existing Conditions (2008). However, a minimal amount of natural resources, such as gravel and asphalt, would likely be used to repair and maintain existing facilities. These materials are locally available, are not rare, and not in short supply. Therefore, there would be no impact to local supplies of natural resources.

<sup>5</sup> Marin County presents possible model for beefing up clean energy in Boulder, Colorado Daily, May 22, 2010. On-line at: [www.coloradodaily.com](http://www.coloradodaily.com)

**Electricity:** Electric power is used primarily for air conditioning and lighting for the administration building and aircraft hangars at the Airport. Electricity is also required to light the airfield (runways, taxiways, and apron areas) and public parking areas. The Airport requires approximately 65,148 kilowatt hours (kWh) of electric power per year, which was converted to 222 million British thermal units (MMBtu) per year for ease in comparing the two types of utility power.

**Natural Gas:** Natural gas provides heat to the administration building, aircraft hangars, and other Airport buildings. Natural gas-powered heating units are generally operated only during the five coolest months of the year. The Airport consumes approximately 157,895 cubic feet (ft<sup>3</sup>) of natural gas per year, which was converted to 150 MMBtu per year for ease in comparing the two types of utility power.

**Fuel:** There is one runway at DVO, Runway 13/31, which is 3,300 feet long, and a helipad that is 60 square feet. The existing runway is too short to allow certain jet aircraft to depart fully loaded with fuel, passengers, and luggage, forcing operators to limit the amount of fuel, passengers, or luggage. Departing without sufficient fuel to reach the destination airport requires an enroute stop to refuel the aircraft. This procedure requires less fuel usage at the Airport as would otherwise be required if a runway of sufficient length were available for these aircraft to carry a greater fuel load. Thus, the annual demand for Jet A fuel at the Airport depends primarily on the type of aircraft, the weight limitations based on the runway length, the number of annual operations, and average taxi time. Users of the Airport consumed 167,918 gallons of Jet A fuel in 2008. Aircraft that use AvGas (typically small single engine aircraft) are less affected by the runway length at DVO. Thus, the annual demand for AvGas depends primarily on the type of aircraft, the number of annual operations, and average taxi time. Users of the Airport consumed 75,258 gallons of AvGas in 2008.

As a general aviation airport, DVO does not require a large fleet of GSE. The Airport operates two fuel trucks, one powered by unleaded gasoline and one diesel-powered fuel truck. Thus, the fuel demand for unleaded gasoline and diesel fuel depends on the number of annual aircraft operations requiring fueling. The Airport used a total of approximately 500 gallons of unleaded gasoline and 500 gallons of diesel fuel for operating GSE in 2008.

**Sustainability:** The Marin County Department of Public Works manages and is responsible for the general service functions of the Airport.<sup>6</sup> The Airport is funded through the County's Aviation Fund. The mission statement of the Public Works Department includes providing a safe, sustainable environment for the people of Marin County. County initiatives to promote sustainability that may affect the Airport include:<sup>7</sup>

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<sup>6</sup> Marin County, *County of Marin Proposed Budget FY 2009-2010: Department of Public Works*.

<sup>7</sup> Marin County, *Public Works Final Performance Plan FY 2008-2009*.

- Develop a "Zero Waste Plan" to guide and further Marin County's waste reduction;
- Install diesel particulate filters on the County's diesel-fueled vehicles;
- Develop and implement an Above Ground Petroleum Storage Tank Program;
- Procure additional hybrid vehicles for the Marin County motor pool;
- Begin development of a computerized Preventive Maintenance Program for Marin County facilities;
- Conduct upgrades of Gness Field hangars to improve moisture sealing and venting; and
- Administer the Waste Management Program to provide hazardous material and waste permitting and oversight of Marin County businesses, and manage the Marin County Solid and Hazardous Waste Joint Powers Authority (JPA).

The Marin County Department of Public Works' proposed budget for 2009-2010<sup>8</sup> states mission accomplishments as:

- Increased percentage of hybrid fleet vehicles to 26 percent; and,
- Expanded the Green Commute Program to 11 percent of County employees carpooling, riding transit, walking or bicycling an average of 3.1 days per week.

The 2009-2010 County Budget lists goals and initiatives that include:

- Enhance quality of life through sustainability and accessibility programs;
- Provide effective infrastructure construction and maintenance;
- Provide effective transportation and regulatory services to the public, including the environmental documentation for the proposed runway extension at Gness Field;
- Implement the first phase of the Emission Retrofit Program for county-owned diesel vehicles;
- Implement the new state-mandated program to monitor and issue permits for above ground storage tanks containing hazardous materials;
- Revise the best management practices component of the Airport Storm Water Pollution Prevention Plan;
- Develop an enhanced trash reduction program for the Airport;
- Complete needed repairs to the internal Airport access road bridge decking and approaches; and,
- Maximize utilization of aviation facilities at DVO.

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<sup>8</sup> Marin County, *County of Marin Proposed Budget FY 2009-2010: Department of Public Works*.

**5.15.3 FUTURE CONDITIONS: 2018**

The following paragraphs describe the projected demand for energy and natural resources under Alternative A, Alternative B (Sponsor’s Proposed Project), and Alternative D in 2018. Conditions were based on the analysis of demand during the Existing Conditions (2008) period, the anticipated changes to operating conditions due to each alternative, and the number of aircraft operations projected for 2018.

**Alternative A:  
No Action**

Under this alternative, the runway and taxiway configurations, and all other Airport facilities, would remain the same as described for the Existing Conditions (2008). A summary of the annual demand for utility power and fuel for 2018 Alternative A is given in **Table 5.15-2**.

**Table 5.15-2  
ANNUAL UTILITY POWER AND FUEL DEMAND  
2018 ALTERNATIVE A (NO ACTION)  
Gross Field Airport**

UTILITY ENERGY		FUEL ENERGY			
Electricity	Natural Gas	Jet A	AvGas	Unleaded Gasoline	Diesel
234 MMBtu (68,590 kWh)	158 MMBtu (166,236 ft <sup>3</sup> )	176,789 gallons	79,234 gallons	537 gallons	526 gallons

Note: MMBtu is million British thermal units per year; kWh is kilowatt hours; and ft<sup>3</sup> is cubic feet. Jet A is jet fuel; AvGas is low-lead (100 octane) aviation gasoline for general aviation aircraft; unleaded gasoline (average 87 octane) and diesel fuel is used for GSE.

Source: Marin County Public Works, 2009; Landrum & Brown analysis, 2009.

**Other Natural Resources:** There would be no requirement for construction or use of natural resources of any kind under 2018 Alternative A and impacts would be as described for the Existing Conditions (2008). However, a minimal amount of natural resources, such as gravel and asphalt, would likely be used to repair and maintain existing facilities. These materials are locally available, are not rare, and not in short supply. Therefore, there would be no impact to local supplies of natural resources.

**Electricity:** No new Airport facilities are proposed for this alternative that would increase the demand for electric power. However, the demand for electric power for air conditioning is expected to increase to 68,590 kWh per year as the number of Airport users is projected to increase with or without the proposed improvements.

**Natural Gas:** No new Airport facilities are proposed for this alternative that would increase the demand for natural gas power. However, the demand for natural gas power to heat Airport facilities is expected to increase to 166,236 ft<sup>3</sup> per year as the number of Airport users is projected to increase with or without the proposed improvements.

**Fuel:** No new Airport facilities are proposed for this alternative that would increase the demand for aircraft fuel. However, the total demand for aircraft and GSE fuel is expected to increase to 257,086 gallons per year as the number of aircraft operations is projected to increase with or without the proposed improvements.

**Sustainability:** Sustainability efforts under the future 2018 Alternative A would be the same as under the Existing Conditions (2008).

**Alternative B:  
Extend Runway 13/31 to the Northwest by 1,100 Feet (Sponsor’s Proposed Project)**

The projected annual demand for utility power and fuel at DVO for 2018 Alternative B as compared to 2018 Alternative A is given in **Table 5.15-3**.

**Table 5.15-3  
ANNUAL UTILITY POWER AND FUEL DEMAND  
2018 ALTERNATIVE B  
Gross Field Airport**

Alternative	UTILITY ENERGY		FUEL ENERGY			
	Electricity	Natural Gas	Jet A	AvGas	Unleaded Gasoline	Diesel
<b>A</b>	234 MMBtu (68,590 kWh)	158 MMBtu (166,236 ft <sup>3</sup> )	176,789 gallons	79,234 gallons	537 gallons	526 gallons
<b>B</b>	253 MMBtu (74,196 kWh)	158 MMBtu (166,236 ft <sup>3</sup> )	197,307 gallons	80,641 gallons	537 gallons	526 gallons

Note: MMBtu is million British thermal units per year; kWh is kilowatt hours; and ft<sup>3</sup> is cubic feet. Jet A is jet fuel; AvGas is low-lead (100 octane) aviation gasoline for general aviation aircraft; unleaded gasoline (average 87 octane) and diesel fuel is used for GSE.

Source: Marin County Public Works, 2009; Landrum & Brown analysis, 2009.

**Other Natural Resources:** Construction of 2018 Alternative B would require the use of asphalt concrete and crushed rock and sand (aggregate). In addition, soil would be required to fill the drainage levee and wetlands. Estimated requirements for natural resources for construction are given in **Table 5.15-4**. None of these materials are considered unusual, rare, or unique. As such, the volume of material required would not significantly deplete the current supply of natural resources.

**Table 5.15-4  
ESTIMATED REQUIREMENT FOR NATURAL RESOURCES  
2018 ALTERNATIVE B  
Gross Field Airport**

<b>MATERIALS</b>	<b>VOLUME REQUIRED (yd<sup>3</sup>)</b>
Soil	72,513
Earthwork	67,500
Total Aggregate	12,552
Asphalt Concrete	1,273

Note: yd<sup>3</sup> is cubic yards. Total aggregate is the total volume of crushed rock and sand required.  
Source: County of Marin Department of Public Works, *Preliminary Design Report: Runway Extension for Gness Field*, FAA AIP Project No. 3-06-0167-08 (December 20, 2002) and Landrum & Brown Analysis, 2009.

**Electricity:** This alternative includes the proposed extension of Runway 13/31 and the extension of the parallel taxiway to the full length of the extended runway. The new airfield pavement would require edge lighting and increase the demand for electric power to 74,196 kWh, an increase of 5,606 kWh per year. Additional electricity would be generated off-site. The power company, PG&E, was contacted to determine the ability of the company to meet the increase in demand. PG&E indicated that they could serve this load for the Airport with no further infrastructure upgrades.<sup>9</sup> Therefore, the increase would not constitute a significant impact to the supply of electricity.

**Natural Gas:** No new Airport facilities that would require additional natural gas power are proposed under this alternative. Alternative B does not increase demand for natural gas beyond the level described under 2018 Alternative A.

**Fuel:** The proposed extension of Runway 13/31 would allow Jet A-fueled aircraft affected by the shorter runway under the Existing Condition (2008) to depart fueled to capacity and capable of reaching the destination airport without stopping enroute to refuel. Furthermore, the proposed extended taxiway for this alternative would require all aircraft to consume additional fuel to taxi to the extended Runway 13 for departure. As a result, implementation of Alternative B would increase the demand for Jet A fuel to 197,307 gallons per year, an increase of 20,518 gallons per year when compared to 2018 Alternative A. The demand for AvGas would increase by 1,407 gallons per year to a total of 80,641 gallons per year when compared to 2018 Alternative A due to the increase in taxi time. Much of the increase in the use of aviation fuel at DVO would be offset by decreases at other regional airports as described in more detail under the Sustainability discussion.

<sup>9</sup> Email correspondence between Consultant and Peter Niewieroski, Account Executive – North Coast (Marin County account representative) Pacific Gas and Electric Company, December 22, 2010. See Appendix K.

It is not anticipated that there would be a change in the number of aircraft operations at the Airport under 2018 Alternative B when compared to 2018 Alternative A. As such, there is no change in the demand for unleaded gasoline and diesel fuel to power GSE under this alternative.

**Sustainability:** The demand for aviation fuel under this alternative would increase as compared to the 2018 Alternative A. However, while not quantifiable, it is likely that much of the increase in the use of aviation fuel at DVO would be offset by decreases at other regional airports. Currently a portion of the annual departures at DVO are weight-restricted due to the runway length. To accommodate for this, pilots restrict weight by either offloading people/cargo or fuel. If people/cargo is restricted, the pilot may call for an additional aircraft or make two trips. If fuel is restricted then the pilot may fly to another regional airport that has a longer runway and completely fuel up before proceeding on the rest of the flight. The longer runway in Alternative B would allow these aircraft to carry as much people/cargo and fuel as needed. Eliminating additional trips or interim stops would reduce the demand for fuel at other regional airports as well as reduce overall aviation fuel consumption as the landing and takeoff process requires more fuel than flying directly to the final destination.

To the extent possible and feasible, construction planning for the project alternatives would meet FAA policy recommendations that facility development include principles of sustainability in design. The FAA encourages the consideration of energy reduction measures in the planning and design of airport improvement projects. These principles are consistent with FAA policy that requires the use of a “systematic interdisciplinary approach, which would ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making.”<sup>10</sup> During construction, Marin County would ensure the construction contractor adheres to the recommendations in FAA *Standards for Specifying Construction of Airports*, which includes the temporary control measures to prevent temporary air and water pollution, soil erosion, and siltation.<sup>11</sup>

#### **Alternative D:**

#### **Extend Runway 13/31 to the Northwest by 860 Feet and to the Southeast by 240 Feet**

The projected annual demand for utility power and fuel at DVO for 2018 Alternative D as compared to 2018 Alternative A and Alternative B is given in **Table 5.15-5**.

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<sup>10</sup> FAA, Order 1050.1E, *Environmental Impacts: Policies and Procedures* (including Change 1), Appendix A, Section 13, *Natural Resources and Energy Supply*, March 20, 2006.

<sup>11</sup> FAA, *Standards for Specifying Construction of Airports*, Advisory Circular 150/5370-10D, Item P-156, *Temporary air and Water Pollution, soil Erosion, and Siltation Control*, September 30, 2008.

**Table 5.15-5  
ANNUAL UTILITY POWER AND FUEL DEMAND  
2018 ALTERNATIVE D  
Gross Field Airport**

Alternative	UTILITY ENERGY (MMBtu)		FUEL ENERGY (gallons)			
	Electricity	Natural Gas	Jet A	AvGas	Unleaded Gasoline	Diesel
<b>A</b>	234 MMBtu (68,590 kWh)	158 MMBtu (166,236 ft <sup>3</sup> )	176,789 gallons	79,234 gallons	537 gallons	526 gallons
<b>B</b>	253 MMBtu (74,196 kWh)	158 MMBtu (166,236 ft <sup>3</sup> )	197,307 gallons	80,641 gallons	537 gallons	526 gallons
<b>D</b>	253 MMBtu (74,196 kWh)	158 MMBtu (166,236 ft <sup>3</sup> )	197,307 gallons	80,641 gallons	537 gallons	526 gallons

Note: MMBtu is million British thermal units per year; kWh is kilowatt hours; and ft<sup>3</sup> is cubic feet. Jet A is jet fuel; AvGas is low-lead (100 octane) aviation gasoline for general aviation aircraft; unleaded gasoline (average 87 octane) and diesel fuel is used for GSE.

Source: Marin County Public Works, 2009; Landrum & Brown analysis, 2009.

**Other Natural Resources:** Construction of 2018 Alternative D would require more material (soil and earthwork) as compared to 2018 Alternative B because there is a greater amount of fill required. Estimated requirements for natural resources for construction are given in **Table 5.15-6**. None of these materials are considered unusual, rare, or unique. As such, the volume of material required would not be considered adequate to significantly deplete the current supply of natural resources.

**Table 5.15-6  
ESTIMATED REQUIREMENT FOR NATURAL RESOURCES  
2018 ALTERNATIVE D  
Gross Field Airport**

MATERIALS	VOLUME REQUIRED (yd <sup>3</sup> )
Soil	72,787
Earthwork	67,500
Total Aggregate	12,552
Asphalt Concrete	1,314

Note: yd<sup>3</sup> is cubic yards. Total aggregate is the total volume of crushed rock and sand required.

Source: County of Marin Department of Public Works, *Preliminary Design Report: Runway Extension for Gness Field*, FAA AIP Project No. 3-06-0167-08 (December 20, 2002) and Landrum & Brown Analysis, 2009.

**Electricity:** This alternative includes the proposed extension of Runway 13/31 and the extension of the parallel taxiway to the full length of the extended runway. The new airfield pavement would require edge lighting and increase the demand for electric power to 74,196 kWh per year, the same as for 2018 Alternative B. Additional electricity would be generated off-site. The power company, PG&E, was contacted to determine the ability of the company to meet the increase in demand. PG&E indicated that they could serve this load for the Airport with no further infrastructure upgrades.<sup>12</sup> Therefore, the increase would not constitute a significant impact to the supply of electricity.

**Natural Gas:** No new Airport facilities that would require additional natural gas power are proposed under this alternative. Alternative D does not increase demand for natural gas beyond the level described under 2018 Alternative A.

**Fuel:** The proposed extension of Runway 13/31 would allow Jet A-fueled aircraft affected by the shorter runway under the Existing Condition (2008) to depart fueled to capacity and capable of reaching the destination airport without stopping enroute to refuel. Furthermore, the proposed extended taxiway for this alternative would require all aircraft to consume additional fuel to taxi to the extended ends of Runway 13/31 for departure. As a result, implementation of Alternative D would increase the demand for Jet A fuel to 197,307 gallons per year, an increase of 20,518 gallons per year when compared to 2018 Alternative A. The demand for AvGas would increase by 1,407 gallons per year to a total of 80,641 gallons per year when compared to 2018 Alternative A due to the increase in taxi time.

It is not anticipated that there would be a change in the number of aircraft operations at the Airport under 2018 Alternative D when compared to 2018 Alternative A. As such, there is no change in the demand for unleaded gasoline and diesel fuel to power GSE under this alternative.

**Sustainability:** Sustainability efforts described under the 2018 Alternative B would be the same as under 2018 Alternative D.

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<sup>12</sup> Email correspondence between Consultant and Peter Niewieroski, Account Executive – North Coast (Marin County account representative) Pacific Gas and Electric Company, December 22, 2010. See Appendix K.

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