

## **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.

### **5.15.1 SIGNIFICANCE CRITERIA**

FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, has not established a significance criteria for energy supply, natural resources, or sustainable design.

FAA Order 1050.1F identifies the following as a factor to consider when determining whether an action would have the potential to have a significant impact on energy supply, natural resources, or sustainable design:

- implementing the action (alternative) would have the potential to cause demand to exceed available or future supplies of resources.

#### **5.15.1.1 Energy Supply, Natural Resources, and Sustainable Design Regulations and Policies**

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.

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. 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 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.

The impact on energy and natural resources was determined by evaluating projected supply and demand based on the guidelines provided in FAA Order 1050.1F *Environmental Impacts: Policies and Procedures*. 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.

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.

The remainder of this section provides an evaluation of the potential for significant impacts for each of the alternatives: Alternative A (No Action), Alternative B (Sponsor's Proposed Project), Alternative D, and Alternative E. The information provided in this evaluation is supported by the procedures and methodology described in Appendix K-1, *Energy Supply, Natural Resources, and Sustainable Design*.

**5.15.2 ENERGY AND NATURAL RESOURCES DEMANDS**

**Table 5.15-1** and the following paragraphs describe the current demand of utility and fuel energy and natural resources at DVO. The current demand was estimated based on 2017 data provided by Marin County.<sup>1</sup>

**Table 5.15-1  
ANNUAL UTILITY POWER AND FUEL DEMAND  
EXISTING CONDITIONS (2018)  
Gross Field Airport**

UTILITY ENERGY		FUEL ENERGY			
Electricity	Natural Gas	Jet A	AvGas	Unleaded Gasoline	Diesel
400 MMBtu (117,228 kWh)	249 MMBtu (262,484 ft <sup>3</sup> )	74,919 gallons	84,905 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, 2018; Landrum & Brown analysis, 2018.

**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>2</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 (2018). 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>1</sup> The 2017 data was provided by Dan Jensen, Gness Field Airport Manager, via email correspondence on August 7, 2018 and August 9, 2018. It should be noted that the data provided included periods of time during which the runway was closed (September 29, 2017 through December 29, 2017). Therefore, the current demand of utility and fuel energy was estimated by using data available for the months where the runway was in operation; the average consumption per month was applied for the months where the runway was closed before totaling the annual demand. Therefore, Table 5.15-1 represents the annual demand based on average current use. See Appendix E-1 for more information.

<sup>2</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 117,228 kilowatt hours (kWh) of electric power per year, which was converted to 400 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 262,484 cubic feet (ft<sup>3</sup>) of natural gas per year, which was converted to 249 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 at DVO is 3,300 feet long and cannot fully accommodate the operations of the existing aircraft, as represented by the family grouping of critical aircraft. Departing without sufficient fuel to reach the destination airport requires an en route 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. Annual Jet A fuel demand was estimated at approximately 74,919 gallons in 2017. 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. Annual AvGas demand was estimated at approximately 84,905 gallons in 2017.

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 2017.

**Sustainability:** The Marin County Department of Public Works manages, operates, and is responsible for the general service functions of the Airport.<sup>3</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>4</sup>

- Continue "Zero Waste Plan" to guide and further Marin County's waste reduction;

---

<sup>3</sup> Marin County, *Department of Public Works*. Airport. Available on-line: <https://www.marincounty.org/depts/pw/divisions/transportation/airport> Accessed July 2018.

<sup>4</sup> Marin County, *Public Works Final Performance Plan FY 2016-2018*.

- Implement "Go for Green" food facility rating and placarding system;
- Replace gasoline and diesel-powered vehicles with electric and/or hybrid vehicles where possible when conducting the annual vehicle replacement program;
- Construct electric vehicle charging stations for the Marin County motor pool;
- Begin development of a computerized Preventive Maintenance Program for Marin County facilities;
- Initiate an Airport Pavement Management Plan to assess pavement and subsurface conditions at Gnoos Field to use in a runway/taxiway pavement rehabilitation design; 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 2018-2020<sup>5</sup> states mission accomplishments as:

- Increased percentage of hybrid and plug-in fleet vehicles to 13 percent; and,
- Diverted 80% of waste from landfills.

The 2018-2020 County Budget lists goals and initiatives that include:

- Enhance quality of life through sustainability and accessibility programs;
- Provide effective infrastructure construction and maintenance;
- Implement new state mandated solid waste programs focusing on greenhouse gas reductions;
- Prepare for mandatory commercial recycling, mandatory organics/composting collection from commercial customers, and reductions in organics disposal, including food waste;
- 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 (SWPPP);
- Prepare for a new set of trash control requirements;
- Install trash capture devices and implement controls to achieve zero discharge of trash larger than 5mm from priority areas; and,
- Maximize utilization of aviation facilities at DVO.

---

<sup>5</sup> Marin County, *County of Marin Proposed Budget FY 2018-2020: Department of Public Works*.

### 5.15.3 FUTURE CONDITIONS: 2024

The following paragraphs describe the projected demand for energy and natural resources under Alternative A, Alternative B (Sponsor's Proposed Project), Alternative D, and Alternative E in 2024. Conditions were based on comparing the Alternative A No Action, to Alternatives B, D, and E based on a projection of energy and natural resources demands from current conditions.

#### 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 (2018). A summary of the annual demand for utility power and fuel for 2024 Alternative A is given in **Table 5.15-2**.

**Table 5.15-2**  
**ANNUAL UTILITY POWER AND FUEL DEMAND**  
**2024 ALTERNATIVE A (NO ACTION)**  
**Gross Field Airport**

UTILITY ENERGY		FUEL ENERGY			
Electricity	Natural Gas	Jet A	AvGas	Unleaded Gasoline	Diesel
407 MMBtu (119,493 kWh)	254 MMBtu (267,349 ft <sup>3</sup> )	80,715 gallons	86,545 gallons	509 gallons	509 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, 2018; Landrum & Brown analysis, 2018.

**Other Natural Resources:** There would be no requirement for construction or use of natural resources of any kind under 2024 Alternative A and impacts would be as described for Existing Conditions (2018). 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 119,493 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 267,349 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 168,278 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 2024 Alternative A would be the same as under the Existing Conditions (2018).

**Alternative B:**

**Extend Runway to the Northwest by 1,100 Feet (Sponsor’s Proposed Project)**

The projected annual demand for utility power and fuel at DVO for 2024 Alternative B is given in **Table 5.15-3**.

**Table 5.15-3  
ANNUAL UTILITY POWER AND FUEL DEMAND  
2024 ALTERNATIVE B  
Gross Field Airport**

Alternative	UTILITY ENERGY		FUEL ENERGY			
	Electricity	Natural Gas	Jet A	AvGas	Unleaded Gasoline	Diesel
<b>A</b>	407 MMBtu (119,493 kWh)	254 MMBtu (267,349 ft <sup>3</sup> )	80,715 gallons	86,545 gallons	509 gallons	510 gallons
<b>B</b>	427 MMBtu (125,104 kWh)	254 MMBtu (267,349 ft <sup>3</sup> )	87,968 gallons	86,866 gallons	509 gallons	510 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, 2018; Landrum & Brown analysis, 2018.

**Other Natural Resources:** Construction of 2024 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**  
**2024 ALTERNATIVE B**  
**Gross Field Airport**

<b>MATERIALS</b>	<b>VOLUME REQUIRED (yd<sup>3</sup>)</b>
Soil/Fill	50,839
New Pavement Material	13,552

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

Source: CalEEMod version 2016.3.2 and Landrum & Brown Analysis, 2018.

**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 125,104 kWh, an increase of 5,611 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>6</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 2024 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 (2018) to depart fueled to capacity and capable of reaching the destination airport without stopping en route 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 87,968 gallons per year, an increase of 7,253 gallons per year when compared to 2024 Alternative A. The demand for AvGas would increase by 321 gallons per year to a total of 86,866 gallons per year when compared to 2024 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>6</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 2024 Alternative B when compared to 2024 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 2024 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 recommend the use of environmental design and sustainability in project planning. During construction, Marin County would ensure the construction contractor adheres to the recommendations in FAA AC 150/5370-10H, *Standard Specifications for Construction of Airports, Item C-102, Temporary Air and Water Pollution Control, Soil Erosion, and Siltation Control*, which includes the temporary control measures to prevent temporary air and water pollution, soil erosion, and siltation.<sup>7</sup>

The Sponsor's Proposed Project (Alternative B) would not result in a substantial increase in demand for energy, natural resources, fuel, or rare consumable natural resources, and would allow existing aircraft, as represented by the family grouping of critical aircraft at DVO, to operate without operational weight restrictions under hot weather conditions. Therefore, Alternative B would not have a significant impact on Energy Supply, Natural Resources, or be inconsistent with Sustainable Design.

---

<sup>7</sup> FAA Advisory Circular, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution Control, Soil Erosion, and Siltation Control* July 21, 2014.

**Alternative D:**

**Extend Runway 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 2024 Alternative D as compared to 2024 Alternative A is given in **Table 5.15-5**.

**Table 5.15-5  
ANNUAL UTILITY POWER AND FUEL DEMAND  
2024 ALTERNATIVE D  
Gross Field Airport**

Alternative	UTILITY ENERGY (MMBtu)		FUEL ENERGY (gallons)			
	Electricity	Natural Gas	Jet A	AvGas	Unleaded Gasoline	Diesel
<b>A</b>	407 MMBtu (119,493 kWh)	254 MMBtu (267,349 ft <sup>3</sup> )	80,715 gallons	86,545 gallons	509 gallons	510 gallons
<b>D</b>	427 MMBtu (125,104 kWh)	254 MMBtu (267,349 ft <sup>3</sup> )	87,968 gallons	86,852 gallons	509 gallons	510 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, 2018; Landrum & Brown analysis, 2018.

**Other Natural Resources:** Construction of 2024 Alternative D would require more material (soil and earthwork) as compared to 2024 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  
2024 ALTERNATIVE D  
Gross Field Airport**

<b>MATERIALS</b>	<b>VOLUME REQUIRED (yd<sup>3</sup>)</b>
Soil/Fill	62,045
New Pavement Material	14,197

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

Source: CalEEMod version 2016.3.2 and Landrum & Brown Analysis, 2018.

**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 125,104 kWh per year, the same as for 2024 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>8</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 2024 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 (2018) to depart fueled to capacity and capable of reaching the destination airport without stopping en route 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 87,968 gallons per year, an increase of 7,253 gallons per year when compared to 2024 Alternative A. The demand for AvGas would increase by 307 gallons per year to a total of 86,852 gallons per year when compared to 2024 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 2024 Alternative D when compared to 2024 Alternative A. As such, there is no change in the demand for unleaded gasoline and diesel fuel to power GSE under this alternative.

<sup>8</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.

**Sustainability:** Sustainability efforts described under the 2024 Alternative B would be the same as under 2024 Alternative D.

Alternative D would not result in a substantial increase in demand for energy, natural resources, fuel, or rare consumable natural resources, and would allow existing aircraft, as represented by the family grouping of critical aircraft at DVO, to operate without operational weight restrictions under hot weather conditions. Therefore, Alternative D would not have a significant impact on Energy Supply, Natural Resources, or be inconsistent with Sustainable Design.

**Alternative E:**

**Extend Runway to the Northwest by 300 Feet**

The projected annual demand for utility power and fuel at DVO for 2024 Alternative E as compared to 2024 Alternative A is given in **Table 5.15-7**.

**Table 5.15-7  
ANNUAL UTILITY POWER AND FUEL DEMAND  
2024 ALTERNATIVE E  
Gross Field Airport**

Alternative	UTILITY ENERGY		FUEL ENERGY			
	Electricity	Natural Gas	Jet A	AvGas	Unleaded Gasoline	Diesel
<b>A</b>	407 MMBtu (119,493 kWh)	254 MMBtu (267,349 ft <sup>3</sup> )	80,715 gallons	86,545 gallons	509 gallons	510 gallons
<b>E</b>	415 MMBtu (121,718 kWh)	254 MMBtu (267,349 ft <sup>3</sup> )	86,044 gallons	86,688 gallons	509 gallons	510 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, 2018; Landrum & Brown analysis, 2018.

**Other Natural Resources:** Construction of 2024 Alternative E would require less material (soil and earthwork) as compared to 2024 Alternatives B and D because there is a reduced amount of fill required. Estimated requirements for natural resources for construction are given in **Table 5.15-8**. 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 5.15-8  
ESTIMATED REQUIREMENT FOR NATURAL RESOURCES  
2024 ALTERNATIVE E  
Gross Field Airport**

<b>MATERIALS</b>	<b>VOLUME REQUIRED (yd<sup>3</sup>)</b>
Soil/Fill	37,811
New Pavement Material	9,680

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

Source: CalEEMod version 2016.3.2 and Landrum & Brown Analysis, 2018.

**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 121,718 kWh, less than that for 2024 Alternatives B and D. 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 E does not increase demand for natural gas beyond the level described under 2024 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 (2018) to depart fueled to capacity and capable of reaching the destination airport without stopping en route 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 E would increase the demand for Jet A fuel to 86,044 gallons per year, an increase of 5,329 gallons per year when compared to 2024 Alternative A. The demand for AvGas would increase by 143 gallons per year to a total of 86,688 gallons per year when compared to 2024 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 2024 Alternative E when compared to 2024 Alternative A. As such, there is no change in the demand for unleaded gasoline and diesel fuel to power GSE under this alternative.

<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.

**Sustainability:** Sustainability efforts described under the 2024 Alternative B would be the same as under 2024 Alternative E.

Alternative E would not result in a substantial increase in demand for energy, natural resources, fuel, or rare consumable natural resources, and would allow existing aircraft, as represented by the family grouping of critical aircraft at DVO, to operate without operational weight restrictions under hot weather conditions. Therefore, Alternative E would not have a significant impact on Energy Supply, Natural Resources, or be inconsistent with Sustainable Design.