The contractor will give adequate notice to residents and building occupants before work begins near their buildings. They shall be advised that construction noise and vibration might cause them some disruption, but that extensive measures have been taken to carefully monitor vibrations and maintain vibrations at levels that will not cause damage to any building.

3.3.6 Energy

This section assesses the impact of the Doyle Drive Project alternatives on transportation-related energy consumption in the study corridor for the design year 2030. This analysis considers the long term (direct) and temporary impacts related to energy consumption. Direct energy consumption includes the fuel required for passenger vehicles (automobiles, vans, and light trucks) and transit buses.

Regulatory Setting

Regulations for transportation energy consumption are generally directed toward motor vehicle fuel efficiency. The *Energy Policy and Conservation Act of 1992* established fuel economy standards for on-road vehicles in the United States. Under this law, the National Highway Traffic and Safety Administration is responsible for reviewing and updating these standards. The U.S. Environmental Protection Agency (EPA) administers the Corporate Average Fuel Economy (CAFE) program, which ensures that vehicle manufacturers are in compliance with the standards.

The *California Environmental Quality Act* (CEQA) requires that a discussion of the potential energy impacts of a proposed project be addressed, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary energy consumption.

Affected Environment

Existing (year 2000) energy consumption in the study area consists of direct energy consumption resulting from automobile and transit operations. Automobile and transit operations are quantified using annual vehicle miles traveled (VMT). The existing annual VMT for passenger vehicles and transit vehicles in the Doyle Drive corridor results in the consumption of approximately 125,000 barrels of oil.

Exhibit 3-61 (on the following page) shows the fuel consumption rates, as measured in British thermal units (BTUs), which were used in the analysis. One BTU is the quantity of energy necessary to raise one pound of water one degree Fahrenheit. These rates were developed by Oak Ridge National Laboratory and published in 1993 by the U.S. Department of Energy in the *Transportation Energy Data Book: Edition 16*.

Exhibit 3-61
Energy Consumption Rates

VEHICLE TYPE	ENERGY CONSUMPTION/VEHICLE MILE
Passenger Vehicles (auto, van, light truck)	6,233 BTU
Transit Bus (all vehicle types)	41,655 BTU

Source: U.S. Department of Energy, 1993

Temporary Impacts

The proposed project would not have any temporary impacts on energy, because once the resource is expended, it can no longer be recovered. As such, impacts to energy are always long term.

Permanent Impacts

Permanent impacts to energy include the use of energy directly expended by the vehicles which use the facility.

The method used to estimate long term (direct) energy consumption is outlined in the *Reporting Instructions for the Section 5309 New Starts Criteria* (USDOT, 2002). Direct energy consumption involves the fuel needed by all of the vehicles (automobile, truck, bus, or transit lane vehicle) in the study corridor. In assessing the direct energy impact, the following factors were used:

- Annual vehicle miles traveled for passenger vehicles and transit buses; and
- Fuel consumption rates by vehicle type.

Daily traffic volumes and total VMT for the corridor (year 2030) were used in the direct energy analysis for each alternative. The 2030 daily traffic volumes for the corridor were developed as part of the traffic modeling process. The daily VMT was annualized using a factor of 335 days/year[31].

Estimates of the annual direct energy consumption, in BTUs, in the year 2030 under the No-Build, Replace and Widen, and the Presidio Parkway Alternatives are provided in **Exhibit 3-62**. This table also shows the BTU-equivalent barrels of crude oil consumed under each alternative. A discussion of the direct energy consumption impacts of each alternative is provided below.

[31] *To annualize average weekday VMT, the factor of 335 was used to account for variations in VMT due to holidays and weekends.*

Exhibit 3-62
Estimates of Annual Direct Energy Consumption in Year 2030

	ALTERNATIVE				
	No-Build	Replace and Widen No-Detour	Replace and Widen w/Detour	Presidio Parkway Diamond	Presidio Parkway Circle Drive
Projected Vehicle Miles Traveled (in thousands)					
Daily Passenger Vehicle	367.3	371.0	371.0	374.8	374.0
Annual Passenger Vehicle	123,029	124,285	124,285	125,541	125,290
Daily Transit Bus	*2.8*	*2.8*	*2.8*	*2.8*	*2.8*
Annual Transit Bus	953.2	953.2	953.2	953.2	953.2
Estimated BTU's (in millions)					
Passenger Vehicle	766,838	774,668	774,668	782,499	780,933
Transit Bus	39,706	39,706	39,706	39,706	39,706
Summary					
Total BTU's (in millions)	806,544	814,374	814,374	822,205	820,639
Total Barrels of Oil[1]	139,059	140,409	140,409	141,759	141,489
Change in Barrels of Oil from No-Build Alternative	N/A	+ 0.97%	+ 0.97%	+ 1.94%	+ 1.75%

Source: Parson Brinckerhoff, Inc., August 2004.
[1]Barrel of Oil = 5.8 million BTUs (USDOT 2002)

Alternative 1: No-Build

Under the No-Build Alternative, the year 2030 VMT for passenger vehicles (automobiles, vans and light trucks) in the Doyle Drive corridor is projected to be approximately 123.0 million miles and approximately 953,200 miles for transit buses. Based on energy consumption rates provided in **Exhibit 3-61**, these vehicles would consume approximately 807 billion BTUs, or approximately 139,000 barrels of oil, in the year 2030.

Alternative 2: Replace and Widen

The Replace and Widen Alternative, No-Detour with Detour Options are grouped together in this discussion because the input for the direct energy analysis (VMT) is not different. Under these alternatives, the year 2030 VMT for passenger vehicles in the Doyle Drive corridor is projected to be approximately 124.3 million miles and approximately 953,200 miles for transit buses. Based on energy consumption rates provided in **Exhibit 3-61**, these vehicles would

consume approximately 814 billion BTUs, or approximately 140,000 barrels of oil, in the year 2030.

Alternative 5: Presidio Parkway

The energy analysis indicates that the options for the Presidio Parkway Alternative each have a different impact on energy. The following discusses the direct energy impacts for each option.

Diamond Option

Under the Presidio Parkway Alternative, Diamond Option, the year 2030 VMT for passenger vehicles in the Doyle Drive corridor is projected to be approximately 125.5 million miles and approximately 953,200 miles for transit buses. Based on energy consumption rates provided in **Exhibit 3-61**, these vehicles would consume approximately 822 billion BTUs, or approximately 142,000 barrels of oil, in the year 2030.

Circle Drive Option

Under the Presidio Parkway Alternative, Circle Drive Option, the year 2030 VMT for passenger vehicles in the Doyle Drive corridor is projected to be approximately 125.3 million miles and approximately 953,200 miles for transit buses. Based on energy consumption rates provided in **Exhibit 3-61**, these vehicles would consume approximately 821 billion BTUs, or approximately 141,000 barrels of oil, in the year 2030.

While facility-operation components are not included in this analysis, it should be noted that an additional direct energy expenditure would be required to operate tunnel segments in the Presidio Parkway Alternative. Tunnel components that require energy to operate include ventilation fans, lighting, and drainage pumps. It is estimated that the operation of these tunnel components would result in an additional thirteen billion BTUs (approximately 2,200 barrels of oil) of annual direct energy consumption, or approximately 1.6-percent more than the consumption values shown in **Exhibit 3-61**.

All Alternatives (including the No-Build)

Direct energy consumption attributable to transit operations is equal among the four build alternatives. None of the alternatives favor transit over another, and therefore the same level of transit operations in the Doyle Drive corridor was assumed to be among all alternatives in the design year 2030.

Avoidance, Minimization, and/or Mitigation Measures

The construction costs of the three build alternatives make them far less energy efficient than the No-Build Alternative. In many cases, mitigation measures could be implemented to reduce VMT, thereby reducing energy consumption. However, passenger and transit VMT vary only slightly among the alternatives under consideration. Therefore, the only means by which energy consumption could be reduced would be through mitigation measures intended to reduce the

short term energy consumption associated with construction activities. Such mitigation measures could include:

- The location of material production facilities on-site or within close proximity to the project site;
- The use of newer, more energy efficient construction vehicles; and
- Implementation of a program to encourage construction workers to carpool or use public transportation for travel to and from the construction site.

3.4 Biological Environment

Botanical and wildlife species in urban landscapes depend on the availability of suitable habitat for survival. Habitat loss and increasing habitat fragmentation are the primary causes of species decline in these environments. This section provides an overview of:

- natural communities;
- wetlands and other waters of the United States;
- plant species;
- animal species; and
- invasive species.

Detailed information about biological resources can be found in the *South Access to the Golden Gate Bridge: Doyle Drive Project Revised Natural Environmental Study* (NES), July 2005. The NES contains an analysis of impacts and specific mitigation measures, as well as Best Management Practices (BMPs) and conservation measures for the biological environment. The NES is incorporated in this document by reference, and in all areas where more detail is provided on mitigation measures, the NES commitments are considered part of this document.

The overall mitigation goal identified in the NES is to avoid or minimize construction-related project impacts on biological resources, using generally accepted and practicable mitigation measures through the deployment of BMPs and the designation of Environmentally Sensitive Areas (ESAs)[32]. Generally, BMPs focus on prevention and containment. This is achieved by controlling the generation of source pollutants and then capturing and containing source pollutants that are generated. For example, application of temporary erosion control materials to unfinished slopes can control a source of sediment

[32] *Environmentally Sensitive Areas (ESAs) are locations of identified at-risk resources that are to be protected by avoidance or by restrictions on Caltrans activities. ESAs typically use fencing, flagging, signing, or monitoring to protect resources from direct physical damage by project activities. The use of the term in this document should not be confused with any discussion of sensitive resources within the construction corridor, for which impacts and mitigations are identified. An ESA, by definition, is a site where all impact is avoided. ESAs will be staked and flagged prior to construction and clearly marked on the contract project plans.*