
4.17 Energy Supply and Natural Resources

4.17.1 Energy Supply

4.17.1.1 Introduction

The energy supply analysis addresses electricity, natural gas,⁶⁴¹ and other fossil fuel consumption for Master Plan-related activities. Construction-related fuel consumption is also addressed. Technical Report 8, *Energy Supply Technical Report*, provides detailed information regarding the affected environment relative to energy, and the methodology used to assess both baseline conditions and project impacts. Technical Report 8 and Technical Report S-6, *Supplemental Energy Supply Technical Report*, contain calculations of projected energy requirements. Potential impacts associated with existing petroleum resources within the Master Plan boundaries are addressed in Section 4.17.2, *Natural Resources*. Potential effects of regional growth induced by the LAX Master Plan are addressed in Section 4.5, *Induced Socio-Economic Impacts (Growth Inducement)*.

4.17.1.2 General Approach and Methodology

Electricity and natural gas consumption at LAX results from a number of activities, including space heating and cooling, airfield and terminal lighting, food preparation, office functions, and maintenance. Other fossil fuel consumption includes aviation fuel for aircraft, as well as diesel, gasoline, and alternative fuels for ground support equipment (GSE), stationary sources, and airport-related motor vehicle trips. This analysis compares energy consumption associated with the No Action/No Project Alternative and four build alternatives to consumption under baseline conditions. The existing use of electricity, natural gas, and other transportation related fuels, including Jet A, gasoline, diesel, LNG, CNG, and liquefied propane gas (propane), is characterized, and methods of transmission and supply are described. The analysis includes estimates of baseline on-airport electricity and natural gas consumption, as well as that associated with areas proposed to be acquired as part of the LAX Master Plan and other airport programs-collectively referred to as the Master Plan boundaries, as described in the Introduction to Chapter 4 of this Final EIS/EIR. Fuel consumption associated with airport operations is also estimated.

Direct and indirect growth in the vicinity of LAX and elsewhere in the region associated with the Master Plan would also result in increased use of energy. Potential impacts are addressed in Section 4.5, *Induced Socio-Economic Impacts (Growth Inducement)*, and in subsection 4.17.1.7, *Cumulative Impacts*.

The following describes the methodologies used for different aspects of the energy analysis. A complete discussion of electricity, natural gas, and fuel consumption factors used to project energy consumption is contained in Technical Report 8, *Energy Supply Technical Report*.

Electricity/Natural Gas

The acreage and location of land required for the proposed Master Plan improvements are unique to each of the four build alternatives. Consequently, each alternative would result in a different footprint. In order for baseline conditions, the No Action/No Project Alternative, and the four build alternatives to be compared side by side, a single study area for electricity and natural gas was used. This composite study area is referred to as the "Master Plan boundaries," as described in the introduction to this chapter. Total electricity and natural gas consumption within the Master Plan boundaries was then calculated (as described below) for baseline conditions and for all alternatives.

Under baseline conditions, land within the Aircraft Noise Mitigation Program (ANMP) acquisition areas is evaluated based on its existing use. Under the No Action/No Project Alternative, it is assumed to be vacant. For each of the build alternatives, it is assumed that all proposed acquisition has been completed and existing land uses demolished. Each alternative proposes a different configuration of land acquisition; thus, not all land within the Master Plan boundaries would be acquired by any one alternative. Land uses within areas not acquired would be unaffected by the Master Plan. The Alternative B off-site fuel farm sites are discussed separately from the Master Plan boundaries.

⁶⁴¹ For purposes of this analysis, the discussion of natural gas usage focuses on standard, domestic usage. Use of liquefied natural gas (LNG) and compressed natural gas (CNG) as transportation fuels for ground support equipment (GSE) and other motor vehicles is considered in the analysis of fuel consumption. These fuels are often referred to as "alternative fuels."

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Electricity and natural gas consumption factors are typically provided in terms of consumption (in kilowatt-hours [kWh] or cubic feet per day) per unit (e.g., square foot of building space). Electricity and natural gas consumption was projected by multiplying the factor by the appropriate number of units. All electricity and natural gas consumption values presented in the impact analysis are estimates, projected based on the factors and methods described below. Details on the derivation and use of these factors are presented in Technical Report 8, *Energy Supply Technical Report*.⁶⁴²

Electricity and natural gas consumption factors for on-airport uses were derived from *Utilities Consumption and Generation at LAX Technical Addendum*.⁶⁴³ These electricity and natural gas factors are based on square footage and facility type. Electricity and natural gas consumption are mainly dependent on square footage for facilities (for heating, cooling, and lighting needs) and tend not to be substantially affected by increased intensification in use of those facilities. With implementation of the Master Plan alternatives, new sources of electricity consumption, independent of square footage, would include gate electrification, operation of a new Automated People Mover (APM), and, under Alternatives A, B, and C, extension of the Green Line. Future energy demand for the existing and new Central Utility Plants (CUPs) under Alternatives A, B, and C was assumed to be proportional to the existing CUP electrical and natural gas consumption.

Gate electrification involves providing utility connections for electricity and conditioned air to aircraft parked at gates. By providing central power and conditioned air at each gate, usage of auxiliary power units (APUs) located on-board aircraft would be reduced, reducing jet fuel consumption and engine emissions. The amount of electricity consumed by gate electrification was estimated from the size and duration of operation of APUs present on aircraft and projected flight operations.

For non-airport land uses, including planned and proposed uses within LAX Northside/Westchester Southside, electricity and natural gas consumption factors from the South Coast Air Quality Management District's (SCAQMD) *CEQA Air Quality Handbook* were used.⁶⁴⁴

To determine whether the projected increase in electricity and natural gas consumption associated with the Master Plan alternatives would be significant, the total quantity of electricity and natural gas consumption was projected for each of the four build alternatives and the No Action/No Project Alternative. These projections were compared to the anticipated supply available from regional electricity and natural gas suppliers.

Fuel Consumption

Aircraft

The fuel consumption for aircraft operations was estimated based on the projected aircraft operations data associated with each particular alternative, using a fullness factor developed from existing LAX operations data.⁶⁴⁵ The fullness factor is the percentage of total fuel tank capacity within an aircraft that is filled during visits to LAX. The total daily capacity of the 1994 fleet mix and operations (i.e., total fuel tank capacity of all departures) was estimated to be 7.24 million gallons. The actual 1994 maximum daily fuel demand (fuel supplied to aircraft) of 4.1 million gallons was then divided by the total daily aircraft capacity, yielding a fullness factor of 56.6 percent (i.e., the percentage of the total daily aircraft fuel tank capacity filled during visits to LAX).⁶⁴⁶ For the purpose of projecting future aircraft fuel demand, it was assumed that the fullness factor would remain constant through the year 2015.

Ground Support Equipment

Information regarding GSE fleet mix, operation time, and brake horsepower was developed to model air quality, as described in detail in Section 4.6, *Air Quality*, and documented by CALSTART in *Clean Fuel*

⁶⁴² Subsequent to the calculation of energy consumption for Alternative C, the alternative was modified to eliminate impacts to a historic resource. This modification reduced the amount of cargo square footage that would be constructed under this alternative, and similarly reduced the square footage of commercial and residential uses that would be acquired. The resultant differences in electricity and natural gas consumption would not be substantial, and would not alter the conclusions of the analysis with regard to level of significance or need for mitigation.

⁶⁴³ Psomas and Associates, *Utilities Consumption and Generation at LAX Technical Addendum*, October 31, 1996.

⁶⁴⁴ SCAQMD, *CEQA Air Quality Handbook*, April 1993.

⁶⁴⁵ Data from 1994 were used because these data were the most current when the EIS/EIR analysis was initiated.

⁶⁴⁶ Camp Dresser & McKee Inc., *LAX Master Plan Scattergood Fuel Farm Relocation Feasibility Study*, March 6, 1998.

Vehicle Mitigation Strategy Assessment.⁶⁴⁷ Assumptions regarding the use of alternative energy sources by GSE are provided in Section 2.3.1 of Appendix S-E, *Supplemental Air Quality Impact Analysis*. These data were used to calculate the energy consumption of the GSE in British Thermal Units (BTU) for each fuel type and each type of equipment. The BTU were converted to gallons of fuel type.

Stationary Sources

Similar to aircraft operations, consumption of diesel and gasoline by stationary sources was calculated by factoring baseline (1996) annual operations to future operations. Stationary sources considered in this analysis include boilers/heaters, stationary engines (e.g., emergency generators and emergency fire water pump engines), and food preparation sources (flight kitchens and airport restaurants). It was assumed that diesel and gasoline ground power units (GPUs - stationary sources using internal combustion engines to generate electricity for aircraft) will cease operating at the airport due to the electrification of gates under the No Action/No Project Alternative and the four build alternatives. However, under the No Action/No Project Alternative, aircraft using hardstanding⁶⁴⁸ are assumed to use on-board aircraft power generating systems including auxiliary power units fueled by jet fuel, rather than ground based units fueled by gasoline, diesel, or electricity.

On- and Off-Airport Vehicle Trips

Fuel consumption for on- and off-airport vehicle trips was based on data prepared for the on- and off-airport traffic analyses (see Section 4.3, *Surface Transportation*). The vehicle miles traveled (VMT) for each type of vehicle was multiplied by the typical fuel consumption per mile (per the SCAQMD CEQA Handbook) in order to arrive at total fuel consumption. Assumptions regarding the use of alternative fuels by on-airport vehicles are provided in Section 2.3.1 of Appendix S-E, *Supplemental Air Quality Impact Analysis*.

Fuel consumption estimates for on- and off-airport vehicles include fleet vehicles transporting passengers to and from, as well as around, LAX. Public and private fleet vehicles are subject to the SCAQMD Rule 1194 (Rule 1194) for commercial airport ground access, adopted August 18, 2000.⁶⁴⁹ Fleet mixes assumed for this analysis were developed prior to the implementation of Rule 1194. Rule 1194 is not anticipated to substantially alter fuel consumption associated with LAX. If changes in fuel consumption at LAX were to result from Rule 1194, they could include a reduction in gasoline and diesel consumption and a corresponding increase in LNG, CNG, and electricity consumption. Rule 1194 applies only to passenger fleets of greater than 14 vehicles, and does not apply to private personal vehicles or cargo operations. Moreover, many of the requirements of Rule 1194 have already been implemented at LAX. As a result, the overall effect of Rule 1194 on gasoline, diesel, LNG, CNG, and/or electricity consumption associated with the LAX Master Plan is anticipated to be negligible.

Construction

A construction energy consumption estimate for Alternative C was prepared by Bechtel Corporation.⁶⁵⁰ This estimate was based on calculations of the likely construction equipment mix and associated manpower requirements and includes fuel consumption for construction equipment, haul vehicle travel, and construction worker travel. It was assumed that construction energy consumption for Alternatives A, B, and D would be proportional to Alternative C, based on the square footage of facilities demolished and constructed. As there is very limited construction activity associated with the No Action/No Project Alternative, it was assumed that its construction-related fuel consumption would be negligible.

The location and depth of major existing electricity and natural gas infrastructure and the areas of proposed improvements were compared to identify any conflicts between proposed Master Plan subsurface activities and existing major infrastructure. The location of existing electricity and natural gas

⁶⁴⁷ CALSTART, *Clean Fuel Vehicle Mitigation Strategy Assessment*, April 1999.

⁶⁴⁸ Hardstanding refers to passengers embarking and disembarking from aircraft via mobile stairways. Passengers enter the terminal by crossing tarmac present near aircraft terminal areas rather than passing through jetways. Under Alternatives A, B, C, and D, no remote hardstands would exist.

⁶⁴⁹ South Coast Air Quality Management District, *Rule 1194: Commercial Airport Ground Access*, August 18, 2000.

⁶⁵⁰ Bechtel Corporation, *Interim Year Construction Inputs to Environmental Analysis for LAX Master Plan, 3rd Iteration Alternatives*, February 4, 1998.

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utilities was determined based on as-built infrastructure plans obtained from the appropriate utilities and from LAWA records.

4.17.1.3 Affected Environment/Environmental Baseline

Electricity

Electricity Generation and Transmission

Electric power within the City of Los Angeles, including LAX, is supplied by the City of Los Angeles Department of Water and Power (DWP). DWP has an obligation to serve its customers as stated in the City Charter.⁶⁵¹ In order to fulfill this obligation, DWP maintains facilities for both generation and distribution. Electricity provided by DWP is generated by DWP and other utilities with power generating facilities located both within the Los Angeles region and in outlying areas. These sources include natural gas-fired, coal-fired, and hydroelectric plants. Approximately 15 to 18 percent of the power transmitted by DWP is purchased from generating sources owned by other power generators or service providers. The current resource mix assures reliability and flexibility in providing electrical energy to the citizens of Los Angeles.⁶⁵² In August 2000, DWP adopted its *2000 Integrated Resource Plan* (IRP). Within that plan, DWP outlined adequate electricity supply and transmission capability to meet the needs of its customers within the Los Angeles area including LAX. The *2000 Integrated Resource Plan* describes how DWP will supply electricity to its customers while divesting its interest in the Mohave Generating Station. The IRP also addressed the modernization of existing, aging power plants located within the Los Angeles basin. Due to escalating air quality compliance issues and the inefficiency of the aging electrical generating equipment, the in-basin generating units will be modernized with more efficient and cleaner equipment.⁶⁵³

The city used 21,134 gigawatt-hours of electricity in 1996.⁶⁵⁴ Projections prepared by DWP in 1997 indicate that the power demand for Los Angeles will be approximately 26,000 gigawatt-hours in 2015. The current electric supply has been developed to provide for a reasonable reserve. DWP's extensive transmission system and its present capacity allows the city to access surplus electricity generated in the Pacific Northwest and Southwest to meet all of the city's needs through the year 2015.^{655, 656, 657}

In addition to obtaining electricity from DWP, LAWA operates a Central Utility Plant (CUP), which provides heating and air conditioning to the Central Terminal Area (CTA). The existing CUP occupies approximately 38,000 square feet in the CTA, with an additional 8,000-square foot cooling facility. The CUP is currently operating at capacity. The CUP houses a co-generation system that generates electrical power. The generated power is traded to DWP for credit towards LAWA's electrical purchases.

LAX is located in DWP's Receiving Station N (RS-N) service area. RS-N is served by four, 138-kilovolt (kV) underground transmission lines: two from Fairfax Receiving Station to the north, and two from Scattergood Generating Station to the south. From RS-N, power is stepped down to 34.5 kV and distributed to six Distributing Stations (DS) in the airport area. In addition to these facilities, there are 12 customer stations also referred to as Industrial Stations (IS) which serve LAX. A customer station is similar to a distribution station with circuit switching and a transformer and is fed by 34.5 kV lines. Existing electrical distribution facilities in the LAX area are shown in **Figure F4.17.1-1, Location of Electrical Power Lines and Distribution Facilities at LAX.**

DWP plans to maintain itself as a generator producing electricity at competitive rates while also providing environmental leadership. DWP has developed the Green Power for a Green LA Program as part of its vision for making the city a "cleaner, greener, and safer place to work, live, and play." Under the Green

⁶⁵¹ Los Angeles Department of Water and Power, 2000 Integrated Resource Plan, August 15, 2000.

⁶⁵² Holloway, Charles C., Supervisor of Environmental Assessment and EMF, Los Angeles Department of Water and Power, Letter to Mr. Steve Frank (CDM), January 27, 1998.

⁶⁵³ Los Angeles Department of Water and Power, 2000 Integrated Resource Plan, August 15, 2000.

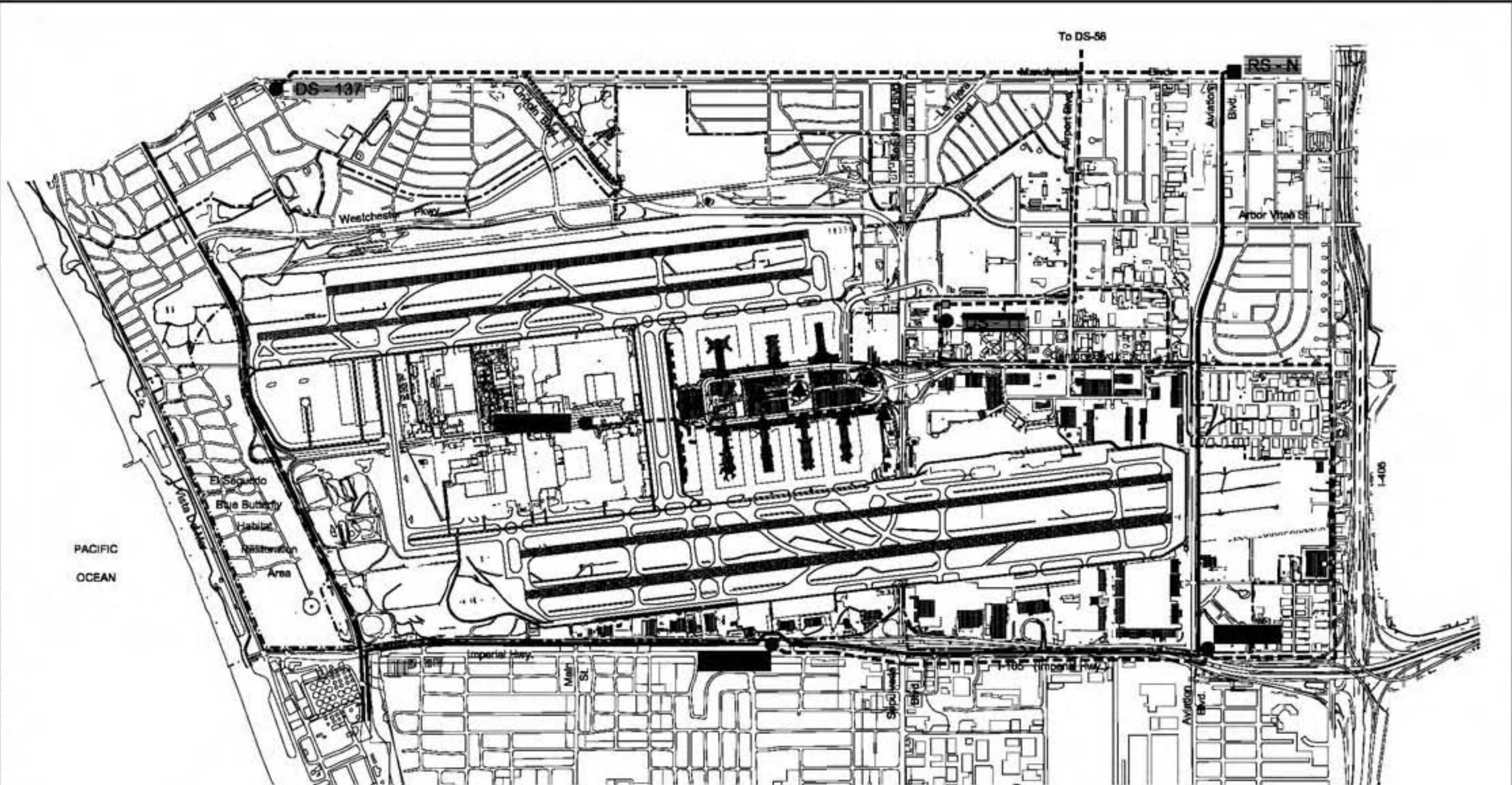
⁶⁵⁴ Holloway, Charles C., Supervisor of Environmental Assessment and EMF, Los Angeles Department of Water and Power, Letter to Mr. Steve Frank (CDM), January 27, 1998.

⁶⁵⁵ Holloway, Charles C., Supervisor of Environmental Assessment and EMF, Los Angeles Department of Water and Power, Letter to Mr. Steve Frank (CDM), January 27, 1998.

⁶⁵⁶ California Energy Commission, Electricity Report, November 1997.

⁶⁵⁷ Los Angeles Department of Water and Power, 2000 Integrated Resource Plan, August 15, 2000.

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LEGEND

- LAX Existing Property Line
- - - - El Segundo Blue Butterfly Habitat Restoration Area
- 34.5 kV Line
- 66 kV Line
- ==== (2) 138 kV Lines
- 230 kV Line
- Receiving Station (RS)
- Distribution Station (DS)
- ▲ Industrial Station (IS)



Source: Comp Dresser & McKee Inc., 2000.

Power for a Green LA program, DWP will promote the use of wind power, solar power, and potentially the use of biomass as a means for the production of electricity.

LAWA issued Resolution No. 20821 on October 19, 1999, describing the terms of a ten-year service agreement with DWP. Under the service agreement, referred to as the Green Power Agreement, LAWA has agreed to continue purchasing electricity exclusively from DWP. In exchange for the continued reliance on DWP for electricity over the next ten years, DWP will use a portion of the fees paid by LAWA for the purpose of promoting the development of renewable (green) sources of energy.⁶⁵⁸

Baseline Electricity Consumption

Electricity is primarily used at LAX for lighting, cooling, and equipment operation. Site-specific electricity consumption data are not collected at LAX. To calculate baseline electricity consumption, usage-based factors were used, as described in subsection 4.17.1.2, *General Approach and Methodology*. Based on these factors, annual baseline electricity consumption at LAX is approximately 201,000 megawatt hours. Annual baseline electricity consumption within the Master Plan boundaries, is approximately 288,000 megawatt hours. LAX's electricity use currently represents approximately 0.9 percent of DWP's demand.

Changes in conditions between 1996 and 2000 include modification of cargo, terminal, and ancillary facilities, and acquisition and demolition of 534 dwelling units within Manchester Square and Belford. These changes resulted in an increase of approximately 14 percent in airport-related electricity consumption and an increase of approximately 9 percent in the total calculated electricity consumption within the Master Plan boundaries for Year 2000 conditions as compared to the 1996 baseline (refer to **Table F4.17.1-3**, Energy Consumption within Master Plan Boundaries, in subsection 4.17.1.6 below).

Under baseline conditions, approximately 40 percent of terminal gates were equipped with centralized power and pre-conditioned air for aircraft use parked at gates between arrival and departure. Under baseline conditions, very few GSE vehicles were powered by electricity. A limited number of electrical vehicle charging stations are currently available for use by employees and the general public.

Two sites close to LAX are being considered for the construction of an off-site fuel farm under Alternative B: Scattergood Electric Generating Station and the oil refinery located south of the airport. Scattergood is provided with electricity by DWP from the adjacent Scattergood Generating Station. The Scattergood Fuel Farm site currently uses little to no electricity. SCE provides electrical service to the oil refinery. The oil refinery fuel farm site currently uses minor amounts of electricity for lighting.

Natural Gas

Natural Gas Supply and Transmission

The Southern California Gas Company (The Gas Company) supplies natural gas to nearly all of Southern and Central California, including the City of Los Angeles. In 1996, approximately 2,433 million cubic feet (MMCF) of natural gas per day was consumed in Southern California.⁶⁵⁹ Projected demand for natural gas for the 2015 planning horizon is anticipated to be 2,924 MMCF of natural gas per day.⁶⁶⁰ The Gas Company obtains the majority of its natural gas from out-of-state sources. The Gas Company's sources include interstate suppliers (36 percent), natural gas transportation companies (56 percent), California producers (7 percent), and offshore supplies (0.3 percent). Future supplies of natural gas are anticipated to be adequate to meet projected demand through 2015.⁶⁶¹

Natural gas is transported from suppliers to The Gas Company's transmission facilities for distribution to their Southern California service areas by a network of high pressure transmission lines. Included in the transmission facilities are five underground storage fields in Southern California. The storage fields act as reservoirs to hold natural gas, and are used to supplement in-line gas storage, primarily to meet peak demands during the winter season. From the transmission facilities, natural gas is distributed on a local level to customers through an extensive pipeline network of underground gas mains. Natural gas is supplied to LAX by several natural gas distribution lines. Service to individual tenants is provided through

⁶⁵⁸ LAWA, [Resolution No. 20821](#), Board File No. LAA-7858, October 21, 1999.

⁶⁵⁹ The California Gas and Electric Utilities, [The California Gas Report, 1997 Supplement](#), 1997.

⁶⁶⁰ California Energy Commission, [State Report, Natural Gas Market Outlook](#), June 1998.

⁶⁶¹ California Energy Commission, [Fuels Report](#), July 1999.

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connections to these distribution lines. Existing natural gas distribution facilities in the LAX area are shown in **Figure F4.17.1-2**, Natural Gas Distribution Lines Serving LAX.

Baseline Natural Gas Consumption

Natural gas is primarily used for electricity generation, space heating, food preparation, and maintenance activities at LAX. Site-specific natural gas consumption data are not collected at LAX. To calculate baseline natural gas consumption, usage-based factors were used, as described in subsection 4.17.1.2, *General Approach and Methodology*. Based on these factors, baseline natural gas consumption at LAX is approximately 1,119 MMCF per year. Baseline natural gas consumption within the Master Plan boundaries is approximately 1,787 MMCF per year. LAX's natural gas consumption is approximately 0.13 percent of the total regional demand.

As indicated above, changes in conditions between 1996 and 2000 include modification of cargo, terminal, and ancillary facilities, and acquisition and demolition of 534 dwelling units within Manchester Square and Belford. These changes resulted in an increase of approximately 0.6 percent in airport-related natural gas consumption and a decrease of approximately 1 percent in natural gas consumption within the Master Plan boundaries for Year 2000 conditions as compared to the 1996 baseline (refer to **Table F4.17.1-3** in subsection 4.17.1.6 below).

As indicated previously, two sites close to LAX are being considered for the construction of an off-site fuel farm under Alternative B: Scattergood Electric Generating Station and the oil refinery located south of the airport. The Scattergood Fuel Farm site currently uses no natural gas. The Gas Company serves the oil refinery. However, the oil refinery fuel farm site consumes little or no natural gas.

Transportation-Related Fuels

A variety of transportation-related fuels are used at LAX. These include: Jet A and aviation gasoline (Avgas) for aircraft; gasoline, diesel, propane, and CNG for GSE; gasoline and diesel for miscellaneous internal combustion engines and GPUs; and gasoline, diesel, and alternative fuels (LNG, CNG, and propane) for shuttle buses and support vehicles. In addition, passenger and cargo vehicle trips associated with the airport require fuel, mainly gasoline and diesel.

Supplies of Jet A, Avgas, gasoline, diesel, and alternative fuels are dependent on energy reserves, both domestic and international, and available refinery capacity. Because California has more stringent requirements for gasoline and diesel than the rest of the country (i.e., California Air Resources Board requirement for Phase 2 reformulated gasoline), only refineries that produce petroleum products that meet California standards can provide gasoline and diesel to the California market.⁶⁶² Projections prepared by the State of California indicate that market factors, including increasing demand for petroleum products within California and declining refinery capacity within the state, may result in increased reliance on out-of-state petroleum resources.⁶⁶³ However, subject to possible fluctuations in price, adequate sources of petroleum supplies are anticipated through 2015.⁶⁶⁴ Factors that could contribute to price fluctuations include volatility in crude oil prices, refinery maintenance and unplanned outages, seasonal and annual demand fluctuations, and changes in the markup and taxation of products.⁶⁶⁵

Jet A Supply and Transmission

The Jet A fuel used at LAX is obtained from the world commodity market for Jet A. The local sources of supply are mainly refineries within the Los Angeles region, including facilities owned by BP Amoco (formerly Arco), Chevron, Unocal, and Mobil. Jet fuel obtained from other sources arrives by either interstate pipelines or domestic or international tankers.

The majority of Jet A fuel used at LAX is transported to the airport through four pipelines dedicated to deliver Jet A to LAX. These pipelines deliver Jet A from the local refineries and terminals, and are owned and operated by the oil companies. Tanker deliveries of Jet A to either the Port of Los Angeles or the

⁶⁶² California Energy Commission, [Fuels Report](#), July 1999.

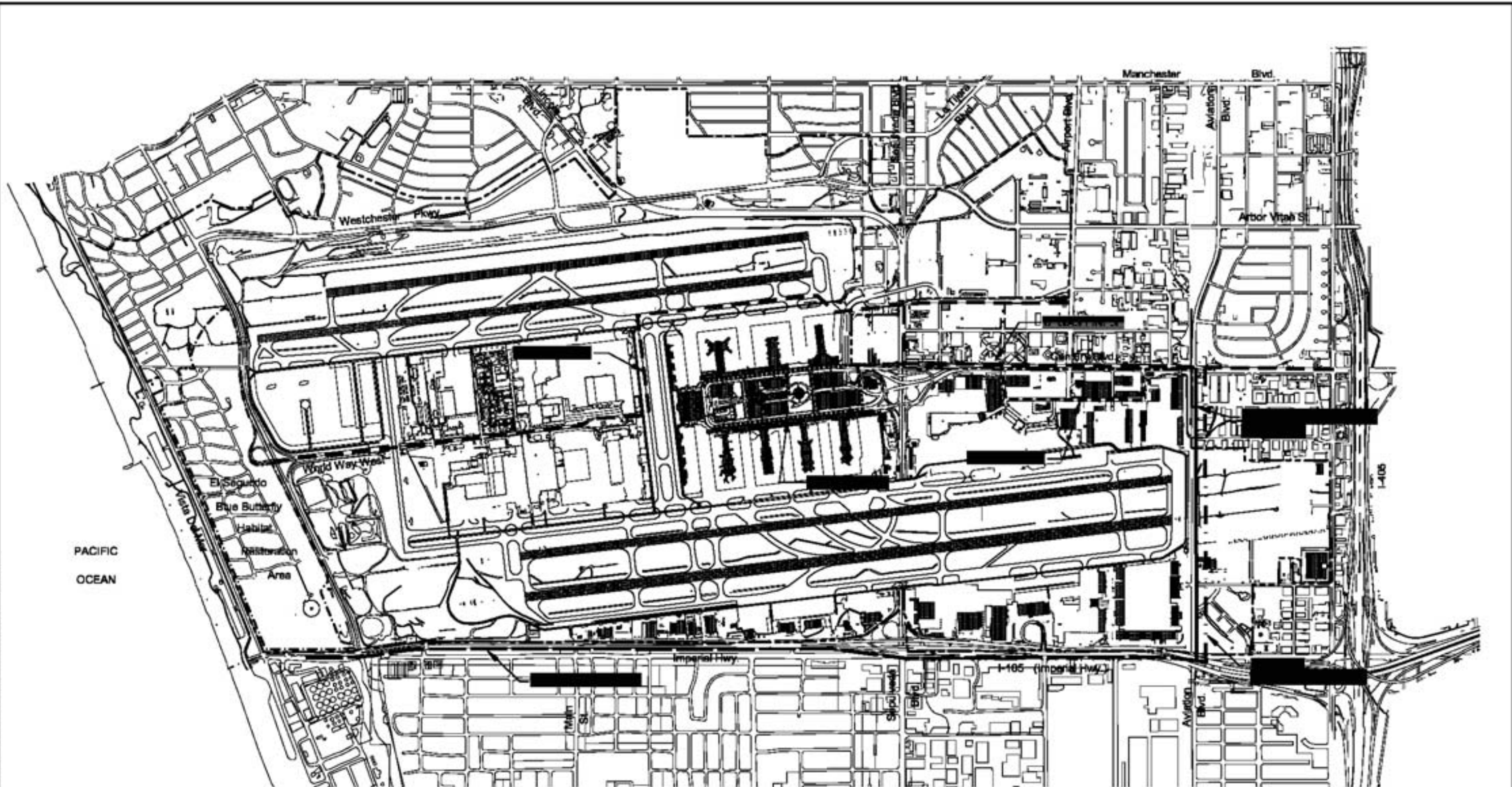
⁶⁶³ California Energy Commission, [Fuels Report](#), July 1999.

⁶⁶⁴ California Energy Commission, [Fuels Report](#), July 1999.

⁶⁶⁵ California Energy Commission, [Fuels Report](#), July 1999.

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-----	LAX Existing Property Line	=====	2" Gas Line
-----	El Segundo Blue Butterfly Habitat Restoration Area	-----	3" Gas Line
-----	2" Gas Line	-----	6" Gas Line
-----	6" to 8" Gas Lines (Varies)	-----	(2) 30" High Pressure Gas Lines
-----	6" to 12" Gas Lines (Varies)		

Port of Long Beach are made through pipeline connections at the GATX terminal, Wilmington Liquid Bulk Terminal facilities (WLBT), and the Shell Carson Terminal. Interstate transport of jet fuel via the Southern Pacific (SP) Pipeline can also be pumped to LAX via the WLBT. The locations of the refineries, terminals, and pipelines delivering Jet A to LAX are provided in **Figure F4.17.1-3**, Oil Refineries, Terminals, and Pipelines Serving LAX.

The existing capability of the four dedicated Jet A pipelines is 200,000 barrels (bbl)/day (a barrel equals 42 gallons).⁶⁶⁶ Discussions with oil company and terminal representatives indicate that the delivery capacity of the four pipelines can be increased by approximately 50 percent over current rates by upgrading the pipelines with additional pumps and filters.⁶⁶⁷

LAXFUEL Corporation operates an on-airport Jet A storage facility (fuel farm) consisting of 14 storage tanks⁶⁶⁸ that can hold between 18,000 and 60,000 bbl each for a total storage capacity of approximately 624,000 bbl. Mercury Air Group also supplies Jet A fuel at LAX. Mercury supplies approximately six percent of the LAX Jet A demand using four 50,000 gallon and one 20,000 gallon underground storage tanks that are re-filled by truckload shipments of Jet A.^{669, 670}

Supply and Transmission of Other Fuels

Avgas,⁶⁷¹ diesel, and gasoline are delivered via tank trucks to airport fueling facilities and local gas stations. LNG is delivered via tank truck and dispensed by an on-airport facility owned by LAWA. CNG is dispensed at an on-airport facility owned by LAWA and at a facility on the United Airlines leasehold. Propane is delivered to LAX and dispensed from on-site storage containers.

Baseline Fuel Consumption

An estimated 1.5 billion gallons of Jet A and approximately 20,000 gallons of Avgas fuel were consumed in 1996. GSE consumed approximately 1.47 million gallons of diesel fuel, 3.7 million gallons of gasoline, and 729 thousand therms⁶⁷² of combined LNG, CNG, and propane in 1996. Baseline fuel consumption associated with stationary equipment (i.e., internal combustion engines and GPUs) was approximately 1.13 million gallons of diesel fuel and 10,000 gallons of gasoline. On-airport vehicles (vehicles primarily used on-airport such as shuttles, vans, and other vehicles that do not travel off-airport during normal trips) other than GSE are estimated to have consumed 4.39 million gallons of gasoline, 2.11 million gallons of diesel, and 471 thousand therms of combined LNG, CNG, and propane. Off-airport vehicles (vehicles that bring passengers, employees, or cargo to and from the airport) are estimated to have consumed 134.4 million gallons of gasoline and 23.0 million gallons of diesel fuel. The total overall estimated fuel consumption at LAX in 1997 and in Year 2000 is presented in **Table F4.17.1-1**, 1996 Baseline and Year 2000 Fuel Consumption. This comparison indicates an increase of approximately 19 percent in Jet A fuel, no change for Avgas, a decrease of approximately 20 percent for gasoline, a decrease of approximately 11 percent in diesel and an increase of approximately 38 percent in LNG/CNG and propane consumption for Year 2000 conditions as compared to the 1996 baseline. The increase in Jet A fuel consumption resulted from increased aircraft operations, coupled with a shift in fleet mix to larger aircraft. The decrease in gasoline and diesel and the increase in LNG/CNG and propane consumption resulted from a shift in the use of traditional fuels to alternative fuels for GSE, on-airport vehicles, and off-airport vehicles.

⁶⁶⁶ Camp Dresser & McKee Inc., LAX Master Plan Preliminary Fuel Farm Relocation Feasibility Study, November 8, 1996.

⁶⁶⁷ Camp Dresser & McKee Inc., LAX Master Plan Preliminary Fuel Farm Relocation Feasibility Study, November 8, 1996.

⁶⁶⁸ In addition to these 14 tanks, the LAXFUEL fuel farm also has one waste fuel tank and one fuel tank for "off-spec" Jet A.

⁶⁶⁹ Camp Dresser & McKee Inc., Underground Tanks and Hazardous Substance Programs (UTAH) Los Angeles International Airport (LAX) Underground Storage Tank Status Report, May 1995, as updated by LAWA, March 1997.

⁶⁷⁰ PLH Aviation Services Corporation, Garrett Aviation Services, and Hudson Aviation Services also deliver fuel to various airlines. However, they obtain Jet A fuel from the above-mentioned sources. None of these companies stores Jet A fuel at LAX.

⁶⁷¹ Avgas is aviation grade gasoline used by small propeller-driven general aviation aircraft.

⁶⁷² Therms are units of thermal energy. One million BTUs are equivalent to 0.1 therms.

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Table F4.17.1-1

1996 Baseline and Year 2000 Fuel Consumption

Fuel	1996 Baseline Consumption	Year 2000 Consumption
Jet A	1,500 million gallons	1,784 million gallons
Avgas	20,000 gallons	20,000 gallons
Gasoline	142.5 million gallons	113.85 million gallons
Diesel	27.71 million gallons	24.78 million gallons
LNG/CNG and Propane	1,200 thousand therms	1,652 thousand therms

Source: Camp Dresser & McKee Inc., 2003.

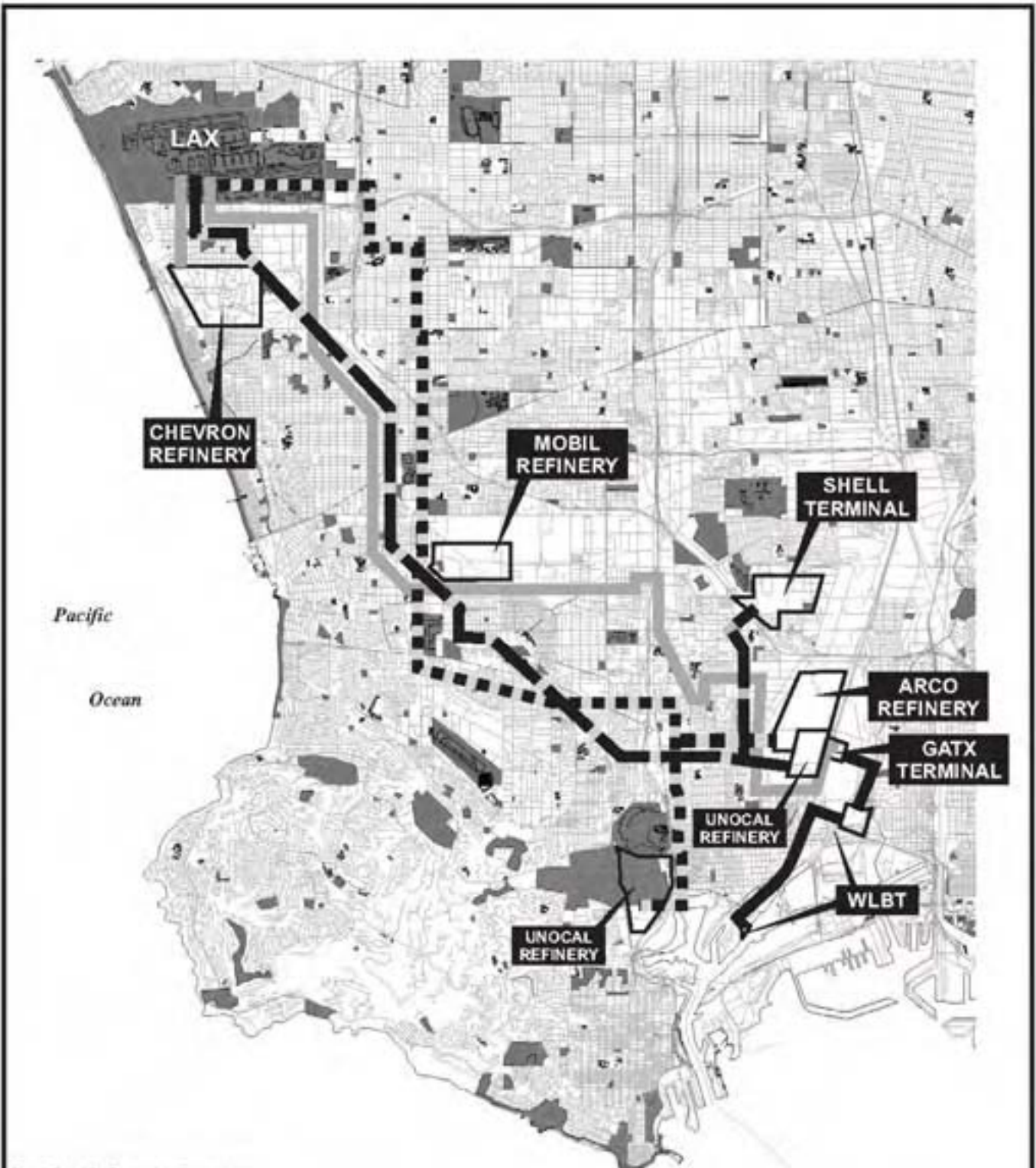
Table F4.17.1-2, 1996 Baseline and Year 2000 Transportation Related Fuel Consumption, presents a comparison of transportation related fuel consumption between 1996 baseline conditions and Year 2000 conditions specific to ground support equipment (GSE), stationary equipment, on-airport vehicles, and off-airport vehicles.

Table F4.17.1-2

1996 Baseline and Year 2000 Transportation Related Fuel Consumption

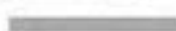



	1996	2000	% Change
Gasoline (million gallons)			
Ground Support Equipment	3.70	3.15	-15%
Stationary Equipment	0.01	0.01	0%
On-Airport Vehicles	4.39	4.39	0%
Off-Airport Vehicles	134.4	106.3	-21%
Diesel (million gallons)			
Ground Support Equipment	1.47	3.34	127%
Stationary Equipment	1.13	1.13	0%
On-Airport Vehicles	2.11	2.11	0%
Off-Airport Vehicles	23.0	18.2	-20%
LNG, CNG, and Propane (therms)			
Ground Support Equipment	729	1,181	62%
Stationary Equipment	--	--	--
On-Airport Vehicles	471	471	0%
Off-Airport Vehicles	--	--	--

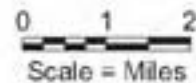
Source: Camp Dresser & McKee Inc., 2003.



Dumas Inc. Mapco, reproduced by permission.

LEGEND

-  GATX/Mobil Chevron
-  Shell
-  Arco/Unocal
-  WLBT



Source: LAX Master Plan Preliminary Fuel Farm Relocation Feasibility Study, November 8, 1996 (CDM)

FigF04_17_01-02.cdr -- 8/11/2004 -- Negotiated

**LAX Master Plan
Final EIS/EIR**

**Oil Refineries, Terminals and
Pipelines Serving LAX**

Figure
F4.17.1-3

4.17.1.4 Thresholds of Significance

4.17.1.4.1 CEQA Thresholds of Significance

A significant energy impact would occur if the direct and indirect changes in the environment that may be caused by the particular build alternative would potentially result in one or more of the following future conditions:

- ◆ An exceedance in regional electricity or natural gas supplies or generation or distribution facilities due to project-related electricity and natural gas demand.
- ◆ A substantial increase in project-related fuel consumption relative to available supply.
- ◆ Interference with existing major electrical or natural gas infrastructure due to construction of project features.

These thresholds of significance are utilized because they address the potential concerns relative to energy associated with the LAX Master Plan alternatives, namely the potential for the project to exceed regional energy supply and distribution capabilities, and the potential for interference with existing energy utility infrastructure due to construction of the proposed Master Plan improvements. The first two thresholds were developed based upon guidance provided in the *Draft L.A. CEQA Thresholds Guide*.⁶⁷³ The third threshold was developed specifically to address potential impacts associated with the Master Plan alternatives relative to construction conflicts, which was not addressed in the *Draft L.A. CEQA Thresholds Guide*.

4.17.1.4.2 Federal Standards

There are no federal standards for the determination of significant impacts on energy supply. It is the policy of the FAA to encourage the development of facilities that exemplify the principles of environmental design including waste minimization and resource conservation. These FAA policies and responsibilities are addressed through the impacts analyses relating to the CEQA Thresholds of Significance presented above, as well as in Section 4.17.2, *Natural Resources*, and Section 4.19, *Solid Waste*.

4.17.1.5 Master Plan Commitments

As addressed in subsection 4.17.1.6, *Environmental Consequences*, implementation of any of the Master Plan alternatives would have potential impacts related to energy use. In recognition of these potential impacts, LAWA has included two energy-related commitments and one public utilities commitment in the LAX Master Plan, coded "E" for "energy" and "PU" for "public utilities."

◆ E-1. Energy Conservation and Efficiency Program (Alternatives A, B, C, and D).

LAWA will seek to continually improve the energy efficiency of building design and layouts during the implementation of the LAX Master Plan. Title 24, Part 6, Article 2 of the California Administrative Code establishes maximum energy consumption levels for heating and cooling of new buildings to assure that energy conservation is incorporated into the design of new buildings. LAWA will design new facilities to meet or exceed the prescriptive standards required under Title 24. Some of the energy conservation measures that LAWA may incorporate into the design of new buildings and airports facilities may include the use of energy-efficient building materials, energy-saving lighting systems, energy-efficient air-conditioning systems, energy-efficient water-heating systems, and designed-in access for alternative means of surface transportation, including the Green Line and the APM. These energy conservation measures may be further improved upon as energy-saving design approaches and technologies develop.

◆ E-2. Coordination with Utility Providers (Alternatives A, B, C, and D).

LAWA will implement Master Plan activities in coordination with local utility providers. Utility providers will provide input on the layout of utilities at LAX to assure that LAX and the surrounding region receive both safe and uninterrupted service. When service by existing utility lines could be affected by airport design features, LAWA will work with the utility to identify alternative means providing equivalent or superior post-construction utility service.

⁶⁷³ City of Los Angeles, *Draft L.A. CEQA Thresholds Guide*, May 14, 1998.

4.17.1 Energy Supply

◆ PU-1. Develop a Utility Relocation Program (Alternatives A, B, C, and D).

LAWA will develop and implement a utilities relocation program to minimize interference with existing utilities associated with LAX Master Plan facility construction. Prior to initiating construction of a Master Plan component, LAWA will prepare a construction evaluation to determine if the proposed construction will interfere with existing utility location or operation. LAWA will determine utility relocation needs and, for sites on LAX property, LAWA will develop a plan for relocating existing utilities as necessary before, during, and after construction of LAX Master Plan features. LAWA will implement the utility relocation program during construction of LAX Master Plan improvements.

4.17.1.6 Environmental Consequences

This section describes the potential environmental impacts of the No Action/No Project Alternative and the four build alternatives. For each alternative, the effects are discussed as they relate to energy usage, the adequacy of existing distribution facilities, and the potential for construction to interfere with existing subsurface electricity and natural gas transmission lines. The forms of energy evaluated include electricity, natural gas, and transportation-related fuels such as Jet A, Avgas, gasoline, diesel, LNG, CNG, and propane. The discussion for each build alternative also addresses construction-related energy consumption, specifically diesel and gasoline consumption from the use of construction equipment and vehicle trips (both worker and supply) to and from construction sites.

As described in the Analytical Framework discussion in the introduction to Chapter 4, the basis for determining impacts under CEQA is different from that of NEPA. Under CEQA, the impacts of a proposed project and alternatives are measured against the "environmental baseline," which is normally the physical conditions that existed at the time the Notice of Preparation was published (i.e., June 1997, or 1996 when a full year of data is appropriate, for the LAX Master Plan Draft EIS/EIR). As such, the CEQA analysis in this Final EIS/EIR uses the environmental baseline, or in some cases an "adjusted environmental baseline," as the basis by which to measure and evaluate the impacts of each alternative. Under NEPA, the impacts of each action alternative (i.e., build alternative) are measured against the conditions that would otherwise occur in the future if no action were to occur (i.e., the "No Action" alternative). As such, the NEPA analysis in this Final EIS/EIR uses the No Action/No Project Alternative as the basis by which to measure and evaluate the impacts of each build alternative (i.e., Alternatives A, B, C, and D) in the future (i.e., at buildout in 2015 or, for construction-related impacts, selected future interim year). Based on this fundamental difference in the approach to evaluating impacts, the nature and significance of impacts determined under CEQA are not necessarily representative of, or applicable to, impacts determined under NEPA. The following presentation of environmental consequences should, therefore, be reviewed and considered accordingly.

4.17.1.6.1 No Action/No Project Alternative

Continued implementation of current commitments and programs, including previously-approved construction and demolition activities, as described in Section 3, *Alternatives*, would increase the amount of cargo space at LAX over baseline conditions. Under the No Action/No Project Alternative, passenger activity at LAX would increase as a result of projected growth. In addition, as part of ongoing activities by LAWA, land uses within the Aircraft Noise Mitigation Program (ANMP) properties -- Belford and Manchester Square -- would be demolished, eliminating existing energy consumption in those areas. Furthermore, LAX Northside and Continental City would be built out with offices, hotels, retail stores, restaurants, a research and development business park, and airport-related uses, creating new demand for energy in currently undeveloped areas within the Master Plan boundaries. By 2015 under the No Action/No Project Alternative, 100 percent of gates would be equipped with centralized power and pre-conditioned air for aircraft use. In addition, the amount of electrified GSE use would increase. Installation of vehicle charging stations would occur across LAX, including terminal and cargo areas.

Electricity and Natural Gas

Under the No Action/No Project Alternative, increased numbers of passengers and flight operations, the expansion of cargo facilities, and the addition of office, light industrial, and other uses within LAX Northside and Continental City, would result in increased consumption of electricity and natural gas within the Master Plan boundaries. The estimates of the amount of each of these forms of energy consumed under the No Action/No Project Alternative are provided in **Table F4.17.1-3**, Energy Consumption within Master Plan Boundaries.

Table F4.17.1-3

Energy Consumption within Master Plan Boundaries

Energy Form	1996 Baseline	Year 2000	Alternative 2015				
			NA/NP	A	B	C	D
<u>ELECTRICITY/NATURAL GAS</u>							
Electricity (MWH/Yr)							
<u>LAX</u>							
Airport Land Uses							
Airport Facilities	154,818	161,348	160,552	311,416	295,462	270,642	219,052
Airport Operations ¹	46,335	68,293	76,269	266,912	343,574	204,557	321,327
Subtotal Airport Land Uses	201,153	229,641	236,821	578,328	639,036	475,199	540,379
Non-Airport Land Uses							
Belford	3,280	1,913	NA ¹⁰	NA ¹¹	NA ¹¹	NA ¹¹	NA ¹⁰
LAX Northside ²	NA	216	66,404	NA	NA	NA	66,404
Continental City	NA	NA	40,205	NA	NA	NA	NA
Westchester Southside	NA	NA	NA	32,825	32,825	32,825	NA
Subtotal Non-Airport Land Uses	3,280	2,129	106,609	32,825	32,825	32,825	66,404
SUBTOTAL AIRPORT AND NON-AIRPORT USES	204,433	231,770	343,430	611,153	671,861	508,024	606,783
<u>Non-Project Uses Within Master Plan Boundaries¹²</u>							
Manchester Square	11,174	9,627	NA ³	23,683 ⁴	NA ⁵	NA ⁵	NA ⁵
Acquisition Areas ⁶	72,291	72,292	72,291	16,692	2,727	38,397	65,415
Subtotal Non-Project Uses	83,465	81,919	72,291	40,375	2,727	38,397	65,415
TOTAL MASTER PLAN BOUNDARIES⁹	287,898	313,689	415,721	651,528	674,588	544,223	672,197
<u>Natural Gas (MMCF/Yr)</u>							
<u>LAX</u>							
Airport Land Uses							
Airport Facilities	299	304	304	546	462	636	411
CUP	820	822	820	1,506	1,430	1,175	820
Subtotal Airport Land Uses	1,119	1,126	1,124	2,052	1,892	1,811	1,231
Non-Airport Land Uses							
Belford	28	16.4	NA ¹⁰	NA ¹¹	NA ¹¹	NA ¹¹	NA ¹⁰
LAX Northside ²	NA	0.2	139	NA	NA	NA	141
Continental City	NA	NA	75	NA	NA	NA	NA
Westchester Southside	NA	NA	NA	93	93	93	NA
Subtotal Non-Airport Land Uses	28	16.6	214	93	93	93	139
SUBTOTAL AIRPORT AND NON-AIRPORT USES	1,147	1,143	1,338	2,145	1,985	1,904	1,370
<u>Non-Project Uses Within Master Plan Boundaries¹²</u>							
Manchester Square	105	86	NA ³	217 ⁴	NA ⁵	NA ⁵	NA ⁵
Acquisition Areas ⁶	536	536	536	143	15	289	498
Subtotal Non-Project Uses	640	622	536	360	15	289	498
TOTAL MASTER PLAN BOUNDARIES⁹	1,787	1,766	1,875	2,505	2,000	2,193	1,868
<u>LIQUID FUELS</u>							
Aircraft Fuels (Million Gallons/Yr)							
Jet A	1,500	1,784	2,767	3,599	3,599	3,371	2,866
Avgas	0.02	0.02	0.02	0.02	0.02	0.02	0.02
TOTAL MASTER PLAN BOUNDARIES	1,500	1,784	2,767	3,599	3,599	3,371	2,866

4.17.1 Energy Supply

Table F4.17.1-3

Energy Consumption within Master Plan Boundaries

Energy Form	1996		Year	Alternative 2015			
	Baseline	2000		NA/NP	A	B	C
Gasoline (Million Gallons/Yr)							
Stationary Sources	0.01	0.01	0.00	0.01	0.01	0.01	0.01
On-Airport Vehicles	4.39	4.39	5.16	3.42	3.42	3.42	3.42
Off-Airport Vehicles ⁷	134.38	106.3	150.7	191.9	190.1	188.9	155.2
GSE	3.70	3.15	1.66	0.82	0.82	0.70	0.70
TOTAL MASTER PLAN BOUNDARIES⁹	142.49	113.85	157.52	196.15	194.35	193.0	159.33
Diesel (Million Gallons/Yr)							
Stationary Sources	1.13	1.13	0.00	0.04	0.04	0.04	0.04
On-Airport Vehicles	2.11	2.11	2.53	0.55	0.55	0.55	0.55
Off-Airport Vehicles ⁷	23.02	18.2	27.1	34.5	34.2	34.0	27.9
GSE	1.47	3.34	2.83	0.06	0.06	0.05	0.06
TOTAL MASTER PLAN BOUNDARIES⁹	27.73	24.78	32.46	35.15	34.85	34.64	28.55
TOTAL LIQUID FUELS	1,670	1,922	2,957	3,830	3,828	3,599	3,053
OTHER FUELS							
LNG, CNG, and Propane (Thousand Therms/Yr)⁸							
On-Airport Vehicles	471	471	925	3,524	3,524	3,524	3,524
GSE	729	1,181	1,480	2,894	2,907	2,453	2,626
TOTAL MASTER PLAN BOUNDARIES⁹	1,200	1,652	2,405	6,418	6,431	5,977	6,150

NA = Not applicable.

¹ Airport operations include the CUP, gate electrification, APM, and electric GSE and on-airport vehicles.

² LAX Northside is currently subject to a trip cap (refer to Chapter 4, *Affected Environment, Consequences and Mitigation Measures*, Analytical Framework subsection. Under Alternative D, this trip cap would be reduced, which would effectively reduce the total amount of development allowed in LAX Northside. Therefore, energy consumption in this area may be overstated.

³ Under the No Action/No Project Alternative and Alternative D, existing uses within Manchester Square would be demolished. No redevelopment is assumed under the No Action/No Project Alternative.

⁴ Under Alternative A, Manchester Square is assumed to be redeveloped with commercial/light industrial uses independent of the Master Plan.

⁵ Under Alternatives B, C, and D, existing uses within Manchester Square would be demolished, and the area would be incorporated into the overall Master Plan development. Energy consumption associated with proposed land uses in this area is incorporated within "Airport Land Uses" above.

⁶ No land within the acquisition areas would be acquired under the No Action/No Project Alternative. Only a portion of the land within the acquisition areas would be acquired for each individual build alternative. The land within the Master Plan boundaries that would not be acquired under a particular alternative is assumed to remain in its current use.

⁷ "Off-airport vehicles" includes energy consumed outside of the Master Plan boundaries, but associated with vehicles traveling to and from LAX and other land uses within the Master Plan boundaries.

⁸ The evaluation of LNG, CNG, and propane was limited to airport use.

⁹ Information in table may not total due to rounding.

¹⁰ Under the No Action/No Project Alternative and Alternative D, existing uses within Belford would be demolished. No redevelopment is assumed for purposes of this analysis.

¹¹ Under Alternatives A, B, and C, existing uses within Belford would be demolished and the area would be incorporated into the overall Master Plan development. Energy use associated with proposed land uses in this area is incorporated within "Airport Facilities" above.

¹² For purposes of this analysis, a single composite study area was established, referred to as the "Master Plan boundaries." However, for each alternative, a portion of the study area would not be incorporated into the Master Plan development.

Source: Camp Dresser & McKee Inc., 2003.

Under the No Action/No Project Alternative, the increase in square footage dedicated to cargo uses would proportionately increase electricity and natural gas consumption at LAX for these airport land uses. Increases in gate electrification, electric GSE, and electric on-airport vehicles would also contribute to increased electricity demand. Total electricity use for airport land uses would increase by approximately 35,668 MWH/yr over 1996 baseline conditions by 2015 (an 18 percent increase), and total natural gas use would increase by five MMCF/yr, an increase of less than 1 percent.

As indicated in **Table F4.17.1-3**, under the No Action/No Project Alternative in 2015, total annual consumption of electricity and natural gas within the Master Plan boundaries would be approximately 415,721 MWH of electricity and 1,875 MMCF of natural gas. This represents an increase in electricity usage of 44 percent and an increase in natural gas consumption of 5 percent relative to 1996 baseline conditions. The development of LAX Northside and Continental City would contribute to these increases. In addition, the increase in electricity consumption would result from additional gate electrification, and electric GSE and on-airport vehicles.

The projected total consumption of electricity and natural gas within the Master Plan boundaries in 2015 would represent 1.6 percent of the electrical energy demand within DWP's service area and 0.2 percent of the regional natural gas demand.

The California Energy Commission forecasts California energy demand and supply. These forecasts are provided to the California state legislature to support the adoption of sound energy commitments that will assure both adequate and affordable energy supplies. As indicated in subsection 4.17.1.3, *Affected Environment/Environmental Baseline*, DWP and The Gas Company project sufficient availability of electricity and natural gas to meet projected needs through 2015. Although sufficient electricity supply is expected to be available, changes in peak electrical loads and the location of new electrical loads within the Master Plan boundaries may result in the need for upgrades to the electrical power transmission system. The upgrades could include the installation of above or below ground power lines, upgraded electrical switching equipment, and possibly new customer service stations. Any new facilities would be coordinated with DWP.

Transportation-Related Fuel Consumption

As indicated in subsection 4.17.1.3, *Affected Environment/Environmental Baseline*, transportation-related fuels include Jet A and Avgas for aircraft; LNG, CNG, propane, gasoline, and diesel for GSE; diesel and gasoline for miscellaneous internal combustion engines and GPUs; and gasoline, diesel, and LNG/CNG for shuttle buses and support vehicles. In addition, passenger and cargo vehicle trips associated with the airport require additional fuel use, primarily gasoline and diesel. Generally, the consumption of these forms of energy varies with the number of annual passengers and the number of flight operations. Additional factors that can affect the consumption of transportation-related fuels include changes in the mix of aircraft sizes, the distances aircraft fly to their destinations, changes in cargo operations, and changes in the energy form used to power vehicles (for example, conversion from gasoline/diesel powered vehicles to vehicles powered by LNG/CNG). The latter factor reflects changes in energy forms and has little effect on the overall amount of fuel consumed.

Jet A and Avgas

Under the No Action/No Project Alternative, annual Jet A consumption by aircraft is estimated to be 2,767 million gallons in 2015. This represents an increase in Jet A fuel consumption over baseline conditions of 84 percent. This increase would result from increasing flight operations, changes in the mix of aircraft to heavier aircraft, and increased distances aircraft would fly to their destinations. Avgas consumption is not projected to increase in 2015, because the principal consumers of Avgas, small, propeller-driven, general aviation aircraft, would not experience an increase of flight operations at LAX over baseline conditions.

As indicated in subsection 4.17.1.3, *Affected Environment/Environmental Baseline*, petroleum product supplies, including both Jet A and Avgas, are anticipated to be adequate through 2015. Moreover, the barrels per day of Jet A consumed would remain below 200,000, the current capacity of the pipelines that transport Jet A to LAX.

Gasoline and Diesel

Under the No Action/No Project Alternative, gasoline consumption is estimated to be approximately 158 million gallons per year in 2015. This represents an increase in gasoline consumption over baseline conditions of 11 percent. Annual diesel consumption is estimated to be approximately 32 million gallons in 2015. This represents an increase in diesel consumption over baseline conditions of 17 percent. Increases in gasoline and diesel consumption would result from an increase in vehicle miles traveled (VMT) from off-airport vehicle trips (including trips by both passengers and employees arriving and departing LAX, as well as trips to and from LAX Northside and Continental City), increased on-airport trips due to greater numbers of passengers being transported around the airport, and increased GSE activity.

4.17.1 Energy Supply

As discussed previously, petroleum products, including gasoline and diesel, are market-driven commodities for which the California Energy Commission indicates adequate supplies are anticipated through 2015.⁶⁷⁴

LNG, CNG, and Propane

Under the No Action/No Project Alternative, the total consumption of LNG, CNG, and propane would be 2,405 thousand therms in 2015. This represents a 100 percent increase over baseline conditions. Increases in LNG, CNG, and propane consumption would originate from the transport of increasing numbers of passengers on the airport using on-airport vehicles fueled by LNG, CNG, and propane. In addition, a greater amount of LNG, CNG, or propane fueled GSE would be used to serve the increasing number of flight operations.

As discussed in subsection 4.17.1.3, *Affected Environment/Environmental Baseline*, petroleum products, including LNG, CNG, and propane, are market-driven commodities for which the California Energy Commission indicates that adequate supplies are anticipated through 2015.^{675, 676}

4.17.1.6.2 Alternative A - Added Runway North

Under Alternative A, the building area dedicated to terminal, cargo, and ancillary airport uses would increase and the building area for maintenance uses compared to baseline conditions would decrease. Under Alternative A, all terminal gates would be equipped with centralized power and pre-conditioned air. In addition, electric vehicle charging stations would be provided for GSE, shuttles, and visitors. These changes would increase the amount of energy required at LAX. Increases in airport operations, such as transporting passengers around the airport, handling passenger baggage, loading and unloading cargo, and providing electrical power for airplanes at gates (gate electrification), would increase energy consumption. Existing uses in the acquisition areas would be demolished. Uses within the ANMP properties -- Belford and Manchester Square -- will be demolished as part of a separate action being undertaken by LAWA. The land within the acquisition areas and Belford would be incorporated into the Master Plan. Manchester Square would be redeveloped independent of the Master Plan with commercial and industrial uses. Alternative A would also include development of Westchester Southside.

Electricity and Natural Gas

Increasing numbers of passengers, flight operations, expansion of cargo facilities, and expanded airport operations under Alternative A, as well as the addition of office, light industrial, and other uses within Westchester Southside, would result in increases in electricity and natural gas consumption within the Master Plan boundaries. Several operational changes under Alternative A would shift the forms of energy consumed from direct fossil fuel consumption (gasoline and diesel) to electricity. Activities that would shift demand for energy from gasoline and diesel to electricity include the following:

- ◆ The installation of an APM by 2015 to reduce the reliance on gasoline and diesel powered cars, buses, and shuttles to transport passengers around the airport. For this analysis the APM has been assumed to be electrically powered. While the APM is most likely to be powered by electricity, other options for powering the APM are possible including natural gas and/or other hybrid systems.
- ◆ The conversion of gasoline, diesel, and LNG/CNG powered GSE and on-airport vehicles to battery powered vehicles.
- ◆ Enhanced use of gate electrification to reduce the use of fossil fuel-powered generators (GPUs and APUs) and air conditioning units (ACUs) for aircraft while operating at terminal gates.

In order to service the heating and cooling needs of the new terminal areas, under Alternative A, a new Central Utility Plant (CUP) would be constructed to serve the new West Terminal Area (WTA). Unlike the existing CUP, the new CUP would not be designed to produce electricity from co-generation; therefore, it would increase electricity and natural gas consumption. The existing CUP would be maintained and would continue to produce electricity through co-generation. The increase in electricity and natural gas

⁶⁷⁴ California Energy Commission, Fuels Report, July 1999.

⁶⁷⁵ California Energy Commission, Fuels Report, July 1999.

⁶⁷⁶ South Coast Air Quality Management District, Final Program Environmental Assessment for: Proposed Fleet Vehicle Rules Amendments, June 5, 2000.

consumption by the CUPs would be proportional to the increase in terminal area after the amount of natural gas consumed for electrical power co-generation of the existing CUP has been factored out.

The estimated consumption of electricity and natural gas under Alternative A in 2015 is provided in **Table F4.17.1-3**. As indicated in the table, in 2015, consumption of electricity and natural gas for airport land uses under Alternative A would increase by approximately 377,175 MWH/yr (a 188 percent increase) and 933 MMCF/yr (an 83 percent increase) over 1996 baseline conditions, respectively. In 2015, electricity and natural gas consumption for Westchester Southside would be approximately 32,825 MWH/yr and 93 MMCF/yr, respectively.

As indicated in **Table F4.17.1-3**, under Alternative A in 2015, total annual consumption of electricity and natural gas within the Master Plan boundaries would be 651,528 MWH of electricity and 2,505 MMCF of natural gas. This represents an increase in electricity and natural gas consumption of 126 percent and 40 percent, respectively, over 1996 baseline conditions. This also represents an increase compared to the No Action/No Project Alternative. The projected consumption of electricity and natural gas would represent 2.5 percent of the projected electrical energy demand within DWP's service area in 2015 and 0.2 percent of the projected regional natural gas demand (refer to subsection 4.17.1.3 for a discussion of projected Year 2015 city electrical energy and regional natural gas demands).

In order to reduce electricity and natural gas consumption under Alternative A, LAWA would implement Master Plan Commitment E-1, Energy Conservation and Efficiency Program (Alternatives A, B, C and D). This commitment would require development of an energy conservation and efficiency program to maximize the energy efficiency of new facilities. This program would be consistent with FAA policies that encourage the development of facilities that exemplify the highest standards of design, including sustainability through resource conservation. It would also be consistent with Executive Order 13123, Greening the Government through Efficient Energy Management (64 FR 30851, June 8, 1999), which encourages federal agencies to reduce energy use in their facilities. As indicated previously, electricity and natural gas are commodities subject to market factors. The California Energy Commission periodically forecasts the projected demand and supply of electricity and natural gas to assure adequate and affordable supplies for the foreseeable future.⁶⁷⁷ Because the Commission expects a sufficient supply of electricity and natural gas to be available, the impact associated with an increase in electricity and natural gas consumption under Alternative A would be less than significant.

However, as with the No Action/No Project Alternative, under Alternative A, changes in peak electrical loads and the location of new electrical loads within the Master Plan boundaries may result in the need for upgrades to the electrical power transmission system.⁶⁷⁸ The upgrades could include the installation of above- or below-ground power lines, upgraded electrical switching equipment, and possibly new customer service stations. Under Master Plan Commitment E-2, Coordination with Utility Providers (Alternatives A, B, C, and D), a utility coordination program would be implemented by LAWA to ensure that adequate electrical distribution facilities are available to support the electricity needs associated with Alternative A. Under this commitment, LAWA would work with DWP to assure that changes to the electrical distribution system performed under Alternative A would not adversely affect electricity service to the surrounding area. Development and implementation of the utility coordination program would reduce potential impacts to the existing electricity supply and distribution system to a level that is less than significant.

Transportation-Related Fuel Consumption

As indicated under the No Action/No Project Alternative, consumption of transportation-related fuels varies with the number of annual passengers, the number of flight operations, the nature of the aircraft fleet, the distance traveled by the aircraft, changes in cargo operations, and changes in the energy form used to power vehicles.

⁶⁷⁷ California Energy Commission, California Energy Commission General Information, Available: <http://www.energy.ca.gov/commission/index.html> [May 3, 2000].

⁶⁷⁸ Charles C. Hallway, Supervisor of Environmental Assessment and EMF, City of Los Angeles, Department of Water and Power, Letter to John Graham (LAWA), July 30, 1997.

4.17.1 Energy Supply

Jet A and Avgas

Under Alternative A, Jet A consumption by aircraft is estimated to be 3,599 million gallons in 2015. This represents an increase in Jet A fuel consumption over baseline conditions of 140 percent. This also represents an increase compared to the No Action/No Project Alternative. This increase would result from increasing flight operations, changes in the mix of aircraft to heavier aircraft, and an increase in average distances aircraft would fly to their destinations. Avgas consumption is not projected to increase in 2015, because the principal consumers of Avgas, small propeller-driven general aviation aircraft, would not experience an increase in flight operations over baseline conditions.

Under Alternative A, in 2015, the existing LAXFUEL Fuel Farm would be moved to a new location at LAX, north of Imperial Highway and west of Sepulveda Boulevard. Construction of a new fuel farm would result in improvements in aircraft fuel storage as compared to the No Action/No Project Alternative.

As discussed previously, the supply of petroleum products including Jet A and Avgas is anticipated to be adequate through 2015. Therefore, the impact associated with increased Jet A and Avgas consumption under Alternative A would be less than significant. In 2015, the amount of Jet A consumed would exceed 200,000 barrels per day, the current capability of the pipelines providing fuel to LAX. However, discussions with oil company and terminal representatives have indicated that the delivery capability of the four pipelines, which are owned and operated by the oil companies, can be increased by approximately 50 percent. Increasing the pipeline delivery capability can be accomplished by upgrading or installing additional pumps and filters along the length of the existing pipeline.⁶⁷⁹ With the upgrades to the dedicated Jet A pipelines, the impact of increased Jet A consumption on the transmission lines would be less than significant.

Gasoline and Diesel

Under Alternative A, gasoline consumption would be approximately 196 million gallons in 2015, an increase of 38 percent over baseline conditions. Diesel consumption is estimated to be approximately 35 million gallons in 2015, an increase over baseline conditions of 27 percent. Gasoline and diesel consumption would both increase compared to the No Action/No Project Alternative. Under this alternative, consumption of gasoline and diesel from on-airport sources, including GSE and on-airport vehicles, would be reduced as a result of the conversion of some of these vehicles to LNG, CNG, or propane power. These decreases would be offset by increases in the amount of gasoline and diesel consumption associated with off-airport vehicle trips, including trips by both passengers and employees arriving and departing LAX, as well as trips to and from Westchester Southside.

As discussed previously, petroleum products, including gasoline and diesel, are market-driven commodities for which adequate supplies are anticipated through 2015 by the California Energy Commission. Because sufficient supply of gasoline and diesel is expected to be available, the impact associated with an increase in gasoline and diesel consumption under Alternative A would be less than significant.

LNG, CNG, and Propane

Under Alternative A, the total consumption of LNG, CNG, and propane would be 6,418 thousand therms in 2015. This represents a 435 percent increase over baseline conditions, as well as an increase over the No Action/No Project Alternative. The increase in LNG, CNG, and propane fuel consumed over baseline conditions would result from increasing numbers of passengers being transported around LAX in on-airport vehicles, increased flight operations, greater numbers of LNG/CNG powered on-airport vehicles, and the introduction of LNG/CNG powered GSE. The impact of these factors would be partially offset by increased use of battery powered GSE and a resulting decreased use of LNG, CNG, and propane powered GSE.

As discussed previously, petroleum products, including LNG, CNG, and propane, are market-driven commodities for which adequate supplies are anticipated through 2015 by the California Energy Commission. Because a sufficient supply of LNG, CNG, and propane is expected to be available, the impact associated with an increase in LNG, CNG, and propane consumption under Alternative A would be less than significant.

⁶⁷⁹ Camp Dresser & McKee Inc, LAX Master Plan Preliminary Fuel Farm Relocation Feasibility Study, November 6, 1996.

Construction

Under Alternative A, the amount of fuel consumed by construction-related activities during the entire construction period, including operation of construction equipment and worker vehicle trips to and from the construction sites, would be approximately 31.6 million gallons of diesel and 3.1 million gallons of gasoline. As discussed previously, petroleum products, including gasoline and diesel, are market-driven commodities for which adequate supplies are anticipated. Because sufficient supplies of gasoline and diesel are expected to be available, the impact associated with the consumption of gasoline and diesel for construction-related activities under Alternative A would be less than significant.

Alternative A would require new electrical and natural gas distribution infrastructure, as well as relocating and renovating on-airport facilities. The construction of this new infrastructure would be incorporated into the LAX Master Plan as part of Master Plan Commitment PU-1, Develop a Utility Relocation Program (Alternatives A, B, C, and D). As indicated previously, new facilities would be coordinated with utility providers under Master Plan Commitment E-2, Coordination with Utility Providers (Alternatives A, B, C, and D). Because the project would be designed to provide the requisite electricity and natural gas infrastructure, the need for new and relocated facilities on the airport would be a less than significant impact.

Construction associated with Alternative A would include activity near existing natural gas and electrical power lines. Excavation near natural gas or electrical power lines could cause an interruption in service to LAX or the surrounding area if improper construction methods or poor planning occurs. Construction near submerged high voltage electrical power lines could later affect the transmission capacity of the lines if surrounding insulation material is improperly changed. The ability of utility providers to access underground pipes or lines could also be affected by construction. Under Master Plan Commitments E-2, Coordination with Utility Providers (Alternatives A, B, C, and D), and PU-1, Develop a Utility Relocation Program (Alternatives A, B, C, and D), LAWA would work with the utility providers to assure that changes to the electrical distribution system performed under Alternative A would not adversely affect electricity or natural gas service to the surrounding area. Development and implementation of these commitments would reduce potential impacts to the existing electricity supply and distribution system from construction activities to a level that is less than significant.

4.17.1.6.3 Alternative B - Added Runway South

As with Alternative A, Alternative B would increase the building area dedicated to terminal, cargo, and ancillary airport uses, and decrease the building area for maintenance uses compared to baseline conditions. Under Alternative B, all terminal gates would be equipped with centralized power and pre-conditioned air. In addition, electric vehicle charging stations would be provided for GSE, shuttles, and visitors. These changes would increase the amount of energy required at LAX. Increases in airport operations, such as transporting passengers around the airport, handling passenger baggage, loading and unloading cargo, and providing electrical power for airplanes at gates (gate electrification), would increase energy consumption. Existing uses in the acquisition areas would be demolished. Also, as with Alternative A, uses within the ANMP properties -- Belford and Manchester Square -- will be demolished as part of a separate action being undertaken by LAWA. The land within these areas would be incorporated into the Master Plan. Alternative B would also include development of Westchester Southside.

Electricity and Natural Gas

As with Alternative A, under Alternative B, increasing numbers of passengers, flight operations, expansion of cargo facilities, and expanded airport operations, as well as the development of Westchester Southside, would result in increases in electricity and natural gas consumption within the Master Plan boundaries. Also, as with Alternative A, operational changes would shift the forms of energy from direct fossil fuel consumption (gasoline and diesel) to electricity, and a new CUP would be constructed to serve the WTA. The new CUP would further increase electricity and natural gas consumption.

The estimated amount of electricity and natural gas that would be consumed under Alternative B is provided in **Table F4.17.1-3**. As indicated in the table, in 2015, consumption of electricity and natural gas for airport land uses under Alternative B would increase by approximately 437,883 MWH/yr (a 218 percent increase) and 773 MMCF/yr (a 69 percent increase) over 1996 baseline conditions, respectively.

4.17.1 Energy Supply

In 2015, electricity and natural gas consumption for Westchester Southside would be approximately 32,825 MWH/yr and 93 MMCF/yr, respectively.

As indicated in **Table F4.17.1-3**, under Alternative B in 2015, total annual consumption of electricity and natural gas within the Master Plan boundaries would be 674,588 MWH of electricity and 2,000 MMCF of natural gas. This represents an increase in electricity and natural gas consumption of 134 percent and 12 percent, respectively, over 1996 baseline conditions. This also represents an increase compared to the No Action/No Project Alternative. The projected consumption of electricity and natural gas would represent 2.6 percent of the electrical energy demand within DWP's service area and 0.2 percent of the regional natural gas demand.

In order to reduce electricity and natural gas consumption under Alternative B, LAWA would implement Master Plan Commitment E-1, Energy Conservation and Efficiency Program (Alternatives A, B, C, and D), to maximize the energy efficiency of new facilities. This program would be consistent with federal policies pertaining to energy efficiency and resource conservation. Similar to Alternative A, a sufficient supply of electricity and natural gas is expected to be available. Therefore, no significant impacts with respect to electricity and natural gas supply would occur.

However, as with Alternative A, under Alternative B, changes in peak electrical loads and the location of new electrical loads within the Master Plan boundaries may result in the need for upgrades to the electrical power transmission system. Under Master Plan Commitment E-2, Coordination with Utility Providers (Alternatives A, B, C, and D), a utility coordination program would be implemented by LAWA to ensure that adequate electrical distribution facilities are available to support the electricity needs associated with Alternative B. Development and implementation of a utility coordination program would reduce potential impacts to the existing electricity supply and distribution system to a level that is less than significant.

Transportation-Related Fuel Consumption

As with Alternative A, consumption of transportation-related fuels would vary with the numbers of annual passengers, the number of the flight operations, the nature of the aircraft fleet, the distance traveled by the aircraft, changes in cargo operations, and changes in the energy form used to power vehicles.

Jet A and Avgas

The number of aircraft operations under Alternative B would be the same as for Alternative A. As a result, Jet A and Avgas consumption would also be the same.

Under Alternative B, the existing LAXFUEL Fuel Farm would be relocated to a new site off of LAX at either the Scattergood Generating Station or the oil refinery located south of the airport. The transmission of fuel from the off-site fuel farm to LAX would be similar for both fuel farm sites. New pipelines from the off-site Fuel Farm would be extended from either the Scattergood Generating Station or the oil refinery westerly to Vista del Mar, north along Vista del Mar to Imperial Highway, and east adjacent to the north side of Imperial Highway to LAX. The relocated fuel farm would have the same capacity as the expanded and relocated On-Site Fuel Farm associated with Alternative A, namely twelve 100,000 barrel tanks. The transmission of Jet A from the off-site fuel farm site to LAX would increase electricity consumption as compared to an on-site storage facility. However, the increase in electricity consumption related to the location of the fuel farm off-site would be small compared to the total consumption of electricity at LAX. As with Alternative A, under Alternative B, the impacts associated with the available supply, transmission, and storage of Jet A would be less than significant.

Gasoline and Diesel

Under Alternative B, gasoline consumption would be approximately 194 million gallons in 2015, an increase over baseline conditions of 36 percent. Diesel consumption is estimated to be approximately 35 million gallons in 2015, an increase over baseline conditions of 26 percent. Gasoline and diesel consumption would both increase compared to the No Action/No Project Alternative. Under this alternative, consumption of gasoline and diesel from on-airport sources, including GSE and on-airport vehicles, would be reduced as a result of the conversion of some of these vehicles to LNG, CNG, or propane power. These decreases would be offset by increases in the amount of gasoline and diesel consumption associated with off-airport vehicle trips, including trips by both passengers and employees arriving and departing LAX, as well as trips to and from Westchester Southside.

Similar to Alternative A, sufficient supplies of gasoline and diesel are expected to be available. Therefore, the impact associated with an increase in gasoline and diesel consumption under Alternative B would be less than significant.

LNG, CNG and Propane

Under Alternative B, the total consumption of LNG, CNG, and propane would be 6,431 thousand therms in 2015. This represents a 436 percent increase over baseline conditions, as well as an increase over the No Action/No Project Alternative. The increase in LNG, CNG, and propane fuel consumed over baseline conditions would result from increasing numbers of passengers being transported around LAX in on-airport vehicles, increased flight operations, greater numbers of LNG/CNG powered on-airport vehicles, and the introduction of LNG/CNG powered GSE. The impact of these factors would be partially offset by increased use of battery powered GSE and a resulting decreased use of LNG, CNG, and propane powered GSE. As with Alternative A, under Alternative B, the impacts associated with the supply of LNG, CNG, and propane would be less than significant.

Construction

Under Alternative B, the amount of diesel and gasoline consumed by construction-related activities during the entire construction period would be approximately 34.1 million gallons of diesel and 3.1 million gallons of gasoline. As discussed previously, adequate gasoline and diesel supplies are anticipated. Because sufficient supplies are expected to be available, the impact associated with the consumption of gasoline and diesel for construction-related activities under Alternative B would be less than significant.

Alternative B would require new electrical and natural gas distribution infrastructure, as well as relocating and renovating on-airport facilities. The construction of the new infrastructure would be incorporated into the LAX Master Plan as part of Master Plan Commitment PU-1, Develop a Utility Relocation Program (Alternatives A, B, C, and D). As indicated previously, new facilities would be coordinated with utility providers under Master Plan Commitment E-2, Coordination with Utility Providers (Alternatives A, B, C, and D). Because the project would be designed to provide the requisite electricity and natural gas infrastructure, the need for new and relocated facilities on the airport would be a less than significant impact.

As with Alternative A, construction associated with Alternative B would include activity near existing natural gas and electrical power lines. Under Alternative B, an off-site fuel farm would be constructed and a pipeline would be installed between the fuel farm and LAX. The impacts associated with these activities would be similar to those described under Alternative A with additional potential construction contracts associated with the off-site fuel farm. Under Master Plan Commitments E-2, Coordination with Utility Providers (Alternatives A, B, C, and D), and PU-1, Develop a Utility Relocation Program (Alternatives A, B, C, and D), LAWA would work with the utility providers to assure that changes to the electrical distribution system performed under Alternative B would not adversely affect electricity or natural gas service to the surrounding area. Development and implementation of these commitments would reduce potential impacts to the existing electricity supply and distribution system from construction activities to a level that is less than significant.

4.17.1.6.4 Alternative C - No Additional Runway

As with Alternatives A and B, Alternative C would increase the building area dedicated to terminal, cargo, and ancillary airport uses, and decrease the building area for maintenance uses compared to baseline conditions. Under Alternative C, all terminal gates would be equipped with centralized power and pre-conditioned air. In addition, electric vehicle charging stations would be provided for GSE, shuttles, and visitors. These changes would increase the amount of energy required at LAX. Increases in airport operations, such as transporting passengers around the airport, handling passenger baggage, loading and unloading cargo, and providing electrical power for airplanes at gates (gate electrification), would increase energy consumption. Existing uses in the acquisition areas would be demolished. As with Alternatives A and B, uses within the ANMP properties - Belford and Manchester Square - will be demolished as part of a separate action being undertaken by LAWA. The land within these areas would be incorporated into the Master Plan. Alternative C would also include development of Westchester Southside.

4.17.1 Energy Supply

Electricity and Natural Gas

As with Alternatives A and B, increasing numbers of passengers, flight operations, expansion of cargo facilities, and expanded airport operations, as well as the development of Westchester Southside, would result in increases in electricity and natural gas consumption within the Master Plan boundaries. As with the other alternatives, operational changes would shift the forms of energy from direct fossil fuel consumption (gasoline and diesel) to electricity. These activities would be the same as those discussed under Alternative A. As with Alternatives A and B, in order to service the heating and cooling needs of the new terminal areas, under Alternative C, a new CUP would be constructed to serve the new WTA. The new CUP would further increase electricity and natural gas consumption.

The estimated amount of electricity and natural gas that would be consumed under Alternative C is provided in **Table F4.17.1-3**. As indicated in the table, in 2015, increases in passenger numbers and flight operations would increase consumption of electricity and natural gas for airport land uses under Alternative C by approximately 274,046 MWH/yr (a 136 percent increase) and 692 MMCF/yr (a 62 percent increase) over 1996 baseline conditions, respectively. In 2015, electricity and natural gas consumption for Westchester Southside would be 32,825 MWH/yr and 93 MMCF/yr, respectively.

As indicated in **Table F4.17.1-3**, under Alternative C in 2015, total annual consumption of electricity and natural gas within the Master Plan boundaries would be approximately 544,223 MWH of electricity and 2,193 MMCF of natural gas. This represents an increase in electricity and natural gas consumption of 89 percent and 23 percent, respectively, over 1996 baseline conditions. This also represents an increase compared to the No Action/No Project Alternative. The projected consumption of electricity and natural gas would represent 2.1 percent of the electrical energy demand within DWP's service area and 0.2 percent of the regional natural gas demand.

In order to reduce electricity and natural gas consumption under Alternative C, LAWA would implement Master Plan Commitment E-1, Energy Conservation and Efficiency Program (Alternatives A, B, C, and D), to maximize the energy efficiency of new facilities. This program would be consistent with federal policies pertaining to energy efficiency and resource conservation. Similar to Alternatives A and B, a sufficient supply of electricity and natural gas is expected to be available. Therefore, no significant impacts with respect to electricity and natural gas supply would occur.

However, as with the other build alternatives, under Alternative C, changes in peak electrical loads and the location of new electrical loads within the Master Plan boundaries may result in the need for upgrades to the electrical power transmission system. Under Master Plan Commitment E-2, Coordination with Utility Providers (Alternatives A, B, C, and D), a utility coordination program would be implemented by LAWA to ensure that adequate electrical distribution facilities are available to support the electricity needs associated with Alternative C. Development and implementation of a utility coordination program would reduce potential impacts to the existing electricity supply and distribution system to a level that is less than significant.

Transportation-Related Fuel Consumption

As with Alternatives A and B, consumption of transportation-related fuels would vary with the number of annual passengers, the number of flight operations, the nature of the aircraft fleet, the distance traveled by the aircraft, changes in cargo operations, and changes in the energy form used to power vehicles.

Jet A and Avgas

Under Alternative C, Jet A consumption by aircraft is estimated to be 3,371 million gallons in 2015, an increase over baseline conditions of 125 percent. This also represents an increase compared to the No Action/No Project Alternative. This increase would result from increasing flight operations, changes in the mix of aircraft to heavier aircraft, and an increase in average distances aircraft would fly to their destinations. As with the other alternatives, Avgas consumption is not projected to increase in 2015.

Under Alternative C, the existing LAXFUEL Fuel Farm would be expanded and the storage capacity increased. The modification of the fuel farm would increase fuel storage capacity to 1,287,000 bbl. As with Alternatives A and B, the impacts associated with the available supply, transmission, and storage of Jet A would be less than significant.

Gasoline and Diesel

Under Alternative C, gasoline consumption would be approximately 193 million gallons in 2015, an increase over baseline conditions of 35 percent. Diesel consumption is estimated to be approximately 35 million gallons in 2015, an increase over baseline conditions of 25 percent. Gasoline and diesel consumption would both increase compared to the No Action/No Project Alternative. Under this alternative, consumption of gasoline and diesel from on-airport sources, including GSE and on-airport vehicles, would be reduced as a result of the conversion of some of these vehicles to LNG/CNG, or propane powered vehicles. These decreases would be offset by increases in the amount of gasoline and diesel consumption associated with off-airport vehicle trips, including trips by both passengers and employees arriving and departing LAX, as well as trips to and from Westchester Southside.

As discussed previously, sufficient supplies of gasoline and diesel are expected to be available. Therefore, the impact associated with an increase in gasoline and diesel consumption under Alternative C would be less than significant.

LNG, CNG, and Propane

Under Alternative C, the total consumption of LNG, CNG, and propane would be 5,977 thousand therms in 2015. This represents a 398 percent increase over baseline conditions, as well as an increase over the No Action/No Project Alternative. The increase in LNG, CNG, and propane fuel consumed over baseline conditions would result from increasing numbers of passengers being transported around LAX in on-airport vehicles, increased flight operations, greater numbers of LNG/CNG powered on-airport vehicles, and the introduction of LNG/CNG powered GSE. The impact of these factors would be partially offset by increased use of battery powered GSE and a resulting decreased use of LNG, CNG, and propane powered GSE. As with Alternatives A and B, under Alternative C, the impacts to the supply of LNG, CNG, and propane would be less than significant.

Construction

Under Alternative C, the amount of diesel and gasoline consumed by construction-related activities during the entire construction period, including operation of construction equipment and worker vehicle trips to and from the construction sites, would be approximately 32.0 million gallons of diesel and 3.1 million gallons of gasoline. As discussed previously, adequate gasoline and diesel supplies are anticipated. Because sufficient supplies are expected to be available, the impact associated with the consumption of gasoline and diesel for construction-related activities under Alternative C would be less than significant.

Alternative C would require new electrical and natural gas distribution infrastructure, as well as relocating and renovating on-airport facilities. The construction of this new infrastructure would be incorporated into the LAX Master Plan as part of Master Plan Commitment PU-1, Develop a Utility Relocation Program (Alternatives A, B, C, and D). As indicated previously, new facilities would be coordinated with utility providers under Master Plan Commitment E-2, Coordination with Utility Providers (Alternatives A, B, C, and D). Because the project would be designed to provide the requisite electricity and natural gas infrastructure, the need for new and relocated facilities on the airport would be a less than significant impact.

As with Alternatives A and B, construction associated with Alternative C would include activity near existing natural gas and electrical power lines. The impacts associated with these activities would be the same as those described under Alternative A. Under Master Plan Commitments E-2, Coordination with Utility Providers (Alternatives A, B, C, and D), and PU-1, Develop a Utility Relocation Program (Alternatives A, B, C, and D), LAWA would work with the utility providers to assure that changes to the electrical distribution system performed under Alternative C would not adversely affect electricity or natural gas service to the surrounding area. Development and implementation of these commitments would reduce potential impacts to the existing electricity supply and distribution system from construction activities to a level that is less than significant.

4.17.1.6.5 Alternative D - Enhanced Safety and Security Plan

Under Alternative D, the building area dedicated to terminal, cargo, and ancillary airport uses would increase, and the building area for maintenance uses would slightly decrease compared to baseline conditions. Under Alternative D, all terminal gates would be equipped with centralized power and pre-

4.17.1 Energy Supply

conditioned air. In addition, electric vehicle charging stations would be provided for GSE, shuttles, and visitors. Increases in airport operations, such as transporting passengers around the airport, handling passenger baggage, loading and unloading cargo, and providing electrical power for airplanes at gates (gate electrification), would increase energy consumption. Existing uses in the acquisition areas would be demolished. As with Alternatives A, B, and C, uses within the ANMP properties -- Belford and Manchester Square -- will be demolished as part of a separate action being undertaken by LAWA. For purposes of this analysis, no redevelopment of the Belford property is assumed. The land within the acquisition areas and Manchester Square would be incorporated into the Master Plan. Alternative D would also include the development of LAX Northside.

Electricity and Natural Gas

As with Alternatives A, B, and C, increasing numbers of passengers, flight operations, expansion of cargo facilities, and expanded airport operations, as well as the development of LAX Northside, would result in increases in electricity and natural gas consumption within the Master Plan boundaries. Also, as with the other build alternatives, operational changes would shift the forms of energy from direct fossil fuel consumption (gasoline and diesel) to electricity.

Table F4.17.1-3 shows that, under Alternative D, total electricity use for airport land uses would increase by 339,226 MWH/yr over 1996 baseline conditions by 2015 (a 169 percent increase). Total natural gas use for airport land uses would increase by 112 MMCF/yr over 1996 baseline conditions by 2015 (a 10 percent increase). Total annual electricity and natural gas consumption within the Master Plan boundaries would increase by 384,299 MWH/yr and 81 MMCF/yr over baseline conditions by 2015 (a 133 percent increase and a 5 percent increase, respectively). This also represents an increase compared to the No Action/No Project Alternative. The projected consumption of electricity and natural gas under Alternative D would represent 2.6 percent of the projected electrical energy demand within DWP's service area in 2015 and 0.2 percent of the projected regional natural gas demand.

In order to reduce electricity and natural gas consumption under Alternative D, LAWA would implement Master Plan Commitment E-1, Energy Conservation and Efficiency Program (Alternatives A, B, C, and D), to maximize the energy efficiency of new facilities. This program would be consistent with federal policies pertaining to energy efficiency and resource conservation. Similar to Alternatives A, B, and C, a sufficient supply of electricity and natural gas is expected to be available. Therefore, no significant impacts with respect to electricity and natural gas supply would occur.

However, as with the other build alternatives, under Alternative D, changes in peak electrical loads and the location of new electrical loads within the Master Plan boundaries may result in the need for upgrades to the electrical power transmission system. Under Master Plan Commitment E-2, Coordination with Utility Providers (Alternatives A, B, C, and D), a utility coordination program would be implemented by LAWA to ensure that adequate electrical distribution facilities are available to support the electricity needs associated with Alternative D. Development and implementation of a utility coordination program would reduce potential impacts to the existing electricity supply and distribution system to a level that is less than significant.

Transportation-Related Fuel Consumption

As with the other build alternatives, consumption of transportation-related fuels would vary with the number of annual passengers, the number of flight operations, the nature of the aircraft fleet, the distance traveled by the aircraft, changes in cargo operations, and changes in the energy form used to power vehicles.

Jet A and Avgas

Under Alternative D, Jet A consumption by aircraft is estimated to be 2,866 million gallons in 2015. This represents an increase in Jet A fuel consumption over baseline conditions of 91 percent. This also represents an increase compared to the No Action/No Project Alternative. This increase would result from increasing flight operations, changes in the mix of aircraft to heavier aircraft, and an increase in average distances aircraft would fly to their destinations. Avgas consumption is not projected to increase in 2015.

Under Alternative D, the existing LAXFUEL Fuel Farm would remain in the existing location on the west side of the airport, north of World Way West. Under this alternative, the barrels per day of Jet A

consumed would remain below 200,000, the current capacity of the pipelines that transport Jet A to LAX. Thus, the impacts associated with the available supply, transmission, and storage of Jet A under Alternative D would be less than significant.

Gasoline and Diesel

Under Alternative D, gasoline consumption would be approximately 159 million gallons in 2015, an increase over baseline conditions of 12 percent. Diesel consumption is estimated to be approximately 29 million gallons in 2015, an increase over baseline conditions of 3 percent. Gasoline and diesel consumption would both increase compared to the No Action/No Project Alternative. Under this alternative, the consumption of gasoline and diesel from on-airport sources, including GSE and on-airport vehicles, would be reduced as a result of the conversion of some of these vehicles to LNG, CNG, or propane power. These decreases would be offset by increases in the amount of gasoline and diesel consumption associated with off-airport vehicle trips, including trips by both passengers and employees arriving and departing LAX, as well as trips to and from LAX Northside.

Similar to Alternatives A, B, and C, sufficient supplies of gasoline and diesel are expected to be available. Therefore, the impact associated with an increase in gasoline and diesel consumption under Alternative D would be less than significant.

LNG, CNG, and Propane

Under Alternative D, the total consumption of LNG, CNG, and propane would be 6,150 thousand therms in 2015. This represents a 413 percent increase over baseline conditions, as well as an increase over the No Action/No Project Alternative. The increase in LNG, CNG, and propane fuel consumed over baseline conditions would result from increasing numbers of passengers being transported around the eastern end of LAX in on-airport vehicles, increased flight operations, greater numbers of LNG/CNG powered on-airport vehicles, and the introduction of LNG/CNG powered GSE. As with Alternatives A, B, and C, under Alternative D, the impacts associated with the supply of LNG, CNG, and propane would be less than significant.

Construction

Under Alternative D, the total amount of diesel and gasoline consumption related to construction equipment and additional worker vehicle trips to and from the construction sites would be approximately 29.9 million gallons and 3.1 million gallons, respectively. As discussed in subsection 4.17.1.3, petroleum products, including gasoline and diesel, are market-driven commodities for which adequate supplies are anticipated. Because sufficient supplies of gasoline and diesel are expected to be available, the impact associated with the consumption of gasoline and diesel for construction-related activities under Alternative D would be less than significant.

Alternative D would require new electrical and natural gas distribution infrastructure, as well as relocating and renovating on-airport facilities. The construction of this new infrastructure would be incorporated into the LAX Master Plan as part of Master Plan Commitment PU-1, Develop a Utility Relocation Program (Alternatives A, B, C, and D). As indicated previously, new facilities would be coordinated with utility providers under Master Plan Commitment E-2, Coordination with Utility Providers (Alternatives A, B, C, and D). Because the project would be designed to provide the requisite electricity and natural gas infrastructure, the need for new and relocated facilities on the airport would be a less than significant impact.

Construction associated with Alternative D would include activity near existing natural gas and electrical power lines. Excavation near natural gas or electrical power lines could cause an interruption in service to LAX or the surrounding area if improper construction methods are used or poor planning occurs. Construction near submerged high voltage electrical power lines could later affect the transmission capacity of the lines if surrounding insulation material is improperly changed. The ability of utility providers to access underground pipes or lines could also be affected by construction. Under Master Plan Commitments E-2, Coordination with Utility Providers (Alternatives A, B, C, and D), and PU-1, Develop a Utility Relocation Program (Alternatives A, B, C, and D), LAWA would work with the utility providers to assure that changes to the electrical distribution system performed under Alternative D would not adversely affect electricity or natural gas service to the surrounding area. Development and implementation of these commitments would reduce potential impacts to the existing electricity supply and distribution system from construction activities to a level that is less than significant.

4.17.1 Energy Supply

4.17.1.7 Cumulative Impacts

This subsection addresses potential cumulative impacts to energy supply associated with the No Action/No Project Alternative and Alternatives A, B, C, and D, in combination with other past, present, and probable future projects. As discussed in subsection 4.17.1.3, *Affected Environment/Environmental Baseline*, electricity and natural gas consumption at LAX results from a number of activities, including space heating and cooling, airfield and terminal lighting, food preparation, office functions, and maintenance. Other transportation-related fuel consumption includes aviation fuel for aircraft, as well as diesel, gasoline, and alternative fuels for GSE, stationary sources, and airport-related motor vehicle trips. Existing energy supplies of electricity, natural gas, and transportation-related fuels are considered to be adequate, with sufficient supplies to meet the future energy needs of LAX.^{680, 681, 682}

4.17.1.7.1 No Action/No Project Alternative

Under the No Action/No Project Alternative, additional aircraft operations, passenger activity, cargo handling, and development of LAX Northside and Continental City would increase the demand for energy including electricity, natural gas, and transportation-related fuels. On-going acquisition of properties by LAWA within the Manchester Square and Belford areas would reduce the demand for electricity and natural gas in the immediate area.

The most sizable other project in the immediate vicinity of LAX is the Playa Vista project, which, combined with development of LAX Northside, could result in cumulative impacts on energy supplies through increased energy consumption. Other projects in the vicinity, relocated residents from Manchester Square, and overall forecast growth throughout the region could result in increased energy consumption and cumulative impacts to energy supplies. However, the growth at LAX, as well as regional growth, was accounted for in regional growth projections and, as such, has been considered in regional energy supply planning programs aimed at providing sufficient energy to meet cumulative demand. In addition, adequate energy supplies are anticipated to be available.

4.17.1.7.2 Alternatives A, B, and C

As previously discussed in Section 4.17.1.6, *Environmental Consequences*, demand for electricity, natural gas, and transportation-related fuels under Alternatives A, B and C would increase due to new development within the Master Plan boundaries, increases in passenger activity and employment, and increased aircraft operations. New buildings constructed at LAX would be required to meet energy consumption standards prescribed for new structures in Title 24. These standards would make the new buildings at LAX more energy efficient than buildings built previously. The consumption of transportation-related fuels would increase with the increased numbers of annual passengers and flight operations. Additional factors that would affect the consumption of transportation-related fuels include changes in the mix of aircraft sizes, the distances aircraft fly to their destinations, changes in cargo operations, and changes in the energy form used to power vehicles (for example, conversion from gasoline/diesel powered vehicles to vehicles powered by LNG/CNG). Because adequate supplies of electricity, natural gas, and transportation-related fuels are anticipated to be available, the impact of increased consumption of electricity, natural gas, and transportation-related fuels within the Master Plan boundaries resulting from Alternatives A, B, and C would be less than significant.^{683, 684, 685}

These alternatives would also have indirect effects on electricity, natural gas, and transportation-related fuel consumption due to project-related increases in population associated with direct employment. This population increase could range from 38,000 to approximately 87,000 within the five county region, which would represent less than one to approximately two percent of forecast population growth from 1996 to 2015. Within a ten-mile radius of LAX, population growth associated with new employment at LAX would represent approximately three to five percent of forecast growth. This increase in population, in

⁶⁸⁰ California Energy Commission, *Electricity Report*, November 1997.

⁶⁸¹ Los Angeles Department of Water and Power, *2000 Integrated Resources Plan*, August 15, 2000.

⁶⁸² California Energy Commission, *Fuels Report*, July 1999.

⁶⁸³ California Energy Commission, *Electricity Report*, November 1997.

⁶⁸⁴ Los Angeles Department of Water and Power, *2000 Integrated Resources Plan*, August 15, 2000.

⁶⁸⁵ California Energy Commission, *Fuels Report*, July 1999.

combination with relocation of residents from Manchester Square and overall forecast growth, would increase regional energy consumption. Because adequate supplies of energy are anticipated to be available, the impact of increased population and resulting increases in consumption of energy would be less than significant.^{686, 687, 688}

Impacts from other projects could also occur as a result of future development in the vicinity of LAX. As indicated in subsection 4.17.1.7.1, *No Action/No Project Alternative*, the most notable major project in proximity to LAX is Playa Vista. Development of Playa Vista would increase demands for electricity, natural gas, and transportation-related fuels. Other projects within the region, including the development of Manchester Square with light industrial uses independent of the Master Plan under Alternative A, would have similar increases.

As indicated above, projected direct and indirect population growth would result in cumulative increases in energy consumption within the Los Angeles region. A component of this growth would consist of residents and businesses that would be relocated within the region due to acquisition associated with Alternatives A, B, and C. Relocated residents and businesses would primarily need electrical and natural gas connections that would be accommodated by DWP and the Southern California Gas Company. The regional demand for gasoline and diesel would be satisfied by local gas stations that would be constructed by energy retailers in response to market-driven factors. As indicated above, regional energy supply planning programs would ensure an adequate energy supply for cumulative growth within the Los Angeles region through the year 2015. Therefore, impacts associated with cumulative increases in energy demand, including electricity, natural gas, and transportation-related fuels, would be less than significant.

4.17.1.7.3 Alternative D - Enhanced Safety and Security Plan

Demand for electricity, natural gas, and transportation-related fuels under Alternative D would increase due to new development within the Master Plan boundaries, increases in passenger activity, and aircraft operations, and development of LAX Northside. Alternative D would not result in an increase in population associated with direct employment. However, relocation of residents from Manchester Square and overall forecast growth would increase regional energy consumption. Impacts from other projects, including Playa Vista, could also occur as a result of future development in the vicinity of LAX. Regional energy supply planning programs would ensure an adequate energy supply for cumulative growth within the Los Angeles region through the year 2015. Therefore, impacts associated with cumulative increases in energy demand, including electricity, natural gas, and transportation-related fuels, would be less than significant.

4.17.1.8 Mitigation Measures

Although energy consumption associated with Alternatives A, B, C, and D could be accommodated by projected supplies, LAWA would implement Master Plan Commitment E-1, Energy Conservation and Efficiency Program (Alternatives A, B, C, and D), to reduce energy consumption associated with these alternatives. In addition, Master Plan Commitments E-2, Coordination with Utility Providers (Alternatives A, B, C, and D), and PU-1, Develop a Utility Relocation Program (Alternatives A, B, C, and D), would ensure coordination of service and minimize potential conflicts with subsurface utilities during construction. As a result, Alternatives A, B, C, and D would not have any significant impacts relative to energy consumption, and no mitigation would be required.

⁶⁸⁶ California Energy Commission, Electricity Report, November 1997.

⁶⁸⁷ Los Angeles Department of Water and Power, 2000 Integrated Resources Plan, August 15, 2000.

⁶⁸⁸ California Energy Commission, Fuels Report, July 1999.

4.17.1 Energy Supply

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