Technical Report
LAX Master Plan EIS/EIR

6. Hydrology and Water Quality Technical Report

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Prepared for:

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U.S. Department of Transportation
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1. INTRODUCTION

This Technical Report presents detailed information on baseline conditions related to hydrology and water quality associated with implementation of the Los Angeles International Airport (LAX) Master Plan. This report provides data and analysis in support of the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the LAX Master Plan prepared pursuant to the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

This Technical Report discusses the baseline conditions with respect to flooding, surface recharge, and water quality and the methodology used to assess hydrology and water quality impacts. This information supplements the analysis contained in Section 4.7, *Hydrology and Water Quality*, of the EIS/EIR. Impacts associated with the information contained in this Supplemental Report are addressed in the Section 4.7, *Hydrology and Water Quality*, of the EIS/EIR.

The EIS/EIR evaluates four alternatives, including a No Action/No Project Alternative and three build alternatives (Alternatives A, B, and C). The study area for this analysis includes the existing LAX property; two areas currently being acquired by Los Angeles World Airports (LAWA) under the Aircraft Noise Mitigation Program (collectively referred to as the “ANMP” properties), and areas adjacent to LAX that are being considered for acquisition under one of the three Master Plan alternatives. This study area is referred to as the Hydrology and Water Quality Study Area and is shown on **Figure 1**, Hydrology and Water Quality Study Area. Two sites in close proximity 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. These sites are discussed separately. The analysis of potential impacts resulting from the construction of ground access improvements, including the LAX Expressway and improvements to State Route 1, is included in Appendix K, *Supplemental Environmental Evaluation for the LAX Expressway and State Route 1 Improvements*.

2. ENVIRONMENTAL SETTING

As the largest commercial airport serving the Los Angeles region, LAX transports 58 million annual passengers (MAP) and over 1.5 million tons of freight annually. LAX lies within the western portion of the Los Angeles region, adjacent to Santa Monica Bay and south of Ballona Creek. The airport is aligned along an east/west transect paralleling Imperial Highway and covering approximately 3,641 acres. Approximately 60 percent of the airport property is impervious, covered by buildings and paved areas (e.g., runways, taxiways, aprons, and parking lots). Vegetation and surface soil cover the unpaved areas of the airport and principally lie at the western end of the airport and between runways and taxiways.

The airport lies on a relatively level area at an elevation of about 100 feet above sea level area. Most of the original sand dune area to the east of Pershing Drive was graded relatively flat during initial development phases of LAX during the 1940s and 1950s. Much of the western end of LAX (from Pershing Drive west to the ocean) was previously developed with homes that were subsequently removed due to noise impacts from LAX. This area still retains some of the original sand dune landform character, with sand ridges ranging from 85 to 185 feet above sea level and closed depressions of varying height creating local relief of up to 80 feet. The LAX Northside/Westchester Southside area consists of flat to rolling terrain, with small hills and depressions having generally less than 20 feet of relief.

Two sites close to LAX are being considered for the construction of an off-site fuel farm under Alternative B: Scattergood Generating Station and the oil refinery located south of the airport. The Scattergood Generating Station lies in the western portion of the El Segundo Sand Hills on recent sand dunes. The oil refinery lies adjacent to, and east of, the Scattergood Generating Station and within the El Segundo Sand Hills on recent and older sand dunes. These areas also retain some of the original sand dune character, with sand ridges ranging from 85 to 185 feet above sea level; however, much of the area has been graded or altered by development.

The two major receiving waters for the airport drainage are the Santa Monica Bay and the Dominguez Channel. Santa Monica Bay is located directly west of LAX and is the receiving water body for surface water drainage from approximately 265,000 acres of land. The Dominguez Channel collects storm water from a 46,000-acre watershed before ultimately discharging into San Pedro Bay at the Los Angeles Harbor. At LAX, the watershed boundary for these two receiving water bodies is located generally along Sepulveda Boulevard, with areas west of Sepulveda Boulevard draining to the Santa Monica Bay and areas east draining to the Dominguez Channel. **Figure 2**, Santa Monica Bay and Dominguez Channel Watersheds, presents LAX in relation to these water bodies and their respective watersheds.

Both proposed fuel farm sites are located within the Santa Monica Bay watershed. The proposed Scattergood Fuel Farm site is located south of the Hydrology and Water Quality Study Area and entirely within the City of Los Angeles. The site is bordered by the Hyperion Treatment Plant to the north, the City of El Segundo and the Chevron refinery to the south, Loma Vista Street and the City of El Segundo to the east, and Vista Del Mar and Dockweiler State Beach to the west. Grand Avenue traverses the site, dividing it into the proposed fuel farm area on the south and the generating station and ancillary facilities to the north. The site is categorized as an industrial land use and is surrounded by areas of industrial, commercial, residential, and open space land uses. The subgrade at the Scattergood site includes both paved and undeveloped surfaces. The area within the bermed portion of the tank farm is currently unpaved; areas south of Grand Avenue are both paved and unpaved.

The proposed oil refinery fuel farm site consists of about 5 acres of industrial land. The oil refinery is located entirely within the city of El Segundo and is bordered by El Segundo Boulevard to the north, the Rosecrans Avenue to the south, Sepulveda Boulevard to the east, and Vista Del Mar/Highland Avenue to the west. The refinery area is categorized as an industrial land use and is surrounded by areas of industrial, commercial, residential, and open space land uses. The proposed fuel farm site is located in the north central portion of the refinery. The proposed fuel farm site is an industrial area and is surrounded by areas of industrial land use. The surfaces at the oil refinery are both paved and undeveloped.

The following sections discuss the environmental setting pertaining to hydrology, as drainage and surface recharge, and surface water quality.

2.1 Hydrology

Hydrology issues are addressed in this report as drainage and surface recharge. Drainage is discussed as it relates specifically to the management of the systems designed to convey storm water runoff and prevent flooding. The environmental setting with respect to drainage and the potential for flooding focuses on the regulatory issues that apply in designing drainage and flood control structures in the vicinity of LAX. Surface recharge is discussed as it relates specifically to surface water that infiltrates pervious surfaces and has the potential to recharge groundwater. The environmental setting with respect to recharge addresses subsurface stratigraphy, depth to groundwater, and groundwater flow directions.

2.1.1 Drainage

Drainage and flood control structures and improvements in the County of Los Angeles are subject to review and approval by the Los Angeles County Department of Public Works (LACDPW), while structures and improvements in the City of Los Angeles are subject to review and approval by the City of Los Angeles Department of Public Works (DPW), Bureau of Engineering. Both agencies utilize design standards to provide a specified level of protection against flooding for different types of land use.

Both LACDPW and DPW regulate drainage-related improvements through plan approvals and permits. Both agencies require project proponents to design storm water collection and conveyance systems using specifications and procedures set forth in their respective storm drain design manuals. The project plans and specifications are submitted to the appropriate jurisdictional agency for review and approval. The agency review includes an evaluation of the effects of the project's discharge on the agency's jurisdictional drain system. Projects exceeding the drainage system's capacity are not approved. In such cases, methods for reducing impacts to the storm drain system can include controlling peak and total discharge through storm water detention or increasing site perviousness.

Within the Hydrology and Water Quality Study Area, surface water is discharged to both Los Angeles County and City of Los Angeles drainage and flood control structures. Los Angeles County facilities include the Dominguez Channel, which discharges to San Pedro Bay, as well as some of the individual drains that discharge into Santa Monica Bay. The city regulates the remaining drainage and flood control structures at the airport. The City of Los Angeles design standards for these facilities are based on the Peak Rate Method described in the Bureau of Engineering Manual, Part G, Storm Drain Design, City of Los Angeles.[1] Using this method, storm drain facilities are designed based on a pattern storm with a 50-year storm return frequency.

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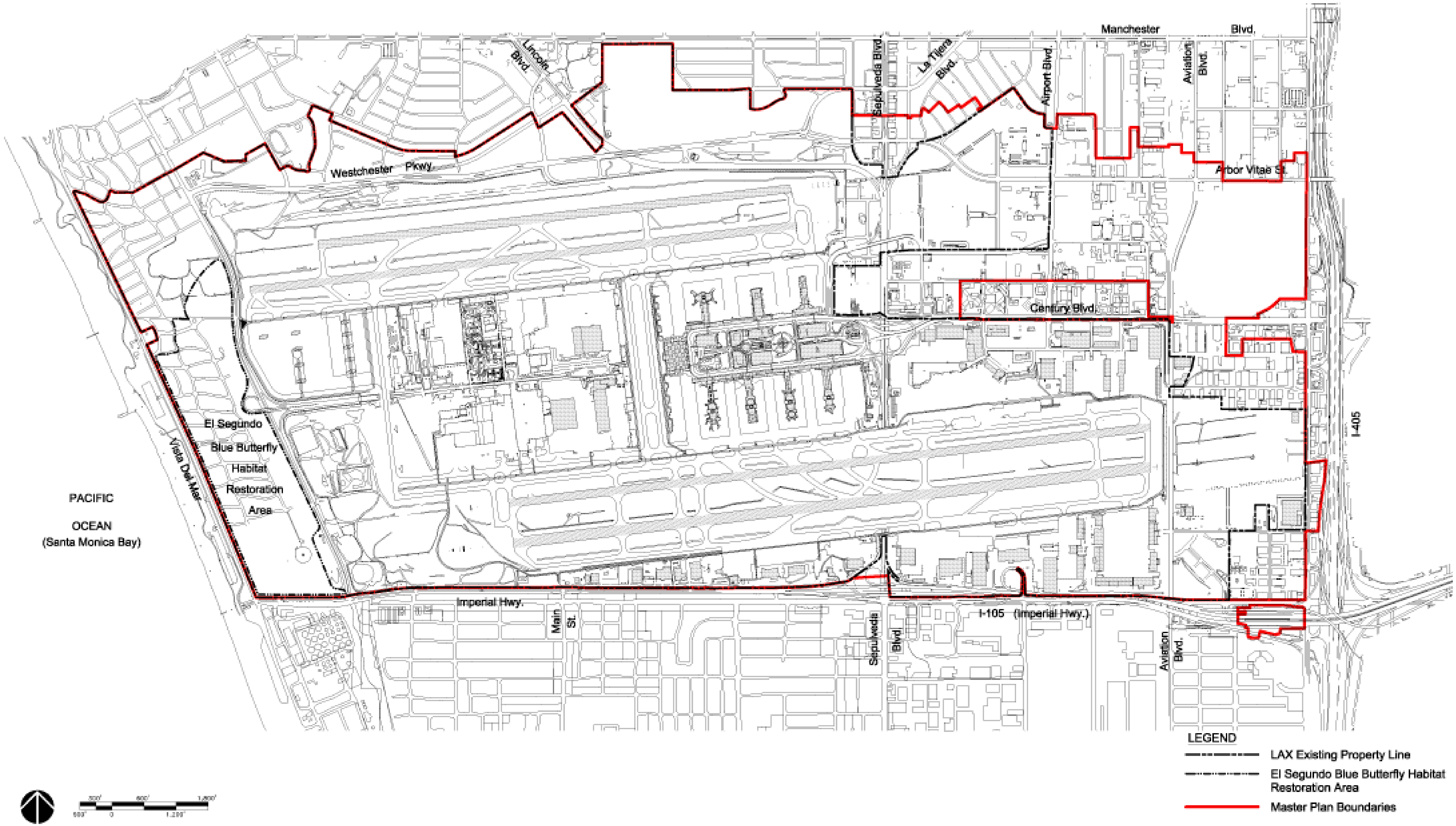
[1] City of Los Angeles Department of Public Works Bureau of Engineering Manual-Part G, Storm Drain Design Manual, 1973.

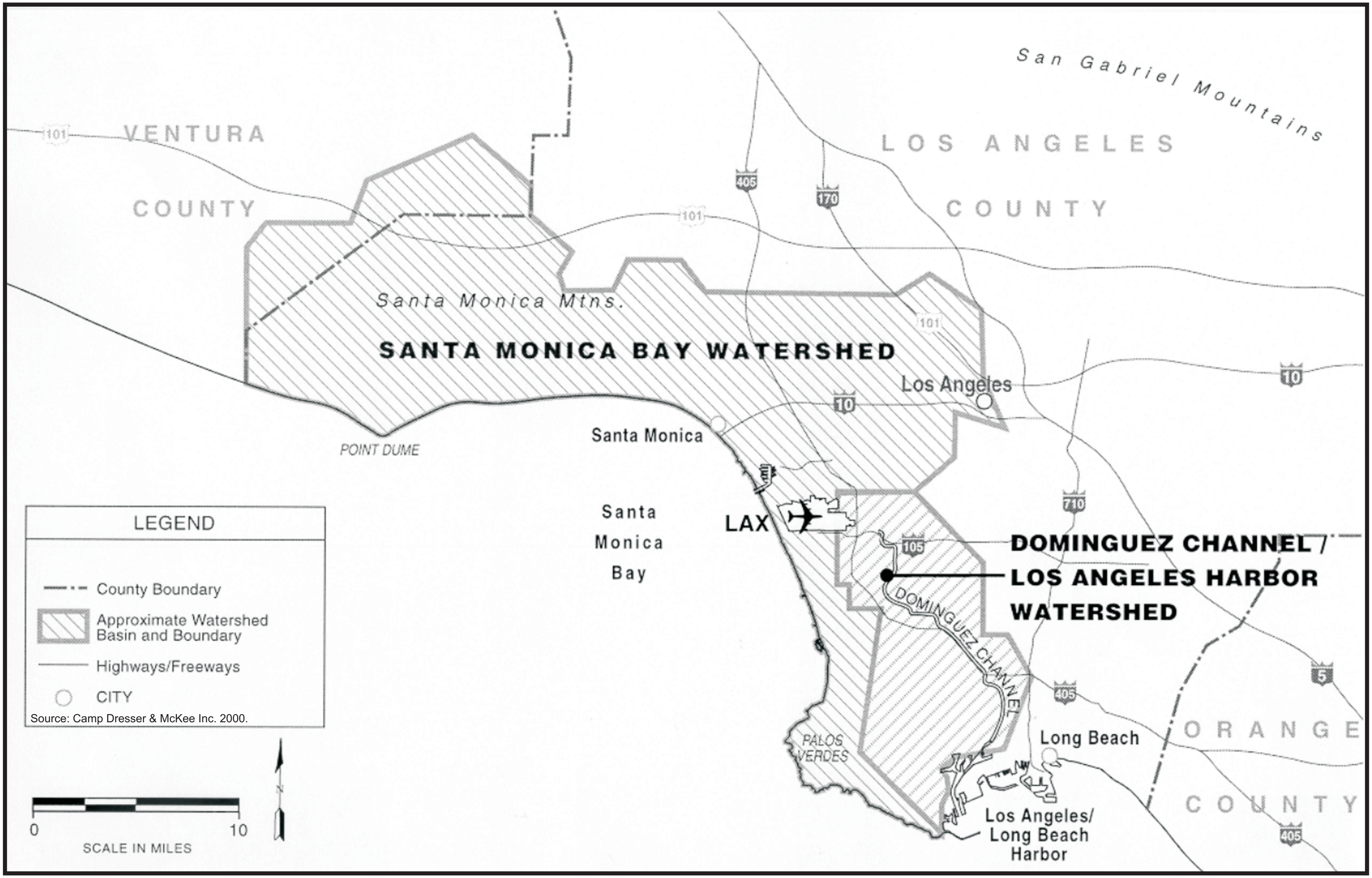


Source: Camp Dresser & McKee Inc., 2000.

Los Angeles International Airport Master Plan

Hydrology and Water Quality Study Area

Figure 1



Los Angeles International Airport Master Plan	Santa Monica Bay and Dominguez Channel Watersheds	Figure 2

2.1.2 Recharge

Surface recharge occurs when precipitation or surface water runoff contacts pervious surfaces and infiltrates through the subsurface to groundwater. Whether or not surface water infiltrates the pervious surface or continues to runoff depends on a number of conditions, including soil type, antecedent soil moisture conditions, and the amount of vegetative cover. Once in the soil, the infiltrating water can be taken up by evapotranspiration[2] or continue to percolate and recharge groundwater. Changes to the amount of pervious surfaces on a property can affect the quantity of surface water recharge and as such, substantial reductions in the amount of surface recharge could lower the water table and reduce the volume of groundwater in storage.

Groundwater occurs in several aquifers beneath the Hydrology and Water Quality Study Area, within what is known as the West Coast Basin. The groundwater basin extends from south of the Ballona escarpment and Baldwin Hills to the Los Angeles-Orange County line and west of the Newport Inglewood Uplift/Fault to the Santa Monica Bay.[3] Water bearing units (aquifers) and aquitards (water bearing rock of low permeability) within the West Coast Basin include (from upper to lower):

- Shallow localized semiperched aquifer
- Upper and lower Bellflower aquitards
- Gage aquifer
- El Segundo aquiclude
- Silverado aquifer

Regional groundwater flow in the West Coast Basin is generally in a westerly direction toward the Pacific Ocean and is controlled by hydrologic properties of unconsolidated, permeable Quaternary sediments partially separated by less permeable aquitards. However, historical dewatering locally changed this generally flow pattern exposing the Basin groundwater to seawater intrusion. To counter this, in 1953 the LACDPW implemented the West Coast Basin Barrier Project (WCBBP). The project, which is still operating, consists of 153 injection wells that parallel the Pacific Ocean extending from just south of LAX to the Palos Verdes Hills. Fresh water is injected into these wells, raising local groundwater levels and creating a hydrologic barrier that reduces seawater intrusion into coastal groundwater aquifers.

The depth to groundwater under LAX is about 100 feet. Groundwater elevations range from 7.5 feet above msl on the western side of the airport property to about 3.0 feet above msl on the eastern side; as measured in March 1997. An apparent groundwater divide exists on the western edge of the airport causing groundwater to flow west toward the Pacific Ocean and inland to the east/southeast. The cause for this divide is unknown although it may be related to injection at the WCBBP or deeper, regional groundwater moving into the shallower aquifers. Whatever the cause for the divide, like the WCBBP barrier to the south, it acts as a hydrologic barrier and reduces seawater intrusion in the shallow aquifers beneath LAX. Locally, semiperched groundwater exists on discontinuous, unconfined clay lenses. Within the Hydrology and Water Quality Study Area, discontinuous perched groundwater is encountered at depths of approximately 20 to 60 feet below ground surface. Additional details on groundwater and perched water levels are presented in Section 4.22, *Earth/Geology,* of the Draft EIS/EIR, and its associated Technical Report.

To characterize the components that contribute to the groundwater supplies in the Basin, a water budget was developed by the West Basin Municipal Water District (presented in **Table 1**, Groundwater Water Budget for the West Coast Basin) as part of a WCBBP water management study.[4]

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[2] Evapotranspiration is defined as the combination of evaporation and transpiration processes. Transpiration is the process by which water in the soil is taken by the roots of plants and evaporated through the leaves the plants.

[3] State of California Department of Water Resources – Southern District, Bulletin No. 104, Planned Utilization of the Ground Water Basin of the Coastal Plain of Los Angeles County, June 1961.

[4] CH2M Hill, West Basin Municipal Water District, Engineering Report, West Coast Basin Barrier Project – West Basin Water Recycling Program, 1993.

Table 1

Groundwater Water Budget for the West Coast Basin

Inflows	**Acre-feet/year**
Surface Recharge	6,700
Inflow from Central Basin	1,600
Inflow from the Pacific Ocean	6,200
West Coast Basin Barrier Project	27,000
Dominguez Gap Barrier Project	9,000
Total	**50,500**
Outflows	
Discharge By pumping	50,000
Ocean Outflow	5,000
Total	**50,500**

Source: CH2M Hill, West Basin Municipal Water District, Engineering Report, West Coast Basin Barrier Project – West Basin Water Recycling Program, 1993.

Based on this water budget, 13 percent of groundwater in the West Coast Basin comes from surface recharge. Sources for this recharge include precipitation, surface water streams, irrigation water from field and lawns, industrial and commercial wastes, and other applied surface waters.[5] Within the Hydrology and Water Quality Study Area, there are no surface water streams and industrial and commercial waste discharges are prohibited on the airport. Therefore, sources for recharge at the airport include precipitation and its associated runoff and applied irrigation.

2.2 Water Quality

Water quality is discussed as it relates to the transport and fate of water quality constituents in surface waters generated by storm water and urban activities. For the purposes of this analysis, a constituent may be a pollutant or other measurable component of water quality. Water quality issues are addressed in this report specifically as the quality of surface water flows discharged from LAX. The environmental setting with respect to drainage and the potential for flooding focuses on the regulatory issues and the water bodies of affected by surface flows in the vicinity of the LAX.

2.2.1 Regulatory Provisions Concerning Water Quality

There are a number of federal, state, and local regulatory programs pertaining to the maintenance and enhancement of water quality. Many of the programs are overlapping. For example, the state is responsible for overseeing many of the permit programs mandated by the federal Clean Water Act (CWA). The County and City of Los Angeles, in turn, are responsible for implementing the permits issued to them under the state program. Included below is a summary of major regulatory provision concerning water quality. The purpose of these programs is generally to protect and enhance water quality.

2.2.1.1 Water Quality Control Plan

The Porter-Cologne Water Quality Control Act (Act) established the principal California program for water quality control. This Act also designated the State Water Resources Control Board (SWRCB) as the agency to implement the provisions of the federal CWA. The Act divided the State of California into nine Regional Water Quality Control Boards (RWQCB). Each RWQCB implements and enforces provisions of the Porter-Cologne Act and the Clean Water Act, subject to policy guidance and review by the SWRCB.

Under the CWA, the state was originally required to develop comprehensive drainage basin plans, as a prerequisite to receiving federal funding for the construction of municipal wastewater treatment plants. The Los Angeles RWQCB (LARWQCB) developed the *Water Quality Control Plan - Los Angeles Region* (Basin Plan) in 1975, and has subsequently been updated several times, most recently in 1994. The

[5] CH2M Hill, West Basin Municipal Water District, Engineering Report, West Coast Basin Barrier Project – West Basin Water Recycling Program, 1993.

Basin Plan guides conservation and enhancement of water resources and establishes beneficial uses for inland surface waters, tidal prisms, harbors, and groundwater basins within the region. Beneficial uses are designated by the LARWQCB so that appropriate water quality objectives can be established and programs that maintain or enhance water quality can be implemented so that designated beneficial uses are protected. The Basin Plan also incorporates SWRCB statewide Water Quality Control Plans. The only applicable statewide plan, at this time, is the California Ocean Plan. Like the Basin Plan, the California Ocean Plan was created to establish beneficial uses and associated water quality objectives for California's ocean waters and to provide a basis for regulation of wastes discharged to coastal waters by point and non-point source discharges.

Water quality objectives have been established by the LARWQCB for the constituents and parameters listed below:

- Ammonia
- Bacteria, Coliform
- Bioaccumulation
- Biochemical Oxygen Demand (BOD_5)
- Biostimulatory substances
- Chemical constituents
- Chlorine, Total Residual
- Color
- Exotic Vegetation
- Floating Material
- Methylene Blue Activated Substances (MBAS)
- Mineral quality
- Nitrogen (Nitrate, Nitrite)
- Oil and Grease
- Oxygen, Dissolved (DO)
- Pesticides
- PH
- Polychlorinated Biphenyls (PCBs)
- Radioactive Substances
- Solid, Suspended, or Settleable Materials
- Taste and Odor
- Temperature
- Toxicity
- Turbidity

Many of the narrative or numerical water quality objectives for the constituents and parameters listed above are established according to the designated beneficial use of the water.

2.2.1.2 National Pollutant Discharge Elimination System (NPDES) Program

The CWA prohibits the discharge of pollutants to waters of the United States from any point source unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. In accordance with the CWA, the U.S. Environmental Protection Agency (USEPA) promulgated regulations for permitting storm water discharges by municipal and industrial facilities and construction activities through the NPDES program. The USEPA regulations require those municipal separate storm sewer systems[6] that discharge to surface waters to be regulated by NPDES permits. The first phase of the municipal storm water NPDES program generally applies to urban areas with a population greater than 100,000. In addition to regulating certain industrial uses, the program requires a NPDES permit for construction activities that disturb an area of five acres or more. The City and County of Los Angeles are currently regulated under the Phase I municipal program, under permits issued by the SWRCB and implemented through the RWQCB. The RWQCB has responsibility for overseeing the implementation of the NPDES program for storm water discharges in the vicinity of LAX.

A second phase of the NPDES storm water program was promulgated in November 1999 and will go into effect in March 2002. This phase will automatically regulate all owners or operators of small municipal separate storm sewer system located within an urbanized area. In addition, the construction activity permit coverage will be lowered to one acre of disturbed area.

Each of the NPDES permits for municipal, industrial, and construction activities are described below.

[6] Sewer systems are often classified according to their use. The two common types of sewer systems include sanitary sewers, which generally convey domestic sewage and industrial waste, and storm sewers, which are designed to convey storm water and other surface waters. Therefore, separate storm sewer systems are only designed to convey storm water.

2.2.1.2.1 NPDES - Municipal Permit

An NPDES permit is required for certain municipal separate storm sewer discharges to surface waters. The airport is within the region covered by NPDES Permit No. CAS614001 issued by the LARWQCB on July 15, 1996. The permit is a joint permit, with the County of Los Angeles as the "Principal Permittee" and 85 incorporated cities within the County of Los Angeles, including the City of Los Angeles, as "Permittees." The objective of permit, and the associated storm water management program, is to reduce pollutants in urban storm water discharges to the "maximum extent practicable" in order to attain water quality objectives and to protect the beneficial uses of receiving waters in Los Angeles County.

As part of the municipal storm water program, the LARWQCB adopted the Standard Urban Storm Water Mitigation Plan (SUSMP) to address storm water pollution from new development and redevelopment projects. The SUSMP is a model guidance document for use by permittees to select post-construction Best Management Practices (BMPs). The SUSMP program applies to specified project types.

BMPs are defined in the SUSMP as any program, technology, process, siting criteria, operational methods or measures, or engineered systems, which, when implemented, prevent, control, remove or reduce pollution.[7] The general requirements of the SUSMP include:

- Controlling peak storm water runoff discharge rates
- Conserving natural areas
- Minimizing storm water pollutants of concern
- Protecting slopes and channels
- Providing storm drain stenciling and signage
- Properly designing outdoor material storage areas
- Properly designing trash storage areas
- Providing proof of ongoing BMP maintenance

Three types of BMPs are described in the SUSMP including source control, structural, and treatment control BMPs.[8] The SUSMP also specifies design standards for structural or treatment control BMPs to either infiltrate or treat storm water runoff and to control peak flow discharge.

2.2.1.2.2 NPDES - Industrial Permit

The SWRCB issued a statewide Industrial Activities Storm Water General Permit (Industrial Permit) that applies to all industrial facilities that discharge storm water and require a NPDES permit. The major provisions of the Industrial Permit require that the permittees:

- Eliminate or reduce non-storm water discharges to storm sewer systems and other waters of the nation
- Develop and implement a storm water pollution prevention plan (SWPPP)
- Perform monitoring of discharges to the storm water system from their facilities

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7 Regional Board Executive Officer, Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County, March 8, 2000. Subsequently, the city of Los Angeles adopted an ordinance authorizing implementation of the SUSMP for public and private development projects in the City (Ordinance No. 173494, passed by the Council of the city of Los Angeles on September 6, 2000).

8 As defined in the SUSMP:

"Source control BMP means any schedules of activities, prohibition of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution."

"Structural BMP means any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both source control and treatment BMPs."

"Treatment control BMP means any engineered system designed to remove pollutants by simple gravity setting of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process."

Each of these components must be completed in conformance to specific conditions outlined in the Industrial Permit.

Industrial activity at a transportation facility includes facilities that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, and airport deicing operations. Since an airport is considered a transportation facility, LAWA and tenants on the airport property that engage in industrial activities are required to be permitted under the industrial NPDES program.

2.2.1.2.3 NPDES - Construction Permit

In addition to the municipal and industrial permits, the SWRCB issued a Statewide NPDES general permit for storm water discharges associated with construction activities (Construction Permit). Project proponents planning construction activities that disturb an area greater than five acres are required to file a Notice of Intent (NOI) to discharge under the Construction Activity Permit. After a NOI has been submitted, the discharger is authorized by the SWRCB to discharge storm water under the terms and conditions of the general permit. The major provisions of the Construction Permit are generally the same as those for the industrial permit although they focus on impacts associated with construction activities.

As indicated previously, in March 2002, these permit requirements will extend to construction activities that disturb an area equal to or greater than one acre.

2.2.1.3 Total Maximum Daily Load Program

Under Section 303(d) of the CWA, states are required to identify water bodies that do not meet water quality objectives through the control of point source discharges under NPDES permits. For these water bodies, states are required to develop appropriate total maximum daily loads (TMDLs). TMDLs are the sum of the individual pollutant load allocations for point sources, nonpoint sources and natural background conditions, with an appropriate margin of safety for a designated water body. The TMDLs are established based on a quantitative assessment of water quality problems, the contributing sources, and load reductions or control actions needed to restore and protect an individual water body.[9] As opposed to the NPDES programs, which focus on reducing or eliminating non-storm water discharges and reducing the discharge of pollutants to the maximum extent practicable, TMDLs provide an analytical basis for planning and implementing pollution controls, land management practices, and restoration projects needed to protect water quality.

States are required to include approved TMDLs and associated implementation measures in water quality management plans or basin plans. To establish TMDLs, the state must:

- Identify and list (303(d) list) quality limited waters that do not or are not expected to meet water quality standards after applying existing required controls
- Prioritize waters/watersheds for TMDL development
- Develop TMDLs for the listed waters that will achieve water quality standards, allowing for seasonal variations and an appropriate margin of safety.

California has generated a 303(d) list that includes the Santa Monica Bay and the Dominguez Channels. On this list, pollutants and TMDL priority schedules have been assigned. This information is presented on **Table 2**, TMDL Priority Schedule for Santa Monica Bay Offshore and Near Shore and **Table 3**, TMDL Priority Schedule for Dominguez Channel Estuary (To Vermont). To date, actual TMDLs for these two water bodies have not been developed, however, the list does indicate that both non-point and point sources of pollution affect the Santa Monica Bay and the Dominguez Channel.[10]

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[9] United States Environmental Protection Agency, Total Maximum Daily Load Fact Sheet, Available: www.epa.gov/region09/water/tmdl/fact.html [4/24/00].

[10] United States Environmental Protection Agency, Total Maximum Daily Load Program, Available: www.epa.gov/region09/water/tmdl/index.html#303d [4/24/00].

Table 2

TMDL Priority Schedule for Santa Monica Bay Offshore and Near Shore

Pollutant/Stressor	Priority
Cadmium	Low
Chlordane	Low
Copper	Low
Dichlorodiphenyltrichloroethane (DDT)	High
Debris	Low
Fish Consumption Advisory	High
Lead	Low
Mercury	Medium
Nickel	Low
Polyaromatic Hydrocarbons (PAHs)	High
Polychlorinated Biphenyls (PCBs)	High
Sediment Toxicity	Medium
Silver	Low
Zinc	Low

Source: USEPA, California 303(d) List, May 12, 1999.

Table 3

TMDL Priority Schedule for Dominguez Channel Estuary (To Vermont)

Pollutant/Stressor	Priority
Aldrin	Medium
Ammonia	Low
Chem A	High
Chlordane	High
Chromium	Medium
Copper	Low
DDT	High
Dieldrin	Medium
High Coliform Count	Low
PAHs	Low
PCBs	High
Zinc	High

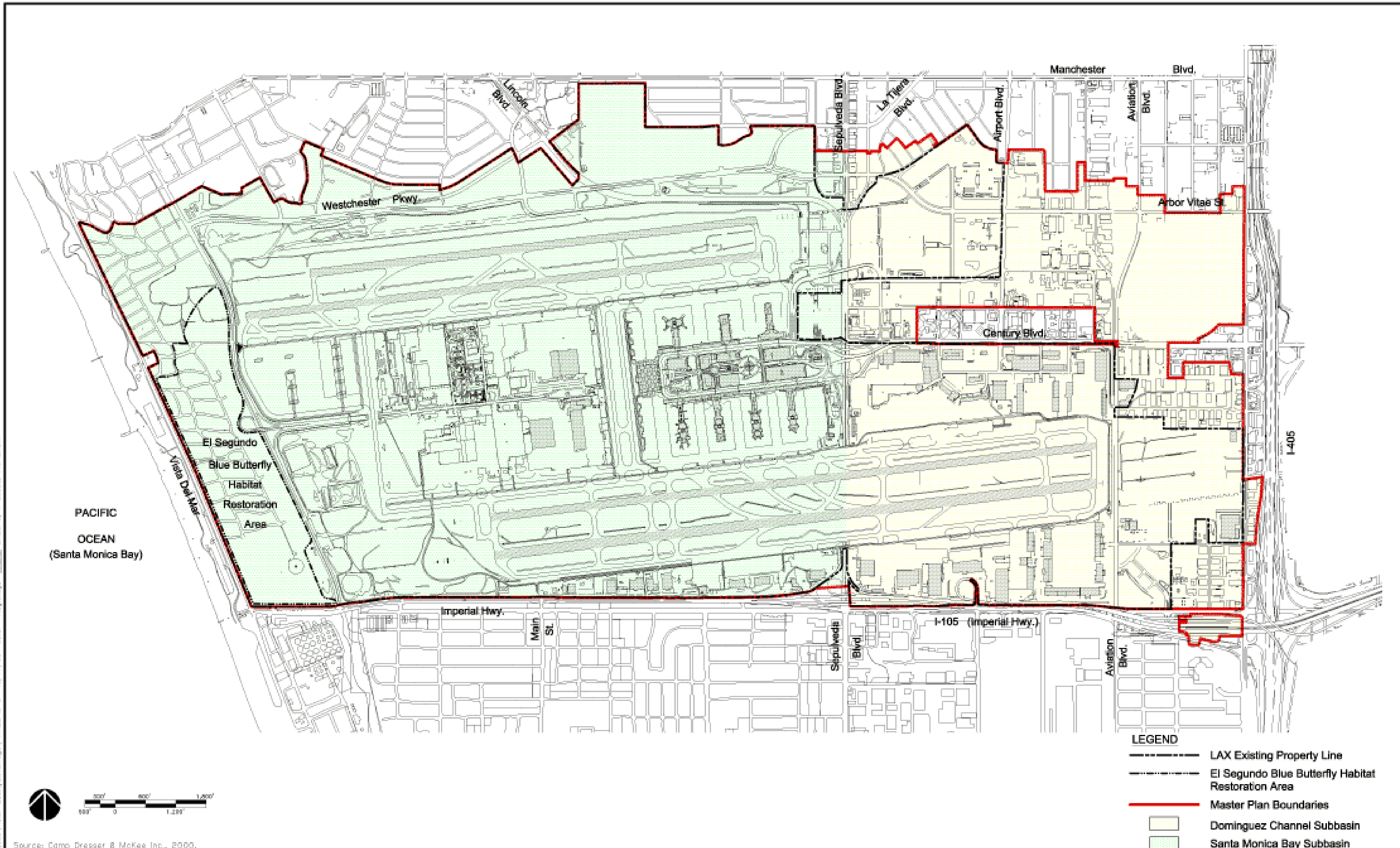
Source: USEPA, California 303(d) List, May 12, 1999.

2.2.2 Receiving Water Bodies

As mentioned previously, the receiving bodies of water for surface flows at LAX are the Santa Monica Bay and Dominguez Channel. Within the Hydrology and Water Quality Study Area, the boundary of these two watersheds is located generally along Sepulveda Boulevard, with areas west of Sepulveda Boulevard draining to the Santa Monica Bay and areas east draining to the Dominguez Channel as shown on **Figure 3,** Assumed Surface Runoff Flow Patterns within the Hydrology and Water Quality Study Area. With respect to surface recharge, the receiving water body is the West Coast Basin. These water bodies are discussed below.

2.2.2.1 Santa Monica Bay

Santa Monica Bay is an open embayment of the Pacific Ocean with designated surface area of approximately 170,000 acres. The Bay is the receiving water body for surface water flows from approximately 265,000 acres of land. Regionally, urban, industrial, and open space land uses comprise most of the Santa Monica Bay watershed and surface water runoff from these areas has drastically



Los Angeles International Airport Master Plan

Assumed Surface Runoff Flow Patterns Within Hydrology and Water Quality Study Area

Figure 3

altered the natural environment of the bay. Based on the SWRCB's 1994 *Water Body Fact Sheet*, the waters of Santa Monica Bay preclude, compromise, or do not support their designated beneficial uses.[11]

Beneficial uses for the Santa Monica Bay designated by the LARWQCB in the Basin Plan for the coastal watersheds of Los Angeles and Ventura Counties are presented in Attachment A. The Santa Monica Bay's biological community has been identified as being imbalanced, severely stressed, or known to contain toxicities in concentrations that are hazardous to human health.[12]

For the purpose of better understanding the impacts of pollutants and evaluating measures to protect the environment of Santa Monica Bay, a consortium of interested parties, including government agencies and private entities, initiated and formed the Santa Monica Bay Restoration Project (SMBRP). The objectives of the project are to document current knowledge about the condition of the Bay and the effects of pollution on human health and the marine environment; evaluate the institutional and regulatory management of the Bay; and recommend future actions to protect and enhance the Bay. Although this program does not directly regulate the water quality of the LAX area, its emphasis on control of pollutant discharges to the Bay is applicable.

The SMBRP produced a report with the objective of updating previous Santa Monica Bay characterization efforts. This report, titled *Characterization Study of the Santa Monica Bay Restoration – State of the Bay 1993* presented a comprehensive assessment of levels of pollution in the Bay and evaluated the effects of the pollution. Of the pollutants measured and found to have affected the Bay's environment, 19 pollutants were identified as pollutants of concern in the SMBRP's State of the Bay Report for 1993.[13] Specifically the pollutants of concern include:

- DDT
- PCBs
- PAHs
- Chlordane
- Tri-butyl Tin (TBT)
- Cadmium
- Chromium
- Copper
- Lead
- Nickel
- Silver
- Zinc
- Pathogenic Bacteria and Viruses
- Total Suspended Solids (TSS)
- Nutrients
- Trash and Debris
- Chlorine
- Biochemical and Chemical Oxygen Demand (BOD and COD)
- Oil and Grease

Sources for these pollutants include both point sources and nonpoint sources.[14] Point sources are defined as discharges that originating from a single source, such as power and wastewater treatment plants; nonpoint sources of are defined those with origins that cannot directly be attributed to a single identifiable source, and include storm water and urban runoff.

Six major point source facilities have been identified that affect the Santa Monica Bay: three wastewater treatment facilities, two power-generating stations, and one petroleum refinery. The wastewater treatment facilities include the City of Los Angeles' Hyperion Treatment Plant (HTP) and the Los Angeles County Sanitation District's Joint Water Pollution Control Plant (JWPCP) which both discharge directly into the Bay. Another wastewater treatment facility, the Tapia Wastewater Treatment Facility discharges treated wastewater into Malibu Creek which eventually drains to the Santa Monica Bay. Since 1971, the quantity of pollutants entering the bay from the HTP and JWPCP has steadily decreased. The City of Los Angeles,

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11 State Water Resources Control Board, Water Body Fact Sheet, May 18, 1994.

12 State Water Resources Control Board, Water Body Fact Sheet, May 18, 1994.

13 Santa Monica Bay Restoration Project, Characterization Study of the Santa Monica Bay Restoration Plan – State of the Bay 1993, January 1994.

14 Santa Monica Bay Restoration Project, Characterization Study of the Santa Monica Bay Restoration Plan – State of the Bay 1993, January 1994.

Department of Water and Power's Scattergood Generating Station, Southern California Edison's El Segundo Generating Station, and Chevron's El Segundo Refinery also discharge waters into the Bay. All of these facilities are subject to NPDES permit limitations.[15]

Non-point source activities affecting the Santa Monica Bay identified in by the SMBRP include marine vessel activities, oil and hazardous material spills, dredging, ocean dumpsites, historically deposited sediments, aerial fallout, and urban runoff. Urban runoff is a general term characterizing flows from both dry weather activities and wet weather events from areas of predominantly urban land-use. Wet weather flows occur in direct response to precipitation while dry weather flows are discharges not resulting from precipitation. Activities generating dry weather flows include, but are not limited to, excessive landscape irrigation, household and industrial waste runoff, wash water, and septic tank leaks. According to the SMBRP's most recent report, *Taking the Pulse of the Bay – State of the Bay 1998*, runoff from urban areas is the most important uncontrolled source of pollution discharging into the Bay.[16]

Pollutant loads generated from non-point sources are generally difficult to quantify since the quantity and type of pollutant associated with each activity varies. However, according to the 1998 State of the Bay report, the quantity of pollutants input into the Bay (pollutant load) from storm water and or urban runoff (non-point sources) is either close to or greater than the pollutant loads from wastewater treatment facilities (point sources).

Over the past two decades the environmental condition of the bay has steadily improved due to better source control, improved sludge handling and increased secondary treatment at the region's two largest wastewater facilities. With these significant reductions, urban runoff and storm water have become the most significant uncontrolled sources of pollution to Santa Monica Bay.[17]

2.2.2.2 Dominguez Channel

The Dominguez Channel receives surface water runoff from approximately 46,000 acres of urban area of Los Angeles. The Dominguez Channel watershed is located entirely within Los Angeles County and is bordered to the north and west by the Santa Monica Bay watershed, to the east by the Los Angeles River watershed and to the south by the Los Angeles/Long Beach Harbor. The Dominguez Channel is concrete lined and discharges surface waters into the Los Angeles Harbor and is the only major surface water feature within the watershed.

Regionally, urban and industrial land uses comprise most of the Dominguez Channel watershed. The SWRCB and LARWQCB have divided the Dominguez Channel watershed into three sub-areas: Dominguez Channel above Vermont Street; Dominguez Channel Estuary to Vermont Street; and Los Angeles Harbor. Since the portion of LAX that resides in the Dominguez Channel is located in the upper reaches of the watershed, the nine-mile reach above Vermont Street is most applicable. This subarea has been designated as impaired due to point source discharges from industrial and municipal activities and accidental spills and urban runoff. Waters in this subarea have been characterized as having elevated metal and pesticide concentrations in sediments along with high coliform counts. Beneficial uses for the Dominguez Channel designated by the LARWQCB in the Basin Plan for the coastal watersheds of Los Angeles and Ventura Counties are presented in Attachment A.

2.2.2.3 West Coast Basin

Groundwater occurs in several aquifers beneath the Hydrology and Water Quality Study Area, within what is known as the West Coast Basin. As with surface water bodies, the LARWRCB has designated beneficial uses for groundwater in the West Coast Groundwater Basin in the Basin Plan. Beneficial uses for the West Coast Basin designated by the LARWQCB in the Basin Plan are presented in Attachment A. These beneficial uses include Municipal, Industrial, Process, and Agricultural. With the exception of remediation of contaminated groundwater, groundwater beneath LAX is not presently used to support these beneficial uses. (See Section 4.23, *Hazardous Materials*, of the Draft EIS/EIR.)

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15 Santa Monica Bay Restoration Project, Characterization Study of the Santa Monica Bay Restoration Plan – State of the Bay 1993, January 1994.

16 Santa Monica Bay Restoration Project, Taking the Pulse of the Bay 1998, January 1998.

17 Santa Monica Bay Restoration Project, Taking the Pulse of the Bay 1998, January 1998.

3. GENERAL APPROACH AND METHODOLOGY

The various sources and methodologies used for the hydrology and water quality analyses are identified below.

3.1 Hydrology

3.1.1 Drainage

The objective of the drainage analysis is to assess the potential for localized flooding to occur under the No Action/No Project Alternative and three build alternatives when compared to baseline conditions. This comparison is made indirectly, using changes in impervious surface area, because reasonable estimates of surface water runoff flows cannot be made, as the drainage infrastructure has not been designed as discussed in Section 3.1.1.1, *General Approach*. Therefore, this analysis quantifies the existing impervious area within the Hydrology and Water Quality Study Area and compares this impervious area to those estimated for the alternatives. This method is appropriate since surface water flow rates in urban regions are a function of impervious area.

3.1.1.1 General Approach

Typically when evaluating drainage, the peak flow rate for the proposed drainage system is calculated and compared to the design capacity of the existing drainage system using the City of Los Angeles Peak Rate Method. This method is a derivative of the classic Rational Method for estimating storm water runoff rates and volumes and was developed in the late 1930s by the City of Los Angeles for applications in the Los Angeles region. The Peak Rate Method requires detailed maps of storm water conveyance structures so that drainage sub-basins, catch basins, storm drains, and other features can be identified. This level of information is not available for future conditions of the alternatives. Also, drainage patterns under baseline conditions are not expected to resemble drainage patterns under the future build conditions since some areas would be cut and filled, altering the slopes and areas of the drainage basins. Since drainage patterns cannot reasonably be estimated under the alternatives, the potential for flooding cannot be reasonably evaluated using the Peak Rate Method or any other Rational Method-based approach.

To identify another means to evaluate potential flooding, other parameters of the Peak Rate Method were reviewed. Using the city's method, the following general parameters are required:

- Pattern storm[18]
- Drainage area
- Soil types
- Development classification (land use) and the associated percentage of imperviousness surfaces
- Time of concentration
- Flow routing
- Conveyance capacities
- Roughness coefficients

Without detailed maps identifying the storm drain infrastructure under the future build conditions, the drainage area, time of concentration, flow routing, and conveyance capacities cannot be accurately estimated, and therefore, do not provide a means to evaluate drainage. However, land use changes under the alternatives can be evaluated. Land uses such as commercial, industrial, and residential are relatively impervious due to the buildings and paved areas associated with these uses. Areas identified as open space or low-density residential land use include some undeveloped property that reduces the amount of impervious area. Generally, the amount of impervious area or the percentage of impervious area is characterized based on land use.

By assuming two drainage areas within the Hydrology and Water Quality Study Area (Santa Monica Bay and Dominguez Channel watersheds), and holding all parameters other than land use constant, a change in land use would produce a change in the amount of impervious area and a corresponding change in

[18] A pattern storm, as used by DPW for storm drain design purposes, is a 24-hour rainfall event producing 6 inches of rain and is preceded by three days of rainfall producing 10%, 40%, and 35% of the pattern storm.

storm water peak flow rates. Also, by assuming that the capacities of the existing storm water conveyance facilities are under capacity (see Section 4.1.1.2, *Flooding*), an increase in the amount of impervious area would produce an increase in peak flow runoff rates, potentially exceeding the design capacity for the drainage structure and, therefore, increasing the likelihood of flooding. For the purposes of this analysis, changes in impervious area are used as a surrogate to assess the potential for flooding.

3.1.1.2 Methodology

Impervious percentages used in this analysis were obtained from the City of Los Angeles Storm Drain Design Manual[19] (LASDDM) for several types of development or zoning classifications. Zone classifications were selected that correspond to land uses identified in the Westchester – Playa del Rey Plan[20] (WPDRP) for community development and the layouts for each alternative.

Current land uses within the acquisition areas include industrial, commercial, residential, and open space. Land uses identified within the remainder of the Hydrology and Water Quality Study Area the include airport operations, airport open space, roadways, open space, commercial and industrial.

- Industrial - areas where heavy and light industrial activities takes place
- Commercial - includes restaurants, businesses, and shops, associated parking space, and other retail-related activities
- Residential - includes both single and multi-family housing developments
- Open Space - undeveloped areas with natural vegetation that are not maintained as part of routine airport operations (e.g., the El Segundo Blue Butterfly Habitat Preserve)
- Airport Operations - impervious areas including all runways, taxiways, aprons, buildings, and storage facilities
- Airport Open Space - undeveloped pervious areas with generally low topographic relief that are maintained as part of the airport
- Roadways - transportation corridors, including major thoroughfares and roadways that may be used for transportation to and from the airport but are not directly associated with airport operations

"Airport operations" is not a land use specified in the LASDDM. Activities associated with airport operations, such as vehicle and aircraft maintenance, washing, and fueling are similar to the commercial and industrial land use categories identified in the LASDDM. These categories are both assigned 100 percent impervious value and so this value was assigned to "airport operations." The imperviousness percentage for airport open space was increased from the open space value in the LASDDM because it contained a small percentage of impervious surfaces that were not graphically represented on the maps (e.g., lights, access roads, pipelines, and detention basins). Since these items are too small and numerous to be measured individually, they were taken into account by assuming an increase of 10 percent of impervious surface area (from 35 percent to 45 percent) for this land use. Considering the relative percentage of the actual impervious roadway and open space associated with landscaped medians, the imperviousness percentage for roadways were generated.

Land uses identified within the Hydrology and Water Quality Study Area, the corresponding zoning classification from the LASDDM and the associated imperviousness percentage are summarized in **Table 4,** Land Use, Zone Classifications, and Associated Imperviousness Percentage. Identified land uses that did not directly correspond to a zone classification, include airport operations, airport open space, and roadways.

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19 City of Los Angeles Department of Public Works, Bureau of Engineering Manual - Part G, Storm Drain Design, 1973.

20 City of Los Angeles, Westchester – Playa del Rey Plan, December 1990.

Table 4

Land Use, Zone Classifications, and Associated Imperviousness Percentage

Land Use	Zone Classification	Imperviousness Percentage
Airport Operations	Special	100
Airport Open Space	Special	45
Roadways	Special	80
Industrial	MR1, MR2, M1, M2, M3	100
Commercial	CR, C1, C2, C4, C5, CM	100
Residential [1]	R4, R5	100
Open Space	OS, A1	35

[1] The residential land uses in the vicinity of LAX are predominantly high density and as such, the higher impervious percentage for this category was assigned.

Source: Camp Dresser & McKee Inc., 2000.

As mentioned previously, impervious area was used to assess potential impacts of the No Action/No Project Alternative and three build alternatives. To calculate impervious area, the land uses within the Hydrology and Water Quality Study Area and the Santa Monica Bay and Dominguez Channel watershed were identified under each alternative and planning horizon. The area within each land use category was calculated and then multiplied by the corresponding percentage of impervious surfaces, resulting in an area for imperviousness. The impervious areas were then totaled for the Santa Monica Bay and Dominguez Channel watersheds.

3.1.2 Recharge

The objective of the recharge analysis is to assess the potential for changes in impervious area to affect groundwater beneath the Hydrology and Water Quality Study Area under the No Action/No Project Alternative and three build alternatives when compared to environmental baseline conditions. This comparison is made by calculating annual recharge volumes from the amount of pervious surfaces within the Hydrology and Water Quality Study Area.

3.1.2.1 General Approach

The potential effects of the Master Plan alternatives on surface water recharge were evaluated by comparing the amount of recharge through pervious surfaces within the Hydrology and Water Quality Study Area. Surface recharge rates were estimated by calculating an average annual recharge rate for pervious surface area in the region and then applying that recharge rate to the estimated amount of pervious surface area under each alternative resulting in an annual average volume of surface recharge.

3.1.2.2 Methodology

To quantify the amount of surface water recharging the shallow aquifers within the Hydrology and Water Quality Study Area, a surface recharge rate was estimated using the volume of surface recharge presented in the West Coast Groundwater Basin water budget (presented in **Table 1**, Groundwater Water Budget for the West Coast Groundwater Basin) and an estimate of pervious area for the West Coast Basin. For this analysis, pervious area was calculated by subtracting the amount of impervious area within the Basin from the total area within the Basin. Impervious area was calculated using the same methodology described in Section 3.1.1, *Drainage*. Land use designations and areas were taken from the *Engineering Report, West Coast Basin Barrier Project – West Basin Water Recycling Program*[21], and included 33,000 acres of residential, 6,350 acres of commercial, 9,900 acres of industrial, and 28,124 acres of open space. The resulting areas by land use categories are presented in **Table 5**, Total Area, Impervious Area, and Pervious Area by Land Use for the West Coast Basin.

[21] CH2M Hill, West Basin Municipal Water District, Engineering Report, West Coast Basin Barrier Project – West Basin Water Recycling Program, 1993.

Table 5

Total Area, Impervious Area, and Pervious Area by Land Use for the West Coast Basin

Land Use	Impervious Percentage [1] (%)	Total Area [2] (acres)	Impervious Area (acres)	Pervious Area (acres)
Residential [3]	70	33,300	23,310	9,990
Commercial	100	6,350	6,350	0
Industrial	100	9,900	9,990	0
Open Space	35	28,124	9,843	18,281
Total	-	**77,674**	**49,403**	**28,271**

[1] Adapted from the City of Los Angeles Department of Public Works, Bureau of Engineering Manual – Part G, Storm Drain Design, 1973.

[2] CH2M Hill, West Basin Municipal Water District, Engineering Report, West Coast Basin Barrier Project – West Basin Water Recycling Program, 1993.

[3] Multiple classifications of residential land uses exist within the West Coast Basin with impervious percentages ranging from 40 to 100. For this analysis, the impervious percentage for medium density residential was used to represent average residential development.

Source: Camp Dresser & McKee, 2000.

The amount of pervious area was calculated by subtracting the impervious area of the Basin from the total area. The calculated amount of pervious area within the West Coast Basin is 28,271 acres. Assuming that all surface recharge in the Basin (6,700 acre-feet/year) occurs through this area, the surface recharge rate for the Basin is 0.24 feet/year (2.88 inches/year). This recharge rate is conservative since it includes recharge from streams and rivers within the West Coast Groundwater Basin which are not present within the Hydrology and Water Quality Study Area. To conservatively calculate the annual volume of surface water recharge within the Hydrology and Water Quality Study Area, 0.24 feet/year of recharge was assumed to occur through the pervious area estimated for the No Action/No Project Alternative and the three build alternatives.

3.2 Water Quality

The objective of the water quality analysis is to compare the projected water quality effects for the No Action/No Project Alternative and three build alternatives with baseline conditions. As with the drainage analysis, the study area for the water quality assessment is the area within the Hydrology and Water Quality Study Area.

3.2.1 General Approach

The effects of the Master Plan on water quality were evaluated by comparing (1) the pollutant loads discharged to receiving bodies associated with storm water runoff and (2) sources that potentially produce dry weather flows. Pollutant loads associated with storm water were estimated quantitatively and are defined as the estimated mass of pollutants of concern delivered to a receiving water body on an average annual basis. The methodology for calculating pollutant loads from within the Hydrology and Water Quality Study Area is discussed below.

3.2.2 Methodology

Estimating the pollutant load discharged to a water body from storm water requires knowledge of surface water runoff volumes, discharge locations, and pollutant sources for the water body. This analysis evaluates pollutant loads transported by storm water from non-point pollution sources. The most accurate method to estimate a non-point source pollutant load is to collect, analyze, and evaluate samples of storm water runoff directly from the project site. However, because pollutant concentrations in storm water runoff are extremely variable due to a number of short- and long-term seasonal factors, including storm duration, intensity, and frequency, among others, several years and a large number of samples are required to provide statistically significant results. In the absence of site-specific sampling data, pollutant loads are commonly assessed using water quality data generated from comprehensive storm water investigations where storm water samples were collected and analyzed to produce statistically significant results. These investigations commonly express results in the form of event mean concentrations

(EMCs). EMCs represent typical pollutant concentrations found in storm water runoff based on the assumptions of the investigation.

3.2.2.1 Storm Water Event Mean Concentrations

USEPA's National Urban Runoff Program's Final Report (NURP) presented the results of an extensive storm water runoff sampling and analysis program that consisted of collecting samples from more than 2,300 separate storm events.[22] The NURP report concluded that concentrations of pollutants in urban runoff can be a function of land use and that pollutant loads from these land uses can be assessed for planning purposes using Event Mean Concentrations (EMCs). Similar storm water investigations were conducted by the Federal Highway Administration (FHWA)[23] and jointly by the American Association of Airport Executives (AAAE) and the Airport Research and Development Foundation (ARDF).[24] These investigations also concluded that the concentrations of pollutants in storm water runoff are a function of land use and provided storm water EMCs.

Recently, several municipalities within Los Angeles County have been conducting an extensive storm water monitoring program to support storm water quality management programs in Los Angeles County, on behalf of all the permittees to the Municipal Permit. These data were compiled and evaluated to provide EMCs in storm water runoff for land use categories within Los Angeles County, including education, retail/commercial, vacant, multi-family residential, mixed residential, transportation, and light industrial.[25] The Los Angeles County storm water program, like NURP, provides storm water quality data that can be used to evaluate the effects of these land uses on water quality. The most recent Los Angeles County storm water data are generated from 1994-1999 monitoring activities.

As described Section 3.1.1, *Drainage*, seven general land use categories were identified within the Hydrology and Water Quality Study Area: industrial, commercial, residential, open space, airport operations, airport open space, and roadways. To calculate storm water pollutant loads for these land uses, published storm water investigations were reviewed for EMCs that could represent the quality of storm water runoff from these land use categories. EMCs from the AAAE/ARDF storm water investigation were used to represent the quality of runoff from airport-related land uses and Los Angeles County storm water data was used for non-airport land uses. These investigations are discussed below.

Storm water data generated as part of the AAAE/ARDF investigation were part of a group storm water application submitted by the to comply with the NPDES program. AAAE monitored the quality of storm water runoff from 65 airports nationwide. EMCs developed under the AAAE investigation were analyzed for total suspended solids (TSS), phosphorus, total kjeldahl nitrogen (TKN), nitrate plus nitrite, oil and grease, biochemical oxygen demand (BOD), and chemical oxygen demand (COD). These constituents reflect the pollutants of concern typically associated with storm water from airports.

The Los Angeles County storm water monitoring program sampled evaluated storm water runoff from several land uses including light industrial, retail/commercial, multi-family and high density residential, transportation, and vacant. EMCs generated from this investigation were selected to represent non-airport land uses because the data reflect local and recent land use practices.

3.2.2.2 Pollutants of Concern

As indicated in Section 2.2.2, *Receiving Water Bodies*, 19 pollutants of concern have been identified for the Santa Monica Bay.[26] However, not all of these 19 contaminants are typically associated with storm water runoff or runoff from airport facilities. According to the *Characterization Study of the Santa Monica Bay Restoration Plan – State of the Bay 1993*, the constituents of concern in urban runoff are generally

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[22] United States Environmental Protection Agency, Water Planning Division, Final Report on the National Urban Runoff Program, December 1983.

[23] Woodward-Clyde Consultants, Federal Highway Administration, Methodology for Analysis of Pollutant Loadings from Highway Storm Water Runoff, SHWA/RD-87/086, June, 1987.

[24] Brenda Ostrom, Predicting Pollutant Loads In Airport Storm water Runoff – Advanced Spatial Statistics, May 12, 1994.

[25] Los Angeles County Department of Public Works, Summary Water Quality Data – Storm Water Quality Data Tables, Available: http://www.dpw.co.la.ca.us/epd/wq/wq_tbl/Table_4-19.pdf [4/24/00].

[26] Santa Monica Bay Restoration Project, Characterization Study of the Santa Monica Bay Restoration Plan – State of the Bay 1993, January 1994.

the same as those limited in NPDES permits for point source discharges and that general categories of contaminants include BOD, oil and grease, and nutrients followed by trace metals for non-point discharges. The 19 pollutants of concern identified for the Santa Monica Bay and their potential to be associated with airport activities is discussed below.

DDT is a pesticide and has not been manufactured since 1985.[27] This contaminant is of concern since sediments previously contaminated by DDT could be exposed by construction activities and transported by erosion and surface runoff. Since DDT is not presently manufactured, it is not expected to be present in surface water runoff from the airport. DDT was not evaluated as a pollutant under the Los Angeles County monitoring program and was not listed as a pollutant for airport facilities under the Industrial NPDES permit. Therefore, DDT was not considered a pollutant of concern for this evaluation.

PCBs have been banned since 1976 and are not expected to present in storm water runoff from LAX or the surrounding areas. PCBs were not detected in any of the storm water samples collected under the Los Angeles County monitoring program. Like DDT, the predominant source for PCBs is historically contaminated soils exposed by grading and construction activities. Therefore, this contaminant was not considered a pollutant of concern in this evaluation.

PAHs are compounds that may be present in crude oil and other refined products and can be also be released during brush and forest fires. PAHs were not evaluated under the Los Angeles County monitoring program and are not listed in the Industrial NPDES for airports. Therefore, this contaminant was not considered a pollutant of concern in this evaluation.

Chlordane is an insecticide that was banned in 1988. Since this compound is no longer used, it was not considered a pollutant of concern in this evaluation.

TBT is an organic form of tin with sources mainly related to boat paint. For this reason, TBT would not be an expected constituent in surface water runoff from LAX and it was not considered a pollutant of concern.

Cadmium, chromium, copper, lead, nickel, silver, and zinc are all heavy metal contaminants of concern for the Santa Monica Bay. Sources for heavy metal contaminants can include weathered soils, atmospheric deposition, automobile emissions and residuals (brake pad and tire wear), applied chemicals (weed killers, etc.), and industrial and other sources. At high concentrations in their soluble form, heavy metal compounds can be toxic to biota. To evaluate the trends of heavy metal contaminants in storm water, EMC data from the Los Angeles County investigation were reviewed. Total copper, lead and zinc were found at substantially higher concentrations than were the remaining constituents. In addition, the NURP investigation focused on these compounds as the most prevalent pollutant constituents in urban runoff.[28] For these reasons, total copper, lead, and zinc were evaluated as pollutants of concern, for this analysis.

Pathogenic bacteria and viruses have been identified in storm water runoff. Sources for these constituents include animal waste, failing septic systems, illicit sewage connections, and boats and marinas. Data for these constituents tend to be highly variable. The NURP investigation did not identify a relationship between land use and bacteria and virus concentrations; the Los Angeles County monitoring program has not collected sufficient samples to characterize these constituents. Moreover, the sources for these constituents are not likely to be prevalent on the airport. Birds are discouraged from residing at the airport since they interfere with airport operations. Limited public access to the majority of airport area minimizes other forms of animal waste. Septic systems and illicit sewage connections were not expected to exist within the Hydrology and Water Quality Study Area. For these reasons, pathogens and viruses were not evaluated as pollutants of concern, in this analysis.

TSS is a measure of the organic and inorganic particulate matter that is suspended in water. Suspended solids can block light from the waters, restricting aquatic plant growth, and sediments can cover spawning habitats. TSS is a pollutant listed in the Industrial NPDES permit for airport facilities and was evaluated as a pollutant of concern for this analysis.

Total phosphorus and TKN for this analysis represent nutrients present in surface water runoff. TKN is the total concentration of ammonia and organic nitrogen. Although nutrients are required for the growth of biota, excessive amounts can be detrimental to a water body. Sources of nitrogen and phosphorus

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[27] Santa Monica Bay Restoration Project, Characterization Study of the Santa Monica Bay Restoration Plan – State of the Bay 1993, January 1994.

[28] United States Environmental Protection Agency, Water Planning Division, Final Report on the National Urban Runoff Program, December 1983.

include fertilizers, animal and human wastes, automobile exhausts, and refrigeration. These constituents were listed as pollutants in the Industrial NPDES permit for airport facilities and they were evaluated as pollutants of concern in this analysis.

Trash and debris mainly affect the aesthetic quality of receiving water bodies, although fish, birds, and marine mammals may become entangled in the litter. As public access is restricted throughout much of the airport, the potential to generate uncontrolled waste is limited. The amount of trash and debris at the airport is further minimized under the airport foreign objects and debris (FOD) program. Trash and debris have the potential to interfere with aircraft operations. As a result, airport policy requires that any trash or debris be picked up and properly disposed of immediately. For these reasons, trash and debris were not evaluated as pollutants of concern in this analysis.

Chlorine is an inorganic substance used as an antifouling agent and as a disinfectant in a wide range of industrial and domestic activities. At one time, gaseous chlorine was used as a disinfectant at LAX Central Utility Plant however it has recently been replaced by liquid bleach. Since chlorine is not used in large quantities at the airport, chlorine is not expected to be present in runoff from the airport. Therefore, chlorine was not evaluated as a pollutant of concern for this analysis.

BOD is an indirect measurement of the quantity of biologically degradable organic matter that has the potential to reduce the dissolved oxygen content of a water body. COD provides a similar measurement but accounts for organic compounds that are not biodegradable. In extreme cases, reductions in dissolved oxygen levels can lead to odors and even fish kills.[29] BOD and COD were pollutants of concern in the investigations reviewed and selected to represent oxygen-demanding pollutants. These constituents were listed as pollutants in the Industrial NPDES permit for airport facilities and were evaluated as pollutants of concern in this analysis.

Oil and grease are often found in urban runoff from roadways, parking lots, and industrial and commercial properties. These constituents are aesthetically unpleasant in natural water bodies and can restrict many beneficial uses of a water body. In some instances, oil and grease can kill birds and aquatic organisms. Oil and grease were listed as pollutants in the Industrial NPDES permit for airport facilities and were evaluated as pollutants of concern in this analysis.

In summary, a subset of nine pollutants of concern identified for the Santa Monica Bay are expected to be associated with storm water runoff at LAX. These pollutants include TSS, phosphorus, TKN, copper, lead, zinc, BOD, COD, and oil and grease.

EMCs used to represent storm water runoff quality and their source are presented in **Table 6**, Event Mean Concentrations for Storm Water Runoff by Land Use.

[29] California Regional Water Quality Control Board, Los Angeles Region, Water Quality Control Plan – Los Angeles Region, June 13, 1994.

Table 6

Event Mean Concentrations for Storm Water Runoff by Land Use

	Pollutant Concentration in mg/L by Land Use Categories						
Pollutant of Concern	**Airport Operations1**	**Airport Open Space1**	**Industrial**	**Commercial**	**Residential**	**Open Space**	**Transportation**
TSS	19.01	19.01	191	65.9	55.6	71	61.9
Total P	0.24	0.24	0.4	0.4	0.3	0.2	0.4
TKN	1.07	1.07	2.9	3	2.4	1.1	1.6
Total Cu	0.047 [2]	0.047[2]	0.036	0.027	0.0195	0.005	0.047
Total Pb	0.0105 [2]	0.010[2]	0.020	0.0146	0.0141	0	0.0105
Total Zn	0.286 [2]	0.286[2]	0.434	0.241	0.211	0.051	0.286
O&G	2.29	2.29	1.6	3.3	1.3	0.3	3.1
BOD_5	6.58	6.48	23.3	27	18.4	14	22
COD	45.7	45.7	82	78	65	14	45

[1] Brenda Ostrom, Predicting Pollutant Loads In Airport Storm Water Runoff- Advanced Spatial Statistics, May 12, 1994.
[2] Los Angeles County Department of Public Works, Summary Water Quality Data – Storm Water Quality Data Tables for Transportation Land Use. Available: http://www.dpw.co.la.ca.us/epd/wq/wq_tbl/Table 4-19.pdf [4/24/00].

Source: Unless noted otherwise all data is from Los Angeles County Department of Public Works, Summary Water Quality Data – Storm Water Quality Data Tables, Available: http://www.dpw.co.la.ca.us/epd/wq/wq_tbl/Table 4-19.pdf [4/24/00].

3.2.2.3 Storm Water Pollutant Load

For this analysis, pollutant loads to Santa Monica Bay are calculated by multiplying EMCs by average annual storm water runoff volumes yielding an annual mass of discharged pollutants. This method for calculating pollutant loads was adapted from the method presented in a report four volume report titled *Assessment of Storm Drain Sources of Contaminants to Santa Monica Bay* (ASDS).[30]

3.2.2.3.1 Average Annual Runoff

The ASDS report calculated average annual storm water runoff from annual rainfall data, drainage area, and the percentage, or fraction, of impervious surfaces within the drainage area using the following equation:

$$\text{AVERAGE ANNUAL RUNOFF} = P \times A \times C \qquad [ft^3]$$

Where:

P = Average annual precipitation [ft]

A = Area [ft^2]

C = Runoff coefficient [-]

Each of the parameters as it relates to the Hydrology and Water Quality Study Area is described below.

Average annual precipitation at the airport was determined from historical records obtained from the National Weather Services' Station #45114 located at LAX. From 1949 to 1996, average annual precipitation was 12.47 inches, with the majority of precipitation between October and April.

Areas for the runoff estimate were delineated by land use and calculated within the Hydrology and Water Quality Study Area for both the Santa Monica Bay and Dominguez Channel watersheds.

As mentioned previously, storm water runoff generated from an area is largely a function of the fraction of impervious surfaces within the drainage area. Moreover, the percentage of impervious surfaces is largely a function of land use. The runoff coefficient in the average annual runoff equation is related to the fraction of impervious surfaces in a given area and accounts for the correlation between runoff volumes

[30] Stenstrom and Strecker, Assessment of Storm Drain Sources of Contaminants to Santa Monica Bay, Volume 1, May 1993.

and impervious surface area. To estimate the runoff coefficient for a given area, a method used by the FHWA was applied.[31] The method is expressed as follows:

RUNOFF COEFFICIENT = $0.007 \times I + 0.1$

Where:

I = Fraction of impervious surfaces [percent]

Runoff coefficients provide a means to convert rainfall to runoff. The land use categories used in this evaluation, and their associated impervious and runoff coefficients, are presented in **Table 7**, Land Use Categories, Impervious Percentages and Runoff Coefficients.

Table 7

Land Use Categories, Impervious Percentages and Runoff Coefficients

Land Use	Imperviousness Fraction (%)	Runoff Coefficients
Airport Operations	100	0.80
Airport Open Space	45	0.42
Non-Airport Roads	80	0.66
Industrial	100	0.80
Commercial	100	0.80
Residential[1]	100	0.80
Open Space	35	0.35

1 The residential land uses in the vicinity of LAX are predominantly high density and as such, the higher impervious percentage for this category was assigned.

Source : Camp Dresser & McKee Inc., 2000

4. BASELINE CONDITIONS

This section describes hydrology and water quality at LAX under baseline conditions (1997). Hydrology and water quality conditions at the two off-site fuel farms proposed under Alternative B are discussed separately below.

4.1 Hydrology

4.1.1 Drainage

This discussion of baseline drainage conditions provides:

- A description of the storm water conveyance infrastructure, including drainage sub-basins, and watersheds.
- An estimate of impervious area under baseline conditions using the methodology described in Section 3, *General Approach and Methodology.*
- A quantitative assessment of recharge based on the pervious area using the methodology described in Section 3, *General Approach and Methodology.*

4.1.1.1 Storm Water Conveyance Infrastructure

The existing drainage system at LAX consists of catch basins, subsurface storm drains and open channels, and outfalls. For this investigation, an outfall is the point at which surface waters are discharged from the drainage conveyance facilities into the receiving water body. The principal drainage conveyance

31 Woodward-Clyde Consultants, Methodology for Analysis of Pollutant Loadings from Highway Storm water Runoff, SHWA/RD-87/086, Prepared for the U.S. Department of Transportation, Federal Highway Administration, June 1987.

structures for surface water captured on the airport property are the Dominguez Channel, the Argo Drain, the Imperial Drain, and the Culver Drain. The service boundaries for each of these outfalls form distinct sub-basins that collect surface water runoff. The service boundaries of these sub-basins extend off airport property and collect surface water runoff from surrounding communities. The locations of the major storm water outfalls and drains and their associated drainage sub-basins within the Hydrology and Water Quality Study Area are presented on **Figure 4,** Regional Drainage Infrastructure, Baseline Conditions.

Surface water flow from the Argo, Imperial, Culver, and Vista Del Mar sub-basins contribute to the total surface water flow in the Santa Monica Bay watershed. Flow from the Dominguez Channel sub-basin contributes to the surface water flow in the larger Dominguez Channel watershed. A description of each sub-basin is provided below.

4.1.1.1.1 Dominguez Channel Sub-Basin

Drainage from the area east of Sepulveda Boulevard flows to the Dominguez Channel. The total airport property draining into the Dominguez Channel is approximately 1,600 acres, which is less than 4 percent of the total Dominguez Channel watershed. Runoff from airport property east of Sepulveda Boulevard and south of Century Boulevard includes the eastern portion of the southern runway complex and a number of cargo facilities. This runoff is collected in a perimeter drain that runs along a portion of Sepulveda Boulevard to Century Boulevard; turns east on Century Boulevard to Aviation Boulevard, and then turns south along Aviation Boulevard to Imperial Highway. The perimeter drainage enters an 8-foot box drain, which crosses east below the Atchison Topeka and Santa Fe Railroad at about 111th Street. After the crossing, the 8-foot box drain turns south and continues to the start of the Dominguez Channel at 116th Street. The perimeter drain is a trapezoidal, concrete-lined open channel from Bellanca Avenue on Century Boulevard to about the end of the southern taxiways along Aviation Boulevard.

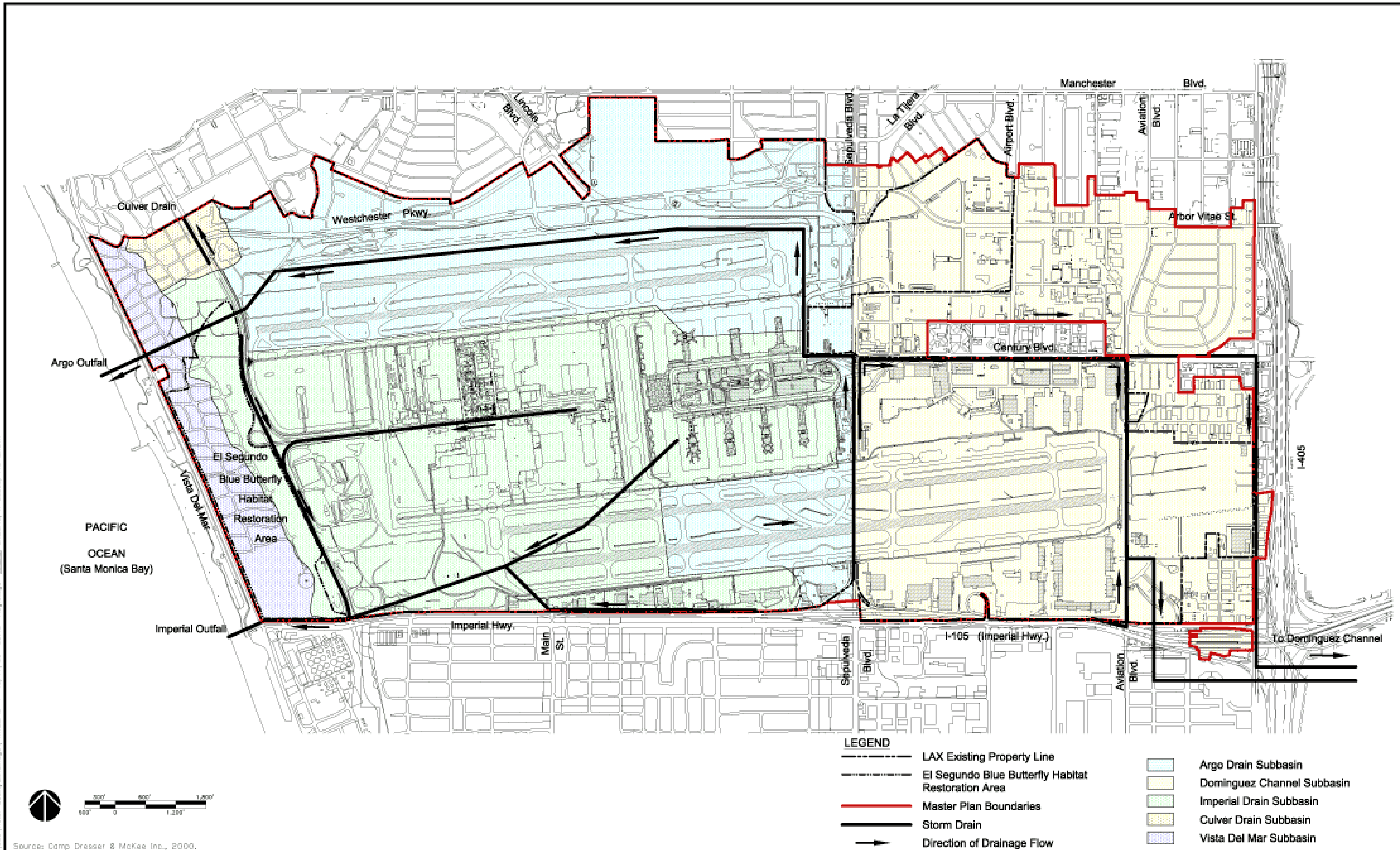
Runoff from airport property and other land areas east of Sepulveda Boulevard and north of Century Boulevard is conveyed through a system of storm drain pipes south and east to a 10-foot-by-11-foot box drain at the corner of Century Boulevard and Aviation Boulevard. This box drain continues west on Century Boulevard to La Cienega Boulevard where it turns south and collects drainage from other off-airport properties. The drain continues south and increases in size until it reaches 116th Street and parallels the Dominguez Channel draining east. The drain eventually connects to the concrete-lined Dominguez Channel at Inglewood Avenue.

4.1.1.1.2 Argo Sub-Basin

The drainage area for the Argo drain is approximately 2,450 acres, not all of which is within the Hydrology and Water Quality Study Area. The Argo drain forms the northern and eastern perimeter drains for the airport and discharges into Santa Monica Bay. The upstream end of the Argo drain on the airport is located at the Sepulveda Boulevard and Imperial Highway intersection. The drain piping creates a perimeter drain along the west side of Sepulveda Boulevard, collecting surface runoff from the portion of runway areas 25R/7L and 25L/7R which are east of the drainage break in the airport property. The storm drain turns west on Century Boulevard to Sky Way, where it again turns north and extends past the northern Runway 24R/6L. In the area near the northern runways, the drain begins to collect storm water from the area outside the airport property. The storm drain piping then turns west and parallels Lincoln Boulevard for a short distance before becoming an open earthen ditch. The ditch collects storm water from both the airport and the community of Westchester north of the airport. This ditch extends nearly the length of the northern runways before it discharges into a concrete box drain. The box drain continues west and south under Pershing Drive to Argo Street, located west of the airport. The culvert follows Argo Street and extends out and into the Bay where the outfall is located.

4.1.1.1.3 Imperial Sub-Basin

The Imperial Sub-basin includes the central and southwestern areas of the airport, as well at the northern and western portions of the City of El Segundo. Approximately 1,300 acres of the sub-basin are located on airport property under baseline conditions. On the airport property, perimeter storm drains for the west and south areas of the airport are connected at the corner of Pershing Drive and Imperial Highway. These drains are hydraulically connected to two storm water outfalls located along the western end of Imperial Highway, which discharge into Santa Monica Bay. The Imperial drainage basin is unique among the airport basins in that it contains both a storm water detention basin for reducing peak flow to the outfall and a water quality retention basin for collecting dry weather and first flush storm flows from the airport.



Los Angeles International Airport Master Plan

Regional Drainage Infrastructure Baseline Conditions

Figure 4

Both basins are located north of Imperial Highway at the Pershing Drive intersection, with the detention basin located on the west side of Pershing and the water quality retention basin on the east side.

The west perimeter drain is located along Pershing Drive and collects drainage from the northern runway area for conveyance to the lines located near Imperial Highway. The storm drain along World Way West, which drains the west central portion of the airport, also connects to the west perimeter drain. The maximum storm drain size along Pershing Drive is a 9'-2" by 11'-0" box just upstream of the detention basin. Downstream of the detention basin, the box size reduces to 8'-5" by 10'-0'. Since the Pershing Drive storm drain collects dry weather flows from the fuel farm and maintenance facilities along World Way West, the drain is connected to the water quality retention basin. The connection to the retention basin is located just south (downstream) of the connection to the detention basin.

The south perimeter drain starts about 2,000 feet west of Sepulveda Boulevard and collects runoff from the cargo and ancillary facilities area on the south side of the airport. The storm drain is located in the mostly vegetated strip of land between Imperial Highway and on-airport access roads and parking areas. Runoff from this strip of land generally flows to Imperial Highway since the top of the junction structure is higher than ground surface elevations along this storm drain. The southern perimeter drain also collects runoff from a majority of the terminal area. The storm drain from the terminal areas connects to the southern perimeter storm drain at the western end of the southern runways. Drainage from both areas continues west to the connection with the western perimeter drain on Pershing Drive. Before the connection on Pershing Drive, the southern perimeter drain is connected to the water quality retention basin to allow collection of dry weather flows from the terminal and cargo areas. The diversion to the retention basin is located where the storm drain passes south of the basin. The southern perimeter drain is not directly connected to the storm water detention basin, although the drain will hydraulically influence flow into the basin since it connects with the west perimeter drain.

Two outfalls located at the west end of Imperial Highway convey storm drainage from both the airport property and the City of El Segundo. Downstream of the connection of the western and southern perimeter drains for the airport, the storm water is conveyed by a 9-foot diameter storm drain along the north side of Imperial Highway. The storm drain diameter is reduced to 7.5 feet in diameter at the steeper slope to the beach near the end of Imperial Highway. The second storm water outfall carries storm water from the City of El Segundo in a 6-foot diameter pipe, which reduces to 4.5 feet in diameter at the steeper slope to the beach. A 6-foot diameter pipe along Imperial Highway from Loma Vista Street in El Segundo to Pershing Drive hydraulically connects these two outfalls. By connecting the two outfalls, the total capacity of both can be shared by the City of El Segundo and the airport. A third outfall in the same location conveys drainage solely from Imperial Highway into the Bay. All three outfalls discharge into the Santa Monica Bay.

The storm water detention basin located west of Pershing Drive is utilized to reduce the peak discharge to the Imperial Storm Drain outfall. During peak flows in excess of drain capacity, storm water is diverted into the concrete-lined basin. As flows recede, the volume stored in the basin is gradually released back into the drain. The primary purpose of the water quality retention basin located east of Pershing is to provide collection and treatment of all dry weather runoff and the initial portion (“first flush”) of wet weather runoff from the airport. The retention basin is concrete-lined with a capacity of 2 million gallons. The retention basin is equipped with a pumping system of about 150 gallons per minute (gpm) capacity; flows from the retention basin are ultimately discharged to Hyperion Treatment Plant. Under wet weather conditions, the basin becomes filled with the initial runoff from the airport property. Based on the size of the drainage area and the amount of impervious surfaces upstream of the basin, less than of 0.1 inch rainfall will fill the basin to capacity. Due to the small size of the retention basin compared to the size of the drainage area, storm water volumes flowing to the Imperial Drain outfall are not substantially reduced by the basin.

4.1.1.1.4 <u>Culver Sub-Basin</u>

The Culver Sub-basin includes a small portion of the northwest corner of the airport property adjacent to, and on either side of, Pershing Drive, as well as areas northwest of the airport. This sub-basin consists of drainage to a storm drain on Pershing Drive. This drain continues north to Culver Boulevard and then west to an outfall in the Bay at the western end of Culver Boulevard.

4.1.1.1.5 <u>Vista Del Mar Sub-Basin</u>

The Vista Del Mar Sub-basin is located at the western end of the airport, adjacent to Dockweiler State Beach. The sub-basin includes all areas west of the dune peaks within of the El Segundo Blue Butterfly

Preserve and the open space to the north. The storm drains in this sub-basin are small, local drains that collect storm water from small catchment areas.

4.1.1.1.6 Off-Site Fuel Farm Sites

Both proposed off-site fuel farm locations are in the Santa Monica Bay watershed. There are no storm water conveyance facilities within the proposed Scattergood Fuel Farm site. Surface water generated at the site consists exclusively of storm water that is contained within earthen berms approximately six feet high where it percolates into the ground. Surface water generated at the proposed oil refinery fuel farm site is collected by the refinery's wastewater treatment system and treated before it is discharged into the refinery's 500-foot outfalls in Santa Monica Bay.

4.1.1.2 Flooding

The storm drain system at LAX is generally able to convey surface runoff volumes from low intensity rainfall events. However, some short-term flooding does occur at LAX during periods of intense rainfall. According to LAWA personnel, during a large rainfall event in 1995, the following areas experienced short-term flooding:[32]

- Service Road F near Hangars 8 and 9 and near Hanger 1 (Dominguez Channel sub-basin)
- Service Road 3 around the eastern end of Taxiways J and F (Dominguez Channel drainage area)
- Sepulveda Boulevard (i.e., the Sepulveda Tunnel) near the central part of LAX (Dominguez Channel sub-basin)
- Lincoln Boulevard south of the Westchester golf course (Argo sub-basin)
- Northwest corner of LAX, southeast of the intersection of Westchester Parkway and Pershing Drive (Argo sub-basin)
- Southeast of the intersection of World Way West and Pershing Drive (Imperial sub-basin)

Preliminary analyses of the storm drain system, conducted as part of this evaluation, indicate that, based on the DPW Peak Rate Method, most of the major storm water outfalls at LAX do not have sufficient capacity to convey the peak runoff rates for DPW 50-year design storm. Using this method, some outfalls are only able to convey the runoff generated by a 1-year to 5-year design storm. Given these preliminary analyses and the evidence for short-term flooding at the airport, it is assumed that the major drainage facilities serving LAX do not adequately convey storm water runoff to prevent flooding.

4.1.1.3 Impervious Area

The amount of impervious area under baseline conditions was calculated as described in Section 3, *General Approach and Methodology*. Using this methodology, 3,510 acres of the 4,224 acres within the Hydrology and Water Quality Study Area (83 percent) are impervious under baseline conditions. Within the Santa Monica Bay watershed, 2,050 acres (75 percent) are impervious and within the Dominguez Channel watershed, 1,460 acres (98 percent) are impervious. Land uses associated with baseline conditions are presented in Attachment B, **Figure B-1**. The associated land use areas and impervious areas for baseline conditions are presented in **Table C-1** of Attachment C, Total and Impervious Area by Land Use within Hydrology and Water Quality Study Area.

4.1.2 Surface Recharge

Using the method described in Section 3, *General Approach and Methodology*, 166 acre-feet/year of surface recharge is estimated to occur within the Hydrology and Water Quality Study Area under baseline conditions. This volume is less than 0.1 percent of the total inflows estimated to for the West Coast Groundwater Basin. Recharge at the oil refinery fuel farm site is not expected since the proposed site is 100 percent impervious. Approximately 0.8 acre-feet/year of surface recharge is estimated to occur at the proposed Scattergood Fuel Farm site under baseline conditions.

4.2 Water Quality

The discussion of water quality under baseline conditions includes:

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[32] Los Angeles World Airports, Construction and Maintenance Division.

- A description of LAWA's existing Storm Water Pollution Prevention Plan for LAX
- An estimate of the storm water pollutant load under baseline conditions using the methodology described in described in Section 3, *General Approach and Methodology*
- A description of the potential sources for dry weather flows at LAX
- A description of LAWA's existing storm water policy for construction activities

4.2.1 Storm Water Pollution Prevention Plan

As indicated in Section 2.2.1.2, *National Pollutant Discharge Elimination System (NPDES) Program,* the SWRCB issued a statewide Industrial Activities Storm Water General Permit (Industrial Permit) applying to all industrial storm water discharges that require an NPDES permit. The major provisions of the General Permit require that industry eliminate non-storm water discharges to the storm drainage system, develop and implement a storm water pollution prevention plan, and perform monitoring of discharges to the storm water system from their facilities. Each of these requirements must be completed in conformance with specific conditions outlined in the General Permit. To conform to these conditions, LAWA has prepared a Storm Water Pollution Prevention Plan (SWPPP) to address the permitting of storm water discharges associated with industrial activities at LAX.

Numerous tenants, who conduct a variety of airport-related support functions, occupy leaseholds at LAX and perform these activities and are therefore included as co-permittees under LAWA's SWPPP program. This approach conforms to federal regulations, is the preferred option of the SWRCB, and allows for the implementation of consistent storm water pollution prevention measures at each leasehold within the airport.

The LAX SWPPP contains general information, such as drainage system layout and tenant and site activities; describes past and present potential sources of pollutants in storm water; designates programs to identify and eliminate non-storm water discharges; and describes the storm water management controls being implemented at LAX. As part of the SWPPP, tenant and site activities performed at the airport were reviewed to identify those areas with the greatest potential to contribute pollutants to storm water. These activities include the following:

- Aircraft, vehicle, and equipment maintenance areas
- Aircraft and vehicle fueling areas
- Aircraft painting and stripping areas
- Aircraft and vehicle washing areas
- Deicing areas
- Material loading/unloading areas
- Chemical and fuel storage areas
- Building and grounds maintenance areas

Based on the identified activities at LAX and responses to questionnaires by tenants, potential pollutants that may be present in storm water discharges from the site would be expected to consist primarily of petroleum products such as fuels, oil, and greases.

As mentioned previously, one of the three major provisions of the Industrial Permit is to eliminate non-storm water discharges to the storm drainage system. LAWA has complied with this provision by focusing on eliminating subtle, or activity-based, non-storm water discharges and actual hard-piped illicit connections. To date LAWA has performed several activities with the intent to eliminate these non-storm water discharges by implementing the LAX SWPPP and monitoring program, and by performing site and tenant inspections and compliance evaluations.

To minimize the effect that the airport operation has on storm water quality, as part of the SWPPP, both source control and treatment BMPs are practiced. BMPs exercised at LAX include:

- Elimination of Non-Storm Water Discharges to Storm Drains
- Aircraft, Ground Vehicle, and Equipment Maintenance
- Aircraft, Ground Vehicle, and Equipment Fueling
- Aircraft, Ground Vehicle, and Equipment Washing
- Aircraft De/Anti-Icing

- Outdoor Material Handling
- Outdoor Storage of Significant Material
- Waste/Garbage Handling and Disposal
- Building and Grounds Maintenance
- Storm Water Pollution Prevention Education
- Lavatory Service Operations
- Outdoor Washdown/Sweeping
- Fire Fighting Foam Discharge
- Potable Water System Flushing
- Runway Rubber Removal
- Oil/Water Separators
- Emergency Spill Cleanup Plans

Also under the SWPPP, a storm water monitoring program was developed and implemented with the primary objectives of monitoring the quality of storm water discharges and evaluating the effectiveness of BMPs to control the discharge of pollutants to storm water.

4.2.2 Storm Water Pollutant Loads

Land uses associated with baseline conditions are presented in Attachment B, **Figure B-1**, Land Use Within Hydrology and Water Quality Study Area. Pollutant loads delivered to receiving water bodies under baseline conditions, as estimated using the methods described in Section 3.0, *General Approach and Methodology*, are presented in **Table 8**, Average Annual Pollutant Loads Baseline Conditions. Detailed pollutant load calculations for baseline conditions are presented in Attachment D, **Tables D-1, D-2,** and **D-3**.

Table 8

Average Annual Pollutant Loads - Baseline Conditions

	Average Annual Pollutant Load (lb/yr)		
Pollutant Load	**Santa Monica Bay**	**Dominguez Channel**	**Total Pollutant Load**
Total Suspended Solids (TSS)	142,457	200,008	342,465
Total Phosphorus (P)	1,171	964	2,135
Total Kjeldahl Nitrogen (TKN)	5,403	5,517	10,920
Total Copper (Cu)	198	136	334
Total Lead (Pb)	62	52	114
Total Zinc (Zn)	1,231	1,010	2,241
Oil and Grease	9,873	7,059	16,932
Biochemical Oxygen Demand (BOD)	40,209	41,564	81,773
Chemical Oxygen Demand (COD)	201,844	185,341	387,186

Source: Camp Dresser & McKee Inc., 2000.

As mentioned previously, storm water runoff is not generated at the proposed Scattergood Fuel Farm site. Storm water runoff from the proposed oil refinery fuel farm site is collected and treated at the refinery's wastewater treatment system where it receives primary treatment by an oil/water separator, consisting of gravity separation and induced air flotation units for oil/water separation. The water is then combined with secondary treated petroleum process wastewater and discharged into the Santa Monica Bay via Chevron's ocean outfall. The water quality of the discharge is sampled and regulated under an NPDES permit.

4.2.3 Dry Weather Flows

As mentioned previously, the water quality of dry weather flows is primarily a function of the activity that generated the flow. As described in Section 4.2.1, *Storm Water Pollution Prevention Plan*, activities at LAX that could potentially generate dry weather flows include the following:

- Aircraft, vehicle, and equipment maintenance
- Aircraft and vehicle fueling, painting and stripping, and washing
- Aircraft deicing
- Material loading and unloading
- Chemical and fuel storage
- Building and grounds maintenance

Each of the activities that could generate dry weather flows are discussed below:

Aircraft, ground vehicle, and equipment maintenance areas at LAX are generally located within the Imperial Sub-basin, with others in the Dominguez Channel Sub-basin. Limited maintenance areas are located within the Argo and Culver drainage areas. Based on the nature of the maintenance activities, materials such as lubricating oils, hydraulic oils, degreasers, and other cleaning products may be present where these activities take place. Most tenants respond to small leaks through the use of sorbents, limiting the potential for pollutants to reach the storm water conveyance system. Some maintenance activities are conducted indoors. In a few instances, tenants have floor drains near their indoor maintenance areas. At these facilities, runoff that is discharged through floor drains is pretreated via oil-water separators before entering the sanitary sewer. BMPs have been developed in the LAX SWPPP to prevent or reduce the discharge of pollutants from aircraft, vehicle, and equipment maintenance repair, including ground vehicle and equipment painting/stripping and floor wash-down water.

Aircraft and ground vehicle fueling activities at LAX include diesel and gasoline fuel transfers into underground storage tanks, fuel transfers from underground storage tanks into ground vehicles, and Jet A fuel transfers into aircraft. Fuel loading is conducted via a closed-hose transfer connection, which limits the potential for spillage. Aircraft fueling activities are conducted on concrete ramps or paved areas, whereas vehicle fueling is conducted at various areas throughout LAX. The majority of tenants who conduct aircraft and ground vehicle fueling is located within the Imperial drainage area. BMPs have been developed in the LAX SWPPP to prevent and clean fuel spillage.

Aircraft painting and stripping occur at LAX. Paint and painting related materials (e.g., thinners, solvents), and the particulates from sand blasting and paint stripping, are all potential surface water pollutants. The majority of painting activities occur indoors where there is limited potential contact with surface water runoff. BMPs have been developed in the LAX SWPPP to prevent these discharges from entering the storm water conveyance system.

Aircraft and vehicle washing occurs at LAX in designated and non-designated aircraft, ground vehicle, and equipment wash areas. Designated wash areas generally contain a wash rack and an oil-water separator to collect any runoff generated. In these areas, runoff from washing is routed to the sanitary sewer system and later treated. Non-designated wash areas are not equipped to collect runoff and may discharge to the storm water conveyance system. BMPs have been developed in LAX SWPPP to minimize the amount of wash water discharges, although such discharges may still occur.

Deicing and anti-icing are performed on aircraft to minimize ice build-up on the wings and plane body during cold weather conditions. Deicing solutions primarily contain ethylene glycol, which has been banned from the sanitary sewer system. Very little deicing, if any, occurs at LAX, due to the moderate climate. Most deicing activities at LAX occurs within the Imperial drainage area and BMPs have been developed in the LAX SWPPP to contain and clean up any spills of this nature.

Material loading/unloading of a variety of materials occurs at tenant facilities throughout LAX. Material loading/unloading areas include both loading docks at buildings and outdoor storage and transfer facilities. BMPs have been developed in the LAX SWPPP to address the potential release of pollutants from loading and unloading of materials and cargo.

Chemicals, fuels, and other hazardous wastes are stored by tenants at LAX. During rainfall events, residues on storage containers, or residuals from spills or leaks in outdoor storage areas, can become a potential source for storm water pollution. The majority of the tenants that store fuel or chemicals at LAX are located within the Imperial drainage area. BMPs have been developed in the LAX SWPPP that address both indoor and outdoor storage areas.

The largest bulk fuel storage area at LAX is the on-site fuel farm operated by LAXFUEL Corporation. The fuel farm consists of 17 above ground tanks located in bermed and or diked areas. Storm water and or spilled fuel that collects within the contained area is treated by an oil-water separator and discharged to the LAWA storm drain system (Imperial drainage area/retention basin). As required by LAWA, LAXFUEL Corporation performs periodic sampling and analysis of their clarifier effluent during the rainy season. LAXFUEL Corporation also currently holds an industrial waste discharge permit (see Section 4.25.2, *Wastewater*, of the Draft EIS/EIR).

Building and grounds maintenance includes the use of pesticide and herbicide products, such as those used to eliminate insects and to inhibit the growth of weeds. Residues from application sites, or from containers which are stored outdoors, can leach onto the pavement and be taken up by storm water. Irrigation of landscaped areas can also potentially produce surface water runoff. BMPs have been developed in the LAX SWPPP to address these sources of flows.

Most of the activities described above occur in the Imperial sub-basin. During low flow (dry weather) conditions and the first surge from a storm event, surface flows generated in this sub-basin flow to a concrete-lined, 2-million gallon retention basin located at the southwestern corner of the airport. Captured flows are pumped from the retention basin at a rate of approximately 150 gallons per minute (gpm) through a 36' x 10' x 6' clarifier to Hyperion Treatment Plant, a publicly owned treatment works. Under high flow (wet weather) conditions, when influent to the basin exceeds the 150 gpm pumping capacity to Hyperion Treatment Plant, the storm water retention basin fills to capacity, the sluice gates close, and the excess flow is diverted directly to the Imperial Storm Drain.

Dry weather flows are not generated at the proposed Scattergood Fuel Farm site. Surface water generated at the proposed oil refinery fuel farm site can consist of industrial process water, including non-contact cooling tower blowdown, boiler blowdown, a portion of the refinery's total recovery well ground water, and other wastes containing no free oil. Three diversion tanks are available for storage of excess storm water runoff if flows exceed primary treatment capacity. Water quality of the waters discharged to the Santa Monica Bay is sampled and regulated under an NPDES permit.

4.2.4 Storm Water Policy for Construction

As mentioned previously in Section 2.2.1, *Regulatory Provisions Concerning Water Quality*, compliance with the SWRCB General Permit is required for construction activities that disturb an area of five acres or more. Construction activities can create pollution sources and can potentially affect water quality. Pollutants of concern generated during construction activities include erosion-induced sediment, nutrients, trace metals, toxic chemicals, and miscellaneous waste. Examples of pollutant sources can include exposed soil, landscaping fertilizer, vehicle fuel, and lumber. In the short-term, construction activities can adversely affect the water quality of the Santa Monica Bay and Dominguez Channel.

As required under the SWRCB General Permit for Construction Activities, LAWA has prepared a Storm Water Guidance Manual for Construction Activities. This document outlines the procedures for preparing and implementing a construction SWPPP before beginning construction operations so that the activities are compliance with the general permit. These requirements include:

- Developing and implementing a construction SWPPP, specifying BMPs that will prevent all construction pollutants from contacting storm water with the intent of keeping all products of erosion from moving offsite into receiving waters
- Eliminating or reducing non-storm water discharges to storm sewer systems and surface waters
- Performing inspections of all BMPs

Temporary construction BMPs specified in the manual include:

- Soil stabilization (erosion control) techniques such as seeding and planting, mulching, and check dams
- Sediment control methods such as detention basins, silt fences, and dust control
- Contractors' training programs
- Material transfer practices

- Waste management practices such as providing designated storage areas and containers for specific waste for regular collection
- Roadway cleaning/tracking control practices
- Vehicle and equipment cleaning and maintenance practices
- Fueling practices

5. ENVIRONMENTAL CONSEQUENCES

The sections below present supplemental information regarding hydrology and water quality for LAX. A discussion of the environmental consequences of changes in hydrology and water quality for each alternative is included in Section 4.7, *Hydrology and Water Quality*, of the Draft EIS/EIR.

5.1 Hydrology

The drainage section quantifies the amount of impervious area within the Hydrology and Water Quality Study Area and the recharge section estimates the annual volume of surface water recharge through the pervious surfaces within the Hydrology and Water Quality Study Area.

5.1.1 Drainage

The total impervious area, upon which this analysis is based, was calculated as described in Section 3, *General Approach and Methodology*. The resulting impervious areas for each alternative and planning horizon are presented in **Table 9,** Total Impervious Area within the Hydrology and Water Quality Study Area.

Table 9

Total Impervious Area within the Hydrology and Water Quality Study Area (acres)

		Alternative							
	Baseline	NA/NP		A		B		C	
Area	Conditions	2005	2015	2005	2015	2005	2015	20015	2015
Santa Monica Bay	2,050	2,184	2,184	2,136	2,259	2,152	2,194	2,148	2,224
Dominguez Channel	1,460	1,398	1,398	1,291	1,371	1,370	1,387	1,366	1,363
Hydrology and Water Quality Study Area	3,510	3,582	3,582	3,427	3,630	3,522	3,581	3,514	3,587

Source: Camp Dresser & McKee Inc., 2000.

5.1.2 Recharge

The total recharge volume was calculated as described in Section 3, *General Approach and Methodology*. The resulting volumes for each alternative and planning horizon are presented in **Table 10**, Annual Surface Water Recharge Volumes within the Hydrology and Water Quality Study Area.

Table 10

Annual Surface Water Recharge Volumes within the Hydrology and Water Quality Study Area

	Baseline Conditions	Alternative							
		NA/NP		A		B		C	
		2005	2015	2005	2015	2005	2015	20015	2015
Pervious Area (acres)	714	643	643	795	593	699	641	707	635
Recharge Volume (acre-feet/year)	171	154	154	191	142	168	154	170	152

Source: Camp Dresser & McKee Inc., 2000.

5.2 Water Quality

This section presents the storm water pollutant loads estimated to discharge to receiving water bodies from within the Master Plan boundaries using the methodology presented in Section 3, *General Approach and Methodology*. The resulting pollutant loads for each alternative and planning horizon are presented in **Table 11** through **17**, Average Annual Pollutant Loads. Land uses designated for the No Action/No Project Alternative and each build alternative are presented in Attachment B, *Land Use within Hydrology and Water Quality Study Area*. Average annual runoff volumes and detailed pollutant load calculations are presented in Attachment D, *Average Annual Storm Water Runoff and Pollutant Loads Generated within Hydrology and Water Quality Study Area*.

Table 11

Average Annual Pollutant Loads No Action/No Project (2005 and 2015)

	Average Annual Pollutant Loads (lb/yr)		
Pollutant Load	Santa Monica Bay	Dominguez Channel	Total Pollutant Load
Total Suspended Solids (TSS)	185,320	195,556	380,876
Total Phosphorus	1,312	920	2,232
Total Kjeldahl Nitrogen (TKN)	6,502	5,084	11,587
Total Copper	212	133	345
Total Lead	70	48	118
Total Zinc	1,373	967	2,341
Oil and Grease	10,930	6,876	17,806
Biochemical Oxygen Demand (BOD)	48,672	39,077	87,749
Chemical Oxygen Demand (COD)	234,934	171,725	406,659

Source: Camp Dresser & McKee Inc., 2000.

Table 12

Average Annual Pollutant Loads Alternative A, North Airfield (2005)

	Average Annual Pollutant Loads (lb/yr)		
Pollutant Load	**Santa Monica Bay**	**Dominguez Channel**	**Total Pollutant Load**
Total Suspended Solids (TSS)	146,636	114,290	260,926
Total Phosphorus (P)	1,242	780	2,022
Total Kjeldahl Nitrogen (TKN)	5,767	3,755	9,522
Total Copper (Cu)	211	131	343
Total Lead (Pb)	67	43	110
Total Zinc (Zn)	1,317	855	2,172
Oil and Grease	10,679	6,544	17,222
Biochemical Oxygen Demand (BOD)	42,733	27,582	70,315
Chemical Oxygen Demand (COD)	217,224	140,765	357,989

Source: Camp Dresser & McKee Inc., 2000.

Table 13

Average Annual Pollutant Loads Alternative A, North Airfield (2015)

	Average Annual Pollutant Loads (lb/yr)		
Pollutant Load	**Santa Monica Bay**	**Dominguez Channel**	**Total Pollutant Load**
Total Suspended Solids (TSS)	169,047	106,183	275,229
Total Phosphorus (P)	1,340	814	2,154
Total Kjeldahl Nitrogen (TKN)	6,444	3,839	10,283
Total Copper (Cu)	224	142	365
Total Lead (Pb)	72	46	118
Total Zinc (Zn)	1,419	908	2,327
Oil and Grease	11,495	7,062	18,557
Biochemical Oxygen Demand (BOD)	47,807	27,413	75,220
Chemical Oxygen Demand (COD)	239,071	148,209	387,280

Source: Camp Dresser & McKee Inc., 2000.

Table 14

Average Annual Pollutant Loads Alternative B – Fifth Runway, South Airfield (2005)

	Average Annual Pollutant Loads (lb/yr)		
Pollutant Load	**Santa Monica Bay**	**Dominguez Channel**	**Total Pollutant Load**
Total Suspended Solids (TSS)	152605	84,960	237,565
Total Phosphorus (P)	1,253	785	2,038
Total Kjeldahl Nitrogen (TKN)	5,799	3,579	9,378
Total Copper (Cu)	214	141	355
Total Lead (Pb)	67	45	112
Total Zinc (Zn)	1,335	879	2,214
Oil and Grease	10,715	7,029	17,744
Biochemical Oxygen Demand (BOD)	43,051	24,994	68,046
Chemical Oxygen Demand (COD)	218,785	142,022	360,807

Source: Camp Dresser & McKee Inc., 2000.

Table 15

Average Annual Pollutant Loads Alternative B – Fifth Runway, South Airfield (2015)

	Average Annual Pollutant Loads (lb/yr)		
Pollutant Load	**Santa Monica Bay**	**Dominguez Channel**	**Total Pollutant Load**
Total Suspended Solids (TSS)	183,510	74,914	258,424
Total Phosphorus (P)	1,314	786	2,100
Total Kjeldahl Nitrogen (TKN)	6,299	3,521	9,821
Total Copper (Cu)	216	145	361
Total Lead (Pb)	69	46	115
Total Zinc (Zn)	1,387	890	2,276
Oil and Grease	10,944	7,209	18,153
Biochemical Oxygen Demand (BOD)	47,659	24,012	71,670
Chemical Oxygen Demand (COD)	231,048	142,962	374,009

Source: Camp Dresser & McKee Inc., 2000.

Table 16

Average Annual Pollutant Loads Alternative C – Four Runways (2005)

	Average Annual Pollutant Loads (lb/yr)		
Pollutant Load	**Santa Monica Bay**	**Dominguez Channel**	**Total Pollutant Load**
Total Suspended Solids (TSS)	144,198	117,671	261,869
Total Phosphorus (P)	1,237	826	2,063
Total Kjeldahl Nitrogen (TKN)	5,700	4,046	9,746
Total Copper (Cu)	213	139	352
Total Lead (Pb)	67	46	113
Total Zinc (Zn)	1,324	906	2,230
Oil and Grease	10,672	7,023	17,694
Biochemical Oxygen Demand (BOD)	41,755	29,315	71,070
Chemical Oxygen Demand (COD)	216,814	151,549	368,364

Source: Camp Dresser & McKee Inc., 2000.

Table 17

Average Annual Pollutant Loads Alternative C – Four Runways (2015)

	Average Annual Pollutant Loads (lb/yr)		
Pollutant Load	**Santa Monica Bay**	**Dominguez Channel**	**Total Pollutant Load**
Total Suspended Solids (TSS)	162,538	118,384	280,923
Total Phosphorus (P)	1,305	825	2,130
Total Kjeldahl Nitrogen (TKN)	6,160	4,013	10,174
Total Copper (Cu)	222	139	361
Total Lead (Pb)	71	46	117
Total Zinc (Zn)	1,399	907	2,307
Oil and Grease	11,204	7,004	18,207
Biochemical Oxygen Demand (BOD)	45,238	29,205	74,443
Chemical Oxygen Demand (COD)	231,858	150,734	382,591

Source: Camp Dresser & McKee Inc., 2000.

Attachment A

Beneficial Uses Designated for Receiving Water Bodies

Beneficial Uses Designated for Nearshore and Offshore Zones of Los Angeles County

Beneficial Use Designation	Description
Industrial Service Supply	Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
Navigation	Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.
Contact Recreation	Uses of water for recreational activities involving proximity to water, where ingestion of water is reasonably possible. These uses include, but are not limited to swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
Non-Contact Recreation	Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beach combing, camping, hunting, sightseeing, or aesthetic enjoyment in conjunction with other activities.
Commercial and Sport Fishing	Uses of water for commercial or recreational collection of fish, shellfish, or other organisms intended for human consumption or bait purposes.
Marine Habitat	Uses of water that support marine ecosystems including, but not limited to, preservation and enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).
Wildlife Habitat	Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, (e.g., mammals, birds, reptiles, amphibians, invertebrates), or other wildlife water and food sources.
Preservation of Biological Habitat	Uses of water that support designated areas or habitats, such as Areas of Special Biological Significance (ASBS), established refuges, parks, sanctuaries, ecological reserves, or other areas where the preservation or enhancement of natural resources requires special protection.
Rare, Threatened or Endangered Species	Uses of water that supports habitats necessary, at least in part, for the survival and successful maintenance of plant and animal species established under state law as rare, threatened, or endangered.
Migration of Aquatic Organisms	Uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.
Spawning, Reproduction, and/or Early Development	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
Shellfish Harvesting	Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sports purposes.

Source: Los Angeles Regional Water Quality Control Board, Water Quality Control Plan-Los Angeles Region Basin Plan, June 13, 1994.

Beneficial Uses Designated for Dominguez Channel (Above Vermont)

Beneficial Use	Description
Municipal and Domestic Supply	Uses of water for community, military, or individual water supply systems including but, not limited to, drinking water supply.
Contact Recreation	Uses of water for recreational activities involving proximity to water, where ingestion of water is reasonably possible. These uses include, but are not limited to swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs. ([b])
Non-Contact Recreation	Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, hunting, sightseeing, or aesthetic enjoyment in conjunction with other activities.
Warm Freshwater Habitat	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. ([a])
Wildlife Habitat	Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, (e.g., mammals, birds, reptiles, amphibians, invertebrates), or other wildlife water and food sources.
Rare, Threatened or Endangered Species	Uses of water that supports habitats necessary, at least in part, for the survival and successful maintenance of plant and animal species established under state law as rare, threatened, or endangered.

[a] This use has been designated as a Potential Beneficial Use and is not an Existing Beneficial Use.
[b] This use has been designated as a Potential Beneficial Use and is not an Existing Beneficial Use. Access is currently prohibited by the Los Angeles County Department of Public Works.

Source: Los Angeles Regional Water Quality Control Board, Water Quality Control Plan-Los Angeles Region Basin Plan, June 13, 1994.

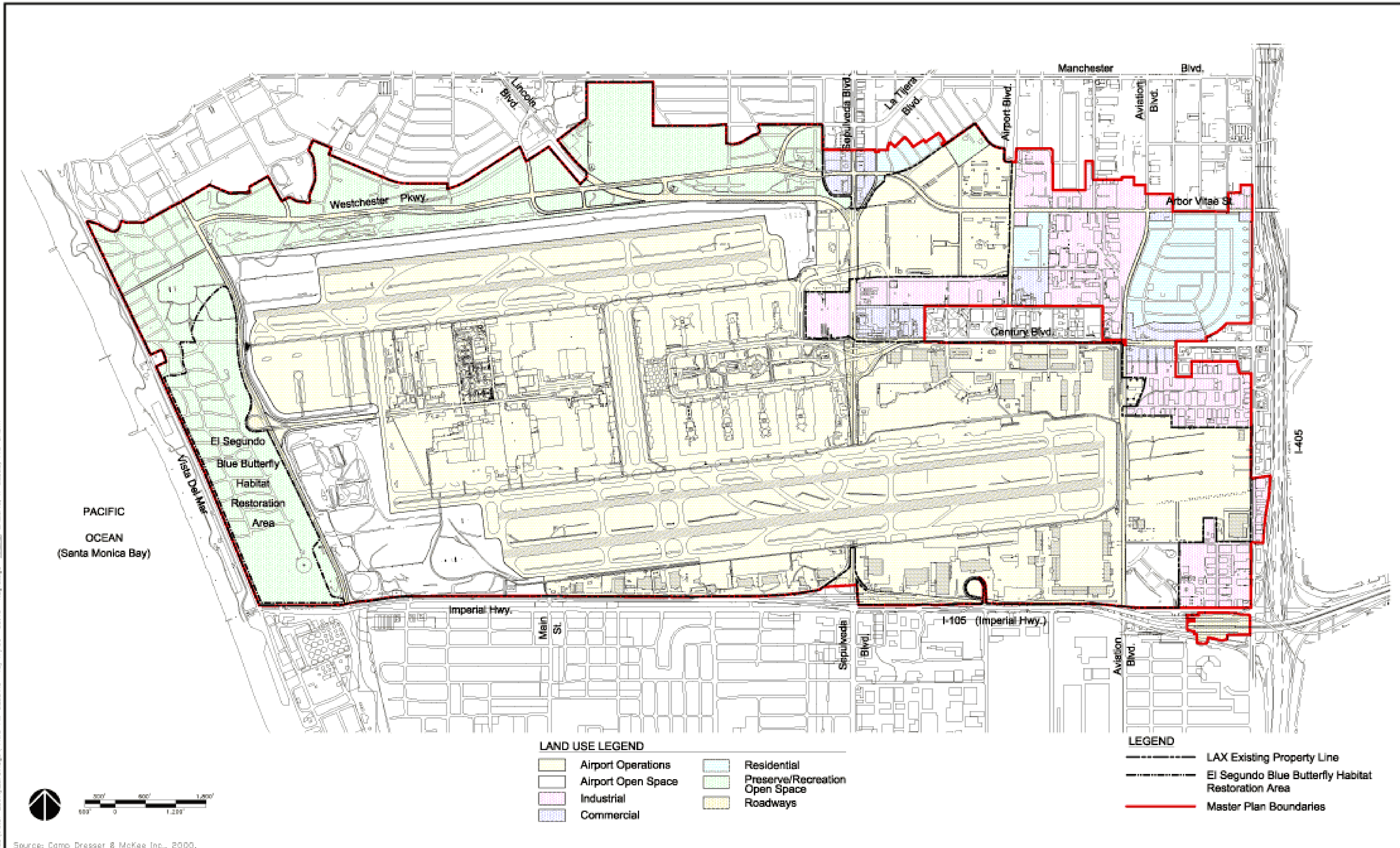
Beneficial Uses Designated for West Coast Basin

Beneficial Use	Description
Municipal and Domestic Supply	Uses of water for community, military, or individual water supply systems including but, not limited to, drinking water supply.
Agricultural Supply	Agricultural – Uses of water for farming, horticulture, or ranching including but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
Industrial Process Supply	Uses of water for industrial activities that depend primarily on water quality
Industrial Service Supply	Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Source: Los Angeles Regional Water Quality Control Board, Water Quality Control Plan-Los Angeles Region Basin Plan, June 13, 1994.

Attachment B

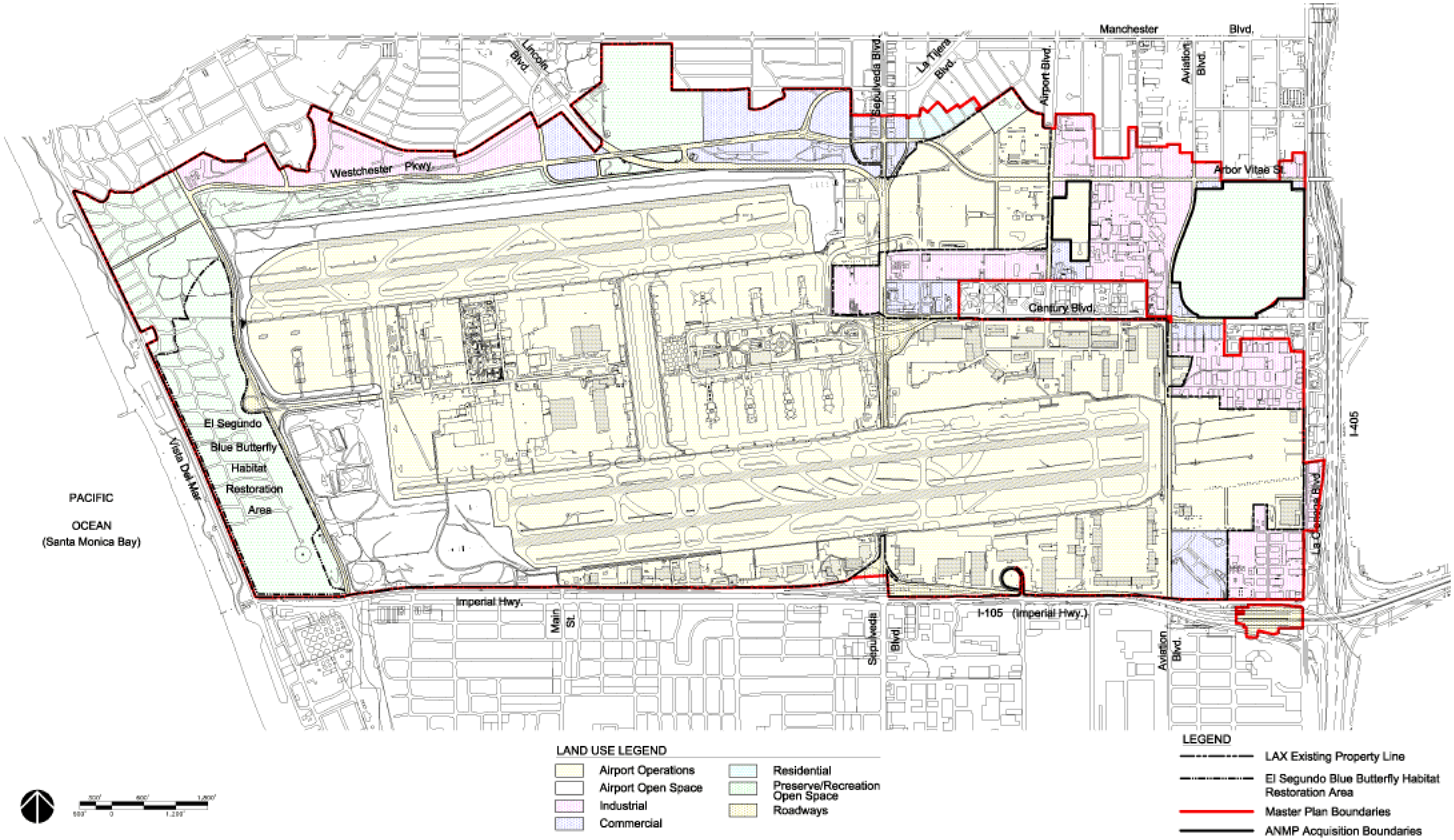
Land Use within Hydrology and Water Quality Study Area



Los Angeles International Airport Master Plan

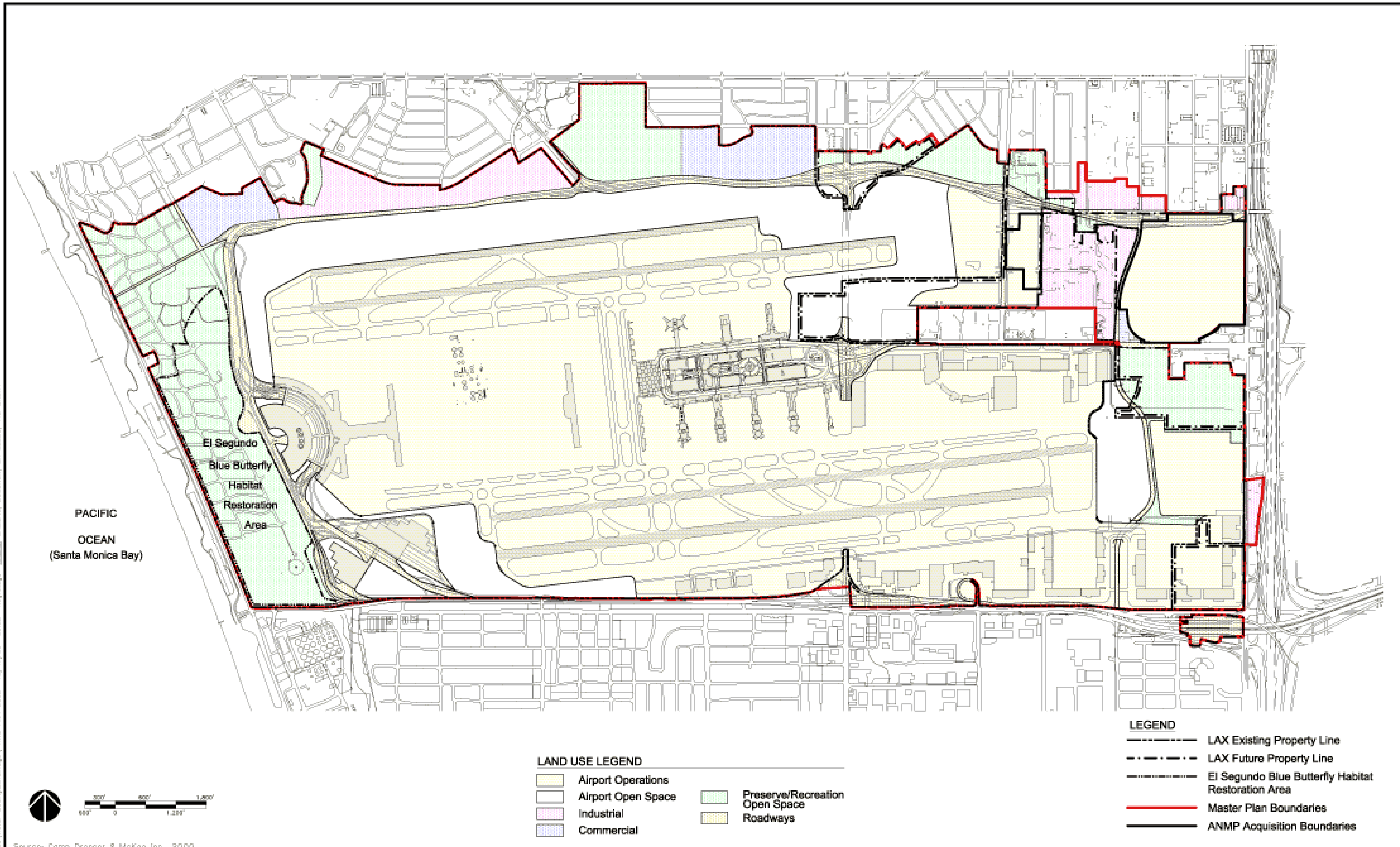
Land-Use Within Master Plan Boundaries Baseline Conditions

Figure **B-1**



Source: Camp Dresser & McKee Inc., 2000.

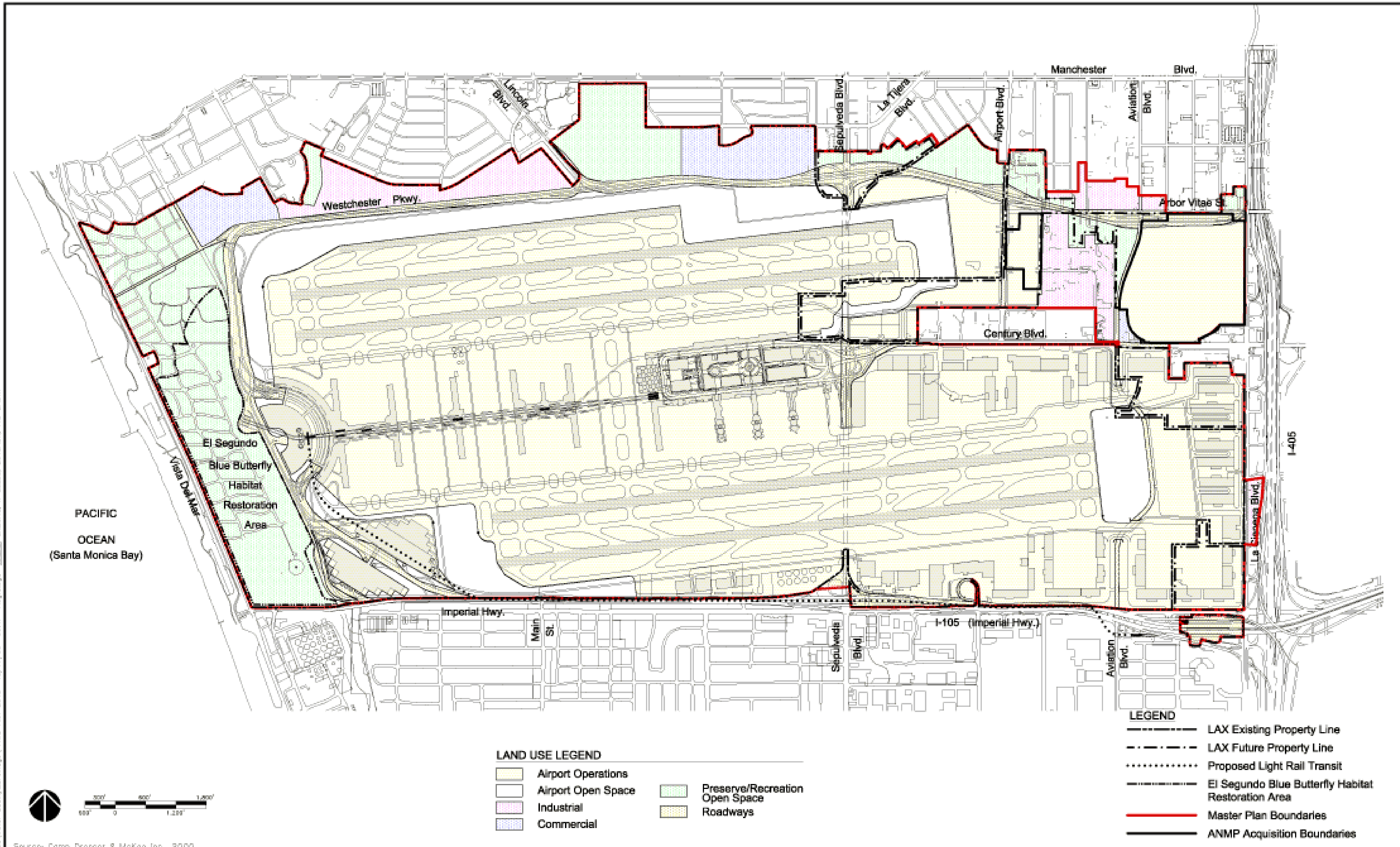
Los Angeles International Airport Master Plan	**Land-Use Within Master Plan Boundaries No Action/No Project Alternative (2005/2015)**	Figure **B-2**



Los Angeles International Airport Master Plan

Land-Use Within Master Plan Boundaries
Alternate A (2005)

Figure
B-3

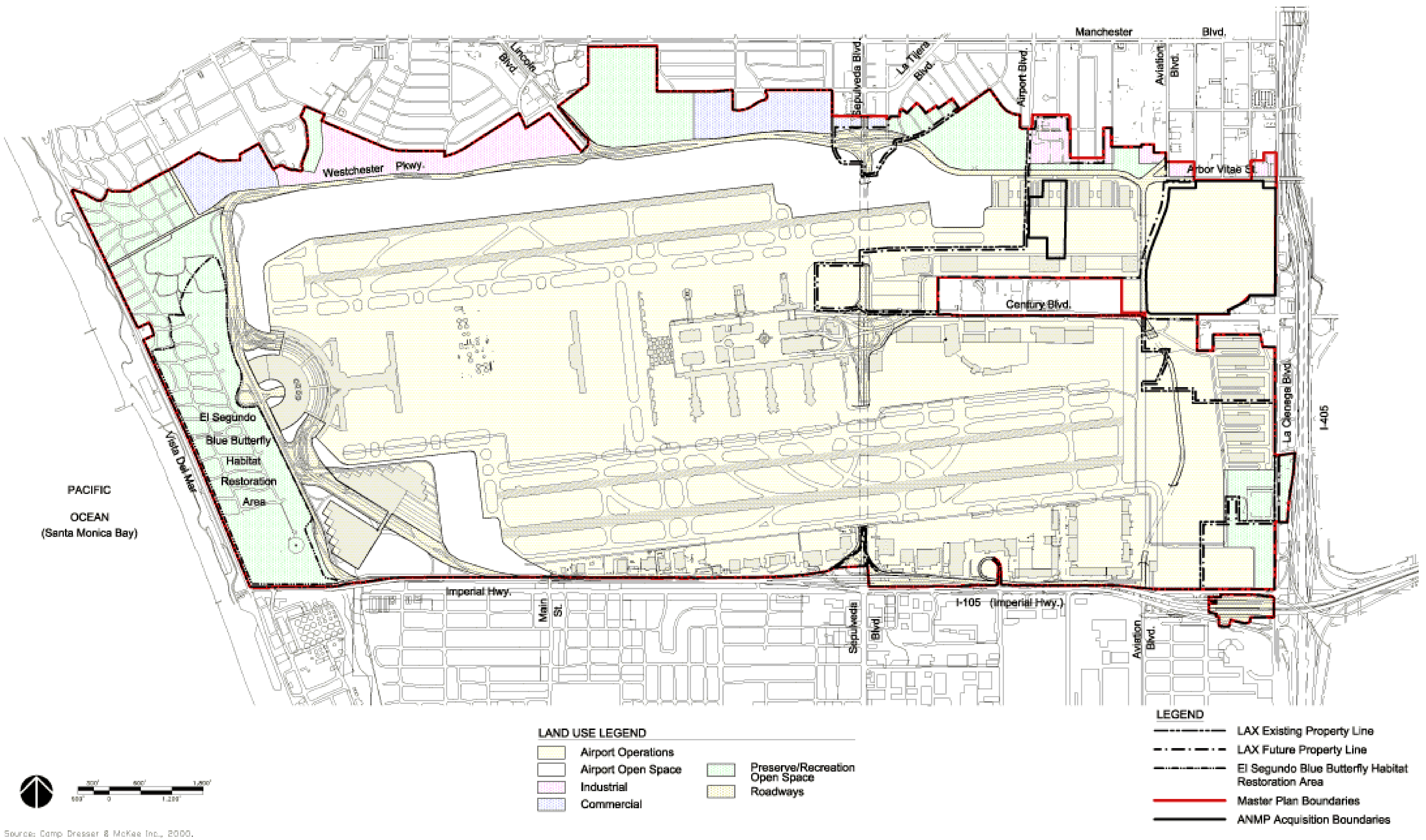


Source: Camp Dresser & McKee Inc., 2000.

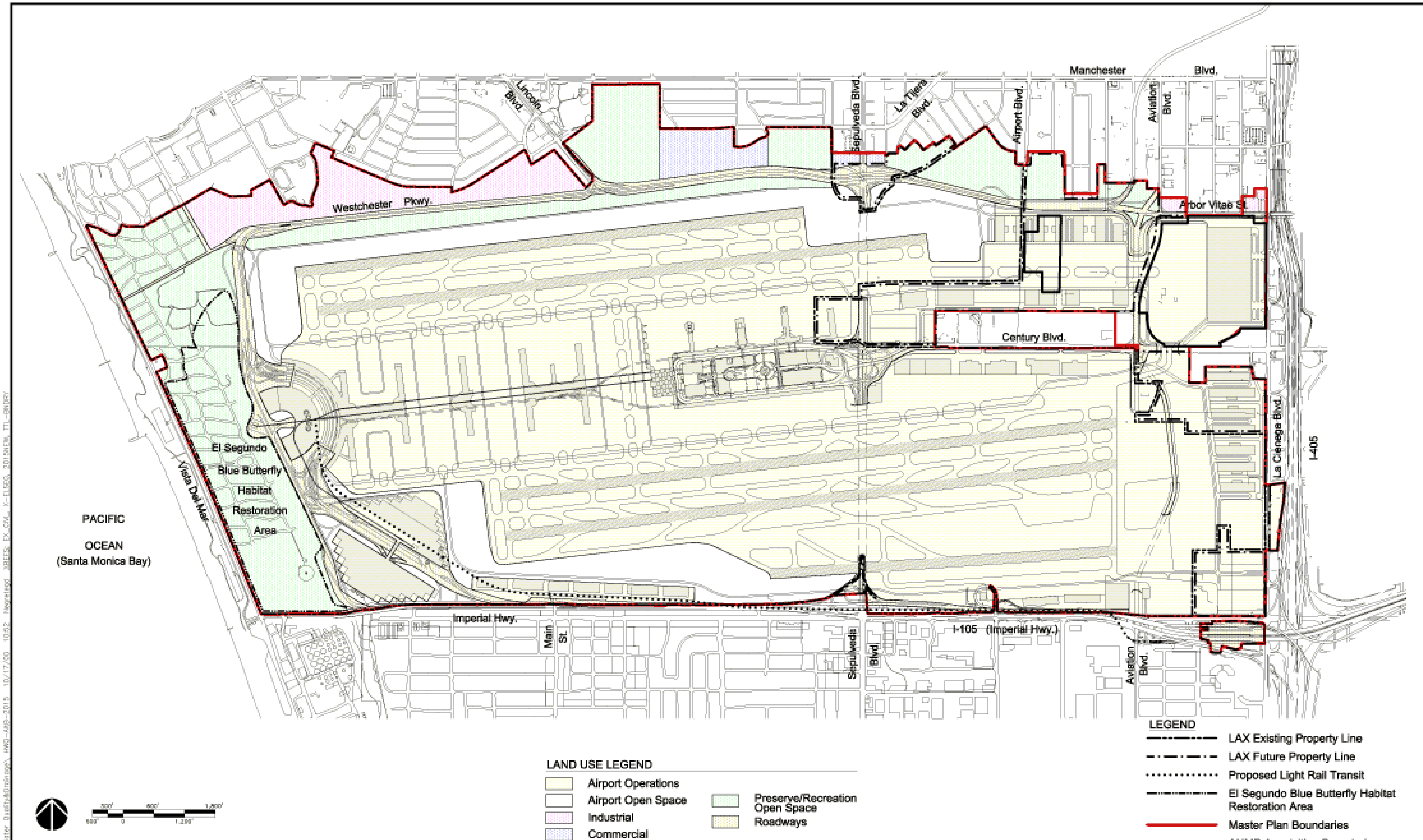
Los Angeles International Airport Master Plan

Land-Use Within Master Plan Boundaries Alternative A (2015)

Figure **B-4**

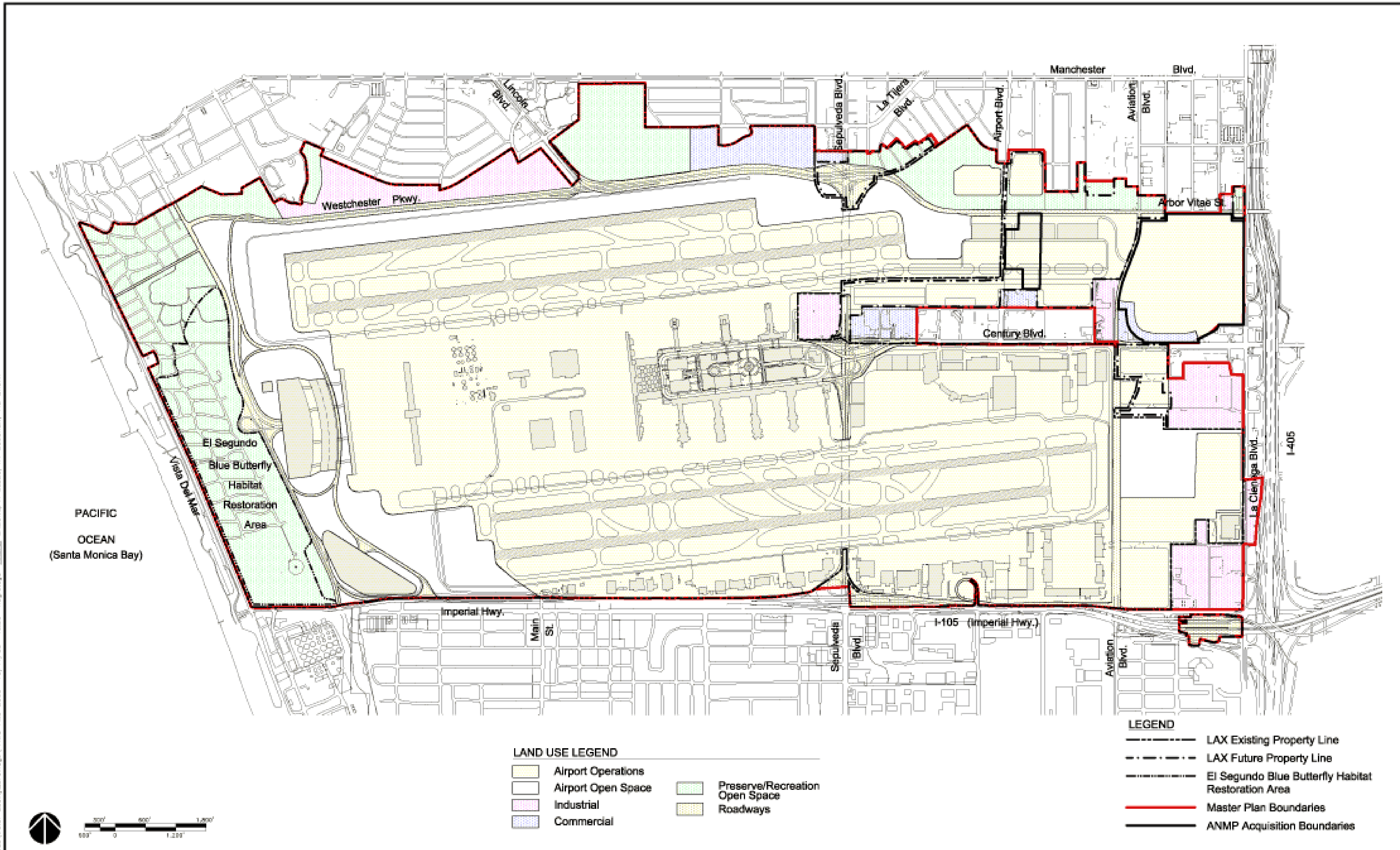


Los Angeles International Airport Master Plan	**Land-Use Within Master Plan Boundaries Alternative B (2005)**	Figure **B-5**



Source: Camp Dresser & McKee Inc., 2000.

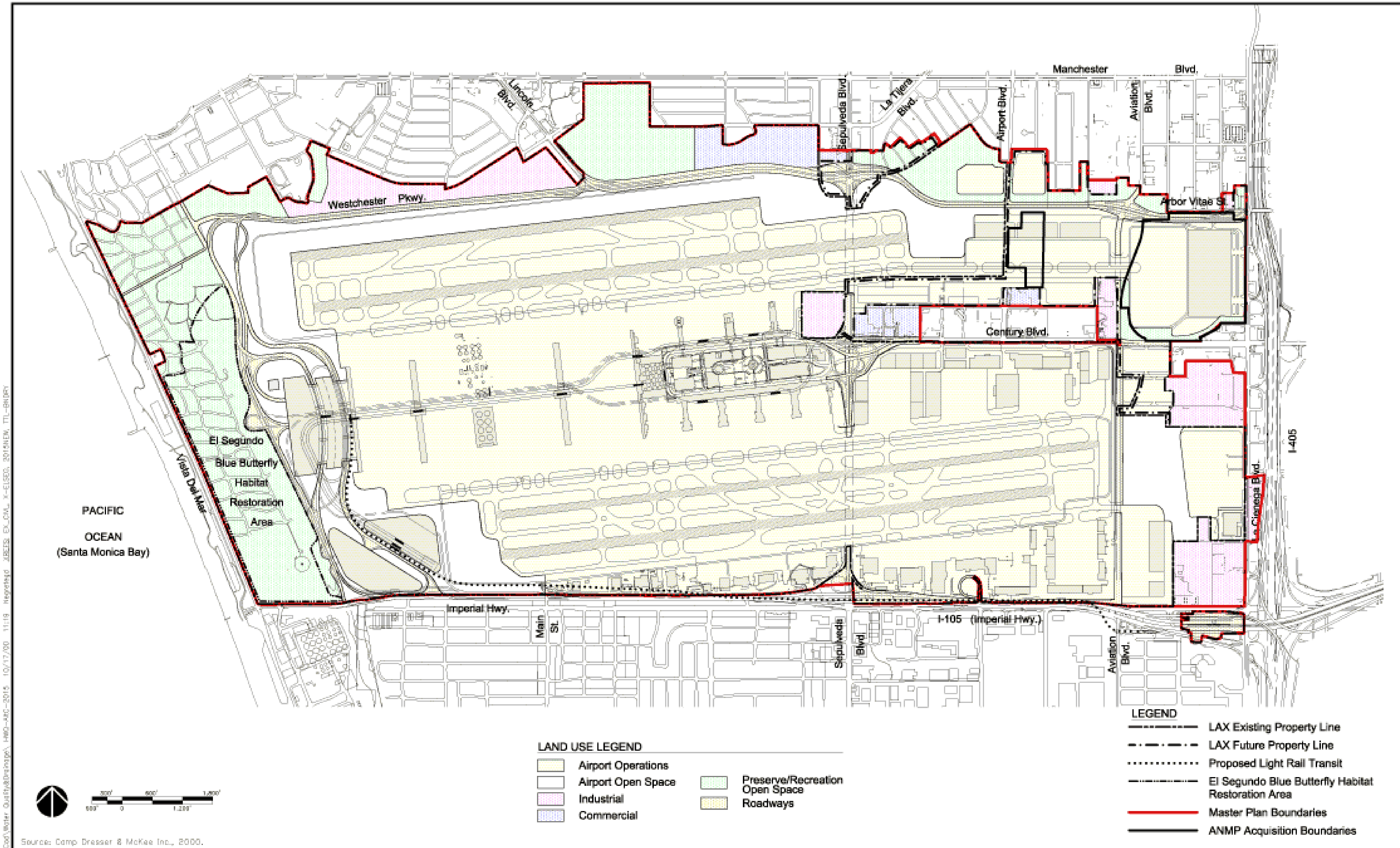
Los Angeles International Airport Master Plan	**Land-Use Within Master Plan Boundaries Alternative B (2015)**	Figure **B-6**



Los Angeles International Airport Master Plan

Land-Use Within Master Plan Boundaries Alternative C (2005)

Figure B-7



Source: Camp Dresser & McKee Inc., 2000.

Los Angeles International Airport Master Plan

Land-Use Within Master Plan Boundaries Alternative C (2015)

Figure **B-8**

Attachment C

Total and Impervious Area by Land Use within Hydrology and Water Quality Study Area

TABLE C-1
Total and Impervious Area by Land Use
Baseline Conditions

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Area Subtotals
	Airport Operations (acres)	Airport Open Space (acres)	Industrial (acres)	Commercial (acres)	Residential (acres)	Open Space (acres)	Transportation (acres)	(acres)
Santa Monica Bay Watershed								
Total Area	1,530	393	20	10	0	676	96	2,725
Impervious Area	1,530	177	20	10	0	237	76	2,050
Dominguez Channel Watershed								
Total Area	884	31	287	63	144	9	81	1,499
Impervious Area	884	14	287	63	144	3	64	1,460
Study Area								
Total Area	2,414	424	307	73	144	685	177	4,224
Impervious Area	2,414	191	307	73	144	240	142	3,510

Source: Camp Dresser & McKee Inc., 2000

TABLE C-2
Total and Impervious Area by Land Use
No Action/No Project Alternative - 2005/2015

Region within Hydrology and Water Quality Study Area	Land Use Classifications							**Area Subtotals**
	Airport Operations (acres)	Airport Open Space (acres)	Industrial (acres)	Commercial (acres)	Residential (acres)	Open Space (acres)	Transportation (acres)	(acres)
Santa Monica Bay Watershed								
Total Area	1,546	377	116	107	0	482	96	2,724
Impervious Area	1,546	170	116	107	0	169	77	2,184
Dominguez Channel Watershed								
Total Area	904	0	288	82	13	133	81	1,501
Impervious Area	904	0	288	82	13	47	64	1,398
Study Area								
Total Area	2,450	377	404	189	13	615	177	4,225
Impervious Area	2,450	170	404	189	13	215	141	3,582

Source: Camp Dresser & McKee Inc., 2000

TABLE C-3
Total and Impervious Area by Land Use
Alternative A - 2005

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Area Subtotals
	Airport Operations (acres)	Airport Open Space (acres)	Industrial (acres)	Commercial (acres)	Residential (acres)	Open Space (acres)	Transportation (acres)	(acres)
Santa Monica Bay Watershed								
Total Area	1,601	410	29	36	0	513	133	2,722
Impervious Area	1,601	185	29	36	0	180	106	2,136
Dominguez Channel Watershed								
Total Area	967	179	108	4	0	139	103	1,500
Impervious Area	967	81	108	4	0	49	82	1,291
Study Area								
Total Area	2,568	589	137	40	0	652	236	4,222
Impervious Area	2,568	265	137	40	0	228	188	3,427

Source: Camp Dresser & McKee Inc., 2000

TABLE C-4
Total and Impervious Area by Land Use
Alternative A - 2015

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Area Subtotals
	Airport Operations (acres)	Airport Open Space (acres)	Industrial (acres)	Commercial (acres)	Residential (acres)	Open Space (acres)	Transportation (acres)	(acres)
Santa Monica Bay Watershed								
Total Area	1,704	311	73	90	0	409	136	2,723
Impervious Area	1,704	140	73	90	0	143	108	2,259
Dominguez Channel Watershed								
Total Area	1,123	103	87	4	0	78	105	1,500
Impervious Area	1,123	46	87	4	0	27	84	1,371
Study Area								
Total Area	2,827	414	160	94	0	487	241	4,223
Impervious Area	2,827	186	160	94	0	170	192	3,630

Source: Camp Dresser & McKee Inc., 2000

TABLE C-5
Total and Impervious Area by Land Use
Alternative B - 2005

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Area Subtotals
	Airport Operations (acres)	Airport Open Space (acres)	Industrial (acres)	Commercial (acres)	Residential (acres)	Open Space (acres)	Transportation (acres)	(acres)
Santa Monica Bay Watershed								
Total Area	1,620	387	46	16	0	506	148	2,723
Impervious Area	1,620	174	46	16	0	177	118	2,152
Dominguez Channel Watershed								
Total Area	1,199	57	31	2	0	121	88	1,498
Impervious Area	1,199	26	31	2	0	42	70	1,370
Study Area								
Total Area	2,819	444	77	18	0	627	236	4,221
Impervious Area	2,819	200	77	18	0	219	188	3,522

Table C-6
Total and Impervious Area by Land Use
Alternative B-2015

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Area Subtotals (acres)
	Airport Operations (acres)	Airport Open Space (acres)	Industrial (acres)	Commercial (acres)	Residential (acres)	Open Space (acres)	Transportation (acres)	
Santa Monica Bay Watershed								
Total Area	1,587	339	115	41	0	475	166	2,723
Impervious Area	1,587	153	115	41	0	166	132	2,194
Dominguez Channel Watershed								
Total Area	1,247	73	9	2	0	84	84	1,499
Impervious Area	1,247	33	9	2	0	29	67	1,387
Study Area								
Total Area	2,834	412	124	43	0	559	250	4,222
Impervious Area	2,834	185	124	43	0	196	200	3,581

Source: Camp Dresser & McKee Inc., 2000

Table C-7
Total and Impervious Area by Land Use
Alternative C - 2005

Region within Hydrology and Water Quality Study Area	Land Use Classifications: Airport Operations (acres)	Airport Open Space (acres)	Industrial (acres)	Commercial (acres)	Residential (acres)	Open Space (acres)	Transportation (acres)	Area Subtotals (acres)
Santa Monica Bay Watershed								
Total Area	1,647	391	28	18	0	517	123	2,724
Impervious Area	1,647	176	28	18	0	181	98	2,148
Dominguez Channel Watershed								
Total Area	1,074	98	110	36	0	92	88	1,498
Impervious Area	1,074	44	110	36	0	32	70	1,366
Study Area								
Total Area	2,721	489	138	54	0	609	210	4,221
Impervious Area	2,721	220	138	54	0	213	168	3,514

Source: Camp Dresser & McKee Inc., 2000

Table C-8
Total and Impervious Area by Land Use
Alternative C - 2015

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Area Subtotals
	Airport Operations (acres)	Airport Open Space (acres)	Industrial (acres)	Commercial (acres)	Residential (acres)	Open Space (acres)	Transportation (acres)	(acres)
Santa Monica Bay Watershed								
Total Area	1,692	356	70	45	0	426	134	2,723
Impervious Area	1,692	160	70	45	0	149	107	2,224
Dominguez Channel Watershed								
Total Area	1,067	105	113	24	0	89	101	1,499
Impervious Area	1,067	47	113	24	0	31	81	1,363
Study Area								
Total Area	2,759	461	183	69	0	515	235	4,222
Impervious Area	2,759	207	183	69	0	180	188	3,587

Source: Camp Dresser & McKee Inc., 2000

Attachment D

Average Annual Storm Water Runoff and Pollutant Loads Generated within Hydrology and Water Quality Study Area

TABLE D-1
Average Annual Storm Water Runoff
Baseline Conditions

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Runoff Subtotals
	Airport Operations (ft3)	Airport Open Space (ft3)	Industrial (ft3)	Commercial (ft3)	Residential (ft3)	Open Space (ft3)	Transportation (ft3)	(ft3)
Santa Monica Bay Watershed								
	55,405,706	7,382,675	724,258	362,129	0	10,556,960	2,853,122	77,284,850
Dominguez Channel Watershed								
	32,012,186	582,348	10,393,097	2,281,411	5,214,655	140,551	2,404,988	53,029,236
Runoff Totals								
	87,417,892	**7,965,023**	**11,117,354**	**2,643,540**	**5,214,655**	**10,697,511**	**5,258,110**	**130,314,086**

Source: Camp Dresser & McKee Inc., 2000

TABLE D-2
Estimated Pollutant Loads
Baseline Conditions

Region within Hydrology and Water Quality Study Area	Parameter	Land Use Classifications							Pollutant Load Subtotals (lbs/yr)
		Airport Operations (lbs/yr)	Airport Open Space (lbs/yr)	Industrial (lbs/yr)	Commercial (lbs/yr)	Residential (lbs/yr)	Open Space (lbs/yr)	Transportation (lbs/yr)	
Santa Monica Bay Watershed									
	TSS	65,753	8,761	8,636	1,490	0	46,792	11,025	142,457
	Total P	830	111	18	9	0	132	71	1,171
	TKN	3,701	493	131	68	0	725	285	5,403
	Total Cu	163	22	2	1	0	3	8	198
	Total Pb	52	7	1	0	0	0	2	62
	Total Zn	989	132	20	5	0	34	51	1,231
	O&G	7,921	1,055	72	75	0	198	552	9,873
	BOD_5	22,413	2,987	1,053	610	0	9,227	3,919	40,209
	COD	158,069	21,062	3,708	1,763	0	9,227	8,015	201,844
Dominguez Channel Watershed									
	TSS	37,990	691	123,924	9,386	18,100	623	9,294	200,008
	Total P	480	9	260	57	98	2	60	964
	TKN	2,138	39	1,882	427	781	10	240	5,517
	Total Cu	94	2	23	4	6	0	7	136
	Total Pb	30	1	13	2	5	0	2	52
	Total Zn	572	10	282	34	69	0	43	1,010
	O&G	4,576	83	1,038	470	423	3	465	7,059
	BOD_5	12,950	236	15,117	3,845	5,990	123	3,303	41,564
	COD	91,329	1,661	53,203	11,109	21,160	123	6,756	185,341
Total Pollutant Loading									
	TSS	103,743	9,452	132,560	10,875	18,100	47,415	20,319	342,465
	Total P	1,310	119	278	66	98	134	131	2,135
	TKN	5,839	532	2,013	495	781	735	525	10,920
	Total Cu	256	23	25	4	6	3	15	334
	Total Pb	82	7	14	2	5	0	3	114
	Total Zn	1,561	142	301	40	69	34	94	2,241
	O&G	12,497	1,139	1,110	545	423	200	1,018	16,932
	BOD_5	35,363	3,222	16,171	4,456	5,990	9,349	7,222	81,773
	COD	249,398	22,724	56,910	12,872	21,160	9,349	14,771	387,186

Source: Camp Dresser & McKee Inc., 2000

Table D-3
Average Annual Wet Weather Pollutant Loads
Baseline Conditions

Pollutant	Total Pollutant Load				
	Santa Monica Bay Watershed		Dominguez Channel Watershed		Total
	(lbs/year)	% of Total	(lbs/year)	% of Total	(lbs/year)
TSS	142,457	42	200,008	58	342,465
Total P	1,171	55	964	45	2,135
TKN	5,403	49	5,517	51	10,920
Total Cu	198	59	136	41	334
Total Pb	62	54	52	46	114
Total Zn	1,231	55	1,010	45	2,241
O&G	9,873	58	7,059	42	16,932
BOD5	40,209	49	41,564	51	81,773
COD	201,844	52	185,341	48	387,186

TABLE D-4
Average Annual Storm Water Runoff
No Action/No Project Alternative - (2005-2015)

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Runoff Subtotals (ft3)
	Airport Operations (ft3)	Airport Open Space (ft3)	Industrial (ft3)	Commercial (ft3)	Residential (ft3)	Open Space (ft3)	Transportation (ft3)	
Santa Monica Bay Watershed								
	55,985,112	7,082,108	4,200,694	3,874,778	0	7,527,300	2,868,060	81,538,052
Dominguez Channel Watershed								
	32,736,444	0	10,429,309	2,969,456	470,767	2,077,035	2,404,988	51,087,999
Runoff Totals								
	88,721,556	**7,082,108**	**14,630,004**	**6,844,234**	**470,767**	**9,604,335**	**5,273,048**	**132,626,052**

Source: Camp Dresser & McKee Inc., 2000

TABLE D-5
Estimated Pollutant Loads
No Action/No Project Alternative - (2005-2015)

Region within Hydrology and Water Quality Study Area	Parameter	Land Use Classifications							Pollutant Load Subtotals
		Airport Operations (lbs/yr)	Airport Open Space (lbs/yr)	Industrial (lbs/yr)	Commercial (lbs/yr)	Residential (lbs/yr)	Open Space (lbs/yr)	Transportation (lbs/yr)	(lbs/yr)
Santa Monica Bay Watershed									
	TSS	66,440	8,405	50,088	15,941	0	33,364	11,083	185,320
	Total P	839	106	105	97	0	94	72	1,312
	TKN	3,740	473	760	726	0	517	286	6,502
	Total Cu	164	21	9	7	0	2	8	212
	Total Pb	52	7	5	4	0	0	2	70
	Total Zn	1,000	126	114	58	0	24	51	1,373
	O&G	8,004	1,012	420	798	0	141	555	10,930
	BOD_5	22,648	2,865	6,110	6,531	0	6,579	3,939	48,672
	COD	159,722	20,205	21,504	18,868	0	6,579	8,057	234,934
Dominguez Channel Watershed									
	TSS	38,850	0	124,356	12,216	1,634	9,206	9,294	195,556
	Total P	490	0	260	74	9	26	60	920
	TKN	2,187	0	1,888	556	71	143	240	5,084
	Total Cu	96	0	23	5	1	1	7	133
	Total Pb	31	0	13	3	0	0	2	48
	Total Zn	584	0	283	45	6	7	43	967
	O&G	4,680	0	1,042	612	38	39	465	6,876
	BOD_5	13,243	0	15,170	5,005	541	1,815	3,303	39,077
	COD	93,395	0	53,388	14,459	1,910	1,815	6,756	171,725
Total Pollutant Loading									
	TSS	105,290	8,405	174,444	28,157	1,634	42,570	20,376	380,876
	Total P	1,329	106	365	171	9	120	132	2,232
	TKN	5,926	473	2,649	1,282	71	660	527	11,587
	Total Cu	260	21	33	12	1	3	15	345
	Total Pb	83	7	18	6	0	0	3	118
	Total Zn	1,584	126	396	103	6	31	94	2,341
	O&G	12,684	1,012	1,461	1,410	38	180	1,020	17,806
	BOD_5	35,891	2,865	21,280	11,536	541	8,394	7,242	87,749
	COD	253,118	20,205	74,892	33,327	1,910	8,394	14,813	406,659

Source: Camp Dresser & McKee Inc., 2000

Table D-6
Average Annual Wet Weather Pollutant Loads
No Action/No Project Alternative - (2005-2015)

Pollutant	Total Pollutant Load				
	Santa Monica Bay Watershed		Dominguez Channel Watershed		Total
	(lbs/year)	% of Total	(lbs/year)	% of Total	(lbs/year)
TSS	185,320	49	195,556	51	380,876
Total P	1,312	59	920	41	2,232
TKN	6,502	56	5,084	44	11,587
Total Cu	212	61	133	39	345
Total Pb	70	59	48	41	118
Total Zn	1,373	59	967	41	2,341
O&G	10,930	61	6,876	39	17,806
BOD5	48,672	55	39,077	45	87,749
COD	234,934	58	171,725	42	406,659

TABLE D-7
Average Annual Storm Water Runoff
Alternative A - 2005

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Runoff Subtotals (ft3)
	Airport Operations (ft3)	Airport Open Space (ft3)	Industrial (ft3)	Commercial (ft3)	Residential (ft3)	Open Space (ft3)	Transportation (ft3)	
Santa Monica Bay Watershed								
	57,976,821	7,702,027	1,050,174	1,303,664	0	8,011,421	3,958,520	80,002,626
Dominguez Channel Watershed								
	35,017,855	3,362,592	3,910,991	144,852	0	2,170,736	3,077,189	47,684,215
Runoff Totals								
	92,994,676	**11,064,619**	**4,961,165**	**1,448,515**	**0**	**10,182,157**	**7,035,710**	**127,686,841**

Source: Camp Dresser & McKee Inc., 2000

TABLE D-8
Estimated Pollutant Loads
Alternative A - 2005

Region within Hydrology and Water Quality Study Area	Parameter	Land Use Classifications							Pollutant Load Subtotals
		Airport Operations (lbs/yr)	Airport Open Space (lbs/yr)	Industrial (lbs/yr)	Commercial (lbs/yr)	Residential (lbs/yr)	Open Space (lbs/yr)	Transportation (lbs/yr)	(lbs/yr)
Santa Monica Bay Watershed									
	TSS	68,804	9,140	12,522	5,363	0	35,510	15,297	146,636
	Total P	869	115	26	33	0	100	99	1,242
	TKN	3,873	514	190	244	0	550	395	5,767
	Total Cu	170	23	2	2	0	3	12	211
	Total Pb	54	7	1	1	0	0	3	67
	Total Zn	1,035	138	28	20	0	26	71	1,317
	O&G	8,288	1,101	105	269	0	150	766	10,679
	BOD_5	23,453	3,116	1,528	2,197	0	7,002	5,437	42,733
	COD	165,405	21,973	5,376	6,348	0	7,002	11,120	217,224
Dominguez Channel Watershed									
	TSS	41,557	3,991	46,633	596	0	9,621	11,891	114,290
	Total P	525	50	98	4	0	27	77	780
	TKN	2,339	225	708	27	0	149	307	3,755
	Total Cu	103	10	9	0	0	1	9	131
	Total Pb	33	3	5	0	0	0	2	43
	Total Zn	625	60	106	2	0	7	55	855
	O&G	5,006	481	391	30	0	41	596	6,544
	BOD_5	14,166	1,360	5,689	244	0	1,897	4,226	27,582
	COD	99,904	9,593	20,021	705	0	1,897	8,645	140,765
Total Pollutant Loading									
	TSS	110,361	13,131	59,155	5,959	0	45,131	27,188	260,926
	Total P	1,393	166	124	36	0	127	176	2,022
	TKN	6,212	739	898	271	0	699	703	9,522
	Total Cu	273	32	11	2	0	3	21	343
	Total Pb	87	10	6	1	0	0	5	110
	Total Zn	1,660	198	134	22	0	32	126	2,172
	O&G	13,294	1,582	496	298	0	191	1,362	17,222
	BOD_5	37,619	4,476	7,216	2,442	0	8,899	9,663	70,315
	COD	265,309	31,567	25,397	7,053	0	8,899	19,765	357,989

Source: Camp Dresser & McKee Inc., 2000

Table D-9
Average Annual Wet Weather Pollutant Loads
Alternative A 2005

Pollutant	Total Pollutant Load				
	Santa Monica Bay Watershed		Dominguez Channel Watershed		Total
	(lbs/year)	% of Total	(lbs/year)	% of Total	(lbs/year)
TSS	146,636	56	114,290	44	260,926
Total P	1,242	61	780	39	2,022
TKN	5,767	61	3,755	39	9,522
Total Cu	211	62	131	38	343
Total Pb	67	61	43	39	110
Total Zn	1,317	61	855	39	2,172
O&G	10,679	62	6,544	38	17,222
BOD5	42,733	61	27,582	39	70,315
COD	217,224	61	140,765	39	357,989

TABLE D-10
Average Annual Storm Water Runoff
Alternative A - 2015

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Runoff Subtotals (ft3)
	Airport Operations (ft3)	Airport Open Space (ft3)	Industrial (ft3)	Commercial (ft3)	Residential (ft3)	Open Space (ft3)	Transportation (ft3)	
Santa Monica Bay Watershed								
	61,706,748	5,842,269	2,643,540	3,259,159	0	6,387,273	4,048,147	83,887,137
Dominguez Channel Watershed								
	40,667,064	1,934,899	3,150,521	144,852	0	1,218,111	3,122,003	50,237,449
Runoff Totals								
	102,373,812	**7,777,169**	**5,794,061**	**3,404,011**	**0**	**7,605,384**	**7,170,150**	**134,124,586**

Source: Camp Dresser & McKee Inc., 2000

TABLE D-11
Storm Water Pollutant Loads
Alternative A - 2015

Region within Hydrology and Water Quality Study Area	Parameter	Land Use Classifications: Airport Operations (lbs/yr)	Airport Open Space (lbs/yr)	Industrial (lbs/yr)	Commercial (lbs/yr)	Residential (lbs/yr)	Open Space (lbs/yr)	Transportation (lbs/yr)	Pollutant Load Subtotals (lbs/yr)
Santa Monica Bay Watershed									
	TSS	73,230	6,933	31,521	13,408	0	28,311	15,643	169,047
	Total P	925	88	66	81	0	80	101	1,340
	TKN	4,122	390	479	610	0	439	404	6,444
	Total Cu	181	17	6	5	0	2	12	224
	Total Pb	58	5	3	3	0	0	3	72
	Total Zn	1,102	104	72	49	0	20	72	1,419
	O&G	8,822	835	264	671	0	120	783	11,495
	BOD_5	24,962	2,363	3,845	5,493	0	5,582	5,560	47,807
	COD	176,046	16,668	13,532	15,870	0	5,582	11,372	239,071
Dominguez Channel Watershed									
	TSS	48,262	2,296	37,566	596	0	5,399	12,064	106,183
	Total P	609	29	79	4	0	15	78	814
	TKN	2,716	129	570	27	0	84	312	3,839
	Total Cu	119	6	7	0	0	0	9	142
	Total Pb	38	2	4	0	0	0	2	46
	Total Zn	726	35	85	2	0	4	56	908
	O&G	5,814	277	315	30	0	23	604	7,062
	BOD_5	16,451	783	4,583	244	0	1,065	4,288	27,413
	COD	116,021	5,520	16,128	705	0	1,065	8,770	148,209
Total Pollutant Loading									
	TSS	121,492	9,230	69,087	14,004	0	33,710	27,707	275,229
	Total P	1,534	117	145	85	0	95	179	2,154
	TKN	6,838	519	1,049	638	0	522	716	10,283
	Total Cu	300	23	13	6	0	2	21	365
	Total Pb	96	7	7	3	0	0	5	118
	Total Zn	1,828	139	157	51	0	24	128	2,327
	O&G	14,635	1,112	579	701	0	142	1,388	18,557
	BOD_5	41,413	3,146	8,428	5,738	0	6,647	9,848	75,220
	COD	292,067	22,188	29,660	16,575	0	6,647	20,143	387,280

Source: Camp Dresser & McKee Inc., 2000

Table D-12
Average Annual Wet Weather Pollutant Loads
Alternative A 2015

Pollutant	Total Pollutant Load				
	Santa Monica Bay Watershed		Dominguez Channel Watershed		Total
	(lbs/year)	% of Total	(lbs/year)	% of Total	(lbs/year)
TSS	169,047	61	106,183	39	275,229
Total P	1,340	62	814	38	2,154
TKN	6,444	63	3,839	37	10,283
Total Cu	224	61	142	39	365
Total Pb	72	61	46	39	118
Total Zn	1,419	61	908	39	2,327
O&G	11,495	62	7,062	38	18,557
BOD5	47,807	64	27,413	36	75,220
COD	239,071	62	148,209	38	387,280

TABLE D-13
Average Annual Storm Water Runoff
Alternative B - 2005

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Runoff Subtotals (ft3)
	Airport Operations (ft3)	Airport Open Space (ft3)	Industrial (ft3)	Commercial (ft3)	Residential (ft3)	Open Space (ft3)	Transportation (ft3)	
Santa Monica Bay Watershed								
	58,664,866	7,269,962	1,665,792	579,406	0	7,902,103	4,421,593	80,503,722
Dominguez Channel Watershed								
	43,419,243	1,070,770	1,122,599	72,426	0	1,889,633	2,614,117	50,188,788
Runoff Totals								
	102,084,109	**8,340,732**	**2,788,392**	**651,832**	**0**	**9,791,736**	**7,035,710**	**130,692,510**

Source: Camp Dresser & McKee Inc., 2000

TABLE D-14
Estimated Pollutant Loads
Alternative B - 2005

Region within Hydrology and Water Quality Study Area	Parameter	Land Use Classifications							Pollutant Load Subtotals
		Airport Operations (lbs/yr)	Airport Open Space (lbs/yr)	Industrial (lbs/yr)	Commercial (lbs/yr)	Residential (lbs/yr)	Open Space (lbs/yr)	Transportation (lbs/yr)	(lbs/yr)
Santa Monica Bay Watershed									
	TSS	69,621	8,628	19,862	2,384	0	35,025	17,086	152,605
	Total P	879	109	42	14	0	99	110	1,253
	TKN	3,919	486	302	109	0	543	442	5,799
	Total Cu	172	21	4	1	0	2	13	214
	Total Pb	55	7	2	1	0	0	3	67
	Total Zn	1,047	130	45	9	0	25	79	1,335
	O&G	8,387	1,039	166	119	0	148	856	10,715
	BOD_5	23,732	2,941	2,423	977	0	6,906	6,073	43,051
	COD	167,368	20,741	8,527	2,821	0	6,906	12,421	218,785
Dominguez Channel Watershed									
	TSS	51,528	1,271	13,386	298	0	8,376	10,102	84,960
	Total P	651	16	28	2	0	24	65	785
	TKN	2,900	72	203	14	0	130	261	3,579
	Total Cu	127	3	3	0	0	1	8	141
	Total Pb	41	1	1	0	0	0	2	45
	Total Zn	775	19	30	1	0	6	47	879
	O&G	6,207	153	112	15	0	35	506	7,029
	BOD_5	17,564	433	1,633	122	0	1,652	3,590	24,994
	COD	123,873	3,055	5,747	353	0	1,652	7,344	142,022
Total Pollutant Loading									
	TSS	121,148	9,898	33,248	2,682	0	43,401	27,188	237,565
	Total P	1,529	125	70	16	0	122	176	2,038
	TKN	6,819	557	505	122	0	672	703	9,378
	Total Cu	300	24	6	1	0	3	21	355
	Total Pb	96	8	3	1	0	0	5	112
	Total Zn	1,823	149	76	10	0	31	126	2,214
	O&G	14,594	1,192	279	134	0	183	1,362	17,744
	BOD_5	41,296	3,374	4,056	1,099	0	8,558	9,663	68,046
	COD	291,240	23,796	14,274	3,174	0	8,558	19,765	360,807

Source: Camp Dresser & McKee Inc., 2000

Table D-15
Average Annual Wet Weather Pollutant Loads
Alternative B 2005

Pollutant	Total Pollutant Load				
	Santa Monica Bay Watershed		Dominguez Channel Watershed		Total
	(lbs/year)	% of Total	(lbs/year)	% of Total	(lbs/year)
TSS	152,605	64	84,960	36	237,565
Total P	1,253	61	785	39	2,038
TKN	5,799	62	3,579	38	9,378
Total Cu	214	60	141	40	355
Total Pb	67	60	45	40	112
Total Zn	1,335	60	879	40	2,214
O&G	10,715	60	7,029	40	17,744
BOD5	43,051	63	24,994	37	68,046
COD	218,785	61	142,022	39	360,807

TABLE D-16
Average Annual Storm Water Runoff
Alternative B - 2015

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Runoff Subtotals (ft3)
	Airport Operations (ft3)	Airport Open Space (ft3)	Industrial (ft3)	Commercial (ft3)	Residential (ft3)	Open Space (ft3)	Transportation (ft3)	
Santa Monica Bay Watershed								
	57,469,841	6,368,261	4,164,481	1,484,728	0	7,417,982	4,944,416	81,849,709
Dominguez Channel Watershed								
	45,157,461	1,371,336	325,916	72,426	0	1,311,812	2,509,553	50,748,504
Runoff Totals								
	102,627,302	**7,739,598**	**4,490,397**	**1,557,154**	**0**	**8,729,794**	**7,453,969**	**132,598,213**

Table D-17
Estimated Pollutant Loads
Alternative B - 2015

Region within Hydrology and Water Quality Study Area	Parameter	Land Use Classifications: Airport Operations (lbs/yr)	Airport Open Space (lbs/yr)	Industrial (lbs/yr)	Commercial (lbs/yr)	Residential (lbs/yr)	Open Space (lbs/yr)	Transportation (lbs/yr)	Pollutant Load Subtotals (lbs/yr)
Santa Monica Bay Watershed									
	TSS	68,202	7,558	49,656	6,108	0	32,879	19,107	183,510
	Total P	861	95	104	37	0	93	123	1,314
	TKN	3,839	425	754	278	0	509	494	6,299
	Total Cu	169	19	9	3	0	2	15	216
	Total Pb	54	6	5	1	0	0	3	69
	Total Zn	1,026	114	113	22	0	24	88	1,387
	O&G	8,216	910	416	306	0	139	957	10,944
	BOD_5	23,248	2,576	6,058	2,503	0	6,483	6,791	47,659
	COD	163,958	18,168	21,318	7,230	0	6,483	13,890	231,048
Dominguez Channel Watershed									
	TSS	53,591	1,627	3,886	298	0	5,814	9,698	74,914
	Total P	677	21	8	2	0	16	63	786
	TKN	3,016	92	59	14	0	90	251	3,521
	Total Cu	132	4	1	0	0	0	7	145
	Total Pb	42	1	0	0	0	0	2	46
	Total Zn	806	24	9	1	0	4	45	890
	O&G	6,456	196	33	15	0	25	486	7,209
	BOD_5	18,268	555	474	122	0	1,147	3,447	24,012
	COD	128,832	3,912	1,668	353	0	1,147	7,050	142,962
Total Pollutant Loading									
	TSS	121,793	9,185	53,542	6,406	0	38,694	28,804	258,424
	Total P	1,538	116	112	39	0	109	186	2,100
	TKN	6,855	517	813	292	0	599	745	9,821
	Total Cu	301	23	10	3	0	3	22	361
	Total Pb	96	7	6	1	0	0	5	115
	Total Zn	1,832	138	122	23	0	28	133	2,276
	O&G	14,672	1,106	449	321	0	163	1,443	18,153
	BOD_5	41,516	3,131	6,532	2,625	0	7,630	10,237	71,670
	COD	292,790	22,081	22,987	7,582	0	7,630	20,940	374,009

Source: Camp Dresser & McKee Inc., 2000

Table D-18
Average Annual Wet Weather Pollutant Loads
Alternative B 2015

Pollutant	Total Pollutant Load				
	Santa Monica Bay Watershed		Dominguez Channel Watershed		Total
	(lbs/year)	% of Total	(lbs/year)	% of Total	(lbs/year)
TSS	183,510	71	74,914	29	258,424
Total P	1,314	63	786	37	2,100
TKN	6,299	64	3,521	36	9,821
Total Cu	216	60	145	40	361
Total Pb	69	60	46	40	115
Total Zn	1,387	61	890	39	2,276
O&G	10,944	60	7,209	40	18,153
BOD5	47,659	66	24,012	34	71,670
COD	231,048	62	142,962	38	374,009

Table D-19
Average Annual Storm Water Runoff
Alternative C - 2005

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Runoff Subtotals
	Airport Operations (ft3)	Airport Open Space (ft3)	Industrial (ft3)	Commercial (ft3)	Residential (ft3)	Open Space (ft3)	Transportation (ft3)	(ft3)
Santa Monica Bay Watershed								
	59,642,613	7,345,104	1,013,961	651,832	0	8,073,888	3,659,764	80,387,162
Dominguez Channel Watershed								
	38,892,633	1,840,972	3,983,417	1,303,664	0	1,436,746	2,614,117	50,071,549
Runoff Totals								
	98,535,246	**9,186,076**	**4,997,377**	**1,955,496**	**0**	**9,510,634**	**6,273,881**	**130,458,711**

Source: Camp Dresser & McKee Inc., 2000

Table D-20
Estimated Pollutant Loads
Alternative C - 2005

Region within Hydrology and Water Quality Study Area	Parameter	Land Use Classifications							Pollutant Load Subtotals
		Airport Operations (lbs/yr)	Airport Open Space (lbs/yr)	Industrial (lbs/yr)	Commercial (lbs/yr)	Residential (lbs/yr)	Open Space (lbs/yr)	Transportation (lbs/yr)	(lbs/yr)
Santa Monica Bay Watershed									
	TSS	70,781	8,717	12,090	2,682	0	35,786	14,142	144,198
	Total P	894	110	25	16	0	101	91	1,237
	TKN	3,984	491	184	122	0	554	366	5,700
	Total Cu	175	22	2	1	0	3	11	213
	Total Pb	56	7	1	1	0	0	2	67
	Total Zn	1,065	131	27	10	0	26	65	1,324
	O&G	8,526	1,050	101	134	0	151	708	10,672
	BOD_5	24,127	2,971	1,475	1,099	0	7,056	5,026	41,755
	COD	170,157	20,955	5,191	3,174	0	7,056	10,281	216,814
Dominguez Channel Watershed									
	TSS	46,156	2,185	47,497	5,363	0	6,368	10,102	117,671
	Total P	583	28	99	33	0	18	65	826
	TKN	2,598	123	721	244	0	99	261	4,046
	Total Cu	114	5	9	2	0	0	8	139
	Total Pb	36	2	5	1	0	0	2	46
	Total Zn	694	33	108	20	0	5	47	906
	O&G	5,560	263	398	269	0	27	506	7,023
	BOD_5	15,733	745	5,794	2,197	0	1,256	3,590	29,315
	COD	110,959	5,252	20,391	6,348	0	1,256	7,344	151,549
Total Pollutant Loading									
	TSS	116,937	10,902	59,587	8,045	0	42,155	24,244	261,869
	Total P	1,476	138	125	49	0	119	157	2,063
	TKN	6,582	614	905	366	0	653	627	9,746
	Total Cu	289	27	11	3	0	3	18	352
	Total Pb	92	9	6	2	0	0	4	113
	Total Zn	1,759	164	135	29	0	30	112	2,230
	O&G	14,087	1,313	499	403	0	178	1,214	17,694
	BOD_5	39,861	3,716	7,269	3,296	0	8,312	8,617	71,070
	COD	281,116	26,207	25,582	9,522	0	8,312	17,625	368,364

Source: Camp Dresser & McKee Inc., 2000

Table D-21
Average Annual Wet Weather Pollutant Loads
Alternative C 2005

Pollutant	Total Pollutant Load				
	Santa Monica Bay Watershed		Dominguez Channel Watershed		Total
	(lbs/year)	% of Total	(lbs/year)	% of Total	(lbs/year)
TSS	144,198	55	117,671	45	261,869
Total P	1,237	60	826	40	2,063
TKN	5,700	58	4,046	42	9,746
Total Cu	213	61	139	39	352
Total Pb	67	59	46	41	113
Total Zn	1,324	59	906	41	2,230
O&G	10,672	60	7,023	40	17,694
BOD5	41,755	59	29,315	41	71,070
COD	216,814	59	151,549	41	368,364

TABLE D-22
Average Annual Storm Water Runoff
Alternative C - 2015

Region within Hydrology and Water Quality Study Area	Land Use Classifications							Runoff Subtotals
	Airport Operations (ft3)	Airport Open Space (ft3)	Industrial (ft3)	Commercial (ft3)	Residential (ft3)	Open Space (ft3)	Transportation (ft3)	(ft3)
Santa Monica Bay Watershed								
	61,272,193	6,687,614	2,534,902	1,629,580	0	6,652,759	4,003,334	82,780,380
Dominguez Channel Watershed								
	38,639,143	1,972,470	4,092,055	869,109	0	1,389,896	3,017,438	49,980,112
Runoff Totals								
	99,911,336	**8,660,084**	**6,626,957**	**2,498,689**	**0**	**8,042,654**	**7,020,772**	**132,760,492**

Source: Camp Dresser & McKee Inc., 2000

TABLE D-23
Estimated Pollutant Loads
Alternative C - 2015

Region within Hydrology and Water Quality Study Area	Parameter	Land Use Classifications							Pollutant Load Subtotals
		Airport Operations (lbs/yr)	Airport Open Space (lbs/yr)	Industrial (lbs/yr)	Commercial (lbs/yr)	Residential (lbs/yr)	Open Space (lbs/yr)	Transportation (lbs/yr)	(lbs/yr)
Santa Monica Bay Watershed									
	TSS	72,715	7,937	30,225	6,704	0	29,487	15,470	162,538
	Total P	918	100	63	41	0	83	100	1,305
	TKN	4,093	447	459	305	0	457	400	6,160
	Total Cu	180	20	6	3	0	2	12	222
	Total Pb	57	6	3	1	0	0	3	71
	Total Zn	1,094	119	69	25	0	21	71	1,399
	O&G	8,759	956	253	336	0	125	775	11,204
	BOD_5	24,787	2,705	3,687	2,747	0	5,814	5,498	45,238
	COD	174,806	19,079	12,976	7,935	0	5,814	11,246	231,858
Dominguez Channel Watershed									
	TSS	45,855	2,341	48,792	3,575	0	6,161	11,660	118,384
	Total P	579	30	102	22	0	17	75	825
	TKN	2,581	132	741	163	0	95	301	4,013
	Total Cu	113	6	9	1	0	0	9	139
	Total Pb	36	2	5	1	0	0	2	46
	Total Zn	690	35	111	13	0	4	54	907
	O&G	5,524	282	409	179	0	26	584	7,004
	BOD_5	15,631	798	5,952	1,465	0	1,215	4,144	29,205
	COD	110,235	5,627	20,948	4,232	0	1,215	8,477	150,734
Total Pollutant Loading									
	TSS	118,570	10,277	79,018	10,280	0	35,648	27,130	280,923
	Total P	1,497	130	165	62	0	100	175	2,130
	TKN	6,674	578	1,200	468	0	552	701	10,174
	Total Cu	293	25	15	4	0	3	21	361
	Total Pb	94	8	8	2	0	0	5	117
	Total Zn	1,784	155	180	38	0	26	125	2,307
	O&G	14,283	1,238	662	515	0	151	1,359	18,207
	BOD_5	40,417	3,503	9,639	4,212	0	7,029	9,642	74,443
	COD	285,041	24,707	33,924	12,167	0	7,029	19,723	382,591

Source: Camp Dresser & McKee Inc., 2000

Table D-24
Average Annual Wet Weather Pollutant Loads
Alternative C 2015

Pollutant	Total Pollutant Load				
	Santa Monica Bay Watershed		Dominguez Channel Watershed		Total
	(lbs/year)	% of Total	(lbs/year)	% of Total	(lbs/year)
TSS	162,538	58	118,384	42	280,923
Total P	1,305	61	825	39	2,130
TKN	6,160	61	4,013	39	10,174
Total Cu	222	61	139	39	361
Total Pb	71	61	46	39	117
Total Zn	1,399	61	907	39	2,307
O&G	11,204	62	7,004	38	18,207
BOD5	45,238	61	29,205	39	74,443
COD	231,858	61	150,734	39	382,591