

CHAPTER FOUR AFFECTED ENVIRONMENT

The Affected Environment chapter provides a description of the existing environmental conditions¹ in and around the vicinity of Gness Field Airport (DVO or Airport). This description of existing conditions describes the area(s) that may be affected by the Sponsor's Proposed Project. It also provides a basis of comparison to determine the environmental consequences of the Sponsor's Proposed Project and remaining alternatives, relative to existing social, economic, and environmental settings. Existing conditions for the following categories listed are described in this chapter, Chapter Four. The remaining categories' existing conditions are described in Chapter Five, *Environmental Consequences*. The affected environment is described in terms of:

- Airport Setting and Location
 - Study Areas
 - Climate and Topography
- Noise
 - Existing Noise Exposure
 - Noise Measurements
- Compatible Land Use
 - Existing Land Use
 - Future Planned Land Use
- Socioeconomic Overview
 - Population Trends
 - Economic Growth and Employment
- Existing Air Quality Conditions
- Water Resources
 - Wetlands and Waters of the U.S.
 - Floodplains
- Public Lands
 - Department of Transportation (DOT) Section 4(f) Resources and Land and Water Conservation Act, Section 6(f) Resources
 - Public Parks and Recreation Facilities
- Historic, Architectural, Archaeological, and Cultural Resources
- Energy Supply and Natural Resources
- Fish, Wildlife, and Plants
 - Threatened and Endangered Species

¹ Conditions measured in 2008 represent existing conditions for these analyses.

4.0 AIRPORT SETTING AND LOCATION

DVO is located in the unincorporated area of Marin County approximately three miles north of the City of Novato on a 120-acre site situated between Highway 101 and the Petaluma River (see **Exhibit 4-1, Airport Regional Location**). DVO is the only public use, general aviation airport in Marin County, California, and one of several reliever airports in the San Francisco Bay area for San Francisco International Airport (SFO) and Oakland International Airport (OAK).

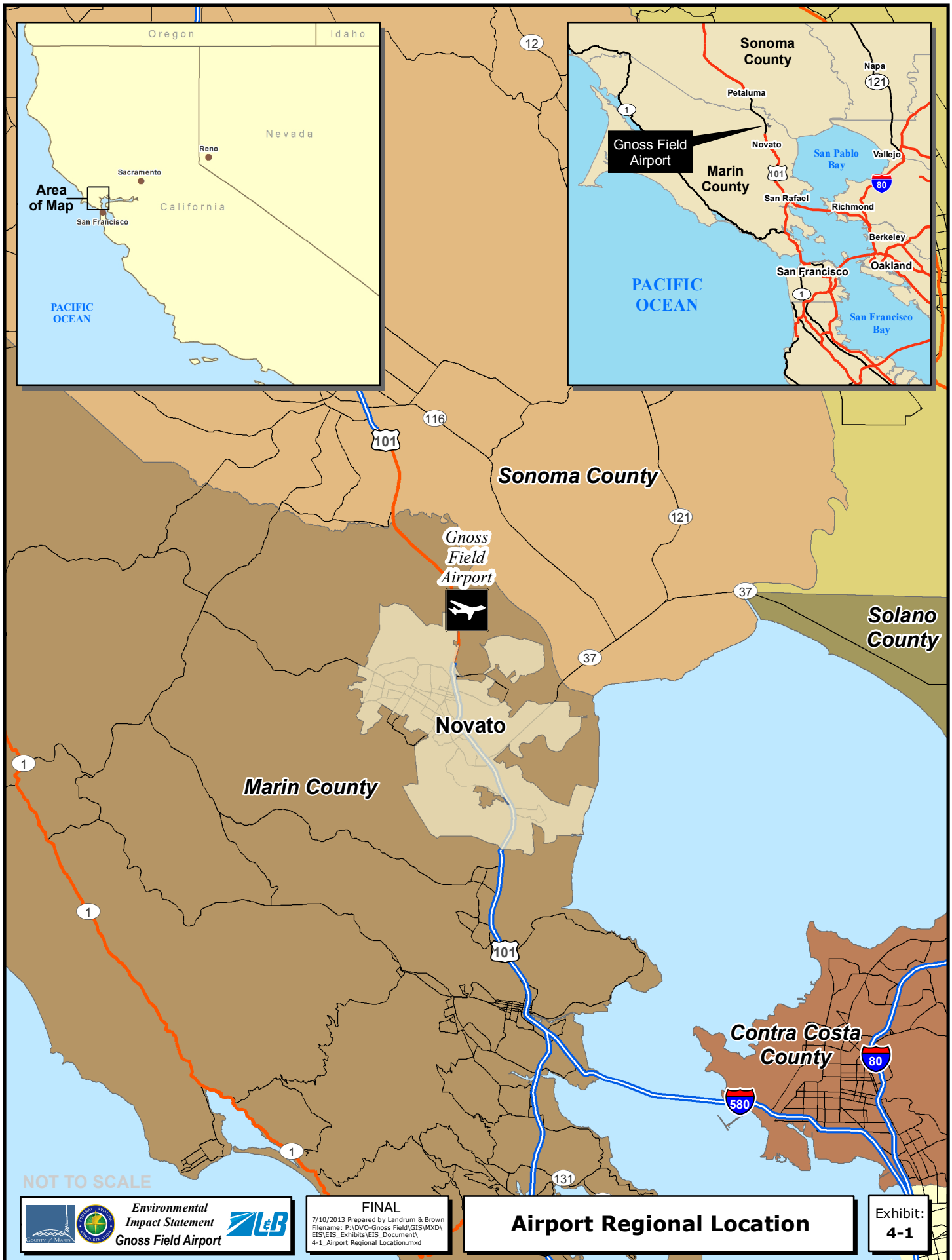
DVO is owned and operated by Marin County, California. The County Department of Public Works is responsible for the daily management of the Airport. The Airport has one runway oriented southeast/northwest (designated Runway 13/31) that measures 3,300 feet long by 75 feet wide. Runway 13/31 was widened from 60 feet to 75 feet due to concerns with the periodic presence of crosswind conditions (winds that blow across the runway rather than towards the ends of the runway). Runways are assigned two numbers that represent the compass heading the runway is pointing towards. For DVO, Runway 13 points to approximately 130 degrees on the magnetic compass, which is a southeasterly direction. Aircraft taking off to the south or landing from the north pointed to the south are using the 13 end of the runway. Likewise, Runway 31 points to approximately 310 degrees on the compass, which is a northwesterly direction. Aircraft taking off to the north or landing from the south pointed to the north are using the 31 end of the runway.

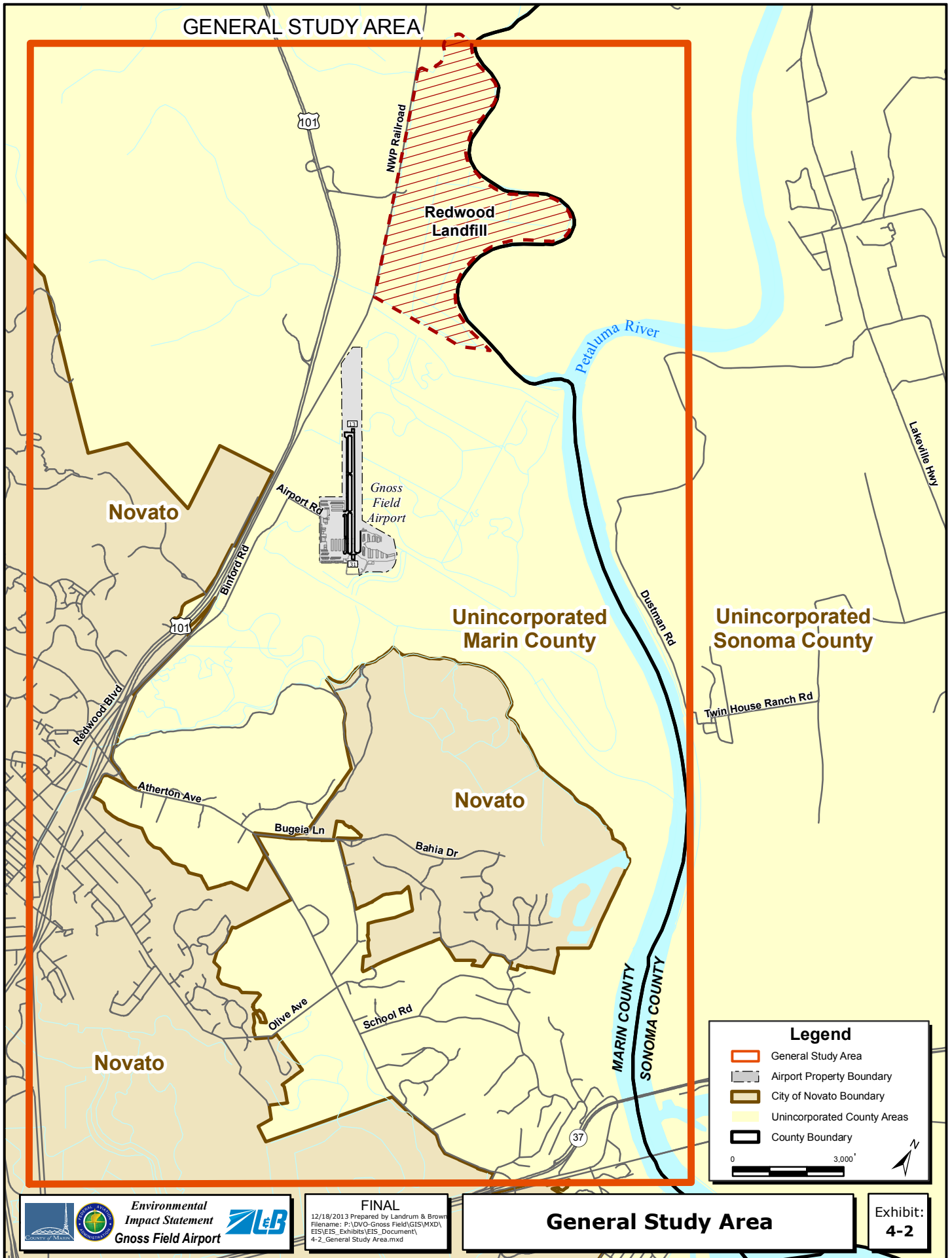
A system of manmade ditches and levees with pumps surround the runway to protect it from flooding. The characteristics of adjacent land uses and zoning, location of nearby communities, and general characteristics of the Airport vicinity are discussed below.

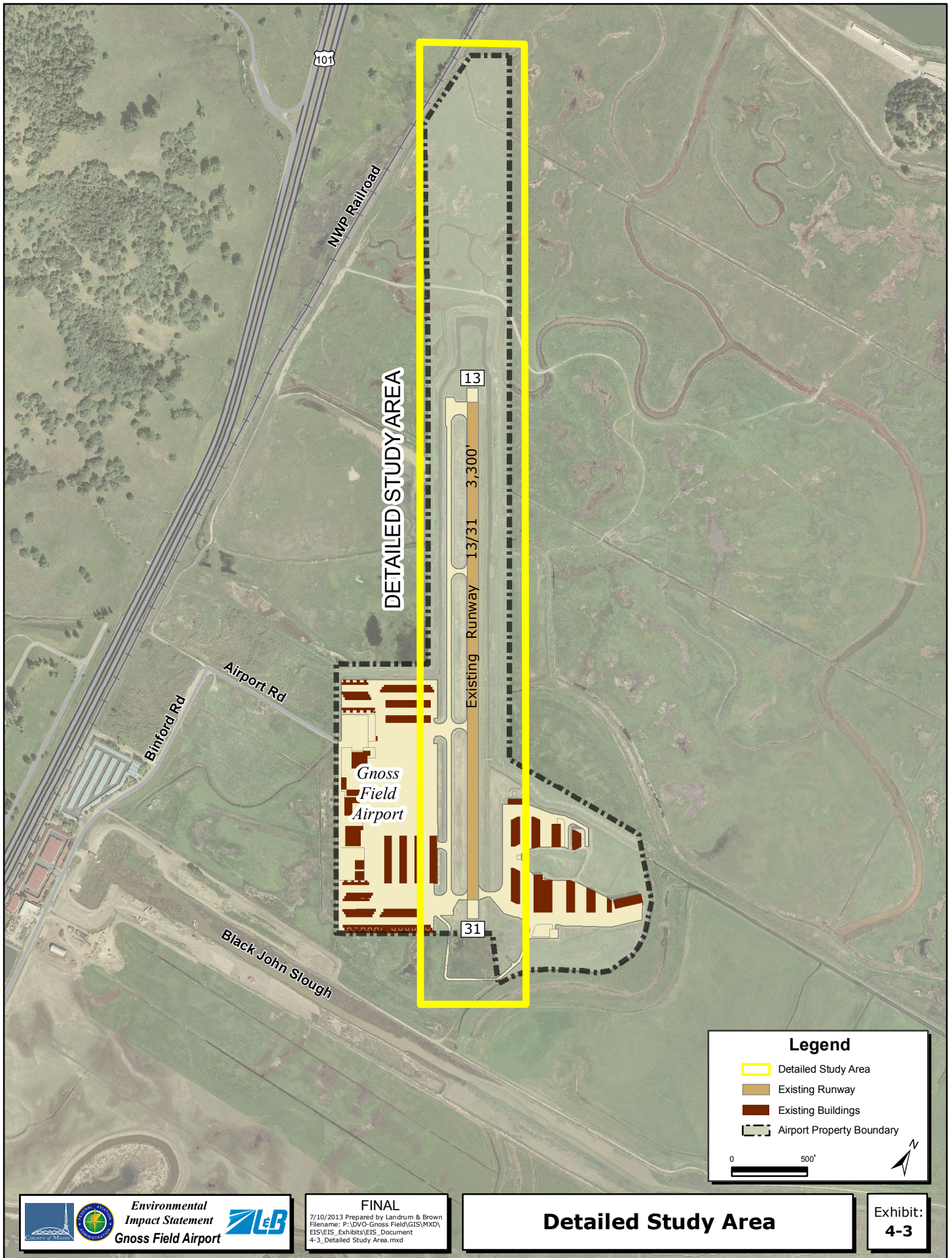
4.0.1 STUDY AREAS

For the purposes of this Environmental Impact Statement (EIS), two study areas have been defined. The General Study Area (GSA) depicts the communities surrounding the Airport. A further refined Detailed Study Area (DSA) depicts the potential land area that may be physically disturbed by the development of the Sponsor's Proposed Project. Exhibits depicting these two study areas show the existing political jurisdictional boundaries; noise-sensitive land uses; compatible land uses; major and minor streets and roadways; and major physical, geographic, and natural features, along with selected place names, road names, and names of major geographic features.

The GSA, shown on **Exhibit 4-2, General Study Area**, covers approximately 12,655 acres and is defined as the area where potential indirect impacts may result from the Sponsor's Proposed Project or its alternatives (see Chapter Two, *Purpose and Need*, for detailed information regarding the Sponsor's Proposed Project). The DSA, shown in **Exhibit 4-3, Detailed Study Area**, covers approximately 102 acres and is defined as the area where potential direct impacts may result from the Sponsor's Proposed Project or its alternatives.







4.0.2 CLIMATE AND TOPOGRAPHY

The climate in the Airport area is generally mild ranging from a mean monthly maximum temperature of 82 degrees Fahrenheit to a mean monthly minimum temperature of 39 degrees Fahrenheit.² Average rainfall is typically highest in December at approximately seven inches and lowest in July at less than one inch.³ DVO is situated on reclaimed marshlands that lie on the eastern flank of low-lying coastal foothills. The area is nearly flat with elevations close to sea level. Several meandering sloughs and excavated drainage channels are located adjacent to the Airport, connecting with the Petaluma River to the east.⁴ Topography to the west and northwest is dominated by Olompali Ridge, which reaches its highest point on Mount Burdell at a summit of approximately 1,556 feet above ground level (1,558-foot mean sea level), located approximately one and one-half miles west of the existing runway. The location of Mount Burdell, coupled with prevailing afternoon offshore wind direction during the spring and summer months leads to strong crosswinds at the Airport during those seasons.⁵ Pinheiro Ridge trends northeast/southwest and lies one mile south of DVO with its highest point at approximately 278 feet above ground level (280 foot mean sea level). Bahia Ridge trends northwest and terminates approximately one mile southeast of DVO at the northeast end of Pinheiro Ridge.⁶ **Exhibit 4-4, Topography**, depicts the topography within the vicinity of DVO.

4.1 NOISE

The following section describes the existing noise exposure at DVO. The primary analysis is based on the development of the average annual Community Noise Equivalent Level (CNEL) noise exposure pattern for the Airport using the FAA's Integrated Noise Model (INM) version 7.0a.⁷ The detailed description of the number of operations, runway use, flight track, and trip length data used as input to the INM version 7.0a for calculation of noise exposure is presented in Appendix E, *Noise Methodology*.

In addition to the noise modeling analysis, a two week noise measurement program was conducted at various locations around the Airport. The results of this program are summarized at the end of the section.

² On-line at <http://www.ncdc.noaa.gov>. Retrieved July 2013.

³ On-line at <http://www.ncdc.noaa.gov>. Retrieved July 2013.

⁴ Cortright & Seibold, *Preliminary Design Report, Runway Extension, Gness Field*, 2002.

⁵ USGS GNIS: Burdell Mountain.

⁶ Cortright & Seibold, *Environmental Impact Report/Environmental Assessment, Marin County (Gness Field) Airport*, Working Paper 6, June 24, 1988.

⁷ INM Version 7.0a was used in the noise analysis as it was the most current version available at the time of analysis.

4.1.1 METHODOLOGY

The evaluation of the Airport noise environment was conducted using the methodologies developed by the FAA and published in FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, FAA Order 1050.1E, Change 1, *Environmental Impacts: Policies and Procedures* and Title 14 Code of Federal Regulations (CFR) Part 150, *Airport Noise Compatibility Planning*. The INM was used to produce noise contours and to analyze noise levels at noise-sensitive sites. FAA Order 1050.1E, Change 1, paragraph 14.1a, requires that the cumulative noise energy resulting from aviation activities must be established in terms of the yearly day-night average sound level (DNL) as FAA's primary noise metric. The paragraph also notes that FAA recognized the use of the CNEL metric as an alternative for use in California. The CNEL metric will be used for noise impact evaluation in this EIS and Marin County is using the CNEL metric in its noise evaluation in its EIR prepared in accordance with the California Environmental Quality Act (CEQA).

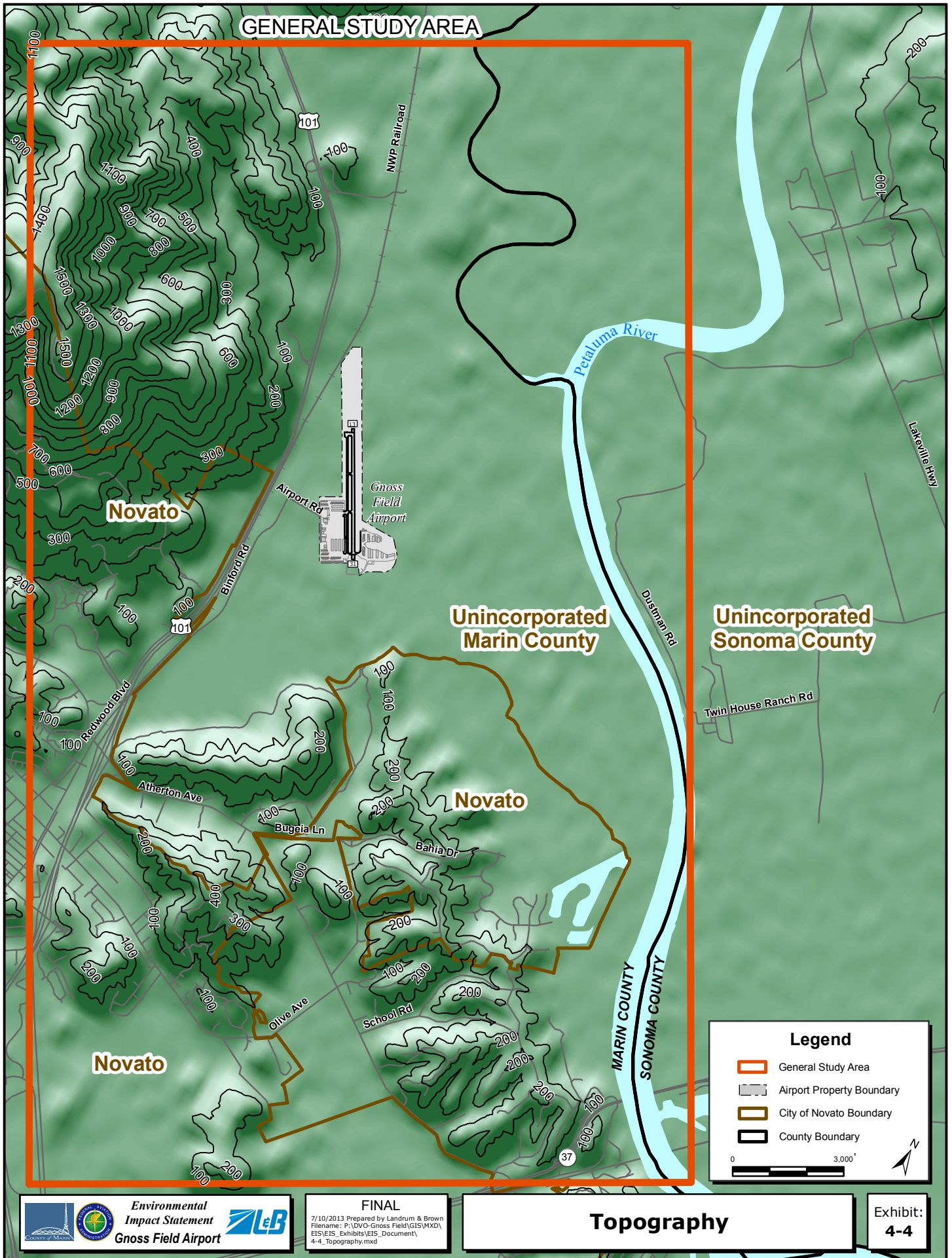
FAA's guidance also notes that CNEL contours, grid point, and/or change of exposure analysis be prepared for the future conditions. Paragraph 14.4i of FAA Order 1050.1E, Change 1 requires the following information be disclosed for the current condition:

- 1) The number of people living or residences within each noise contour at or above CNEL 65 dB, and
- 2) The location and number of noise sensitive uses (e.g., schools, churches, hospitals, parks, recreation areas) exposed to CNEL 65 dB or greater.

These requirements are also commensurate with the requirements for the CEQA analysis.

4.1.2 EXISTING NOISE EXPOSURE

Exhibit 4-5, Existing Conditions (2008) Community Noise Equivalent Level, reflects the noise contour calculated with INM present at the Airport under existing conditions. The noise contour is shown over a map of the local Airport area that includes the specific land uses in the area. **Table 4-1** summarizes the noise sensitive land uses and areas within each noise contour level. Noise contours are presented for the 65, 70, and 75 CNEL. The FAA uses the 65 CNEL as the noise level in which noise-sensitive land uses (residences, churches, schools, libraries, and nursing homes) become significantly impacted. Below the 65 CNEL, all land uses are determined to be compatible.



**Table 4-1
AREAS WITHIN EXISTING NOISE EXPOSURE CONTOUR
Gross Field Airport**

CONTOUR RANGE	EXISTING CONDITIONS (2008)			
	SQUARE MILES	ACRES	NON-RESIDENTIAL NOISE SENSITIVE LAND USES	RESIDENTIAL NOISE SENSITIVE HOUSING UNITS
65-70 CNEL	0.17	111.6	0	0
70-75 CNEL	0.07	45.4	0	0
75 + CNEL	0.05	29.9	0	0
65 + CNEL	0.29	186.9	0	0

Source: Landrum & Brown, 2009.

A CNEL noise contour does not represent the noise levels present on any specific day, but represents the sound pressure energy-average of all 365 days of operation during the year. Noise contours extend from an airport along the extended runway centerline, reflective of the flight tracks used by all aircraft. The relative distance of a contour from the airport along each route is a function of the frequency of use of each runway end for total arrivals and departures, as well as its use at night, and the type of aircraft assigned to it. The size and shape of the noise contours for DVO are a function of the combination of flight tracks and runway use gathered from Airport radar data representative of the existing conditions (2008).

The radar data indicated that traffic largely followed the Airport's requested voluntary noise abatement runway use program with departures taking off to the north on runway end 31 and arrivals approaching from the north on runway end 13. Approximately 90 percent of the departures were made to north with 10 percent of departures to the south. Conversely, about 90 percent of the arrivals were made to south with about 10 percent of the arrivals occurring from the south. As a result, the Existing Condition (2008) noise contour is longer and wider to the north of the Airport than it is to the south. To the north of the Airport, the noise contour extends approximately 1/3 of a mile north of the north end of the runway to a point just east of the railroad tracks. The shape of the noise contour is generally aligned with the runway and reflects the combination of takeoffs to the north and arrivals from the north which is 90 percent of the activity at the Airport. The contour covers an area that comprises Airport property and extends northward off Airport property over areas of compatible land use. The higher noise levels of 70 and 75 CNEL cover a progressively smaller area of similar compatible land uses to the north.

The noise contour runs adjacent to the Airport runway with the contour lines generally parallel to the runway alignment. To the south, the 65 CNEL noise contour only extends 500 feet south of Airport property over both commercial and agricultural land uses. The higher noise levels of 70 and 75 CNEL contours remain largely over Airport property and their shape is associated with the start of takeoff

roll noise associated within a high percentage of departures. As Exhibit 4-5 illustrates there are no residential or noise sensitive land uses within any of the noise contour levels evaluated. Consequently, there are no identifiable significant noise impacts associated with the existing aircraft operations at the Airport.

4.1.3 NOISE MEASUREMENTS

To complement the noise modeling of INM, a program was developed to measure noise exposure levels in areas surrounding the Airport. The measurement program included long-term sites where measurements were taken for several days and short-term sites where measurements were taken for several hours. The effort was designed to collect cumulative CNEL noise levels, aircraft single event levels, and ambient levels at each of the six long-term sites. Similar data was also collected for the short-term sites, with the exception of the 24-hour CNEL values. The noise measurements contain all noise recorded at a site including aircraft and non-aircraft events. The findings provide context of background and cumulative noise levels in which any changes in modeled noise exposure resulting from the proposed project alternatives can be considered. Thus, stake holders, FAA decision makers, and the general public have a context when considering the relevant contributions of project-related noise exposure as compared to noise levels produced without project-related changes.

In addition to CNEL several other metrics were also computed from the measured data as supplemental information. These include the following:

- L50 – Sound level at which 50 percent of the measured one-second samples are above and 50 percent are below. This is generally considered to be an estimation of background noise levels by FAA.
- Aircraft Leq (or CNEL)_(obs) – Sound level of the observed aircraft events averaged across the observation time period (obs).
- Non-Aircraft Leq (or CNEL)_(obs) – Average sound level of noise during observation time less the aircraft event noise.
- Total Leq (or CNEL) – Total average equivalent sound level during the measurement period.
- Aircraft Lmax – Range of maximum sound level associated with observed aircraft events.

The noise measurement program focused on collecting a sample of data within specific areas that were directly related to the areas of past noise concerns, the range of alternatives evaluated, and the local land uses within the GSA.

The measurement program took place for a two-week period from Saturday, May 23, 2009 through Friday, June 5, 2009. The short-term noise measurements were taken at 20 locations, and consisted of collecting one hour's worth of noise measurement data at each location. A technician was present at each of these sites for the one hour period and logged any aircraft noise events that occurred. The locations were chosen from residential areas south of Gness Field.

Long-term noise measurements were conducted at six locations. These locations included three residences south of Gness Field, Olompali State Historic Park, an access road north of Gness Field, and a walking trail south of Gness Field. In general, noise data for the long-term measurements were collected continuously 24 hours per day for a period of seven days, although for some of the long-term sites, the collection time was less than seven days. Since it was not practical to staff each long-term site with an observer to log events, continuous digital audio recordings were taken for the duration of the measurements at each site.

Table 4-2 provides a brief depiction of the 26 measurement locations chosen for this program along with their general land use type. The sites with the "L" prefix identify the long-term sites and those with the "S" prefix indicate the short-term sites.

Table 4-2
NOISE MEASUREMENT PROGRAM MONITORING SITES
Gness Field Airport

SITE	LOCATION	MEASUREMENT DATE(S) (TIMES)
L1	265 Saddle Wood	5/23 – 5/30
L2	160 H Lane	5/23 – 5/30
L3	Olompali State Park	5/27 – 5/29
L4	600 Santana Road	5/30 – 6/5
L5	Access Road	5/30 – 6/5
L6	Walking Trail	5/30 – 6/5
S1	Saddle Wood Drive	05/25 (13:41-14:41)
S2	Bugeia Lane	05/26 (13:05-14:05)
S3	Bahia Drive Open Space	05/26 (16:39-17:39)
S4	End of Bolero Court	05/27 (12:27-13:28)
S5	Park on Topaz Drive	05/27 (13:37-14:38)
S6	Bahia Drive and Topaz Drive	05/27 (14:51-15:51)
S7	School Road and Atherton Avenue	05/27 (17:36-18:36)
S8	H Lane Driveway	05/28 (12:32-13:33)
S9	Topaz Drive Sidewalk	05/28 (14:23-15:23)
S10	End of William Road	05/28 (15:37-16:38)
S11	Malobar Drive and Topaz Drive	05/29 (15:49-16:49)
S12	H Lane at Kenilworth Court	05/30 (08:41-09:42)
S13	End of Topaz Drive	05/29 (18:13-19:15)
S14	Cerro Crest Drive	05/30 (15:34-16:35)
S15	Archibald Lane	05/31 (09:09-10:10)
S16	Alpine Road and William Road	05/31 (11:16-12:16)
S17	Lindsey Court	06/01 (10:46-11:46)
S18	Baruna Court	06/02 (10:20-11:21)
S19	River Vista Court	06/03 (10:27-11:33)
S20	Crest Road and Guisela Court	06/04 (09:53-10:59)

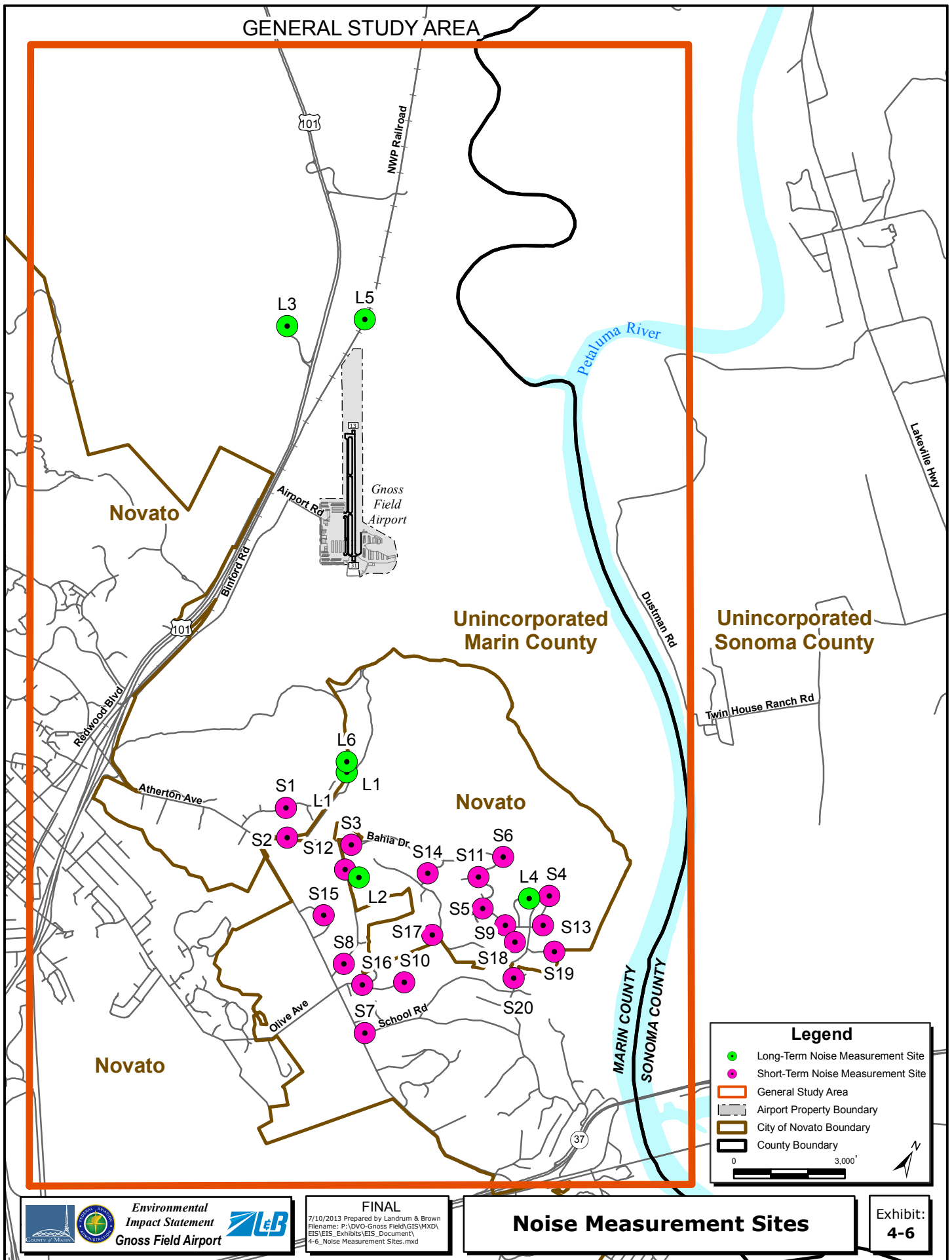
Source: Landrum & Brown, 2009.

Exhibit 4-6, Noise Measurement Sites, illustrates the locations of all the sites on a map of the area. As the exhibit illustrates, the measurement program generally focused on the residential areas south of Gness Field. Two of the long-term sites were located north of the airfield to capture noise to the north where most of the aircraft operations occur. The sites to the south cover the residential areas nearest to the airfields where there have been noise concerns in the past.

Appendix E presents a detailed discussion of the measurement program including a description of each of the sites as well as more information regarding location, study area position, land use type, and the procedures used and the detailed results of the program.

The results of the measurement program are generally summarized in **Table 4-3**. The data for each site is presented in terms of the CNEL values for each of the long-term sites and the one-hour Leq for the short-term sites. Similarly, the L50 values for each site are also presented. The L50 provides an estimate of what could be considered background noise levels for each site. This should be considered an estimate as even the long-term sites captured only a small sample of the annual noise that may occur at each location.

Table 4-3 presents a summary of the noise levels associated with the observed aircraft events for each measurement site. The range of maximum noise values is presented separately for jet and propeller aircraft events. It should be noted that the full range of values is presented for the short-term sites as the observation logs were able to confirm each aircraft event. For the long-term sites, the range presented represents only aircraft events that were 65 dB or higher. This is a result of the methodology used to correlate aircraft events to noise level measurements. Since 24-hour observations were not possible, radar data was evaluated to attempt to correlate aircraft overflights at each site to the noise levels. Unfortunately, the resolution of the radar data was found to be insufficient to effectively correlate aircraft activity to one-second noise levels. As a result, the audio recordings were used to identify periods of aircraft noise. This process required that a noise threshold (65 dB) be identified to focus the audio review effort to time periods where aircraft events were likely.



**Table 4-3
NOISE MEASUREMENT PROGRAM RESULTS SUMMARY
Gross Field Airport**

SITE	CNEL	L ₅₀	AIRCRAFT EVENTS – L _{MAX} RANGE	
			JET	PROP.
L1	51.8	42.9	65.3 – 70.7	65.3 – 79.7
L2	47.7	40.0	NA	66.5 – 72.5
L3	54.9	47.6	65.1 – 76.3	65.2 – 80.5
L4	48.0	36.6	68.3 – 72.4	65.1 – 71
L5	55.5	49.7	66.9 – 92	65.2 – 84.9
L6	57.8	43.7	65.1 – 75.8	65.1 – 76.1
	Leq_(1-hr)			
S1	47.6	35.8	48.9 – 48.9	42.7 – 59.5
S2	56.4	46.8	52.2 – 56.3	58.9 – 60.5
S3	54.4	46.4	48.7 – 59.6	45.3 – 62.2
S4	43.2	37.4	41.3 – 41.3	41.1 – 65.1
S5	49.8	38.4	NA	39.8 – 62.2
S6	50.7	44.0	NA	47.7 – 60.6
S7	54.8	46.5	NA	52.6 – 66.7
S8	49.1	38.1	43.9 – 54.8	40.6 – 60.7
S9	53.8	43.1	49.3 – 51.1	46.2 – 54.3
S10	44.8	41.5	51.4 – 61.7	44.6 – 58.5
S11	49.9	44.5	45.3 – 54.7	43.7 – 59.8
S12	48.0	43.5	50.4 – 50.4	45.9 – 56.7
S13	50.5	40.5	40.5 – 46.9	38.3 – 50.1
S14	58.0	47.7	47.6 – 67.7	43.8 – 67.3
S15	43.9	40.6	41.4 – 44.5	42 – 48.9
S16	43.2	41.5	40.6 – 58.1	42.1 – 56.9
S17	46.0	39.4	41.8 – 61.1	39.2 – 62.8
S18	47.5	38.7	47.7 – 47.7	41.6 – 65.9
S19	48.2	40.5	53.4 – 53.4	39.2 – 55.7
S20	42.7	34.2	41.1 – 60.6	34.1 – 48.1

Source: Landrum & Brown, 2009.

4.2 COMPATIBLE LAND USE

The Airport is located entirely within unincorporated Marin County, California. The majority of the GSA for this EIS is located within Marin County, with the exception of approximately 1,788 acres of the northeastern portion of the GSA located within neighboring Sonoma County, California. The location of the Airport within these political jurisdictions is shown on Exhibit 4-2, *General Study Area*.

4.2.1 EXISTING LAND USE

Portions of Marin County, the City of Novato (within Marin County), and Sonoma County are located within the GSA. Each of these entities has categorized land use in the vicinity of DVO, as shown on **Exhibit 4-7, Existing Land Use**. The land use designations and descriptions used by Marin County, the City of Novato, and Sonoma County are listed in **Table 4-4**.

Within Marin County, the Airport property is categorized as publically-owned non-taxable land. The area surrounding DVO is predominantly agricultural, vacant, and open space to the east and south, including the Burdell Unit of the California Department of Fish and Game Petaluma Marsh Wildlife Area, with light industrial/office areas to the north and west. Marin County has avigation easements on some properties adjacent to the north and south of the Airport to prevent the construction of structures that would inhibit the takeoff and landing of aircraft at the Airport.

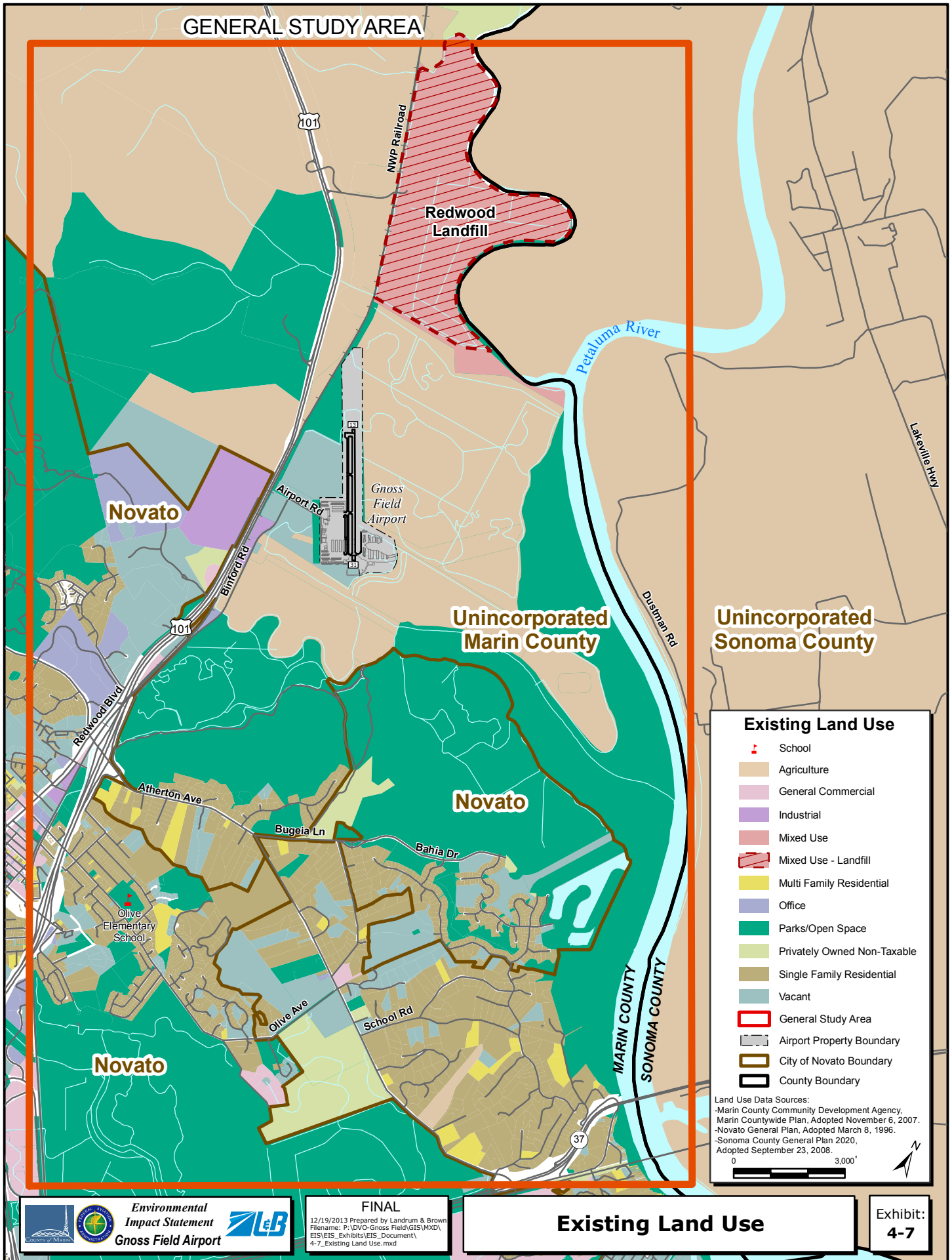
Redwood Landfill, a 420-acre site owned by Waste Management, is located approximately one-half mile northwest of DVO, directly east of Highway 101. Light industrial and office uses are located west of DVO along Binford Road. Industrial areas are also located in the eastern portion of the GSA near the border with Sonoma County. Olompali State Historic Park is categorized as publically-owned non-taxable land. Other land use categories include office, general commercial, and residential in the southern portion of the GSA.⁸ Within Sonoma County, the areas located in the GSA are used for agriculture.⁹

The City of Novato has designated the DVO property as a Community Facility. The *Novato General Plan* states that in the areas outside the City limits in unincorporated Marin County, agricultural activities are present west of DVO, south of Bel Marin Keys, and within the Indian Valley area. Other areas outside the City limits are predominantly open space. Within the City of Novato, the land use is predominantly residential in the valley areas west of Highway 101. Most units are single-family detached on lots under one acre in size. Commercial uses are concentrated downtown along Grant Avenue, along Redwood Boulevard, in pockets along Highway 101, and in various small clusters and convenience centers. Offices are located along Highway 101, in and around Downtown, near the Novato Community Hospital, along Novato and South Novato Boulevards, and within the industrial parks. Novato Industrial Park contains the bulk of the City's warehousing, distribution, and manufacturing uses. Several industrial operations remain near the downtown, between the railroad and Redwood Boulevard.¹⁰

⁸ Marin Community Development Agency. *Marin Countywide Plan*, adopted November 6, 2007. On-line at: <http://www.co.marin.ca.us/depts/cd/main/fm/index.cfm> . Retrieved October 8, 2013.

⁹ *Sonoma County General Plan 2020*, Adopted September 23, 2008.

¹⁰ *Novato General Plan*, Adopted March 8, 1996.



**Table 4-4
LAND USE CLASSIFICATIONS
Marin County, City of Novato, and Sonoma County, California
Gross Field Airport**

LAND USE DESIGNATION	DESCRIPTION
MARIN COUNTY	
Single Family (SF3)	Residential: 1 unit/1-5 acres
Multi Family (MF4)	Residential: 11-30 units/acre
Planned Residential (PR)	1 unit/1-10 acres
Residential Commercial (RC)	FAR = 0.01 TO 0.03
Industrial (IND)	FAR = 0.04 TO 0.35
Public Facility/Industrial (PF-IND)	FAR = 0.04 TO 0.35
Public Facility/Recreational Commercial (PF-RC)	FAR = 0.01 TO 0.30
Public Facility/Agricultural (PF-AG3)	Residential: 1 unit/1-9 acres
Open Space (OS)	
Agricultural (AG1)	Residential: 1 unit/31-60 acres
Agriculture and Conservation (AGC3) (AGC1)	AGC3 = Residential: 1 unit/2-9 acres ACC1 = Residential: 1 unit/31-60 acres
Mineral Resource Area	
Ridge and Upland Greenbelt Area	For the preservation of visual quality (per Community Design Policy DES-4.1 of <i>Marin Countywide Plan</i> , Adopted November 6, 2007)
Baylands Corridor	
CITY OF NOVATO	
Rural Residential (RR)	Up to 0.49 dwelling units per acre
Very Low Density Residential (RVL)	0.5 to 1.0 dwelling units per acre
Low Density Residential (R1)	1.1 to 5.0 dwelling units per acre
Medium Density Detached Residential (R4)	4.1 to 7.0 dwelling units per acre
Medium Density Residential (R5)	5.1 to 10.0 dwelling units per acre
Medium Density Multiple Family Residential (R10)	10.1 to 20.0 dwelling units per acre
High Density Multiple Family Residential (R20)	20.1 to 30.0 dwelling units per acre
Mixed Use (MU)	Maximum FAR of 0.4 for commercial uses and up to 0.8 may be allowed if housing is incorporated
Neighborhood Commercial (CN)	Maximum FAR of 0.4 with an increase to 0.6 if housing is included, provided the difference between FAR 0.4 and 0.6 is used for housing
General Commercial (CG)	Maximum FAR of 0.4
Downtown Core	Maximum FAR of 1.2 for commercial uses up to 2.0 FAR may be allowed for housing historic preservation or exceptional design in conformance with downtown specific plan guideline
Commercial/Industrial (CI)	Maximum FAR of 1.0
Business and Professional Office (BPO)	Maximum FAR of 0.4

**Table 4-4, Continued
LAND USE CLASSIFICATIONS
Marin County, City of Novato, and Sonoma County, California
Gross Field Airport**

LAND USE DESIGNATION	DESCRIPTION
CITY OF NOVATO, Continued	
Research/Education-Institutional (REI)	Maximum FAR of 0.2 for non-residential uses, maximum residential density is 1.0 dwelling unit per acre
Light Industrial/Office (LIO)	Maximum FAR of 0.4 except for Novato Industrial Park and Hamilton Hanger Area where the maximum FAR is 0.6
Open Space (OS)	
Agriculture (AG)	Maximum density of 1 dwelling unit per 60 acres
Conservation (CON)	Maximum density is 1 dwelling unit per 10-60 acres
Parkland (P)	
Community Facilities (CF)	Maximum FAR of 0.8
SONOMA COUNTY	
Diverse Agriculture	10-60 acres per residential unit
Land Extensive Agriculture	60-320 acres per residential unit
Land Intensive Agriculture	20-100 acres per residential unit
Resources and Rural Development	20-320 acres per residential unit
Rural Residential	1-20 acres per residential unit
Urban Residential	High density: 12-20 dwelling units per gross acre Medium density: 6-12 dwelling units per gross acre Low density: 4-6 dwelling units per gross acre
Recreation/Visitor Serving Commercial	Outdoor recreation facilities and tourist commercial uses
Public/Quasi-Public	
General Commercial	Intense commercial uses
Limited Commercial	Limited commercial uses
Limited Commercial Traffic Sensitive	Limited commercial uses, severely constrained by traffic congestion
General Industrial	Intense industrial uses
Limited Industrial	Limited industrial uses

Note: FAR = Floor Area Ratio

Sources: Marin County Community Development Agency, *Marin Countywide Plan*, Adopted November 6, 2007. *Novato General Plan*, Adopted March 8, 1996. *Sonoma County General Plan 2020*, Adopted September 23, 2008

4.2.2 FUTURE PLANNED LAND USE

The *Marin Countywide Plan*, the *Novato General Plan*, and the *Sonoma County General Plan 2020* each describe planning goals for the area surrounding DVO that is included in the GSA. Future planned land-use is shown on **Exhibit 4-8, Future Land Use**, and is described in the following discussion.

The *Marin Countywide Plan* lists the following planning goals for the Novato Planning Area, which includes the DVO area.¹¹

- Designate Land Use in North Novato. Publicly owned lands shall be designated open space, exclusive of DVO, which shall retain its Industrial land use designation with a Public Facilities combining designation, consistent with the approved and planned development under the *Airport Land Use Master Plan*. Most of the lands east of the Northwestern Pacific Railroad tracks are within the Baylands Corridor. Lands north of Gness Field, Birkenstock, and the Buck Center and not within the Baylands Corridor are in the Inland Rural Corridor. Developed parcels not within the Baylands Corridor and south of Olompali State Park are in the City-Centered Corridor. Lands within the City-Centered Corridor and Baylands Corridor shall be designated for industrial use, with master plans required for development; for planned residential at a density of 1 unit per 1 to 10 acres; for recreational-commercial use; and agriculture and conservation at a residential density of 1 unit per 10 to 60 acres. Commercial uses on lands surrounding the Airport shall be limited to those that are Airport related or compatible with the Airport.
- Designate Land Use in West Novato. Land use for West Novato shall include single-family residential, ranging from 4 units per acre to 1 unit per 5 acres; planned residential, ranging from 1 unit per acre to 1 unit per 10 acres; and agriculture, ranging from 1 unit per 1 acre to 1 unit per 60 acres. Publicly owned open space is also designated.
- Designate Land Use in Southwest Novato. Land use in the Southwest Novato area shall include agriculture at 1 unit per 31 to 60 acres. Publicly owned open space is also designated.
- Designate Land Use in Bel Marin Keys. Portions of Bel Marin Keys such as tidal marshes and low-lying grasslands are within the Baylands Corridor. Agricultural land uses shall be designated as agriculture and conservation at a density of 2 to 10 acres per housing unit. In the developed portion of Bel Marin Keys, multi-family residential density shall be designated at 11 to 30 units per acre and single-family density at 1 to 7 units per acre. Lands owned by the Coastal Conservancy undergoing wetland habitat restoration and other publicly owned lands shall be designated as open space.

¹¹ Marin Community Development Agency, *Marin Countywide Plan*, adopted November 6, 2007. On-line at: <http://www.co.marin.ca.us/depts/cd/main/fm/index.cfm>. Retrieved October 8, 2013.

The *Novato General Plan* designates the land use in the DVO-area as “Community Facilities,” which is a designation that includes public buildings, schools, recreation and cultural facilities, museums, public libraries, utility facilities, transformer stations, water and sewage treatment plants, solid waste transfer facilities, recycling facilities, and related easements, City offices, fire and police stations, hospitals, churches and privately-owned uses operating in conjunction with public uses. The City of Novato planning goal for this area is to promote development and conservation in this land use pattern.¹²

The *Sonoma County General Plan* designates land use in the “Petaluma and Environs” Planning Area, which includes the western portion of the County that is included in the GSA, as agriculture. Sonoma County’s planning goals for agriculture lands are to continue to protect a full range of agricultural uses and to limit residential intrusion.¹³

4.3 SOCIOECONOMIC OVERVIEW

Population, growth, and employment trends are used to evaluate the socioeconomic characteristics of an area. A socioeconomic overview for the land area surrounding DVO identifies the patterns of growth and development.

Based on 2007 estimates by the U.S. Census Bureau, 51,233 people reside within the City of Novato. Housing units total 20,537. The racial makeup is roughly 76.1 percent White, 3.1 percent Black or African American, 0.8 percent Native American, 5.4 percent Asian, 11.9 percent from other races, and 2.7 percent from two or more races. Residents of any race who also identified themselves as Hispanic or Latino account for 19.8 percent of the population.

The average household size is 2.6. The median age is 41.4 years. The majority of the population is 18 years and older (78.2 percent). Persons aged 65 and older make up 13.0 percent of the population and those aged 5 and under make up 6.0 percent of the population. The median household income is \$78,895. The median family income is \$91,890. The per capita income for the city is \$37,605. Approximately 5.7 percent of families and 7.3 percent of individuals are below the poverty line.¹⁴

4.3.1 POPULATION TRENDS

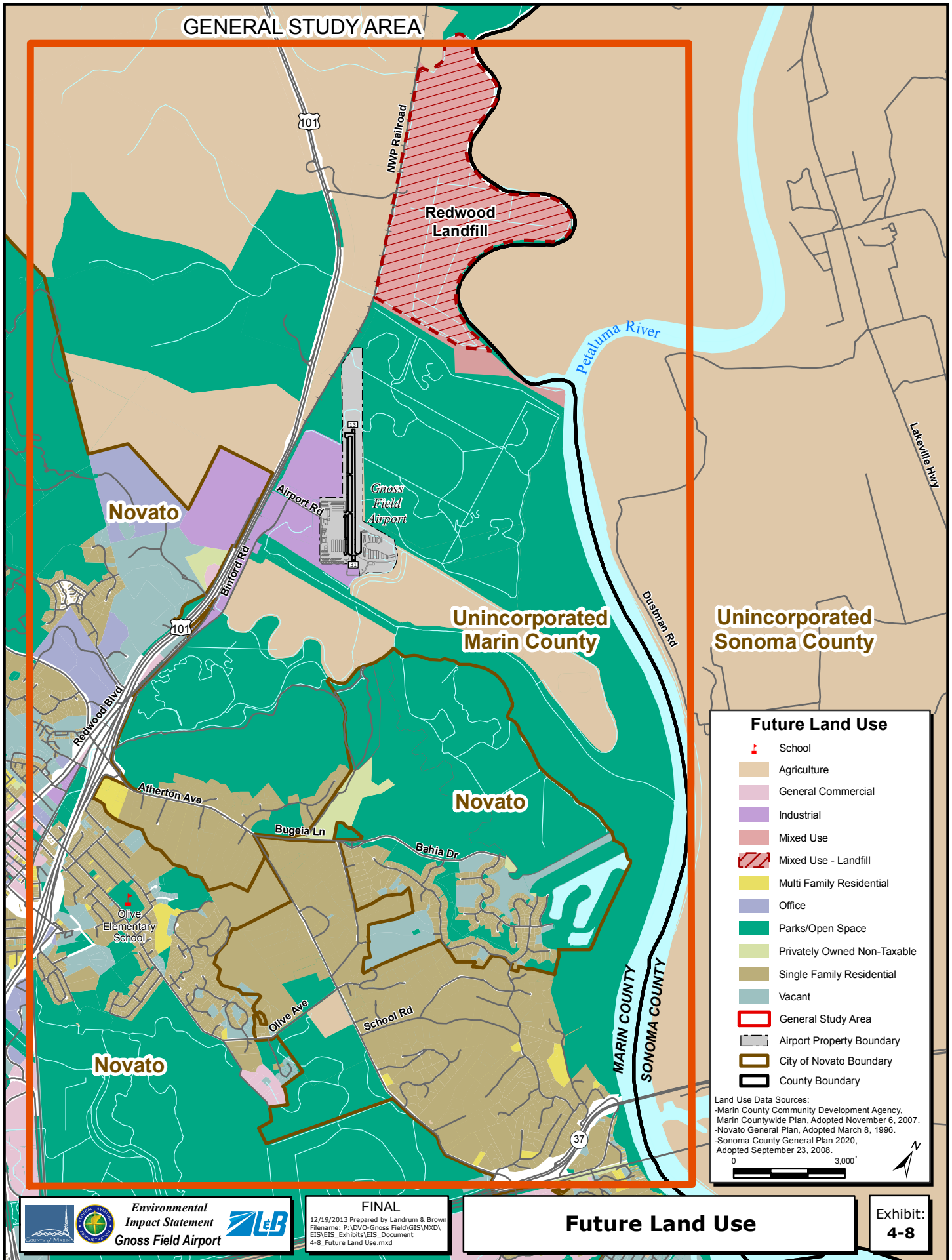
Population trends and forecasts for the DVO area, in comparison to the nine-county San Francisco Bay Area, and to the State of California as a whole are presented in **Table 4-5**. As shown in **Table 4-6a**, the Marin County population of 248,794 in 2008 accounts for 3.5 percent of the population of the nine-county San Francisco Bay Area.¹⁵

¹² *Novato General Plan*, adopted March 8, 1996.

¹³ *Sonoma County General Plan 2020*, Adopted September 23, 2008.

¹⁴ U.S. Census Bureau, *American Factfinder, Novato City, California, 2005-2007 Data Profile Highlights*.

¹⁵ Association of Bay Area Governments, on-line at www.abag.ca.gov



**Table 4-5
POPULATION AND PROJECTIONS
Gross Field Airport**

AREA	2000 CENSUS	2008 CENSUS ESTIMATE	POPULATION PROJECTIONS		
			2010	2020	2030
State of California	33,871,648	36,756,666	38,067,134	42,206,743	46,444,861
9-County San Francisco Bay Area*	6,783,760	7,046,719	7,351,177	7,952,222	8,709,203
Marin County	247,289	248,794	253,682	260,305	273,151
Sonoma County	458,614	466,741	495,412	546,151	606,346
City of Novato	47,630	52,737	(Unavailable)*	66,400***	(Unavailable)

* Includes the counties of Marin, Sonoma, San Francisco, San Mateo, Napa, Alameda, Contra Costa, Solano, and Santa Clara. Marin County and Sonoma County are also listed separately in the table.

** The *Novato General Plan*, adopted March 8, 1996, projects approximately 27,000 households by 2015; the Plan also reports that the Association of Bay Area Governments projects a total of 25,750 households in Novato by the year 2010.

*** Population projection from the Association of Bay Area Governments as reported in the *Novato General Plan*, adopted March 8, 1996.

Sources: U.S. Census Bureau, on-line at www.census.gov. State of California, Department of Finance, *Population Projections for California and Its Counties 2000-2050*, Sacramento, California, July 2007. On-line at: <http://www.dof.ca.gov/research/demographic/reports/projections/p-3/>
Marin Countywide Plan, adopted November 6, 2007.

**Table 4-6a
SHARE OF REGIONAL POPULATION BY COUNTY OF THE
NINE-COUNTY SAN FRANCISCO BAY AREA
Gross Field Airport**

COUNTY	TOTAL POPULATION (2008 ESTIMATE)	PERCENT SHARE OF POPULATION (2008 ESTIMATE)
Alameda	1,474,368	20.9%
Contra Costa	1,029,703	14.6%
Marin	248,794	3.5%
Napa	133,433	1.9%
San Francisco	808,976	11.5%
San Mateo	712,690	10.1%
Santa Clara	1,764,499	25.0%
Solano	407,515	5.8%
Sonoma	466,741	6.6%
Total	7,046,719	100.0%

Sources: U.S. Census Bureau on-line at www.census.gov, Landrum & Brown, 2009.

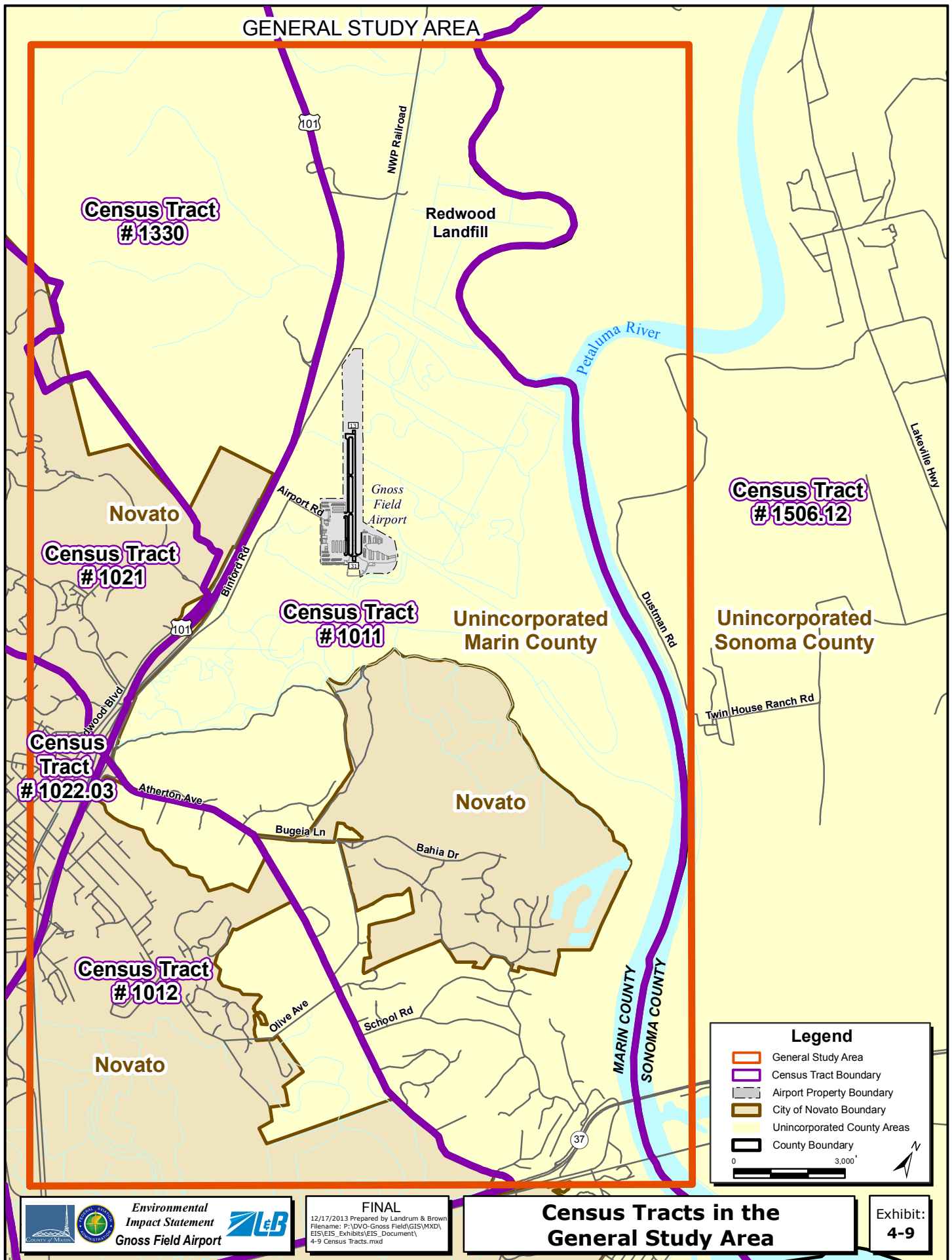
Exhibit 4-9, *Census Tracts in the GSA*, shows the census tracts within the GSA. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, requires all Federal agencies to address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

The U.S. DOT Order 5610.2(a) defines a minority population as any readily identifiable groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed DOT program, policy, or activity. The U.S. DOT Order 5610.2(a) states Low-Income is a person whose median household income is at or below the Department of Health and Human Services (HHS) poverty guidelines. In 2012, the HHS poverty guideline level for a family of four was \$23,050¹⁶. The U.S. DOT Order 5610.2(a) defines a Low-Income Population as any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed DOT program, policy or activity. These definitions are discussed in more detail in Section 5.3.2.

Table 4-6b shows the percent minority population and median household income for the census tracts in the GSA and Marin County. The population of Marin County is 80 percent White, and 20 percent minorities. Within the GSA, census tract 1011, which includes DVO, has a five percent minority population. Census tracts 1012, 1021, and 1506.12 also have minority populations that are less than the 20 percent average minority population for Marin County. Census tract 1330 has a 22 percent minority population, slightly higher than the overall Marin County percentage of 20 percent minorities. The portion of census tract 1330 within the GSA consists of Olompali State Park and agricultural areas and has very few residences, so the total population and minority population within this portion of the GSA is very low. Census tract 1022.03 has a 33 percent minority population, as opposed to the 20 percent overall minority population for Marin County. However, only a small portion of census tract 1022.03 is within the GSA. This census tract evaluation shows that there is no readily identifiable minority population within the GSA of the Proposed Project.

The HHS poverty guideline level for a family of four was \$23,050 in 2012. As shown in Table 4.6b, census tract 1011, which includes DVO, has a median income of \$139,250. This is the highest median income level of any census tract in the GSA. All the other census tracts within the GSA had a median income level at least twice the HHS 2012 poverty level. There is no readily identifiable population of low-income persons in the GSA who live within geographic proximity of DVO.

¹⁶ Office of the Assistant Secretary for Planning and Evaluation, Department of Health and Human Services, Prior HHS Poverty Guidelines and Federal Register References online at <http://aspe.hhs.gov/poverty/figures-fed-reg.cfm> accessed December 2013.



**Table 4-6b
SOCIOECONOMIC AND ETHNIC COMPOSITION OF THE GSA
Gross Field Airport**

Marin County		
	Median Income	Percent Minority Population
	\$90,962	20%
General Study Area		
Census Tract	Median Income	Percent Minority Population
1011	\$139,250	5%
1012	\$65,398	18%
1021	\$106,544	18%
1022.03	\$53,819	33%
1330	\$60,250	22%
1506.12	\$95,694	11%

Source: Table S1903, U.S. Census Bureau, 2008-2012 American Community Survey, on-line at www.census.gov, Landrum & Brown, 2013.

Table 4-7, shows the pattern of workers commuting to Marin County from counties within the San Francisco Bay Area. In 2000, over 43,953 people (35.8 percent of the Marin County workforce) commuted to Marin County from outlying counties.¹⁷ Over half of the work force (64.2 percent) commutes from within Marin County.

**Table 4-7
DAILY COMMUTER TOTALS TO MARIN COUNTY
Gross Field Airport**

ORIGINATING COUNTY	PERSONS COMMUTING TO MARIN COUNTY	PERCENT OF PERSONS COMMUTING TO MARIN COUNTY
Marin	78,681	64.2%
Sonoma	18,336	14.9%
San Francisco	6,450	5.3%
San Mateo	973	0.8%
Napa	894	0.7%
Alameda	3,745	3.1%
Contra Costa	6,803	5.5%
Solano	4,418	3.6%
Santa Clara	578	0.5%
All other areas outside Bay Area	1,756	1.4%
<i>Total from outside Marin County</i>	<i>43,953</i>	<i>35.8%</i>

Sources: *County to County Worker Flow Files*, 2007, US Census Bureau.
U.S. Census Bureau, 2000 Census Data, on-line at www.census.gov

¹⁷ U.S. Census Bureau, *County to County Worker Flow Files*, 2007.

4.3.2 ECONOMIC GROWTH AND EMPLOYMENT

The City of Novato's labor force was 26,000 in 2009.¹⁸ Major employers include the Fireman's Fund Insurance Company, the Buck Institute for Age Research, small biotech firms, such as Biosearch Technologies and BioMarin Pharmaceutical, and several small technology companies, including 2K Marin, Radiant Logic, Imagemovers Digital, and Sonic Solutions. The former Hamilton Air Force Base, decommissioned and closed in 1974, was designated a discontinuous Historic District in 1998.¹⁹ Current uses of the former Hamilton site include parks, open space, wetlands, single family homes, office buildings, light industrial, and retail uses.²⁰ Today, the Hamilton Wetlands Restoration Project, led by the U.S. Army Corps of Engineers, the California State Coastal Conservancy, and the San Francisco Bay Conservation and Development Commission, is working to return the 988-acre former airfield and north antenna to their natural tidal wetland state, along with 1,600-acres of additional adjacent lands located in the Bel Marin Keys area.²¹

The workforce in Marin County has decreased from 137,700 in 2000 to 128,400 in 2007.²² This reflects a seven percent decrease in the total number of Marin County resident workers. **Table 4-8** lists the most recent information available on industry sectors, and number of employees in each sector for the San Francisco-San Mateo-Redwood City Metropolitan Area (MA), which includes Marin County. The Service Providing sector comprises the largest share of workforce in the area. The largest growth has been in the Professional, Scientific and Technical Services sector with a 14.0 percent increase between 2003 and 2007. The most significant decrease has been in the number of people employed in the Durable Goods sector with a 40.0 percent decrease between 2003 and 2007.²³ **Table 4-9** highlights the top private employers in Marin County in 2009.

According to the California Employment Development Department, the occupations with the fastest projected job growth between 2006 and 2016 in the San Francisco-San Mateo-Redwood City MA are Biomedical Engineers, Network Systems and Data Communication Analysts, Medical Scientists and Biochemists. Biomedical Engineers has the largest projected percentage increase from 530 employees to 850 employees, approximately 60.0 percent.²⁴

¹⁸ Labor Force and Unemployment Rate for Cities and Census Designated Places, *California Employment Development Department*, online at www.labormarketinfo.edd.ca.gov

¹⁹ National Park Service. On-line at: <http://www.nps.gov/nr/travel/aviation/ham.htm> Retrieved September 30, 2013.

²⁰ *Novato General Plan*, adopted March 8, 1996.

²¹ Hamilton Wetlands Restoration Project. On-line at: <http://hamiltonwetlands.scc.ca.gov/> Retrieved October 8, 2013.

²² Labor Force and Unemployment Rate for Cities and Census Designated Places, *California Employment Development Department*, online at www.labormarketinfo.edd.ca.gov

²³ *California Employment Development Department*, online at www.labormarketinfo.edd.ca.gov.

²⁴ Occupations with Fastest Job Growth (percent change), *California Employment Development Department*, online at www.labormarketinfo.edd.ca.gov

**Table 4-8
ESTIMATED EMPLOYMENT BY SECTOR, SAN FRANCISCO-SAN MATEO-
REDWOOD CITY METROPOLITAN AREA (INCLUDES MARIN COUNTY)
Gross Field Airport**

SECTOR	2003	2004	2005	2006	2007	NET CHANGE 2003-2007
Service Providing	98,800	97,700	97,200	97,600	98,300	-0.5%
Trade, Transportation and Utilities	20,300	19,200	18,800	18,300	18,500	-8.8%
Professional and Business Services	17,700	18,600	18,500	19,600	19,700	11.2%
Retail Trade	16,200	15,100	14,900	14,300	14,500	-10.4%
Educational and Health Services	15,700	15,500	15,600	15,800	15,900	1.3%
Government	14,800	14,400	14,700	1,500	15,000	1.4%
Leisure and Hospitality	12,700	12,700	12,600	12,700	13,100	3.1%
Health Care, Social Assistance	12,500	12,300	12,400	12,600	12,500	0.0%
Local Government	12,100	11,700	1,200	12,300	12,400	2.5%
Goods Producing	11,600	11,200	11,000	10,400	10,500	-9.5%
Accommodation and Food Service	10,000	10,100	10,000	10,200	10,300	3.0%
Professional, Scientific and Technical Services	9,700	10,500	10,700	11,200	11,100	14.4%
Financial Activities	9,700	9,400	9,300	9,200	8,900	-8.2%
Finance and Insurance	6,900	6,500	6,500	6,400	6,300	-8.7%
Administrative and Support and Waste Services	6,100	6,100	5,600	6,100	6,400	4.9%
Other Services	4,700	4,900	4,600	4,800	4,900	4.3%
Information	3,300	3,300	3,100	2,200	2,400	-27.3%
Educational Services	3,200	3,100	3,200	3,100	3,300	3.1%
Manufacturing	3,100	2,600	2,500	2,400	2,100	-32.3%
Real Estate and Rental and Leasing	2,800	2,900	2,800	2,800	2,600	-7.1%
Wholesale Trade	2,800	2,800	2,600	2,700	2,800	0.0%
Arts, Entertainment, and Recreation	2,600	2,600	2,600	2,500	2,700	3.8%

**Table 4-8, Continued
ESTIMATED EMPLOYMENT BY SECTOR, SAN FRANCISCO-SAN MATEO-
REDWOOD CITY METROPOLITAN AREA (INCLUDES MARIN COUNTY)
Gross Field Airport**

SECTOR	2003	2004	2005	2006	2007	NET CHANGE 2003-2007
State Government	1,800	1,800	1,800	1,800	1,900	5.5%
Nondurable Goods	1,600	1,300	1,300	1,200	1,200	-25.0%
Durable Goods	1,500	1,300	1,200	1,200	900	-40.0%
Transportation, Warehousing and Utilities	1,400	1,300	1,400	1,300	1,200	-14.2%
Federal Government	900	900	900	900	700	-22.2%
Total Farm	600	700	600	700	600	0.0%
Total	307,000	302,500	289,800	288,100	302,900	-1.3%

Note: Column totals might not sum due to rounding.

Source: *California Employment Development Department*, online at www.labormarketinfo.edd.ca.gov.

**Table 4-9
TOP PRIVATE EMPLOYERS IN MARIN COUNTY IN 2009
Gross Field Airport**

COMPANY	NATURE OF BUSINESS	LOCAL FULL-TIME EMPLOYMENT
Kaiser Permanente	Health Care	1,311
Autodesk	Software Developer	1,028
Marin General Hospital	Health Care	975
Fireman's Fund Insurance	Insurance	947
BioMarin Pharmaceutical	Pharmaceutical	632
Comcast	Telecommunications	619
Safeway	Grocery Retailer	452
Macy's	Department Store	445
Dominican University	Education	370
MHN	Health Care	350
Guide Dogs for the Blind	Nonprofit	287
Brayton Purcell, LLP	Legal	275
Mollie Stones Market	Grocery Retailer	270
Wells Fargo Bank	Financial	265
Cotsco Wholesale	Retail	260
Kentfield Rehabilitation & Specialty Hospital	Health Care	229
W. Bradley Electric, Inc.	Electrical	227
Novato Community Hospital	Health Care	225
Ghilotti Bros, Inc.	Construction	224
Lucasfilm	Film Production	220
Longs Drugs	Drugstore	217
Nordstrom	Department Store	211
Coldwell Banker	Real Estate	207
Bank of Marin	Banking	200

Source: North Bay Business Journal *Private Sector Employers, Marin County 2009* accessed on-line at <http://lists.northbaybusinessjournal.com>

4.4 AIR QUALITY

The assessment of airport air quality for an environmental review prepared pursuant to the NEPA is required to follow the procedures established by the FAA's *Air Quality Procedures for Civilian Airports & Air Force Bases*.²⁵ The procedures require the assessment of the existing conditions to determine the contribution of airport operations to the local air quality and the potential impact to the community.

This section contains a discussion of existing air quality conditions in the Marin County area and includes a summary of relevant air quality topics and airport-related emissions sources.

4.4.1 AIR QUALITY STATUS OF MARIN COUNTY

For Federal air quality standards, Marin County is included in the San Francisco Bay Intrastate Air Quality Control Region.²⁶ The region does not currently meet the Federal eight-hour standard for healthful levels of ozone and has been designated by the U.S. Environmental Protection Agency (USEPA) as a marginal nonattainment area for ozone.²⁷ Ozone is not directly emitted from a source. Rather, ozone is formed through photochemical reactions involving emissions of the precursor pollutants Nitrogen Oxides (NO_x) and Volatile Organic Compounds (VOC) in the presence of abundant sunlight and heat. Therefore, emissions of ozone on a project level are evaluated based on the rate of emissions of the ozone precursor pollutants, NO_x, and VOC.

Further, USEPA has determined the County exceeds the 24 hour standard for emissions of fine particulate matter (PM_{2.5}). In the past Marin County was designated as nonattainment for carbon monoxide (CO) but in April 1998 the Bay Area was redesignated to attainment and now operates under a maintenance plan in order to prevent emissions from reaching an unhealthy level. **Table 4-10** summarizes Marin County's compliance status with Federal air quality standards. For more information on the Federal air quality standards and Marin County's status, see Appendix F, *Air Quality*.

Marin County is also located within the Bay Area Air Quality Management District (BAAQMD) of California. California maintains more stringent standards than the USEPA for which the County must adhere called the California Ambient Air Quality Standards. Marin County has been designated by the BAAQMD as nonattainment for the eight-hour and one-hour standards for ozone, the annual arithmetic mean and the twenty four-hour standards for coarse particulate matter (PM₁₀), and the annual arithmetic mean standard for PM_{2.5}.²⁸

²⁵ *Air Quality Procedures for Civilian Airports & Air Bases*, April 1997; and Addendum, September 2004.

²⁶ USEPA, Title 40 CFR Part 81, § 81.21, *San Francisco Bay Intrastate Air Quality Control Region*, January 16, 1981.

²⁷ USEPA website, <http://www.epa.gov/oar/oaqps/greenbk>, accessed October 8, 2013.

²⁸ BAAQMD website, http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm, accessed October 8, 2013.

**Table 4-10
FEDERAL AIR QUALITY STATUS IN MARIN COUNTY
Gross Field Airport**

POLLUTANT	AVERAGING PERIOD	ATTAINMENT STATUS
Sulfur Dioxide (SO ₂)	Annual Arithmetic Mean	Attainment
	24-Hour Average	
	3-Hour Average	
Particulate Matter (PM ₁₀)	24-Hour Average	Attainment
Particulate Matter (PM _{2.5})	Annual Arithmetic Mean (1997 Std)	Attainment
	24-Hour Average (2006 Std)	Non-attainment
Carbon Monoxide (CO)	8-Hour Average	Maintenance plan
	1-Hour Average	
Ozone (O ₃)	8-Hour Average (2008 Std)	Non-attainment
	1-Hour Average (revoked)	revoked
Nitrogen Dioxide (NO ₂)	1-Hour Daily Maximum	Attainment
	Annual Arithmetic Mean	
Lead (Pb)	Rolling 3-Month Average	Attainment
	3-Month Arithmetic Mean	

Notes: Std is Standard.

Sources: USEPA and BAAQMD, 2011.

4.4.2 ASSESSMENT OF EXISTING CONDITIONS (2008)

An emission inventory was prepared using 2008 data, which is representative of existing conditions, using the FAA Emissions and Dispersion Modeling System (EDMS), version 5.1. The EDMS computer program is the FAA-required and USEPA-approved model for estimating emissions and calculating pollutant concentrations from airport-specific sources. The model estimates the rate of emissions of the criteria and precursor pollutants in tons per year. The assumptions used in the emissions inventory and the methodology used to develop this air quality assessment are provided in Appendix F.

4.4.3 CRITERIA AND PRECURSOR POLLUTANT EMISSION INVENTORY

The results of the emission inventory are provided in **Table 4-11**. The approximately 266 annual tons of all emissions are comprised primarily of CO emissions. The greatest overall emission contribution comes from aircraft operations. Emissions of Lead (Pb), PM₁₀ and PM_{2.5} are also produced primarily by aircraft engines. The largest contributor of CO in the inventory is from aircraft operations.

**Table 4-11
CRITERIA AND PRECURSOR POLLUTANT EMISSION INVENTORY
EXISTING CONDITIONS (2008)
Gross Field Airport**

EMISSION SOURCES	ANNUAL EMISSIONS (tons per year)						
	CO	VOC	NO _x	SO _x	PM ₁₀	PM _{2.5}	Pb
Aircraft	147.50	10.70	1.04	0.41	9.54	9.54	0.11
GSE	0.69	0.16	1.14	0.04	0.03	0.03	NA
GAV in Parking Facilities	0.32	0.04	0.04	0.00	0.00	0.00	NA
GAV on Roadways	0.26	0.02	0.04	0.00	0.00	0.00	NA
Stationary Sources	0.52	17.08	1.22	0.00	0.05	0.05	NA
TOTAL	149.30	28.00	3.48	0.46	9.62	9.62	0.11

Key:

CO: Carbon Monoxide

VOC: Volatile Organic Compounds

NO_x: Nitrogen Oxides

SO_x: Sulfur Oxides

PM₁₀: Course particulate matter

PM_{2.5}: Fine particulate matter

Pb: Lead

GSE: Ground Support Equipment, which includes the Airport's two fuel trucks

GAV: Ground Access Vehicles

Source: EDMS ver. 5.1 L&B Analysis, 2009

4.4.4 CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

Research has shown there is a direct correlation between fuel combustion and Greenhouse Gas (GHG) emissions. In terms of U.S. contributions, the General Accounting Office (GAO) reports that "domestic aviation contributes about three percent of total carbon dioxide emissions, according to EPA data," compared with other industrial sources including the remainder of the transportation sector (20 percent) and power generation (41 percent).²⁹ The International Civil Aviation Organization (ICAO) estimates that GHG emissions from aircraft account for roughly three percent of all anthropogenic GHG emissions globally.³⁰ Climate change due to GHG emissions is a global phenomenon, so the affected environment is the global climate.³¹

²⁹ GAO Report to Congressional Committees, *Aviation and Climate Change*, 2009.

³⁰ Alan Melrose, "European ATM and Climate Adaptation: A Scoping Study," in *ICAO Environmental Report*. (2010).

³¹ As explained by the U.S. Environmental Protection Agency, "greenhouse gases, once emitted, become well mixed in the atmosphere, meaning U.S. emissions can affect not only the U.S. population and environment but other regions of the world as well; likewise, emissions in other countries can affect the United States." Climate Change Division, Office of Atmospheric Programs, U.S. Environmental Protection Agency, *Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act* 2-3 (2009).

The scientific community is continuing efforts to better understand the impact of aviation emissions on the global atmosphere. The FAA is leading and participating in a number of initiatives intended to clarify the role that commercial aviation plays in GHG emissions and climate. The FAA, with support from the U.S. Global Change Research Program and its participating Federal agencies (e.g., NASA, NOAA, EPA, and DOE), has developed the Aviation Climate Change Research Initiative (ACCRI) in an effort to advance scientific understanding of regional and global climate impacts of aircraft emissions. FAA also funds the Partnership for Air Transportation Noise & Emissions Reduction (PARTNER) Center of Excellence research initiative to quantify the effects of aircraft exhaust and contrails on global and U.S. climate and atmospheric composition. Similar research topics are being examined at the international level by the International Civil Aviation Organization.³²

4.4.5 HAZARDOUS AIR POLLUTANTS

Hazardous air pollutants (HAP) are gaseous organic and inorganic chemicals, compounds, and particulate matter that may be carcinogenic (known or suspected to cause cancer) or non-carcinogenic (known or suspected to cause other adverse health effects). These substances are believed to cause unique exposure risks because of the innate toxicity of each substance. The 188 substances listed in the Clean Air Act (CAA) Section 112 have a variety of toxic effects causing major health concerns relating to, among others, the nervous and reproductive systems, and lung and liver diseases.

The health effects from exposure to HAPs in the ambient air are influenced by the regional meteorology. Higher winds have a tendency to dilute the vaporized pollutants downwind but may also increase the volatilization rate of some liquids.³³ Greater wind speeds may also increase the concentration of nonvolatile contaminants absorbed and adsorbed³⁴ to soil and dust. Atmospheric instability, which relates to vertical motions in the air, may increase the dispersion of contaminants throughout various vertical levels whereas downwind contaminant concentrations are usually higher when stable atmospheric conditions exist. Precipitation reduces overall airborne contaminants by removing the particles from the air and volatile contaminants emit at lower rates from wet soil than from dry soil. In addition, solar radiation and temperature can also affect the volatilization of liquids. When considering the parameters that affect the formation and dispersion of HAPs, it is clear that health effects from HAP emissions is appropriately assessed on a regional level and not confined to a project-level analysis of a single source.

An evaluation of HAP emissions due to airport projects is not required under NEPA or by the provisions of CAA, including the 1990 Amendments, and the USEPA has not established National Ambient Air Quality Standards for any HAP. However, an inventory of HAP was requested during air quality scoping meetings with the EPA

³² Lourdes Q. Maurice and David S. Lee. *Chapter 5: Aviation Impacts on Climate*. Final Report of the International Civil Aviation Organization (ICAO) Committee on Aviation and Environmental Protection (CAEP) Workshop. October 29th November 2nd 2007, Montreal.

³³ Keith, Lawrence H., et al., Handbook of Air Toxics – Sampling, Analysis, and Properties, 1995.

³⁴ A substance that is attracted to a surface and remains concentrated on the surface is adsorbed, whereas absorption occurs when the substance is not only retained on the surface but also passes through the surface to become distributed throughout.

and BAAQMD. The HAP inventory (Appendix F) includes a project-level emission inventory of selected HAPs based on the criteria and precursor pollutant emission inventory prepared to satisfy other regulatory requirements for the air quality assessment. The HAP inventory is provided for disclosure purposes only and should not be relied on as an interpretation of health risks, should not be compared to other sources of HAPs in the region, or compared to HAP emissions reported for other airports.

4.5 WATER RESOURCES

This section addresses existing water resources with respect to surface water and ground water as they relate to the DSA.

4.5.1 SITE HYDROLOGY

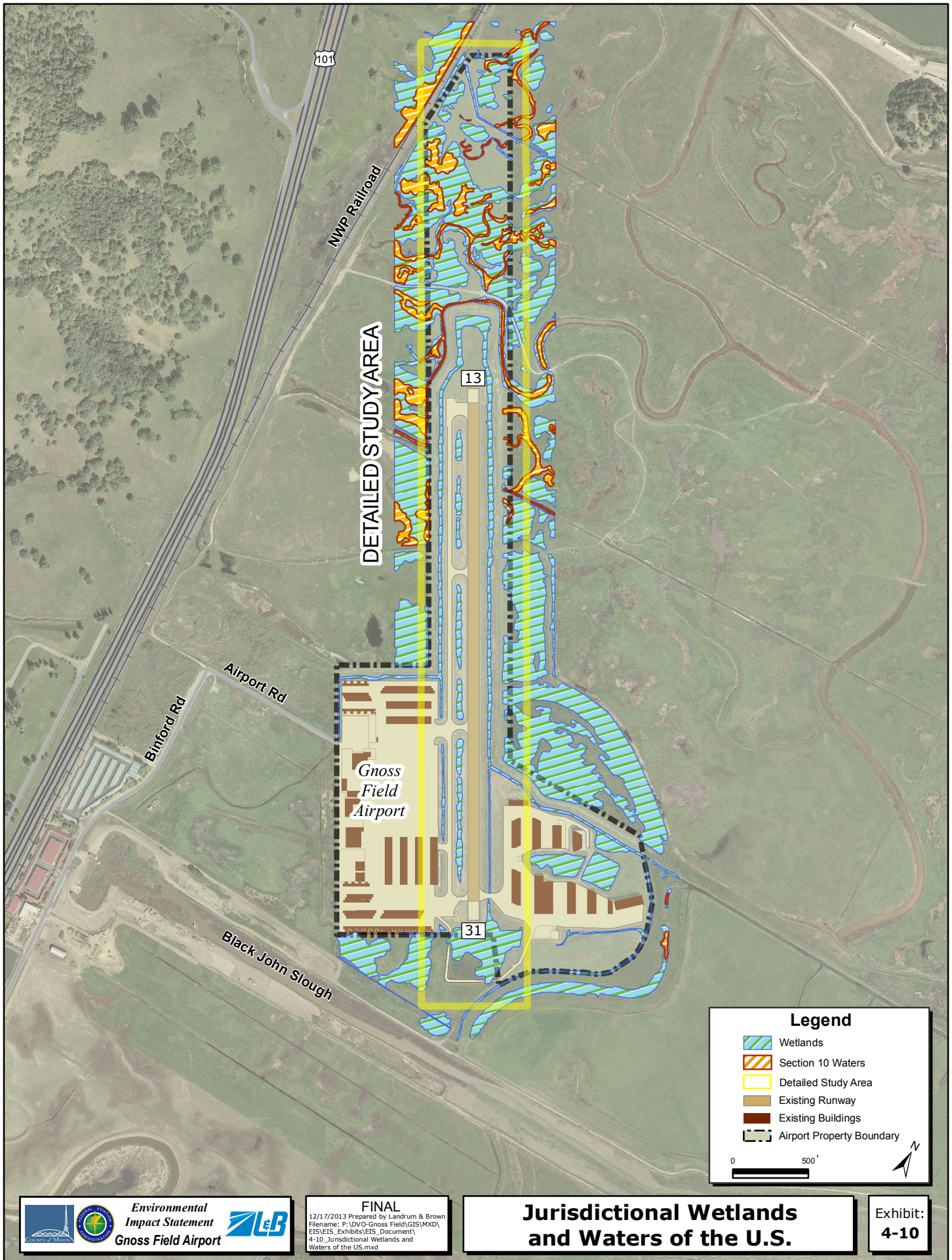
DVO lies within the original flood plain of the Petaluma River at sea level. It was built in an area of reclaimed salt water tidal marshlands that are part of the formerly extensive salt marshes present around the northwest corner of San Pablo Bay, characterized by muds and clays found in marshes, swamps, and waterways. The area comprises an element of the extensive wetlands associated with San Francisco Bay, which once formed the largest contiguous tidal marsh system present on the Pacific Coast of North America.^{35,36,37}

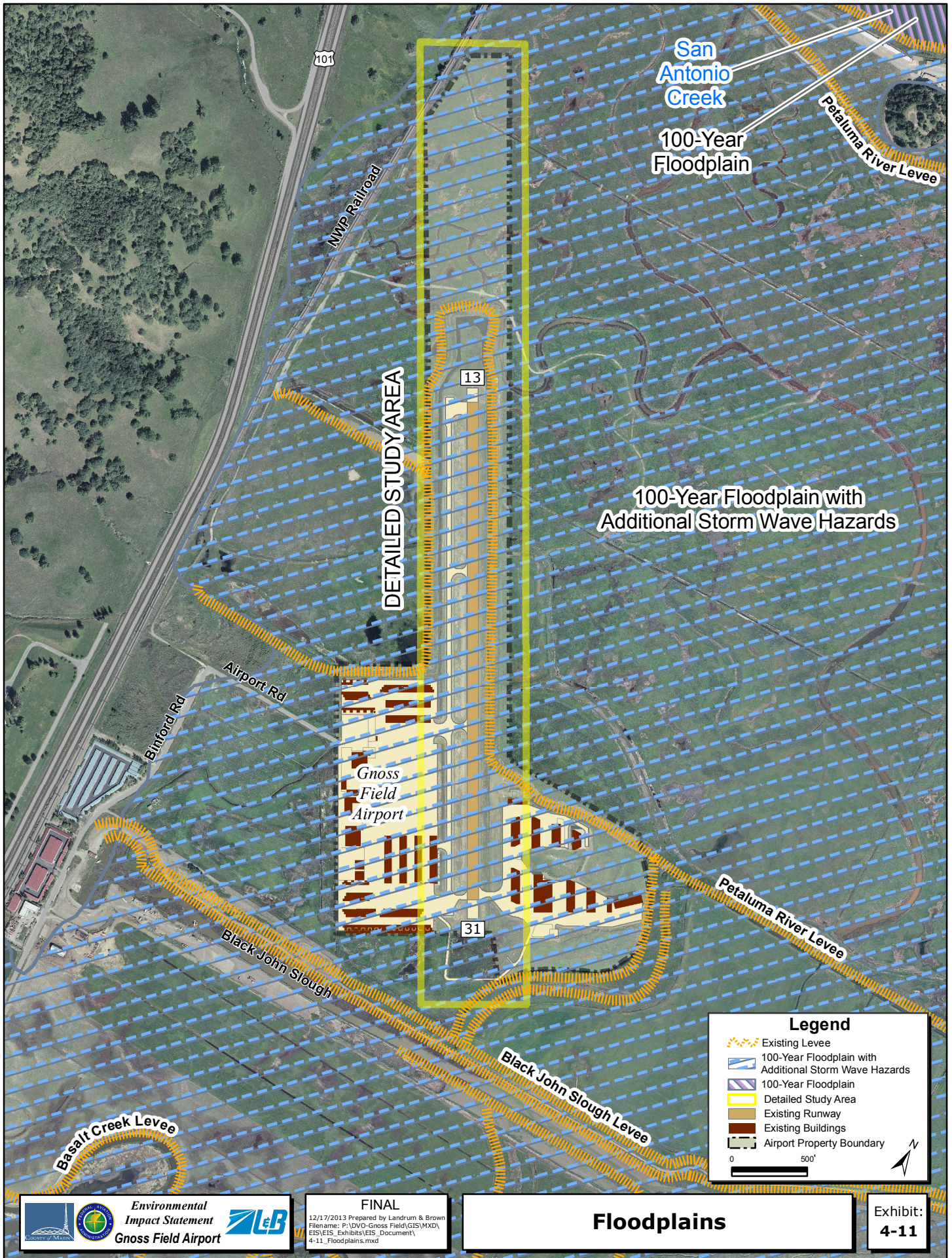
The area north of DVO is drained by San Antonio Creek and Black John Slough is located immediately south of the site, as shown on **Exhibit 4-10, Jurisdictional Wetlands and Waters of the U.S.**, and also on **Exhibit 4-11, Floodplains**. Both of these features are tributary to the Petaluma River, which flows into San Pablo Bay at the north end of San Francisco Bay. Surface waters on the site are fed by precipitation, overland flow, and seeps. The seeps occur primarily in the northwestern corner of the Airport, and are fed by shallow subsurface flow from the foothills of Burdell Mountain, which is located to the west. Water flows off of Airport property via a system of ditches, canals, and sloughs and is pumped over two sets of levees into the Petaluma River. Levees were first constructed along the Petaluma River to reclaim the area between the hills to the west and the Petaluma River for agriculture. The levees that protect the Airport are located west of the original levee along the Petaluma River. The two sets of levees are shown on Exhibit 4-9, *Jurisdictional Wetlands and Waters of the U.S.*, and also on Exhibit 4-10, *Floodplains*. Because the Airport site is protected by these levees, the water level fluctuations at the site are more similar to a reservoir than to a typical estuary. There is virtually no influence of tidal action on the hydrologic regime.

³⁵ Conomos, T.J. (Editor), 1979, *San Francisco Bay: the Urbanized Estuary*. Pacific Division, American Association for the Advancement of Science, San Francisco, California.

³⁶ Josselyn, Michael, 1983, *The Ecology of San Francisco Bay Tidal Marshes: A Community Profile*. Report No. FWS/OBS-83/23, U.S. Fish and Wildlife Services, Division of Biological Services, Washington, D.C.

³⁷ Nichols, D.R. and N.A. Wright, 1972, *Preliminary Map of Historic Margins of Marshlands, San Francisco Bay, California*. U.S. Geological Survey Open-File Map 71-216.





4.5.2 WETLANDS AND OTHER WATERS OF THE U.S.

Wetlands located within the DSA were delineated as part of this environmental analysis. The U.S. Army Corps of Engineers (USACOE) issued a jurisdictional determination letter and map in August 2009 stating concurrence with the Gnost Field Airport Delineated Waters of the U.S., as submitted to the USACOE by Marin County in March 2009, and as verified by the USACOE during a site visit in June 2009. See Appendix J, *Wetlands* for a copy of the USACOE jurisdictional letter and map. Wetland communities in the DSA include depressional seasonal wetlands, riverine seasonal wetlands, slope seep wetlands, high brackish marsh wetlands, perennial drainage and ditches/canals totaling 74.70 acres (see Exhibit 4-9, *Jurisdictional Wetlands and Waters of the U.S.*).

Approximately 78.9 percent (58.96 acres) of the delineated wetlands are high brackish marsh wetlands. High brackish marsh plant communities consist of emergent species that are tolerant of both salt and occasional inundation. They are typically found above Mean High Water and may only be inundated by storm tides or found on the landward side of levees where the salinity is still high enough to discourage plants that can only exist in freshwater marshes.

A total of 3.59 acres of depressional seasonal wetlands have been delineated within the DSA. Depressional seasonal wetlands exhibit a hydrologic regime dominated by saturation, rather than inundation. Depressional seasonal wetlands were identified on the site as depressions within the topography with a hydrologic regime dominated by saturation and capable of supporting hydrophytic plant species and hydric soils. Plant species in depressional seasonal wetlands are adapted to withstand short periods of saturation or saturated soils conditions but will not withstand prolonged periods of inundation, as is common in vernal pools.

A total of 0.52 acres of riverine seasonal wetlands has been delineated within the DSA. Riverine seasonal wetlands are defined by a hydrologic regime dominated by unidirectional flow of water. Riverine seasonal wetlands typically occur in topographic folds or swales and represent natural drainages that convey sufficient water to support wetland vegetation. Riverine seasonal wetlands typically convey water during and shortly after storm events. Riverine seasonal wetlands may have a moderately defined bed and bank and often exhibit sufficient gradient to convey water off of the site. As in depressional seasonal wetlands, plant species found within riverine seasonal wetlands are typically adapted to a hydrologic regime dominated by saturation rather than inundation.

A total of 2.95 acres of seep have been delineated within the DSA. Seeps are characterized as areas where groundwater intersects with the soil surface. Typically, flow from seeps continues for some period after the rainy season and may continue all year. Seeps can support isolated wetland vegetation (such as on a hillside) or they may form the headwaters of a riverine seasonal wetland or other jurisdictional drainage feature. Vegetation in seeps often consists of plant species associated with seasonal and perennial marsh habitats. When seeps flow for only short periods beyond the rainy season and into the warm season, herbaceous perennial wetland species typically dominate. Seeps that persist for longer periods may support woody, perennial, wetland obligate species.

A total of 2.48 acres of perennial drainage have been delineated within the DSA. Perennial drainages are features that may not meet the three-parameter criteria for vegetation, hydrology and soils but do convey water and exhibit an "ordinary high water mark". Perennial drainages generally convey unidirectional water flows throughout the entire year. Perennial drainages typically consist of a channel, bed and bank and are devoid of vegetation due to the scouring effect of flowing water. Perennial drainages are often bordered by wetland vegetation communities of various composition and cover depending on flow rates, duration of flows and soil types.

A total of 6.20 acres of ditches have been delineated within the DSA. Ditches excavated in upland areas and draining entirely uplands are not typically considered within Clean Water Act (CWA) jurisdiction by the USACOE. However, the ditches on the site typically drain at least some wetland areas and often connect to wetland features. Therefore, the ditches on the site are considered within CWA jurisdiction.

A summary of wetlands in the DSA is included in **Table 4-12**.

Table 4-12
SUMMARY OF CLEAN WATER ACT JURISDICTIONAL FEATURES AND
WETLANDS AT GNOSS FIELD AIRPORT

CLASSIFICATION	TOTAL ACREAGE	JURISDICTIONAL ACREAGE	WIDTH (IN FEET)	LENGTH (IN FEET)
Depressional Seasonal Wetland	3.59	3.59	n/a	n/a
Riverine Seasonal Wetland	0.52	0.52	n/a	n/a
Slope Seep Wetland	2.95	2.95	n/a	n/a
High Brackish Marsh Wetland	58.96	58.96	n/a	n/a
Perennial Drainage	2.48	2.48	145	2,739
Ditch/Canal	6.20	6.20	140	17,446
Total	74.70	74.70	285	20,185

Source: CWA Jurisdictional Determination for Gness Field Airport, Correspondence from the U.S. Army Corps of Engineers to the Marin County Department of Public Works, Received August 27, 2009. See Appendix J.

4.5.3 FLOODPLAINS

Executive Order 11988, *Floodplain Management*, directs Federal agencies to take action to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural beneficial values of floodplains. The Executive Order defines floodplains as the "lowland and relatively flat areas adjoining inland and coastal waters, including flood prone areas of offshore islands, including at a minimum, those that are subject to a one percent or greater chance of flooding in any given year".³⁸ The 100-year flood (one percent annual chance) has been adopted by the Federal Emergency Management Agency (FEMA) as the base flood for floodplain management purposes.

DOT Order 5650.2, *Floodplain Management and Protection*, states that all airport development actions must avoid the floodplain if a practicable alternative exists. If no practicable alternative exists, actions in a floodplain must be designed to minimize adverse impact to the floodplain's natural and beneficial values. The design must also minimize the potential risks for flood-related property loss and impacts on human safety, health, and welfare.³⁹

The Flood Management Branch of the California Department of Water Resources administers programs aimed at reducing the threat of loss of life and damage to property through the encouragement and use of nonstructural alternatives and practices. The Branch coordinates with Federal, state and local agencies and provides planning assistance to state agencies on the placement of their facilities and conducting their programs to minimize the risk of flood loss and damage. The Branch coordinates all activities related to the state's participation in the National Flood Insurance Program; and facilitates problem resolution of California communities' compliance with the National Flood Insurance Program. There are various laws and programs designed to reduce the impact of flood waters on the Central Valley area of California, but none of those place additional requirements on this project.⁴⁰

The Marin Countywide Plan provides guidance and recommendations regarding development within floodplains in order to protect people and property from risks associated with flooding and inundation within the County. Notably, Policy EH 3.2, Retain Natural Conditions, ensures that flow capacity is maintained in stream channels and floodplains, and achieves flood control using biotechnical techniques instead of storm drains, culverts, riprap, and other forms of structural stabilization.⁴¹ Additional detail is available in the Marin Countywide Plan including specific goals and implementing programs.

³⁸ Executive Order 11988, *Floodplain Management*, May 24, 1977. Available online at <http://www.epa.gov/owow/wetlands/regs/eo11988.html> Accessed October 8, 2013.

³⁹ DOT Order 5650.2, *Floodplain Management and Protection*, April 23, 1979. Available online at: <http://isddc.dot.gov/OLPFiles/DOT/007652.pdf> Accessed October 8, 2013

⁴⁰ *California Department of Water Resources, Flood Management*, On-line at: <http://www.water.ca.gov/floodmgmt/lrafmo/fmb/> Retrieved October 8, 2013.

⁴¹ *Marin Countywide Plan, 2.6, Environmental Hazards*. Adopted by the Marin County Board of Supervisors, November 6, 2007.

A Flood Insurance Rate Map (FIRM) prepared by FEMA (May 4, 2009)⁴² was used to establish the boundary of the 100-year floodplain within the DSA. FIRM Community Panel and Marin County data show that the entire DSA lies within the FEMA designated "100-year Floodplain with Additional Storm Wave Hazards," also known as "Area of Special Flood Hazard Zone VE", which describes high-risk coastal areas with an annual one percent or greater chance of flooding and an additional hazard associated with storm waves,⁴³ as shown in Exhibit 4-10, *Floodplains*.

A system of manmade ditches and levees constructed along the Petaluma River provide some flood protection for the Airport. In addition, a second system of manmade ditches and levees has been constructed surrounding the runway to provide protection from flooding. While both of these systems provide protection from flooding, the exact level of flood protection has not been calculated.

4.6 DEPARTMENT OF TRANSPORTATION SECTION 4(f) RESOURCES AND LAND AND WATER CONSERVATION ACT, SECTION 6(f) RESOURCES.

The Federal statute that governs impacts in this category is commonly known as the DOT Act Section 4(f) provisions. Section 4(f) of the DOT Act, which is codified and renumbered as section 303(c) of 49 U.S.C., provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land from an historic site of national, State, or local significance as determined by the officials having the jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land and such program, and the project includes all possible planning to minimize harm resulting from the use.

Section 6(f) of the Land and Water Conservation Fund (LWCF), 16 United States Code § 4601 et. seq. provides funds for buying or developing public use recreational lands through grants to local and state governments. LWCF Section 6(f)(3) prevents conversion of lands purchased or developed with LWCF to non-recreation uses unless the conversion is approved by the Secretary of Interior acting through the National Park Service. No LWCF lands would be converted to non-recreational use as a result of any of the alternatives proposed in this EIS. Therefore, LWCF Section 6(f) lands are not discussed further in this EIS.

⁴² Federal Emergency Management Agency, *Flood Insurance Rate Map*, Community Number 0601730175D. Available online at: <https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1> Accessed October 8, 2013.

⁴³ *Definitions of FEMA Flood Zone Designations*, On-line at: <http://msc.fema.gov> Retrieved October 8, 2013.

Portions of one public park/recreation facility, the Burdell Unit of the Petaluma Marsh Wildlife Area, are located within the DSA. There are 18 public parks/recreational/historic facilities, open space preserves, and wildlife areas located partially or wholly within the GSA, as listed below and shown in **Exhibit 4-12, Public Parks, Historic, and Recreational Facilities**, that would be considered Section 4(f) resources. The facilities and preserves located within the GSA fall under the jurisdiction of the State of California, Marin County, and the City of Novato are listed below.

- Park/Recreational/Historic Facility
 - Rancho Olompali State Historic Park, State of California
 - Hamman Field, City of Novato, California
 - Slade Park, City of Novato, California
 - Pansy Tong Lo Park, City of Novato, California
 - Bahia Mini Parks (3 sites), City of Novato, California
 - Black Point Boat Launch, Marin County, California
- Open Space Preserve
 - Mount Burdell, Marin County, California
 - Rush Creek, Marin County, California
 - Deer Island, Marin County, California
- Wildlife Area
 - Petaluma Marsh Wildlife Areas:
 - Petaluma River Unit, State of California
 - Burdell Unit, State of California
 - Black John Slough Unit, State of California
 - Rush Creek Unit, State of California
 - Bahia Wetlands Unit, State of California
 - Green Point Unit, State of California
 - Novato Creek Unit, State of California

4.7 HISTORIC, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

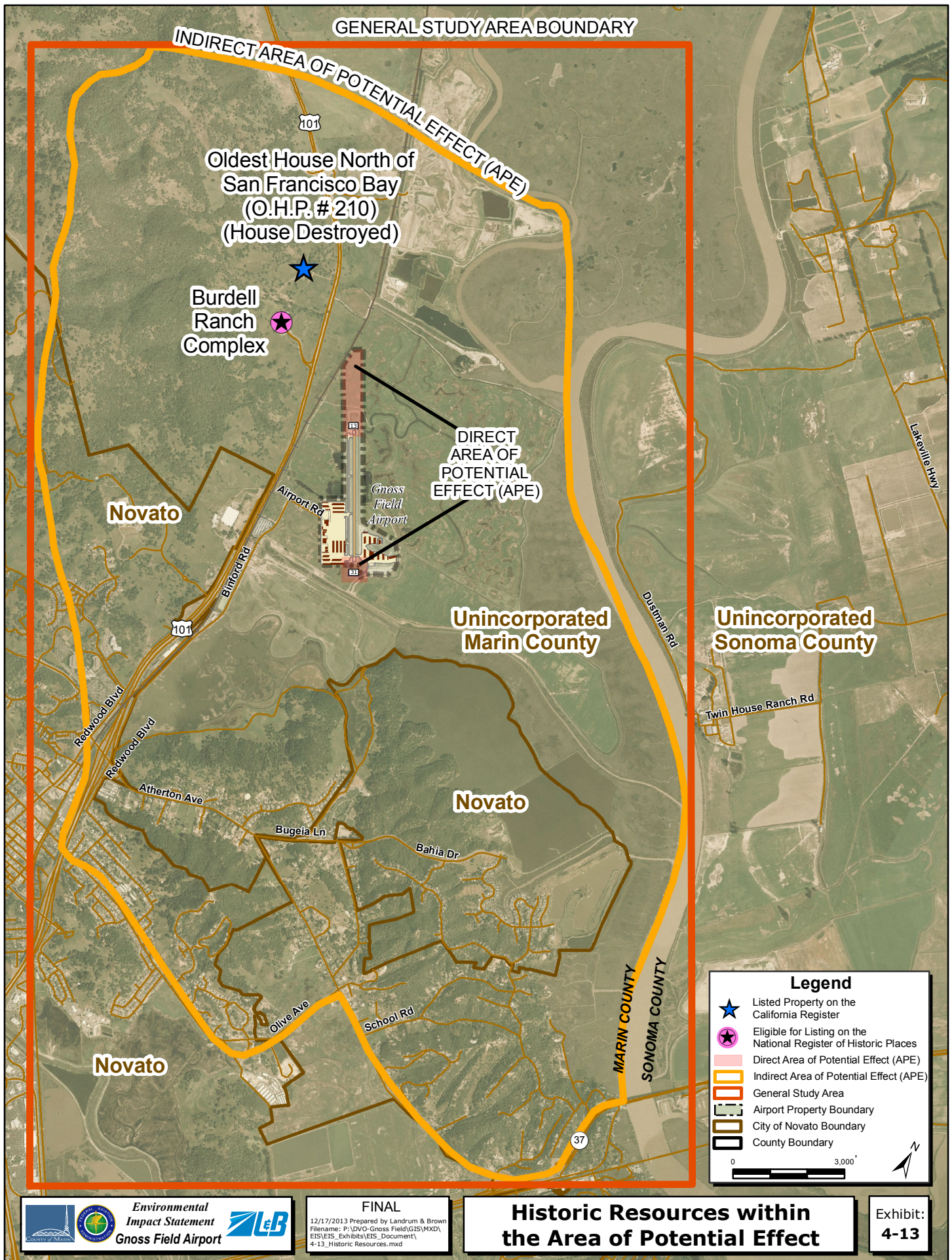
In accordance with the National Historic Preservation Act, Section 106, the FAA as the lead Federal agency for this EIS prepared documentation regarding the definition of the Area of Potential Effect (APE) and the identification of historic properties within the APE. The FAA sent letters to tribal groups requesting they identify any concerns regarding the proposed project, and at the request of the Federated Indians of Graton Rancheria, also met with the tribe regarding the proposed project. While developing the APE, the FAA considered both direct and indirect impacts to historic properties. Direct impacts would include direct and physical disturbance of historic properties. For this undertaking, direct impacts could occur within the area of ground disturbance. Indirect impacts would include impacts to historic properties associated with noise, visual impacts, or changes in setting. As a result of this effort the FAA defined two APEs - a Direct APE, where direct effects of the proposed project might occur, and an Indirect APE, where the indirect effects of the proposed project might occur. The boundary of the Indirect APE was determined after tribal consultation with the Federated Indians of Graton Rancheria. The California State Historic Preservation Office (SHPO) concurred with the APEs via letter on July 20, 2010 (see Appendix H, *Cultural Resources*).

As shown on **Exhibit 4-13, *Historic Resources within the Area of Potential Effect***, the Direct APE is comprised of two areas, totaling just over 39 acres (the northern portion totals 28.24 acres and the southern portion totals 11.04 acres), which represents the area of potential direct impacts as a result of the undertaking (Proposed Project) and other reasonable alternatives. The Indirect APE is an irregularly-shaped area, totaling approximately 8,669 acres, which represents the area of potential indirect impacts as a result of the undertaking (Proposed Project) and other reasonable alternatives. By e-mails of July 25, 2011, the California SHPO requested a determination of the depth of ground disturbance associated with the proposed project and direct APE, and the FAA responded that the depth of ground disturbance is anticipated to be up to three feet.⁴⁴

There are no historic properties located within the Direct APE that are listed or eligible for listing on the National Register of Historic Places (NRHP) or state register of historic places. The Olompali Burdell Ranch Complex, located in the Indirect APE, is eligible for listing on the NRHP. The site of The Oldest House North of San Francisco Bay, California Register of Historic Resources, California State Historic Landmark, Marin County, #210, is within the Indirect APE, but is not eligible for NRHP listing because the house was previously destroyed by fire.⁴⁵ (See Exhibit 4-13, *Historic Resources within the Area of Potential Effect*).

⁴⁴ Letter from Federal Aviation Administration to California State Historic Preservation Office, October 6, 2011 (see Appendix H for copy of letter).

⁴⁵ California State Historical Landmarks in Marin County, Retrieved October 15, 2011, on-line at: http://ceres.ca.gov/geo_area/counties/Marin/landmarks.html



The State of California Native American Heritage Commission (NAHC) was contacted as part of the development process of this EIS with a request for a query of the Sacred Lands File and a list of Native American contacts (see Appendix H for Native American consultation documentation). The NAHC indicated that a records search of the Sacred Lands File revealed that no Native American Cultural Resources have been recorded within the Direct or Indirect APEs.

A field survey of the Direct APE associated with the Sponsor's Proposed Project was conducted in May 2008 and a field survey of the entire Direct APE was conducted in September 2009. Through each survey, there were no observed surficial prehistoric, ethnohistoric, or historic cultural resources. To determine if subsurface cultural materials were present, shovel test probes (STPs) were excavated at various locations within the survey area. No subsurface cultural materials were observed within any of the STP locations (see Appendix H).

4.8 ENERGY SUPPLY AND NATURAL RESOURCES

4.8.1 ENERGY SUPPLY

The existing electricity infrastructure, as well as natural gas infrastructure are provided to DVO and other customers within Marin County by Pacific Gas and Electric (PG&E); a company that provides electricity and natural gas to most of northern and central California. PG&E generates electricity from hydropower stations, gas-fired steam turbines, and Diablo Canyon Nuclear Power Plant, located in San Luis Obispo County. In addition PG&E buys electricity from other in-state and out-of-state generators.⁴⁶ PG&E has 68 hydroelectric powerhouses with a total generating capacity of 3,896 megawatts (MWs). PG&E's Diablo Canyon Power Plant, which is located in San Luis Obispo County, provides electricity for more than three million people in northern and central California from its two nuclear powered 1,100 megawatt units.⁴⁷ In 2007, PG&E's total electricity generating capacity was over 6,500 MWs.⁴⁸ In May 2010, the Marin Energy Authority gained the ability to buy electricity on the free market and have it delivered to its residents over the existing infrastructure owned by the local utility company. This is made possible by Community Choice Aggregation, which results from a State of California law passed in 2002. The electricity provided to Marin County customers is largely generated from renewable sources.⁴⁹

⁴⁶ Pacific Gas & Electric. PG&E's Electric System. Available online at: <http://www.pge.com/myhome/edusafety/systemworks/electric/>. Retrieved October 8, 2013.

⁴⁷ Pacific Gas & Electric. Diablo Canyon Fact Sheet, March, 2001. Available online at: <http://www.pge.com/myhome/edusafety/systemworks/dcpp/about/> Retrieved October 8, 2013.

⁴⁸ Energy Information Administration. Form EIA-860 Database Annual Electric Generator Report, February, 2009. Available online at: <http://www.eia.doe.gov/cneaf/electricity/page/eia860.html>. Retrieved October 19, 2011.

⁴⁹ Marin County presents possible model for beefing up clean energy in Boulder, Colorado Daily, May 22, 2010. On-line at: www.coloradodaily.com. Retrieved October 19, 2011.

Electricity usage at DVO averages 178 Kilowatt hours (KWH) per day.⁵⁰ In 2007, PG&E provided nearly 515,000 million cubic feet (MMCF) of natural gas⁵¹ to more than four million customers.⁵² On average, DVO uses 1,000 cubic feet of natural gas per day for heating during the winter months.⁵³

Aviation fuel is offered by concession at DVO in both 100 Low-Lead (LL) for piston-engine aircraft and Jet-A grade for turbo-prop and turbojet-engine aircraft. Total fuel consumption at DVO in 2008 was approximately 75,000 gallons of 100LL and 168,000 gallons of Jet-A. The peak monthly fuel consumption in 2008 was 8,590 gallons of 100LL and 19,654 gallons of Jet-A.⁵⁴

4.8.2 GEOLOGY/NATURAL RESOURCES

DVO lies within the Petaluma River Valley approximately two feet above sea level. The geology of the DSA is characterized by soils deposited within the San Pablo Bay drainage basin during the late Holocene Epoch (less than 11,500 years ago).⁵⁵ DVO is not located within any current fault hazard zone subject to the provisions of the Alquist-Priolo Earthquake Fault Zoning Act.⁵⁶ DVO is adjacent to the Burdell Mountain Fault, a Quarternary active fault that has not experienced ground rupture in an earthquake since 1776.⁵⁷ There are no known historic or active mines, nor any known precious metals or mineral deposits, nor any oil or gas fields located within or near the DSA.

4.8.3 SOILS

Soils within the DSA are predominately Reyes clay, which is a somewhat poorly drained soil.⁵⁸ According to the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service, Reyes clay does not meet the criteria for prime farmland or farmland of statewide importance as outlined in the USDA's Land Inventory and Monitoring project for the Marin County Soil Survey.⁵⁹ See **Exhibit 4-14, Site Soils**, for locations of soil types within the DSA.

⁵⁰ Data provided by the Marin County Public Works Department.

⁵¹ Energy Information Administration. EIA-176 Query System. Available online at: http://www.eia.doe.gov/oil_gas/natural_gas/applications/eia176query.html. Retrieved October 19, 2011.

⁵² Pacific Gas & Electric, PG&E's Natural Gas System Overview. Available online at: <http://www.pge.com/myhome/edusafety/systemworks/gas/overview/>. Retrieved October 8, 2013.

⁵³ Data provided by the Marin County Public Works Department, 2009.

⁵⁴ Data provided by the Marin County Public Works Department, 2009.

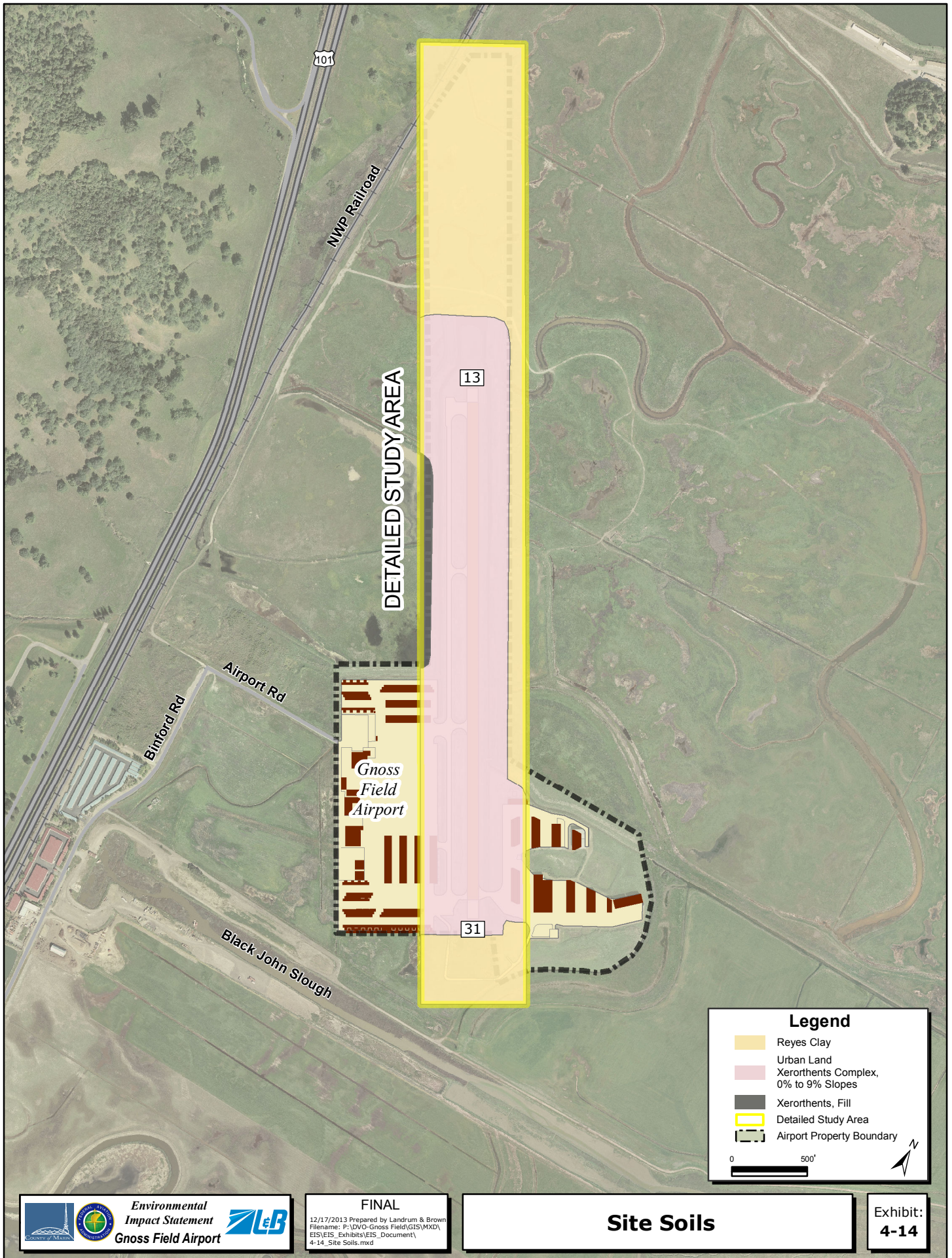
⁵⁵ U.S. Department of Interior, U.S. Geological Survey, Geologic Map of the San Francisco Bay Region, 2006.

⁵⁶ California Geological Survey, Fault Rupture Hazard Zones in California, 1997

⁵⁷ U.S. Department of Interior, U.S. Geological Survey, Map of Quarternary Active Faults in the San Francisco Bay Region, 2006.

⁵⁸ U.S. Department of Agriculture, Natural Resources Conservation Service, Soil Survey Geographic (SSURGO) database for Marin County, California, 10/12/2007.

⁵⁹ California Department of Conservation. Farmland Mapping and Monitoring Program: Soil Candidate Listing for Prime Farmland and Farmland of Statewide Importance, Marin County, 7/06/2004.



4.9 FISH, WILDLIFE, AND PLANTS

Biotic communities at and in the vicinity of DVO were surveyed as part of this environmental analysis. The full report is included in Appendix I, *Biological Resources*, of this document.⁶⁰ Two major biological communities occur within the immediate vicinity of DVO including annual grassland and high brackish marsh. Within these two primary communities are also some additional wetland communities. These communities provide habitat to a number of common species of wildlife and may provide suitable habitat for special-status species. Each of the biological communities including associated common plant and wildlife species observed, or that are expected to occur within these communities are described in the following discussions. Locations of biotic communities and wildlife habitats within the DSA are shown in **Exhibit 4-15, Vegetation and Wildlife Habitats**.

4.9.1 ANNUAL GRASSLAND

Annual Grassland is the dominant upland plant community within the DSA (see Exhibit 4-14, *Vegetation and Wildlife Habitats*). Annual grassland is characterized primarily by an assemblage of non-native grasses and forbs and typically supports breeding, foraging, and shelter habitat for several species of wildlife. Species observed or expected to occur in this habitat include savannah sparrow (*Passerculus sandwichensis*), western meadowlark (*Sturnella neglecta*), white-tailed kite (*Elanus leucurus*), western burrowing owl (*Athene cunicularia hypugaea*), northern harrier (*Circus cyaneus*), black-tailed jackrabbit (*Lepus californicus*), and gopher snake (*Pituophis melanoleucus*).⁶¹

4.9.2 HIGH BRACKISH MARSH

High Brackish Marsh, a wetland community, is the major plant community within the DSA outside of the developed airfield. Lesser amounts of other wetland types are also present as described in Section 4.5.2, Wetlands and Other Waters of the U.S. High Brackish Marsh typically supports breeding and foraging habitat for a variety of wildlife. Species observed within this community include northern harrier (*Circus cyaneus*), red-winged blackbird (*Agelaius phoeniceus*), short-eared owl (*Asio flammeus*), black necked stilt (*Himantopus mexicanus*), killdeer (*Charadrius vociferus*), marsh wren (*Cistothorus palustris*), and San Pablo song sparrow (*Melospiza melodia samuelis*).^{62,63}

⁶⁰ Foothill Associates, *Biological Resources Assessment, Marin County Airport*, 2011. See Appendix I.

⁶¹ Foothill Associates, *Biological Resources Assessment, Marin County Airport*, 2011. See Appendix I.

⁶² Foothill Associates, *Biological Resources Assessment, Marin County Airport*, 2011. See Appendix I.

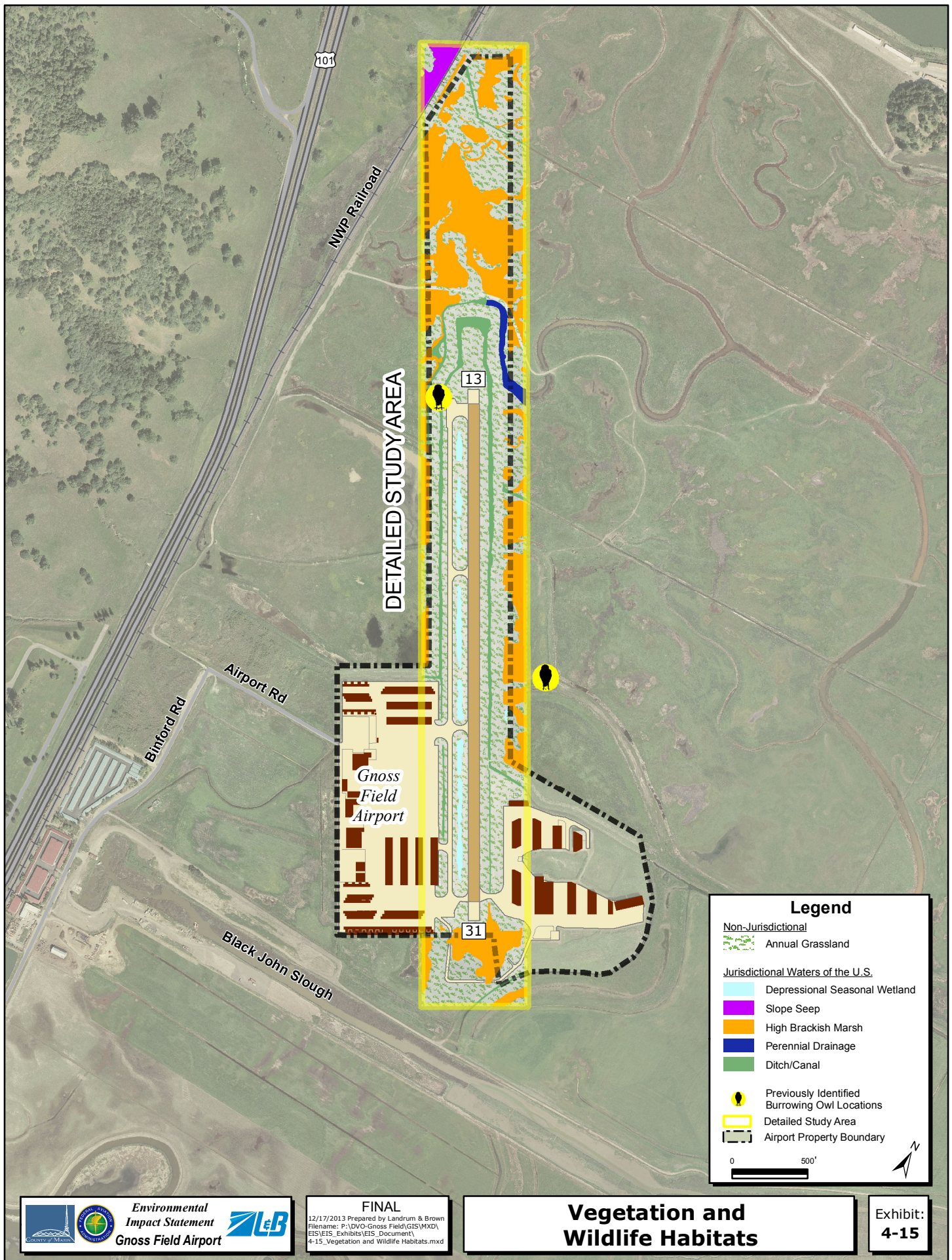
⁶³ The marsh wren and San Pablo song sparrow are not typically associated with high brackish marsh habitat, but were observed by the biologists during the site visit.

4.9.3 SPECIAL STATUS SPECIES

Special-status species are plant and animal species that have been afforded special recognition by Federal and/or state agencies or organizations. Listed and special-status species are of relatively limited distribution and may require specialized habitat conditions. Special-status species are defined as meeting one or more of the following criteria:

- Listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS);
- Listed as threatened or endangered under the California Endangered Species Act or otherwise fully protected under California state law; or
- Protected under other regulations, such as the Migratory Bird Treaty Act (MBTA).

Special-status species considered for this analysis are based on a USFWS list of Federally threatened or endangered species; Federally designated critical habitat that could potentially be affected by the project; and query of the California Department of Fish and Game's (CDFG) California Natural Diversity Data Base (CNDDB) for the Petaluma River quadrangle and the eight surrounding quadrangles. **Tables 4-13** and **4-14** include the common names and scientific names for each Federal and State of California threatened or endangered plant and wildlife species, respectively, and their potential for occurrence within the DSA.



**Table 4-13
FEDERALLY THREATENED AND ENDANGERED SPECIES THAT OCCUR OR
HAVE THE POTENTIAL TO OCCUR WITHIN THE DETAILED STUDY AREA
Gross Field Airport**

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	POTENTIAL HABITAT IN DSA	POTENTIAL FOR OCCURRENCE IN DSA
PLANTS				
Soft bird's beak	<i>Cordylanthus mollis ssp. mollis</i>	Endangered	Marginal potential habitat in DSA	Concluded species is absent based on negative species survey in DSA.
WILDLIFE				
Birds				
California clapper rail	<i>Rallus longirostris obsoletus</i>	Endangered	Habitat is present in DSA	USFWS has determined that the area of the proposed runway extension is habitat for the California clapper rail. The FAA concurred with this determination. Suitable marsh habitat for this species exists to the south of the study area and the species could seasonally (winter) forage within the survey area.
Animals				
Salt marsh harvest mouse	<i>Reithrodontomys raviventris</i>	Endangered	Habitat is present in DSA	USFWS has determined that the brackish marsh area north of the proposed runway extension is habitat for the salt marsh harvest mouse. The FAA concurred with this determination. Marginal habitat for this species occurs within the study area, specifically within the areas of man-made drainage, which provide (limited) connectivity with suitable habitats adjacent to the Petaluma River and east of a levee used to isolate the Airport from tidal flows and processes. Although pickleweed is present in the DSA, it does not contain pickleweed-dominated marsh. Rather, the marsh is dominated by saltgrass and alkali heath.

**Table 4-13, Continued
FEDERALLY THREATENED AND ENDANGERED SPECIES THAT OCCUR OR
HAVE THE POTENTIAL TO OCCUR WITHIN THE DETAILED STUDY AREA
Gross Field Airport**

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	POTENTIAL HABITAT IN DSA	POTENTIAL FOR OCCURRENCE IN DSA
Amphibians/Reptiles				
California red-legged frog	<i>Rana aurora draytonii</i>	Threatened	Habitat is present in DSA during winter months	There is low potential for the frog to be present onsite during winter months as a result of dispersing from adjacent localized freshwater habitat areas. If the species migrates into the site outside of the winter months (i.e., during the region's dry period), it is not anticipated to survive.

Source: Foothill Associates, *Biological Resources Assessment, Marin County Airport*, 2011. See Appendix I.

**Table 4-14
STATE OF CALIFORNIA SPECIES WITH SPECIAL STATUS THAT OCCUR OR
HAVE THE POTENTIAL TO OCCUR WITHIN THE DETAILED STUDY AREA
Gross Field Airport**

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	POTENTIAL HABITAT IN DSA	POTENTIAL FOR OCCURRENCE IN DSA
PLANTS					
Soft bird's beak	<i>Cordylanthus mollis ssp. mollis</i>	Endangered	CR	Marginal potential habitat in DSA	Concluded species is absent based on negative species survey in DSA.
WILDLIFE					
Birds					
California clapper rail	<i>Rallus longirostris obsoletus</i>	Endangered	CFP	Habitat is present in DSA	USFWS has determined that the area of the proposed runway extension is habitat for the California clapper rail. The FAA concurred with this determination. Suitable marsh habitat for this species exists to the south of the study area and the species could seasonally (winter) forage within the survey area.
Loggerhead shrike	<i>Lanius ludovicianus</i>	--	CSC	Marginal potential habitat in DSA	Concluded species is unlikely to occur in the DSA based on the absence of suitable habitat.
Northern harrier	<i>Circus cyaneus</i>	--	CSC	Habitat is present in DSA	Concluded species are present based on positive species survey in DSA.
San Pablo song sparrow	<i>Melospiza melodia samuelis</i>	--	CSC	Habitat is present in DSA	Concluded species are present based on positive species survey in DSA

Table 4-14, Continued

**STATE OF CALIFORNIA SPECIES WITH SPECIAL STATUS THAT HAVE THE
POTENTIAL TO OCCUR WITHIN THE DETAILED STUDY AREA (DSA)**

Gross Field Airport

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	POTENTIAL HABITAT IN DSA	POTENTIAL FOR OCCURRENCE IN DSA
Birds, Continued					
Tricolored blackbird	<i>Agelaius tricolor</i>	--	CSC	Marginal potential habitat in DSA	Concluded species is unlikely to occur in the DSA based on the absence of suitable habitat.
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	--	CSC	Habitat is present in DSA	Concluded species are present based on positive species survey in DSA.
White-tailed kite	<i>Elanus leucurus</i>	--	CFP	Habitat is present in DSA	Concluded species are present based on positive species survey in DSA.
Other Raptors (Hawks, Owls and Vultures)		Protected under Migratory Bird Treaty Act (MBTA)	Protected under Section 3503.5 of the California Fish and Game Code	High potential habitat in DSA	Concluded species are present based on positive species survey in DSA.
Animals					
American badger	<i>Taxidea taxus</i>	--	CSC	Marginal potential habitat in DSA	Concluded species is unlikely to occur in the DSA based on the absence of suitable habitat.
Pallid bat	<i>Antrozous pallidus</i>	--	CSC	Marginal potential habitat in DSA	Concluded species is unlikely to occur in the DSA based on the absence of suitable habitat.

Table 4-14, Continued

**STATE OF CALIFORNIA SPECIES WITH SPECIAL STATUS THAT HAVE THE
POTENTIAL TO OCCUR WITHIN THE DETAILED STUDY AREA (DSA)
Gross Field Airport**

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	POTENTIAL HABITAT IN DSA	POTENTIAL FOR OCCURRENCE IN DSA
Animals, Continued					
Salt marsh harvest mouse	Reithrodontomys -raviventris	Endangered	CFP	Habitat is present in DSA	USFWS has determined that the brackish marsh area north of the proposed runway extension is habitat for the salt marsh harvest mouse. The FAA concurred with this determination. Marginal habitat for this species occurs within the study area, specifically within the areas of man-made drainage, which provide (limited) connectivity with suitable habitats adjacent to the Petaluma River and east of a levee used to isolate the Airport property from tidal flows and processes. Although pickleweed is present in the DSA, it does not contain pickleweed- dominated marsh. Rather, the marsh is dominated by saltgrass and alkali heath.

Table 4-14, Continued

**STATE OF CALIFORNIA SPECIES WITH SPECIAL STATUS THAT HAVE THE
POTENTIAL TO OCCUR WITHIN THE DETAILED STUDY AREA (DSA)
Gross Field Airport**

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	POTENTIAL HABITAT IN DSA	POTENTIAL FOR OCCURRENCE IN DSA
Animals, Continued					
Townsend's big-eared Bat	<i>Corynorhinus townsendii</i>	--	CSC	Marginal potential habitat in DSA	Concluded species is unlikely to occur in the DSA based on the absence of suitable habitat.
Amphibians/Reptiles					
California red-legged frog	<i>Rana aurora draytonii</i>	Threatened	CSC	Habitat is present in DSA during winter months	There is low potential for the frog to be present onsite during winter months as a result of dispersing from adjacent localized freshwater habitat areas. If the species migrates into the site outside of the winter months (i.e., during the region's dry period), it is not anticipated to survive.

KEY:

State of California Classifications: **CFP** = California Fully Protected; **CSC** = California Species of Special Concern; **CR** = California State Rare;

Source: Foothill Associates, *Biological Resources Assessment, Marin County Airport*, 2011. See Appendix I

4.9.3.1 Plants

FEDERALLY THREATENED AND ENDANGERED PLANT SPECIES

Based on the USFWS list, special-status plant species have the potential to occur onsite or in the vicinity of the DSA. However, based on field observations and literature review specific to the special-status plants listed in Table 4-13, no Federally threatened or endangered plant species are known to be present or are considered to have a high potential to occur within the DSA. The late blooming plant species that is considered to have a low potential to occur onsite is the soft bird's beak (*Cordylanthus mollis* ssp. *mollis*). Surveys to identify the presence of soft bird's beak were performed on the site in March 2008, July 2009, and July, August, and September of 2010. No occurrences of soft bird's beak were found during these surveys (see Appendix I). Based upon the lack of observed occurrence, the marginally-suitable nature of the available habitat on-site (primarily due to the alteration of the site's hydrologic and plant community structure by surrounding levees), and the fact that the majority of the potential habitat is within a highly disturbed, actively grazed, non-native agricultural community, it has been concluded that this species is absent from the site.⁶⁴

STATE OF CALIFORNIA THREATENED AND ENDANGERED PLANT SPECIES

Based on a records search of the CNDDDB, special-status plant species have the potential to occur onsite or in the vicinity of the DSA. However, based on field observations and literature review specific to the special-status plants listed in Table 4-14, no State of California threatened or endangered plant species are known to be present or are considered to have a high potential to occur within the DSA. The late blooming plant species that are considered to have a low potential to occur on-site is the soft bird's beak (*Cordylanthus mollis* ssp. *mollis*). Surveys to identify the presence of soft bird's beak were performed on the site in March 2008, July 2009, and July, August, and September of 2010. No occurrences of soft bird's beak were found during these surveys (see Appendix I). Based upon the lack of observed occurrence, the marginally-suitable nature of the available habitat on-site (primarily due to the alteration of the site's hydrologic and plant community structure by surrounding levees), and the fact that the majority of the potential habitat is within a highly disturbed, actively grazed, non-native agricultural community, it has been concluded that this species is absent from the site.⁶⁵

OTHER PLANT SPECIES OF CONCERN

Through the tribal coordination process as part of this document, the FAA and Marin County held a meeting in December 2008 with representatives of the Federated Indians of Graton Rancheria (FIGR) (see Appendix H). At that meeting, FIGR representatives identified 42 native plant species that they consider to be to be sacred and culturally significant. Of the 42 plant species identified by the FIGR as sacred and culturally significant, one species, the Showy Indian Clover (*Trifolium amoenum*), is both a Federal and State of California threatened or endangered

⁶⁴ Foothill Associates, *Biological Resources Assessment, Marin County Airport*, 2011. See Appendix I.

⁶⁵ Foothill Associates, *Biological Resources Assessment, Marin County Airport*, 2011. See Appendix I.

plant species. However, based on field observations and literature review specific to the special-status plant species, it was determined that the DSA does not contain suitable habitat for this species.⁶⁶ The remaining plant species identified by the FIGR are not Federally or State of California threatened or endangered species.

4.9.3.2 Wildlife

FEDERALLY THREATENED AND ENDANGERED WILDLIFE

Based on a records search of the CNDDDB, the USFWS list, and informal consultation with the USFWS, no special-status animal species are known to occur on the site or in the immediate vicinity of DVO. However, based Endangered Species Act Section 7 consultation between the USFWS and the FAA, the FAA determined in its Biological Assessment (Appendix I) that the brackish marsh areas that surround the Airport should be considered marginal habitat for the Federally-endangered salt marsh harvest mouse (*Reithrodontomys raviventris*) and for the Federally-endangered California clapper rail (*Rallus longirostris obsoletus*). Also based on the Endangered Species Act, Section 7, consultation between the USFWS and the FAA, the FAA also determined in its Biological Assessment (Appendix I) there is low potential for the California red-legged frog (*Rana aurora draytonii*) to be present onsite during the winter months.

STATE OF CALIFORNIA THREATENED AND ENDANGERED BIRD AND ANIMAL SPECIES

Special-status animal species have the potential to occur onsite or in the vicinity of DVO based on a records search of the CNDDDB. Based on field observations and literature review specific to the special-status animals listed in Table 4-14, State of California threatened or endangered species that are known to be present or that are considered to have a potential to occur onsite include California clapper rail (*Rallus longirostris obsoletus*), northern harrier (*Circus cyaneus*), San Pablo song sparrow (*Melospiza melodia samuelis*), western burrowing owl (*Athene cunicularia hypugaea*), white-tailed kite (*Elanus leucurus*), and other raptors, as well as the salt marsh harvest mouse (*Reithrodontomys raviventris*). The species that are considered to have a low potential onsite include loggerhead shrike (*Lanius ludovicianus*), tricolored blackbird (*Agelaius tricolor*), American badger (*Taxidea taxus*), pallid bat (*Antrozous pallidus*), and Townsend's big-eared bat (*Corynorhinus townsendii*).

⁶⁶ Foothill Associates, *Biological Resources Assessment, Marin County Airport*, 2011. See Appendix I.

4.9.3.3 Federally and State Threatened and Endangered Fish Species

The Proposed Project is located on the inland side of levees that separate the runway extension project area from the Petaluma River and San Pablo Bay. Coordination with the USFWS⁶⁷ and NMFS⁶⁸ confirmed that there no Federally threatened or endangered fish species would be expected to occur in the runway extension project area or be affected by the Proposed Project (see Appendix I). The NMFS also stated that the Proposed Project would not affect Essential Fish Habitat as defined by the Magnuson-Stevens Fishery Conservation and Management Act. No State of California threatened or endangered fish species occur in the runway extension project area.

⁶⁷ Foothill Associates, *Biological Resource Assessment, Gness Field Airport, Marin County, California*, 2011. See Appendix I.

⁶⁸ Letter from National Marine Fisheries Service to Federal Aviation Administration, March 5, 2010 (see Appendix I for copy of letter).

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