TRAVIS AFB
SUSTAINABILITY STUDY

Background Report

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This study was prepared under contract with the County of Solano, with financial support from the Office of Economic Adjustment, Department of Defense. The content reflects the views of the County of Solano and the jurisdictions, agencies and organizations participating in the TSS program, and does not necessarily reflect the views of the Office of Economic Adjustment.

TRAVIS AIR FORCE BASE SUSTAINABILITY STUDY

Background Report

Prepared Under Contract With:

Solano County, Department of Resource Management
675 Texas Street, Suite 5500
Fairfield, CA 94533-6342

Prepared By:

April 2018

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Acknowledgements

Policy Committee

The Policy Committee (PC) served an active and important role in providing policy direction during the development of the Travis Air Force Base (AFB) Sustainability Study (TSS). The Policy Committee comprised the following individuals:

- **Len Augustine,** *Mayor*
  City of Vacaville
- **Jack Batchelor,** *Mayor*
  City of Dixon
- **Osby Davis,** *Mayor*
  City of Vallejo
- **John T. (Tom) Dunn,** *Deputy Director for Installation Support*
  Travis Air Force Base
- **Erin Hannigan,** *Supervisor District 1*
  County of Solano
- **Elizabeth Patterson,** *Mayor*
  City of Benicia
- **Harry Price,** *Mayor*
  City of Fairfield
- **Norman Richardson,** *Mayor*
  City of Rio Vista
- **Pete Sanchez,** *Mayor*
  City of Suisun City
- **Linda Seifert,** *Supervisor District 2*
  County of Solano
- **Jim Spering,** *Supervisor District 3*
  County of Solano
- **Skip Thomson,** *Supervisor District 5*
  County of Solano
- **John Vasquez,** *Supervisor District 4*
  County of Solano

Technical Advisory Committee

The Technical Advisory Committee (TAC) served a key role in the development of the Travis AFB TSS, providing the overall advisory support, review, and guidance of the study. The TAC comprised the following individuals:

- **1st Lt William M. Beckman**
  Travis Air Force Base
- **Fred Buderi,** *City Planner*
  City of Vacaville
- **John T. (Tom) Dunn,** *Deputy Director for Installation Support*
  Travis Air Force Base
- **Bill Emlen,** *Director of Resources Management*
  County of Solano
- **Jason Garben,** *Development Services Director*
  City of Suisun City
- **Teri Killgore,** *Assistant City Manager*
  City of Vallejo
- **Jim Leland,** *Principal Planner*
  County of Solano
- **David Lin,** *Chief, Engineering Flight*
  Travis Air Force Base
- **Brian Miller,** *Associate Planner*
  City of Fairfield
- **Matthew Walsh,** *Principal Planner*
  County of Solano

Spectrum Encroachment Working Group

The Spectrum Encroachment Working Group assisted in the identification, assessment, review, and development of strategies to address frequency spectrum encroachment issues as part of the compatibility factors developed through the TSS process.

- **James Kirby,** *Spectrum Manager*
  Travis Air Force Base
- **TSgt Nathan Sams,** *60th Communications Squadron*
  Travis Air Force Base
- **MSgt Raphael Sorhaindo,** *60th Air Mobility Wing, Plans*
  Travis Air Force Base
- **Stephen Vancil,** *ALUC Commissioner*
  County of Solano
- **Mike Yankovich,** *Planning Program Manager*
  County of Solano

County of Solano (Project Sponsor)

The County of Solano served as the overall TSS project management agency and the administrator of the Office of Economic Adjustment (OEA) grant that helped to fund the study.

- **Jim Leland,**
  TSS Project Manager
- **Mike Yankovich,**
  Planning Program Manager

TSS Consultant / Technical Advisors

Matrix Design Group, Inc. was the project consultant hired to conduct the TSS project through coordination with assistance from the County of Solano, the PC, the Spectrum Encroachment Working Group, the TAC, the public, and other stakeholders.

- **Rick Rust, AICP, GISP**
  Project Manager
- **Celeste Werner, AICP**
  Deputy Project Manager
- **Bren Cox, AICP**
  Lead Planner

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Table of Contents

Figures and Tables

Acronyms

A

AB	Assembly Bill
ADA	Americans with Disabilities Act
AFB	Air Force Base
AFGE	American Federation of Government Employees
AFI	Air Force Instruction
AGL	above ground level
AIA	airport influence area
AICUZ	Air Installation Compatible Use Zone
ALUC	Airport Land Use Commission
ALUCP	Airport Land Use Compatibility Plan
ALZ	assault landing zone
AMC	Air Mobility Command
AMW	Air Mobility Wing
APZ I	Accident Potential Zone I
APZ II	Accident Potential Zone II
APZs	Accident Potential Zones
AQ	Air Quality
AQCR	air quality control regions
AT	Anti-Terrorism / Force Protection
AT/FP	Anti-Terrorism / Force Protection
ATC	air traffic control

B

BAAQMD	Bay Area Air Quality Management District
BAH	Basic Allowance for Housing
BART	Bay Area Rapid Transit
BASH	Bird / Wildlife Aircraft Strike Hazard
BIO	Biological Resources

C

CAAQS	California Ambient Air Quality Standards
Cal/EPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFCP	California Farmland Conservancy Program
CFR	Code of Federal Regulations
CMLUCA	California Military Land Use Compatibility Analyst
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
COA	critical operations areas
CR	Cultural Resources
CT	Commercial Thoroughfare
CWA	Clean Water Act
CWCG	California Wildfire Coordinating Group
CZ(s)	Clear Zone(s)

D

DASR	Digital Airport Surveillance Radar
dB	decibel
DCMA	Defense Contract Management Agency
DNL	day-night average sound level
DOD	Department of Defense
DPE	Dual-Phase Extraction
DSS	Dust / Smoke / Steam
DTRA	Defense Threat Reduction Agency

E

EA	Environmental Assessment
ED	Energy Development
ED.I-9	Economic Development Implementation
ED.P-11	Economic Development Policy
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
EUL	Enhanced Use Lease

F

FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FAST	Fairfield and Suisun Transit
FCC	Federal Communications Commission
FESA	Federal Endangered Species Act
FLPMA	Federal Land Management and Policy Act
FONSI	Finding of No Significant Impact
FSC	Frequency Spectrum Capacity
FSI	Frequency Spectrum Impedance / Interference
FY	fiscal year

G

GSA	Groundwater Sustainability Agency
GSUs	geographically separated units

H

HA	Housing Availability
HCP	habitat conservation plan
HUD	United States Department of Housing and Urban Development

I

I	Interstate
I-80	Interstate 80
ICEMAP	Installation Complex Encroachment Management Action Plan
IDP	Installation Development Plan
IE	Infrastructure Extensions
IFR	instrument flight rules
INRMP	Integrated Natural Resources Management Plan

J

JP-8	Jet Propellant 8

L

LAFCo	Local Agency Formation Commission
LAS	Land / Air / Sea Space Competition
LCA	Land Conservation Agreement
LEG	Legislative Initiatives
LG	Light and Glare
LOS	Level of Service
LU	Land Use
LU 3	Land Use Objective
LUCP	Land Use Compatibility Plan

M

MACA	Mid-Air Collision Avoidance
MAR	Marine Environments
MAT	Military Air Transport
MFZ	Mandatory Frangibility Zone
MHz	megahertz
MOAs	Military Operating Areas
mph	miles per hour
MSL	mean sea level

N

N	No
NAAQS	National Ambient Air Quality Standards
NACo	National Association of Counties
NEPA	National Environmental Policy Act
NGOs	Non-governmental organizations
NHPA	National Historic Preservation Act
NLR	noise level reduction
NO2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Noise
NPDES	National Pollutant Discharge Elimination System
NTIA	National Telecommunications Industry Association

O

O3	ozone
OEA	Office of Economic Adjustment
OPR	Office of Planning and Research
OSM	Office of Spectrum Management

P

HS.P-50	Public Health and Safety Policy
PC	Policy Committee
PCBs	polychlorinated biphenyls
PG&E	Pacific Gas and Electric
PM	particulate matter
PM10	course particles
PM2.5	fine particles

ppm	parts per million
PT	Public Trespassing
PUD	planned unit development

R

RAPCON	Radar Approach Control
RC	Roadway Capacity
RCS	Recovery Credit System
REPI	Readiness and Environmental Protection Integration
RF	radio frequency
RS.I-50	Resources Implementation

S

SA	Safety
SAC	Strategic Air Command
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SEWG	Spectrum Encroachment Working Group
SGHAT	Solar Glare Hazard Analysis Tool
SLUCM	Standard Land Use Coding Manual
SNR	Scarce Natural Resources
SO2	sulfur dioxide
SOI	sphere of influence
SPL	Sport Pilot License
SR	State Route
SUA	Special Use Airspace

T

TAC	Technical Advisory Committee
TACAMO	Take Charge and Move Out
TACAN	tactical air navigation system
TBD	To be determined
TC.P-21	Transportation and Circulation Policy
TCE	Trichloroethene
TP	Travis Protection
TSS	Travis Air Force Base Sustainability Study
TSS Update #1	TSS Project Overview

U

UAS(s)	unmanned aerial system(s)
UAV	unmanned aerial vehicle
UFC	Unified Facilities Criteria
UP	Union Pacific Railroad Company
USAF	US Air Force
USAHAS	US Avian Hazard Advisory System
USFWS	US Fish and Wildlife Service

V

V	Vibration
VA	Veterans Affairs
VFR	visual flight rules
VHF	very high frequency
VO	Vertical Obstructions

VOCs	volatile organic compounds
VOR	VHF omnidirectional range
VORTAC	VHF omnidirectional range and tactical air navigation system

W

WHA	Wildlife Hazard Assessment
WMD	weapons of mass destruction
WQQ	Water Quality / Quantity

Y

Y	Yes

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Introduction 1

Inside Chapter 1...

Military installations are critical to local economies, generating thousands of jobs and millions of dollars in economic activity and tax revenue annually. In the past, incompatible development has been a factor in the loss of training operations and realignment of mission-critical components. To protect the missions of military installations and the health of the local economies that rely on them, the way they interact must be addressed through collaboration and joint planning between installations and local jurisdictions and state agencies. This Travis Air Force Base Sustainability Study (TSS) addresses the current state of Base/Community interaction and provides a roadmap for proactive engagement in identified areas as the Base and surrounding communities continue to evolve.

There are several jurisdictions around Travis Air Force Base (AFB) that participated in this TSS effort: Solano County and the cities of Fairfield, Suisun City, Vacaville, and Vallejo. These entities have a long history of collaboration and cooperation with Travis AFB and seek to build upon past efforts to ensure the long-term viability of the Base and the symbiotic benefits of Base / County collaboration.

1.1 What is the Travis AFB Sustainability Study?

The TSS is a planning process accomplished through the collaborative efforts of a comprehensive set of stakeholders in a defined study area to identify compatibility guidelines within, and adjacent to, Travis AFB. These stakeholders include local jurisdictions, state, and federal officials, agencies and organizations, business organizations, non-governmental organizations, and the military. In addition, the public also plays a vital role in the development and review of the TSS.

While funded by a federal grant, the content of the TSS is produced by and for local stakeholders.

The intent of the study is to build upon the already positive working relationship that exists between Travis AFB and stakeholders in the surrounding communities. The desired result is further collaboration among all to prevent and / or reduce future encroachment issues associated with current and future missions and local growth. The study also identifies opportunities for increased collaboration on economic development and environmental initiatives. To do this, the TSS process culminates in an agreed upon set of recommended strategies that can be implemented by identified stakeholders to promote compatibility and ongoing relationships between the military and neighboring communities.

This TSS effort is funded through a grant from the Department of Defense (DOD), Office of Economic Adjustment (OEA) and a local match from the County of Solano. While OEA provides the grant funding, the content of the TSS is produced by and for the local stakeholders. Project management for the TSS was provided by Solano County.

This TSS can play an important role in preserving and enhancing compatibility between Travis AFB and the surrounding areas and to better protect the health, safety, and welfare. The TSS effort will benefit both Travis AFB and the surrounding region by:

- Protecting the health and safety of proximate residents and workers;
- Preserving and enhancing long-term land use compatibility between Travis AFB and the surrounding communities;
- Promoting comprehensive community planning that addresses compatibility issues;
- Enhancing a cooperative spirit between Travis AFB and community officials including identification of economic and environmental benefits and opportunities; and
- Coordinating between the surrounding local jurisdiction growth policy plans with the installation's plans.

Travis AFB Sustainability Study Goal

The goal of the TSS is to protect the viability of current and future military operations, while simultaneously supporting community growth, sustaining the environmental and economic health of the region, and furthering public health, safety, and welfare.

Travis AFB Sustainability Study Objectives

To achieve this goal, three TSS objectives were identified.

- **Understanding.** Convene community and military representatives to identify, confirm, and understand compatibility concerns in an open forum, taking into consideration both community and military perspectives and needs. This includes public awareness, education, and input organized in a cohesive outreach program.

- **Collaboration.** Encourage cooperative land use and resource planning between the military and surrounding communities so that future community growth and development in those communities are compatible with the training and operational missions at Travis AFB and Base operations maintain compatibility with local communities.

The TSS is a proactive approach to encourage increased communication and foster relationships among all TSS stakeholders and partners.

- **Actions.** Provide a set of mutually supported tools, activities, and procedures from which local jurisdictions and agencies, and Travis AFB can select, prepare, and approve / adopt and use to implement the recommendations developed during the TSS development. The actions include both operational measures to mitigate installation impacts on surrounding communities and local government and agency policies and implementation measures to reduce community impacts on military operations. These collective tools, activities, and procedures will help decision makers resolve compatibility issues and prioritize implementing projects within the annual budgeting process.

1.2 Why Prepare the Travis AFB Sustainability Study?

Although military installations and nearby communities may be separated by a fenceline, they often share natural and manmade resources such as land, airspace, water, and infrastructure. Despite the many positive interactions among local jurisdictions, agencies, and the military, and because so many resources are shared, the activities or actions of one entity can pose unintended impacts on another, resulting in conflicts.

As communities develop and expand in response to growth and market demands, land use entitlements can potentially result in incompatible development closer to military installations and operational / training areas. Land use and other compatibility issues can be the results and can have negative impacts on community safety, economic development, and sustainment of military activities and readiness. This threat to military readiness activities is currently one of the military's greatest operational challenges.

Collaboration and joint planning among military installations, local communities, and agencies should occur to ensure the long-term viability of existing and future military missions. Working together presents opportunities to enhance local economic and environmental health and wellbeing.

Recognizing the close relationship that should exist between installations and adjacent communities, the OEA implemented the TSS program to help communities and Travis AFB mitigate existing and future conflicts and enhance communication and coordination among all affected stakeholders. This program aims to preserve the sustainability of local communities within the TSS Study Area while protecting current and future operations and missions at Travis AFB.

Regional Economic and Local Importance

Travis AFB is located in northern California in the center of Solano County, approximately 30 miles southwest of the City of Sacramento and 40 miles northeast of the City of San Francisco. Travis AFB is located within the city limits of Fairfield, along the eastern edge of the city. The City of Suisun City's downtown is located about two miles west of Travis AFB, the City of Vacaville's downtown is approximately four miles northwest of the installation, and the City of Vallejo's downtown is approximately 16 miles southwest of Travis AFB. Rural county land surrounds Travis AFB to the northeast, east, and south. Figure 1-1 shows the location of Travis AFB.

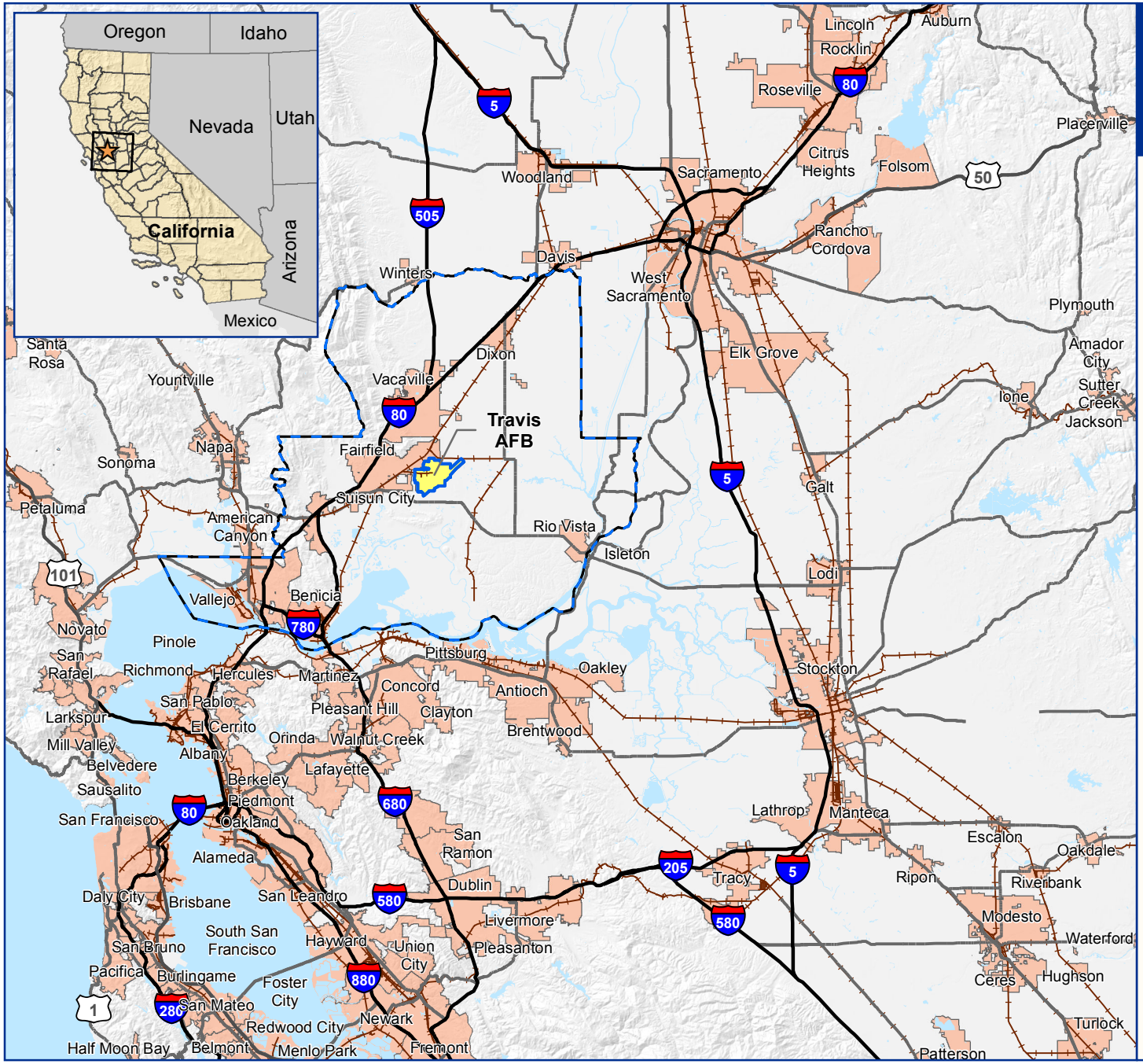

Figure 1-1

Travis AFB Location Map

Legend

- Travis AFB
- Solano County
- City
- Interstate
- Highway
- Railroad
- Waterbody

Source: Travis AFB, 2016; US Census, 2014.

TRAVIS AFB SUSTAINABILITY STUDY

0 5 Miles

Matrix DESIGN GROUP

Aircraft from the 60th Air Mobility Wing at Travis AFB taking part in the Freedom Launch, September 11, 2013

Travis AFB is an important economic engine in the region, contributing greater than $1.6 billion in economic benefit to local communities in fiscal year (FY) 2013. Travis AFB supported 26,443 people in FY 2013, consisting of 10,296 military personnel, 3,118 civilians, and 13,029 military dependents. Additionally, 45,339 military retirees reside within a 50-mile radius of Travis AFB.

Military Strategic Importance

Travis AFB is a strategic asset in the nation's defense. Travis AFB executes four primary mobility capabilities – airlift, aerial refueling, aeromedical evacuation, and global reach laydown. The 60th Air Mobility Wing, the host unit at the Base, is the Air Force's largest air mobility organization. The Base also includes the 349th Air Mobility Wing, 621st Contingency Response Wing, and more than 50 other partner organizations. The wings operate C-5, C-17, and KC-10 aircraft and provide rapid and precise global reach and mobility. In addition, Travis AFB is home to the David Grant Medical Center, the largest Air Force medical facility on the west coast and a Veterans Services Administration Center.

Additional details on Travis AFB's missions and activities are described in Chapter 3, Military Profile.

1.3 Local Communities Working Together

Travis AFB contributes to the local community in more ways than just its economic benefit. The Base interacts with the community through actions both related to and independent of the military.

Travis AFB participates in a variety of community events and activities throughout the year, including Base tours, special events, parades, fire department and police force cross-training and support to local jurisdictions, and professional growth organizations. Some of the activities that Travis AFB engages in to make itself a greater part of the local and regional community are as follows.

- Travis AFB holds an air show and open house events to provide visitors with a better understanding of the installation and its missions. The air show, Thunder Over Solano, has not been held since 2014, but it is planned to return in 2017. Attendees can watch air

performances by some of the most talented pilots in the world, view an array of aircraft on the ground, and experience a diverse group of exhibitors.

- Travis Airmen and civilian employees speak at community events through the Base's Speaker's Bureau Program.
- Travis AFB holds an annual Golden Bear Outreach and Recruiting event, welcoming more than 100 high school students to the Base. The event provides potential recruits with more information about Air Force careers.
- The Band of the Golden West, based at Travis AFB, performs free community relations concerts throughout the local community, including multiple schools in support of National Red Ribbon Week, a drug-prevention program.
- Volunteers from Travis AFB participate in the Martin Luther King Day of Service each year through the Airman and Family Readiness Center, logging 18,000 volunteer hours in 2015, helping with Habitat for Humanity, the Red Cross, and Rebuilding Together Solano County.
- Travis AFB participates in the Travis Community Partnership Leadership Committee, along with leaders of the surrounding communities. The committee identifies and implements mutually beneficial partnerships and has led to the construction of a jointly used Emergency Responder Urban Training Site.

1.4 Public and Stakeholder Outreach

The goal and objectives of the TSS process is designed to create a locally applicable study that builds consensus and obtains support from the various stakeholders involved. To achieve the TSS goal and objectives, the TSS process included a stakeholder and public outreach program that provided a variety of opportunities for interested parties to contribute to its development.

Stakeholders

An early step in any planning process is the identification of stakeholders. Informing and involving them early in the project is instrumental in the identification of compatibility issues to address and solve through the development of integrated strategies. Stakeholders include individuals, groups, organizations, and governmental entities interested in, affected by, or affecting the outcome of the TSS project. Stakeholders identified for the Travis AFB Sustainability Study included, but were not limited to:

- Local jurisdictions (Solano County, City of Fairfield, City of Suisun City, City of Vacaville, and City of Vallejo)
- DOD officials and Travis AFB personnel
- Local, regional, state, and federal planning, regulatory, and resource management agencies
- The public (including residents and landowners)
- Environmental advocacy organizations
- Non-governmental organizations (NGOs)
- Other special interest groups

TSS Committees

The development of the TSS was guided by three committees, composed of representatives from Solano County, the cities of Fairfield, Suisun City, and Vacaville, Travis AFB, federal and state agencies, resource agencies, and other stakeholders. The three committees are the Policy Committee (PC), the Technical Advisory Committee (TAC), and the Spectrum Encroachment Working Group (SEWG).

TSS Policy Committee. The PC was made up of the Solano City County Coordinating Council, which consists of the 7 Mayors and the 5 members of the Board of Supervisors. The PC was responsible for guiding the direction of the TSS, preparing and approving the study design, approving policy recommendations, and approving the draft. PC meetings occurred during the regularly scheduled City County Coordinating Council meetings.

TSS Technical Advisory Committee. The TAC was responsible for identifying and studying technical issues. Membership included representatives from local jurisdictions, agencies, and Travis AFB with technical expertise in one or more of the compatibility factors discussed in Chapter 5, Compatibility Assessment. The TAC identified and addressed technical issues, provided feedback on report development, and assisted in the development and evaluation of implementation strategies and tools.

The PC and TAC served as liaisons to their respective stakeholder groups. PC and TAC members were charged with conveying committee activities and information to their organizations and constituencies and relaying their organization's comments and suggestions to both committees for consideration. PC members were encouraged to set up meetings with their organizations and/or constituencies to facilitate this input. The responsibilities and list of participants for the TSS sponsors, the PC, and the TAC are identified in Tables 1-1, 1-2, and 1-3, respectively.

Table 1-1. TSS Sponsor Responsibilities and Participants

Responsibilities	Participants
▪ Coordination ▪ Accountability ▪ Grant management ▪ Financial contribution	▪ Office of Economic Adjustment ▪ Solano County

Table 1-2. TSS PC Responsibilities and Participants

Responsibilities	Participants
▪ Policy direction ▪ Study oversight ▪ Monitoring ▪ Report adoption	▪ City of Benicia ▪ City of Dixon ▪ City of Fairfield ▪ City of Rio Vista ▪ City of Suisun City ▪ City of Vacaville ▪ City of Vallejo ▪ Solano County ▪ Travis AFB

Table 1-3. TSS TAC Responsibilities and Participants

Responsibilities	Participants
▪ Identify issues ▪ Provide expertise to address Technical issues ▪ Evaluate and recommend Implementation options to the PC ▪ Provide draft and final report Recommendations to the PC	▪ City of Fairfield ▪ City of Suisun City ▪ City of Vacaville ▪ City of Vallejo ▪ Solano County ▪ Travis AFB

Spectrum Encroachment Working Group. The SEWG worked to identify and characterize the spectrum issues associated with the Travis AFB missions. This included identification and evaluation of spectrum encroachment and interference issues, plus additional topics identified by the SEWG.

Committee meetings were held throughout the process to ensure the TSS identified and appropriately addressed local issues. The meetings conducted are highlighted as follows.

- **TAC Project Kick-Off / Meeting # 1 (March 3, 2016).** The project kick-off meeting was held with the TAC. The purpose of the project kick-off meeting was to outline the TSS process and goals, educate all stakeholders about the TSS and their roles and responsibilities in the process. A tour of Travis AFB was also conducted.
- **TAC Meeting # 2 (August 11, 2016).** The second TAC meeting included a review of potential data gaps, a review of initial issues identified to date, identification of additional compatibility issues, and an exercise to establish the priority of the compatibility issues identified.
- **PC Meeting #1 (August 11, 2016).** The first PC meeting was similar to the kickoff meeting for the TAC. It provided the PC with an overview of the TSS process, layout of the documents, information on public involvement opportunities, and a discussion of the preliminary compatibility issues identified to date.
- **TAC Meeting # 3 (January 12, 2017).** The third TAC meeting was an in-depth discussion on how to address the compatibility issues. Prior to the meeting, a list of preliminary recommendations was developed for review. Meeting attendees were broken into two groups to go through each of the preliminary recommendations to review, refine them, and add new recommendations to the list.
- **PC Meeting # 2 (January 12, 2017).** The second PC meeting was held to provide an update on the TSS process, an overview of the compatibility issues identified, and information on preliminary recommendations and the outcome of the TSS meeting held earlier in the day.
- **SEWG Meeting (February 28, 2017).** The SEWG meeting was held to discuss the issues that were identified regarding spectrum encroachment and use of frequencies for communication both between Travis AFB and its personnel / aircraft and between the Base and the local communities (e.g., for emergency management coordination). The SEWG reviewed the issues and provided comments on them, and also assisted in developing recommendations to address the relevant issues.
- **TAC Meeting # 4 (October 19, 2017).** The fourth TAC meeting was held to present the results of the public review and comment period and discuss any changes for the Final TSS.
- **PC Meeting # 3 (May 10, 2018).** The third PC meeting was held to present the Final TSS Report. The final report was prepared with all the comments and revisions as outlined in the previous tasks and as deemed appropriate to incorporate by the stakeholders. The presentation of the Final TSS Report discussed the overall findings, major changes and revisions to the report that were incorporated based on comments received from the committee members and the public.

Public Workshops

In addition to the PC, TAC, and SEWG meetings, a series of public workshops were held during the development of the TSS. These workshops provided an opportunity for the exchange of information with the greater community, assisted in identifying the issues to be addressed in the TSS, and provided input on the proposed strategies. Each workshop included a traditional presentation and a facilitated exercise providing a hands-on, interactive opportunity for the public to participate in the development of the plan. The public workshops conducted are highlighted as follows.

- **Public Workshop # 1 (September 15, 2016).** The focus of this workshop was to explain the purpose and function of the TSS, provide an overview of the military operations at Travis AFB, introduce project participants, share the TSS approach and discuss the TSS goals. The format of this meeting included a presentation to the public followed by an interactive working session where attendees were encouraged to share their input on potential TSS issues. A user-friendly TSS Project Overview (TSS Update #1) was distributed at this workshop to provide the public a tool in completing a compatibility issues exercise. Attendees worked in groups around large-scale Study Area maps to complete a compatibility issues worksheet as well as engage in intimate group discussions with the TSS team. Participants were able to provide input through interactive audience response systems that allow for immediate response viewing and tracking.
- **Public Workshops # 2 and # 3 (October 4 and October 19, 2017).** The second public workshop was held during the Public Draft review and comment period. Attendees of the workshop were given a summary of the TSS process and were provided a breakdown of the TSS and Background Report chapters and how the compatibility issues were addressed. A focus of the meeting was the TSS Implementation Plan (Chapter 6 of the TSS Report), how the strategies were developed, and how to read the strategies. The process for submitting comments on the draft was explained and all attendees were encouraged to review the documents and provide any comments or concerns they have.

Compatibility issue identification exercise at first public workshop, September 15, 2016

Public Outreach Materials


FACT SHEET #1: OVERVIEW / FACTORS

TRAVIS AFB JOINT LAND USE STUDY

JLUS Objectives

Who Will Guide the JLUS Development?

Why Is It Important to Partner With Travis AFB?

Stay up-to-date on the Travis AFB JLUS at www.travisjlus.com

Various public outreach activities were conducted throughout the TSS process to keep the public engaged in the process and get their input on any issues or concerns that should be addressed in the TSS. Along with the public workshops that were held, informational materials (fact sheets and brochures) were developed and handed out at the workshops. A project website was also maintained during the duration of the project.

TSS Overview Fact Sheet. At the beginning of the TSS project, a TSS Overview Fact Sheet was developed that describes the TSS program, objectives, methods for the public to provide input into the process, an overview of the 24 compatibility factors that were analyzed throughout the project, and the TSS Study Area. This Fact Sheet was made available at the public workshops and posted on the project website for download.


FACT SHEET #2: STRATEGY TOOLBOX

TRAVIS AFB SUSTAINABILITY STUDY

What are Travis AFB Sustainability Study Strategies?

The Strategy "Toolbox"

Stay up-to-date on the TSS at www.TravisSustainability.com

Strategy Tools Brochure. The Strategy Tools Brochure was prepared for the second public workshop. TSS strategies constitute a variety of actions that local governments, military installations, agencies, and other stakeholders can implement to promote compatible land use planning. This brochure provides an overview of the strategy types that could be applied to address compatibility issues around Travis AFB.

Website. A project website was developed and maintained to provide stakeholders, including the public, and media representatives with access to project information. This website was maintained for the entire duration of the project to ensure information was easily accessible. Information on the website included project points of contact, schedules, documents, maps, public meeting information, a link to join the list to receive email updates, and a link to submit comments. The project website is located at www.travissustainability.com.

1.5 TSS Study Area

The TSS Study Area is designed to address all lands near Travis AFB that may impact current or future military operations or be impacted by operations. Located within Solano County, the surrounding communities' land uses include a variety of residential, commercial, industrial, agricultural and open space uses. The primary characteristics evaluated in determining the TSS Study Area were general compatibility factors associated with military mission readiness and land uses that may impact or be impacted by military operations. Based on this evaluation, and for simplicity in application, the TSS Study Area was defined to match Solano County's area, although the focus of the study was the communities providing Base infrastructure or proximate to Base borders. Figure 1-2 illustrates the Study Area.

1.6 TSS Organization

The following is a brief overview of the organization of the three Travis AFB TSS documents – the Background Report, Sustainability Study Report, and the Executive Summary Brochure.

Background Report

Chapter 1: Introduction

Chapter 1 provides an introduction and overview of the Travis AFB Sustainability Study. This chapter describes the strategic and local importance of Travis AFB, the working relationships among Base and local communities, the background and intent of the TSS, the TSS Study Area, the objectives used to guide development of the TSS, the stakeholders involved in developing the TSS, public outreach methods, implementation premise, and the organization of the document.

Chapter 2: Community Profile

This chapter introduces the local jurisdictions that are within the TSS Study Area and gives an overview of their history and current statistics, including population, housing characteristics, economic outlook, and trends of growth and development. The chapter also discusses an overview of the transportation system within the TSS Study Area.

Chapter 3: Travis AFB Profile

The Travis AFB Profile chapter provides an overview of Travis AFB as well as the military operations that take place on the Base and in the surrounding area. The discussion of Travis AFB also includes information on the units that operate out of the Base.

It is important to identify the military operating areas and current and possible future missions that take place in the TSS Study Area to get an idea of how the military operations could potentially impact, or be impacted by, the surrounding communities. For this reason, Chapter 3 includes a discussion and associated maps describing the military footprint of Travis AFB.

Chapter 4: Existing Compatibility Tools

This chapter provides an overview of relevant plans, programs, and studies that are tools that are, or could be, used to address compatibility issues in the TSS Study Area. The applicable tools are reviewed to assess the effectiveness of each existing plan or program relative to addressing the compatibility issues that are identified and described in Chapter 5.

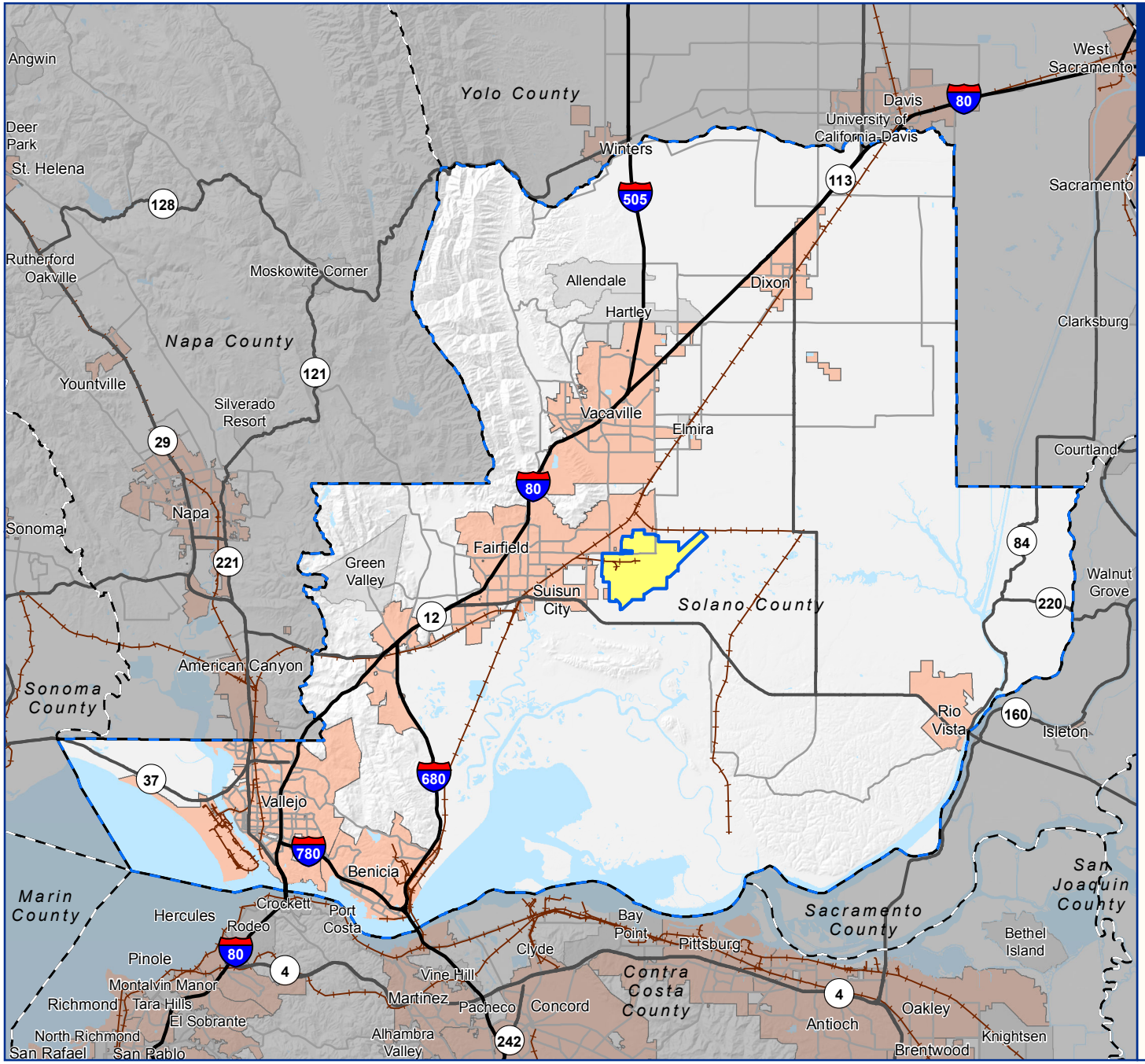

Figure 1-2

Travis AFB TSS Study Area

Legend

- Travis AFB
- Solano County
- Other County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Railroad
- Waterbody

Source: Travis AFB, 2016; US Census, 2014.

TRAVIS AFB SUSTAINABILITY STUDY

0 1 2 3 Miles

Matrix DESIGN GROUP

Chapter 5: Compatibility Assessment

Compatibility, in relation to military readiness, can be defined as the balance or compromise between community needs and interests and military needs and interests. This chapter presents the compatibility issues identified for the TSS. These issues were identified based on input from the PC and TAC, members of the public, stakeholder interviews, existing plans and technical reports, and evaluation by the project team. This chapter categorizes the issues into the following 24 compatibility factors:

- Air Quality (Section 5.2)
- Anti-Terrorism / Force Protection (Section 5.3)
- Biological Resources (Section 5.4)
- Communication / Coordination (Section 5.5)
- Cultural Resources (Section 5.6)
- Dust / Smoke / Steam (Section 5.7)
- Energy Development (Section 5.8)
- Frequency Spectrum Capacity (Section 5.9)
- Frequency Spectrum Impedance / Interference (Section 5.10)
- Housing Availability (Section 5.11)
- Infrastructure Extensions (Section 5.12)
- Land / Air / Sea Space Competition (Section 5.13)
- Land Use (Section 5.14)
- Legislative Initiatives (Section 5.15)
- Light and Glare (Section 5.16)
- Marine Environments (Section 5.17)
- Noise (Section 5.18)
- Public Trespassing (Section 5.19)
- Roadway Capacity (Section 5.20)
- Safety (Section 5.21)
- Scarce Natural Resources (Section 5.22)
- Vertical Obstructions (Section 5.23)
- Vibration (Section 5.24)
- Water Quality / Quantity (Section 5.25)

TSS Report

The TSS Report presents an overview of the TSS planning process, purpose and objectives of the study and the recommended Implementation Plan. The report presents a concise description of the following:

- TSS project study area, including Travis AFB mission overviews;
- Population profile and economic overview of the TSS Study Area and jurisdictions;
- Summary of the factors and compatibility issues identified during the TSS process; and
- Set of recommended strategies to mitigate or prevent encroachment and proactively achieve land use compatibility.

TSS Executive Summary Brochure

The TSS Executive Summary is a graphical brochure that provides a brief overview of the TSS project and process and highlights the major compatibility issues and recommended strategies to address them. It also includes Travis AFB Military Compatibility Area maps and descriptions of each area.

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Inside Chapter 2...

This chapter provides a profile of the local jurisdictions and institutions within the Travis Air Force Base (AFB) Sustainability Study (TSS) Study Area. These profiles provide a summary of the history and trends that influence the direction of each jurisdiction and institution. The chapter also provides general setting information on the TSS Study Area.

Providing a look at certain demographic and economic characteristics of the participating TSS communities and institutions can help to provide a baseline context from which informed decisions can be made when developing compatibility strategies. The goal is to provide information that enables stakeholders to gain an understanding of population and development trends that have the potential to affect the future of Travis AFB. Further, this chapter is designed to foster an understanding by the military about the types of activities occurring "outside the fence" when considering future missions and operations.

2.1 Introduction

Understanding the socio-economic characteristics of the surrounding TSS communities is essential to providing a baseline context from which informed decisions can be made when assessing compatibility issues and developing strategies. The purpose of this chapter is to provide information that will enable stakeholders to understand population and development trends that have the potential to affect the future of Travis AFB. This information, combined with the other factors presented, is intended to help decision-makers develop informed planning policies about future development and economic growth and to avoid new compatibility issues.

This chapter is also designed to enhance the Base's understanding of the types of activities occurring "outside the fence" in its neighboring communities so that military leadership can apply those insights when considering future missions and operations.

History and Profile

Solano County

Year Established: 1850

2016 Estimated Population: 431,498

Projected 2030 Population: 493,422

Major Industries:
Agriculture and agricultural processing

Solano County covers over 900 square miles of land and is one of the nine counties that make up the San Francisco Bay Area region. Approximately 128 square miles of the county, or 14 percent of the total land area, lies within seven incorporated cities: Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo. The county is bordered by Contra Costa County to the south, Sonoma and Napa counties to the west, Yolo County to the north, and Sacramento County to the east. The western quarter of the county extends into the foothills of the Coastal Range, characterized by steep slopes. The remainder of the county is part of the Sacramento Valley, located within the Central Valley, characterized by low rolling hills and more level topography compared to the western portion. Interstate 80 runs from the northeast portion of the county to the southwest portion. Other interstates that traverse the county are Interstate 680, Interstate 780, and Interstate 505. The City of Vallejo has the largest population in the county, while the City of Fairfield is the largest city by area and also serves as the county seat. The county had a 2010 population of 413,344.

Solano County's commitment to focus development within urban areas has resulted in about 95 percent of the county's population living in its cities Benicia, Vallejo, Fairfield, Suisun City, Vacaville, Dixon, Rio Vista. The majority of land use in the unincorporated land area is undeveloped natural resource land and agricultural use. Agricultural land is concentrated in the eastern portion of the county and in smaller areas scattered throughout the county.

Solano County Government Center

The history of Solano County dates back thousands of years. Artifacts of stone-age people have been found in Green Valley that date back to 2000 BCE. Solano County was originally home to the Patwin Indians. In 1835, the Mexican government commissioned Commandante General Mariano Guadalupe Vallejo to colonize the lands north of San Francisco Bay as a buffer against the Russians at Fort Ross and to protect settlers from hostile Native American attacks. The Mexican regime lasted until June 14, 1846 when the California Republic was established. The California Republic was short-lived, and the American flag was raised on July 7, 1846.

The area that became Solano County continued as part of the Sonoma territory for three years under the American government. The boundaries of Solano County were established on February 18, 1850 by the first elected legislature of the Territory of California, making Solano County one of the original 27 counties.

At the request of Commandante General Mariano Guadalupe Vallejo, the county derives its name directly from a Native American Chief, Chief Solano of the Suisun people, a Native American tribe of the region and Vallejo's close ally.

One of the first industries to take root in Solano County was the fruit industry in the 1850s. Fruit can be grown all over Solano County, including cherries, apricots, peaches, wine grapes, table grapes, pears, plums, and prunes. Other industries that prospered during the late 1800s were canneries, wineries, dairy farming, grain production, and milling and manufacturing.

Travis AFB is not the only military presence in the county. The Benicia Arsenal was established in 1852 to serve the ordnance needs of the Army on the west coast. In 1854, the Pacific Coast Navy Yard, now Mare Island Naval Shipyard, was established in Vallejo. The shipyard was closed in 1996 and portions of it have been redeveloped for commercial, office, and other uses.

The City of Benicia was the first city incorporated in 1850, followed by the cities of Vallejo and Suisun City in 1868. The City of Dixon was incorporated in 1878, followed by the City of Vacaville in 1892, City of Rio Vista in 1893, and City of Fairfield in 1903. As cities grew along transportation corridors, Solano County maintained its agricultural activities in the unincorporated areas of the county. Fisheries, mining, and construction also played important roles by utilizing the natural resources of the area and building infrastructure around a growing population.

In the mid-1960s, private industry, distribution, and service business began to locate in Solano County, starting with the establishment of the Benicia Industrial Park and progressing up to Fairfield and Vacaville.

Solano County is governed by general law, following provisions prescribed by the state of California's constitution and by the statutes of the state legislature. The five-member Solano County Board of Supervisors is tasked with managing county funds and property by adopting the county budget and setting tax levies and county salaries. The board consists of one elected representative from each of the five county districts, each of whom serves four-year terms.

Source: Solano Economic Development Profile 1985, https://www.solanocounty.com/about/history.asp

City of Fairfield

Year Incorporated: 1903

2016 Estimated Population: 112,637

Projected 2030 Population: 124,300

Major Industry:
Food Manufacturing

The City of Fairfield is in central Solano County and is the home of Travis AFB. It is generally considered the midpoint between the cities of Sacramento and San Francisco and is accessible via Interstate 80. It serves as Solano County's county seat and had a 2010 population of 105,321. The city is surrounded by undeveloped or sparsely developed hills on its western and northern borders and grazing and prairie grasslands to the east and northeast. To the south are Suisun City and the Suisun Marsh, the largest remaining wetland around San Francisco Bay.

Native Americans were the first known settlers of the area, in the Rockville and Green Valley areas. In 1837 the Native American Chief Solano received the Rancho Suisun Mexican land grant. This grant eventually came into the hands of a clipper ship captain from Fairfield, Connecticut named Robert H. Waterman. He parcelled out the town in 1856 and entered Fairfield in the running for Solano County seat in 1858 and beat out Benicia for the title. As an inducement he granted 16 acres of land for the construction of county buildings. In 1903 Fairfield was incorporated as a city.

Over the decades, the city's character has gradually evolved, beginning as a small farming-related community. The city began to take on the identity of a military town when military operations began at the Fairfield-Suisun Army Air Base (now Travis AFB) in 1943. Travis AFB was annexed to Fairfield in 1966.

Fairfield City Hall from Lake Side

In the past few decades, it has also become a major business and retail center for Solano County. Anheuser-Busch opened a brewery in Fairfield in 1976, one of 12 Anheuser-Busch breweries in the US. The Jelly Belly Candy Company constructed its company headquarters in Fairfield in 1986. These developments, along with the city's natural amenities and abundant land, helped grow the population of Fairfield from 3,100 people in 1950 to 105,321 in 2010.

The City is governed by a five-member City Council. Each of these elected positions serves four-year terms.

Source: City of Fairfield General Plan

Suisun City

Year Incorporated: 1868

2016 Estimated Population: 29,091

Projected General Plan 2035 Buildout Population: 32,400

Major Industry:
Tourism

Suisun City is in Solano County, southeast of the City of Fairfield and west of Travis AFB. The land is characterized by relatively level topography throughout the city. Suisun City is directly north of the Suisun Marsh, the largest contiguous brackish marsh in the western US. The 2010 population was 28,111.

Suisun City was established in the 1850s around the time of the California Gold Rush. In 1869, the Transcontinental Railroad connected to Suisun City, the first train stop in Solano County.

In the 1960s and 1970s, Suisun City experienced rapid growth as the San Francisco Bay Area's suburban ring expanded to the formerly rural Solano County. Also in the 1960s, Interstate 80 was constructed two miles outside the city, effectively moving commercial traffic away from railways and water transportation.

Suisun City's historic Waterfront District area has grown extensively and has undergone redevelopment over the past 20 years. Suisun City invested 65 million dollars in blight elimination and infrastructure improvements, including construction of the Suisun City Marina and waterfront promenade. The city replaced dilapidated housing and built new affordable units, the Civic Center, the Nelson Community Center, the Lambrecht Sports Complex, and the Suisun City Library. Due to Fairfield's economic opportunities and proximity, many Suisun City residents work in Fairfield, including Travis AFB.

Suisun City Marina and City Hall

Suisun City is governed by a five-member City Council. Each of these elected positions serves a four-year term.

Source: http://www.visitsuisuncity.com/suisun-history, City of Suisun City General Plan

City of Vacaville

Year Incorporated: 1868

2016 Estimated Population: 97,667

Projected 2030 Population: 109,400

Major Industry:
Retail

The City of Vacaville is in Solano County, approximately six miles north of Travis AFB. Vacaville is located on the edge of the Coastal Range that separates California's Central Valley from the San Francisco Bay Area. Interstate 80 runs through the middle of the city, connecting it to the Bay Area to the southwest, and to the Sacramento metropolitan area to the northeast. Interstate 505 branches off Interstate 80 and connects to Interstate 5 to the north. As of the 2010 census, Vacaville had a population of 92,428, making it the third largest city in Solano County.

Vacaville was established as a town in 1851, when livestock and wheat production were the principal economic products in Solano County. The completion of nearby railroads in the late 1860s provided a way for ranchers to get their crops to market, but the higher cost of rail transport coupled with increased competition led to the decline of the area's wheat industry during the 1880s. While rail transport had contributed to the decline of wheat production, the ease of access it provided gave a boost to produce farming. By the 1890s, Vaca Valley and the foothills of the Vaca Mountains were covered with orchards, and in 1892, Vacaville was formally incorporated.

After peaking in the mid-1910s, fruit production in the Vacaville area declined due to drought and soil depletion, competition during the Great Depression, and overproduction for the World War I war effort. In the mid-20th century, new employers arrived in the area, resulting in explosive growth in Vacaville. The Basic Vegetable Products Company located a 1,000-worker onion dehydrating facility in Vacaville in 1941, closing in 1986. Large Bio-tech companies such as Genentech began locating in the City beginning in the 1980s.

With its industry, ease of access, and proximity to the Bay Area, Vacaville saw its population double between 1940 and 1950. Ongoing freeway construction and increasing employment in the Bay Area led to Vacaville's continued growth through the end of the 20th century and the beginning of the 21st.

Old Vacaville Town Hall

Vacaville is governed by a five-member City Council, with the Mayor serving as presiding officer and is elected separately. Each of these elected positions serves a four-year term.

Source: http://www.ci.vacaville.ca.us/about-us/vacaville-s-history

City of Vallejo

Year Incorporated: 1868

2016 Estimated Population: 117,322

Projected 2030 Population: 126,200

Major Industry:
Medical

The City of Vallejo is in Solano County, approximately 4 miles southwest of Travis AFB. Vallejo abuts the San Pablo Bay on the northeastern edge of the San Francisco Bay area.

The City was incorporated in 1868. Prior to its incorporation, Vallejo was home to many Native American tribes, which included the Suisun and Karkin Indians. After California was admitted to the Union in 1850, Vallejo became the first permanent seat of California in 1852, although it was moved to Sacramento after a few weeks.

In the year following Vallejo's incorporation, the California Pacific Railroad established a ferry terminal in the city, connecting railroad lines northeast to Sacramento and later San Francisco and cities in Napa Valley, making Vallejo a transportation hub. The location of the city along the bay has been key for commercial shipping, industry, oil companies, and ferry transportation.

The Mare Island Naval Shipyard was established in Vallejo in 1854 and was the largest ship construction and repair facility during WWII. This led to both population and economic growth in Vallejo. During WWII, Vallejo's waterfront was in its prime due to the use of the Mare Island Naval Shipyard and the sailors that worked there. After the war, the waterfront became dilapidated, but was renewed in the late 1950's and early 1960's. The shipyard was decommissioned and closed in 1996. Since then, the land has been transferred to public and private entities and portions of it have been redeveloped for uses such as commercial and office. In recent years Vallejo has developed into a major ferry hub to San Francisco.

Vallejo is governed by a seven-member City Council. The councilmembers are elected at large, with the Mayor being elected separately, to serve four-year terms.

Source: http://www.visitvallejo.com/about-vallejo/history

Vallejo City Hall

2.2 TSS Study Area Growth Trends

It is important to examine past, current, and future growth trends to understand the types and amount of growth and development occurring in the Study Area. Identifying growth patterns for the area surrounding Travis AFB is one step in determining potential future compatibility issues or areas of concern associated with where new growth may occur that could impact or be impacted by military operations. This section assesses the recent and projected future population changes within the TSS Study Area, as well as housing trends that could be indicators of future growth.

Population

Population data is based on the 2016 estimates provided by the California Department of Finance and data from the US Census. Population numbers show the growth or decline in people in a geographical area. Population is a major factor for the economy of the Study Area and ultimately supports the employment and housing opportunities. The following information provides an overview of the changes in population in the TSS Study Area from 2000 to 2010.

Table 2-1 shows the 2000 and 2010 census totals and percent change in populations of jurisdictions within the TSS Study Area. The table also shows the percentage change from the 2010 census total to the 2016 estimate.

All jurisdictions within the TSS Study Area saw an increase in their population levels, with the cities of Fairfield and Suisun City seeing the largest percentage growth from 2000 to 2010. The City of Fairfield also saw the largest percentage growth from 2010 to 2016. Solano County's location (situated midway between San Francisco and Sacramento and adjacent to Napa), mild climate, and open space has helped to drive this population increase. The jurisdictions in the area have worked to achieve a blend of agriculture, corporate business, and pleasant lifestyle to enhance the attractiveness of the region.

The City of Fairfield saw the largest growth between 2000 and 2010, increasing by 10 percent, about the same rate as the state. The City of Vacaville saw the slowest percentage growth between 2000 and 2010. Due to the County's orderly growth ordinance, most growth is within incorporated cities.

Figure 2-1 illustrates the population densities in the TSS Study Area in 2000 and Figure 2-2 shows the change in densities in 2010. These figures are both presented to show the growth and density of areas within the TSS Study Area. A comparison of the two maps shows that the cities of Fairfield, Suisun City, and Vacaville are growing and are seeing increased density within the cities, especially within eastern Suisun City and northeast Fairfield. If this trend continues consistently for the next several decades, then there will be more people living closer to Travis AFB, although City and County policies prevent encroachment into sensitive areas near the Base.

Table 2-1 shows the population projections for the TSS communities. Of the cities within the immediate vicinity of Travis AFB, Vallejo had the highest population in 2016, with an estimated 117,322 people, and is projected to increase by three percent by the year 2020. Fairfield, the second largest city in the Study Area, is expected to grow at more than double the rate (seven percent). Suisun City, the city with the smallest estimated population in 2016, is expected to grow at the same rate as Vacaville, by eight percent. Except for Vallejo, these cities have higher projected growth rates than Solano County and the State of California by 2020, but by 2030, they are all projected to be lower than the State, while Solano County as a whole is projected to grow at a greater rate than the State.

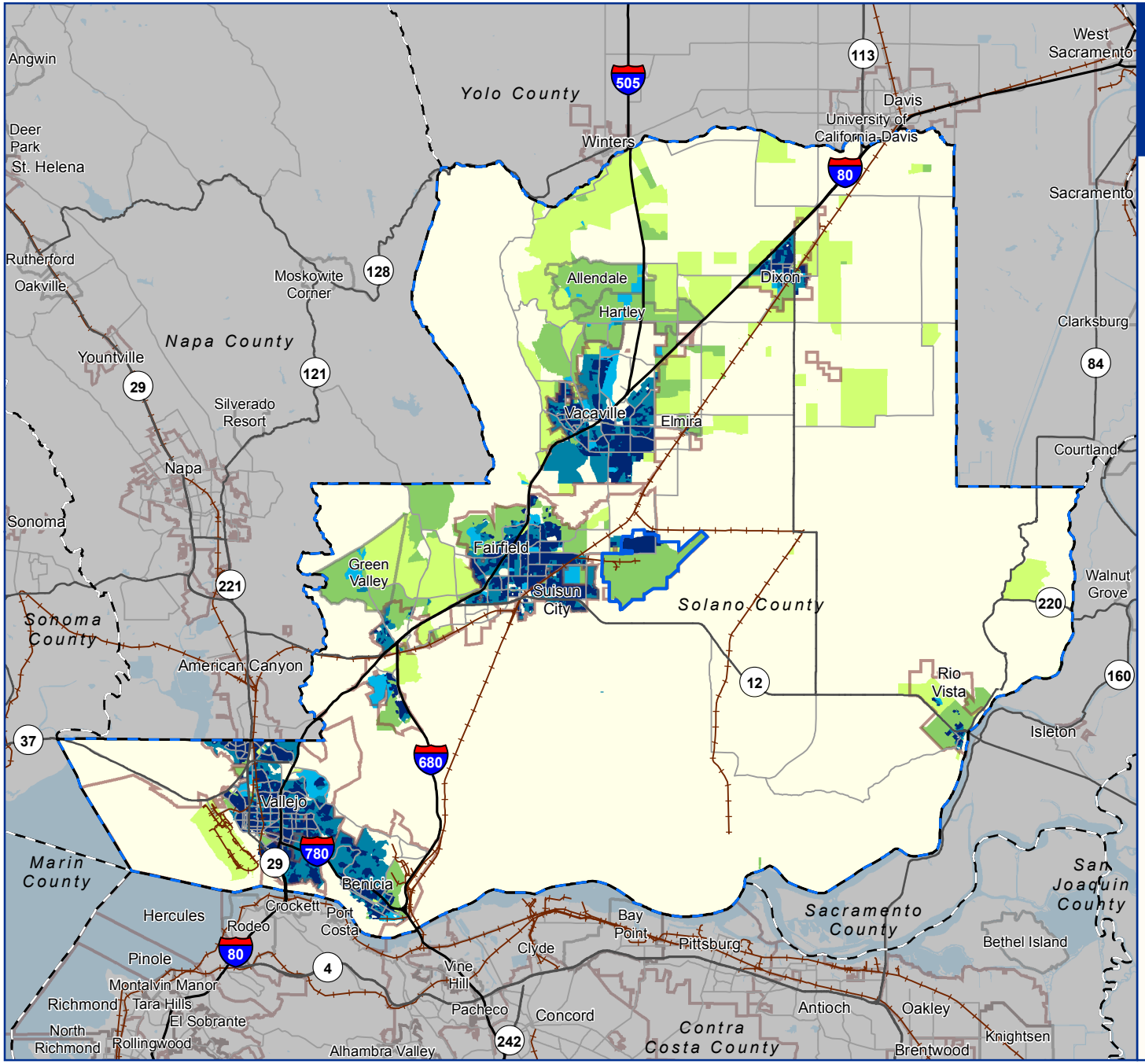


Figure 2-1

TSS Study Area Population Density, 2000

Legend

Population Per Sq. Mile

- 0 - 25
- 26 - 100
- 101 - 500
- 501 - 1000
- 1001 - 5000
- 5001+
- Travis AFB
- Solano County
- Other County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Railroad
- Waterbody

Source: US Census, 2000.

TRAVIS AFB SUSTAINABILITY STUDY

0 1 2 3 Miles

Matrix DESIGN GROUP

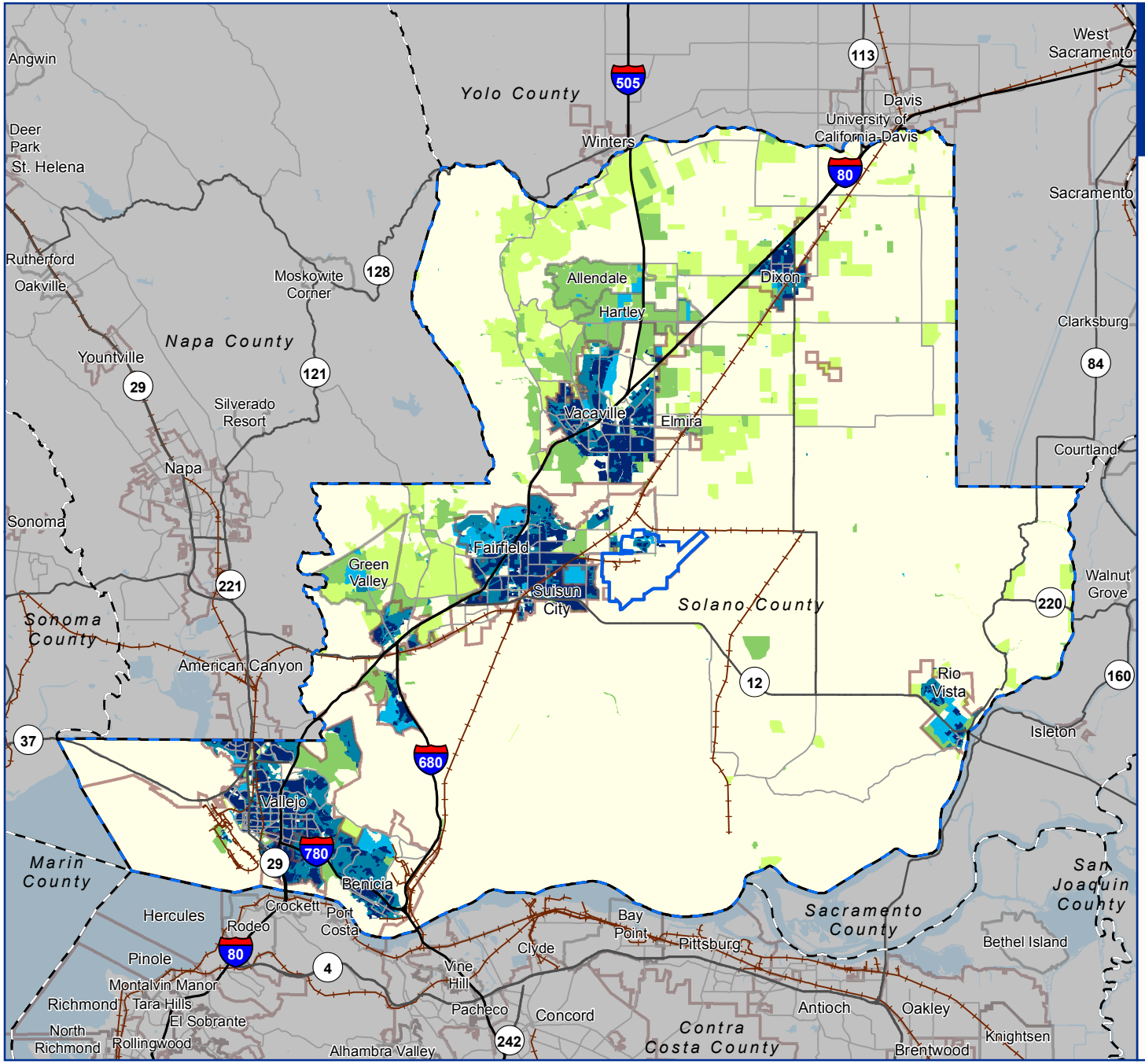


Figure 2-2

TSS Study Area Population Density, 2010

Legend

Population Per Sq. Mile

- 0 - 25
- 26 - 100
- 101 - 500
- 501 - 1000
- 1001 - 5000
- 5001+
- Travis AFB
- Solano County
- Other County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Railroad
- Waterbody

Source: US Census, 2010.

TRAVIS AFB SUSTAINABILITY STUDY

0 1 2 3 Miles

Matrix DESIGN GROUP

Table 2-1. Population Change 1990-2010 and Estimates through 2030

Jurisdiction	2000	2010	% Change 2000-2010	2016 Est.	% Change 2010-2016	2020 Est.	% Change 2016-2020	2030 Est.	% Change 2020-2030
California	**33,871,648**	**37,253,956**	**10%**	**39,256,000**	**5%**	**40,643,643**	**4%**	**44,279,354**	**9%**
Solano County	394,542	413,344	5%	431,498	4%	447,217	4%	493,422	10%
City of Fairfield	96,178	105,321	10%	112,637	7%	118,900	6%	124,300	5%
Suisun City	26,118	28,111	8%	29,091	3%	36,500	8%	38,600	7%
City of Vacaville	88,625	92,428	4%	97,667	6%	105,000	8%	109,400	4%
City of Vallejo	116,760	115,942	-1%	117,322	1%	121,000	3%	126,200	4%

Source: US Census Bureau (2000 and 2010), California Department of Finance (2016 Estimate) UC Davis Center for Regional Change, 2010-2060 (Projections for California and Solano County); Association of the Bay Area Governments Population Projections, 2009 (Projections for cities of Fairfield, Suisun City, and Vacaville) and 2013 (for City of Vallejo)

Housing Trends

The TSS Study Area has seen an increase in the number of housing units, as shown in Table 2-2. The jurisdiction with the highest percentage change in units is the City of Fairfield. However, Suisun City and the City of Vacaville also experienced a high percentage change in units, as did the City of Vallejo. The increase in attractiveness of the area as a suburban extension of the San Francisco metropolitan region is causing large increases in both population and new housing development.

Table 2-2. TSS Study Area Housing Unit Trends, 2000-2010

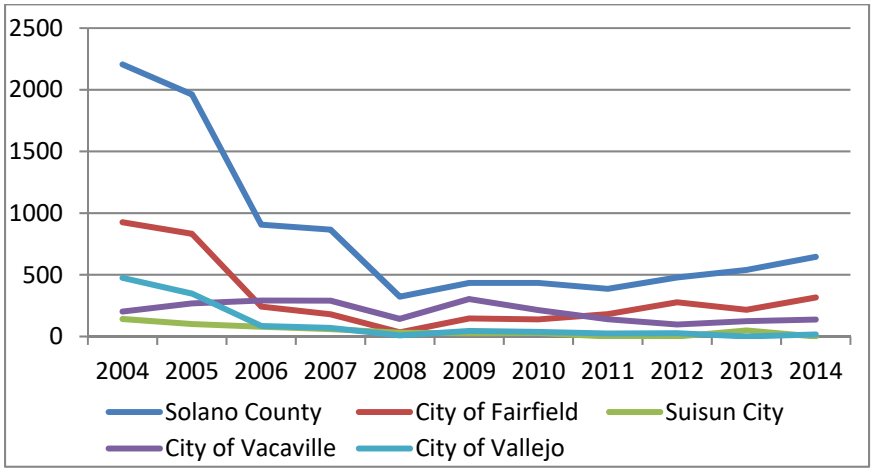
Jurisdiction	2000	2010	Number Change	Percent Change
California	**12,214,549**	**13,680,081**	**1,465,532**	**12%**
Solano County	134,513	152,698	18,185	14%
City of Fairfield	31,792	37,184	5,392	17%
Suisun City	8,146	9,454	1,308	16%
City of Vacaville	28,696	32,814	4,118	14%
City of Vallejo	41,219	44,433	3,214	8%

Source: 2000 and 2010 US Census Data

Building Permits

An analysis of the number of single-family building permits issued can be a good indicator of the health of the local economy. In general, the region has seen positive growth in single-family building permits. Between 2004 and 2014, a total of 7,362 single-family building permits were issued within the cities of Fairfield, Suisun City, and Vacaville. As shown on Figure 2-3, during this time Solano County experienced a peak in single-family building permits in 2004. Since 2004, single-family building permit activity showed a significant decline that did not start to recover until 2009. Beginning in 2010, the County began to see a consistent rate of single-family building permits.

Figure 2-3. Single-Family Housing Building Permits, 2004-2014

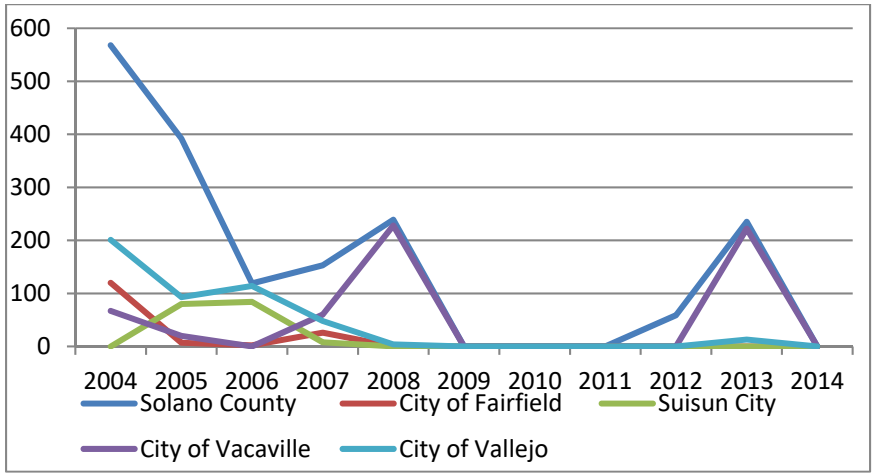


Source: US Department of Housing and Urban Development, 2016 (https://socds.huduser.gov/permits/)

Multi-family residential building permits can be indicative of the type of housing available to military personnel who are single or with a small family. This type of housing is limited in Suisun City, but can be found more readily in Vacaville and Fairfield.

Figure 2-4 illustrates the trend line for the number of multi-family residential units constructed in the Study Area jurisdictions. As reflected on Figure 2-4, Vacaville and Vallejo are the only cities to have constructed multi-family units from 2007 to 2014. It should be noted that no multi-family units were constructed from 2009 to 2012 in any of the Study Area cities. Since 2014, there have been some additional multifamily units constructed in Fairfield. In Figures 2-3 and 2-4, the number of permits shown for Solano County are inclusive of the permits for each city within the county.

Figure 2-4. Multi-Family Units Built, 2004-2014



Source: US Department of Housing and Urban Development, 2016 (https://socds.huduser.gov/permits/)

Housing Value Trends

Housing value trends assist in illustrating the changes in land and home values relative to market fluctuations. These fluctuations can be indicative of development activity or inactivity as well as the location or migration patterns of populations. Table 2-3 provides the median housing value trends in the TSS Study Area from 2000 to 2010.

Table 2-3. TSS Study Area Median Housing Value, 2000-2010

Jurisdiction	2000	2010	Number Change	Percent Change
California	**$211,500**	**$458,500**	**$247,000**	**117%**
Solano County	$178,300	$389,800	$211,500	119%
City of Fairfield	$174,700	$392,700	$218,000	125%
Suisun City	$160,700	$341,400	$180,700	112%
City of Vacaville	$181,300	$377,900	$196,600	108%
City of Vallejo	$162,600	$355,300	$192,700	119%

Source: US Census Bureau, Median Gross Housing Value (Dollars) 2000, 2010

Median housing values have experienced substantial growth throughout the TSS Study Area although still below California in trends. These increasing values translate into higher rents and mortgages as well as an increase in the cost of living for area residents. Greater housing values cause a challenge to the affordability of housing near Travis AFB.

An increasing number of potential renters in Solano County have led to a higher demand for rental units. A demand-driven rise in rent costs affects both the local economy and housing market. Table 2-4 shows the change in median monthly rents for communities in the TSS Study Area from 2000 to 2010. During this timeframe, the median monthly rent increased by a range of roughly 46 to 52 percent among the Study Area jurisdictions. Overall, in the 10-year span, the state and all the Study Area jurisdictions experienced roughly the same change in median monthly rent.

Table 2-4. TSS Study Area Median Monthly Rents, 2000-2010

Jurisdiction	2000	2010	Number Change	Percent Change
California	**$747**	**$1,147**	**$400**	**54%**
Solano County	$797	$1,195	$398	50%
City of Fairfield	$778	$1,172	$394	51%
Suisun City	$870	$1,320	$450	52%
City of Vacaville	$842	$1,256	$414	50%
City of Vallejo	$781	$1,144	$363	46%

Source: US Census Bureau, Median Gross Rent (Dollars) 2000, 2010

Since military personnel, by the nature of their employment, are mobile and the income level of enlisted personnel is relatively low, they need rental housing that is affordable to low and moderate-income households and that is available on a month-to-month basis.

The Basic Allowance for Housing (BAH) is a stipend given to military personnel who choose to live outside the Base or cannot be accommodated in on the Base housing and is designed to augment the costs of living associated with private sector housing, including home or apartment rent, utilities, and renter's insurance. Table 2-5 shows the 2016 Travis AFB BAH rates, by rank.

Solano County had a 2010 Median Rental Rate of $1,195 (not including utilities). The BAH for a grade E-4 without dependents is $464 more than the median rent. While BAH may cover the county wide median rental, this may not reflect the cost and availability of quality housing near Travis AFB.

Table 2-5. Travis AFB BAH for Military Personnel 2016

Grade	With Dependents	Without Dependents
E-1	$2,010	$1,659
E-2	$2,010	$1,659
E-3	$2,010	$1,659
E-4	$2,010	$1,659
E-5	$2,049	$1,863
E-6	$2,250	$1,974
E-7	$2,310	$2,013
E-8	$2,370	$2,091
E-9	$2,439	$2,151
W-1	$2,256	$1,998
W-2	$2,334	$2,088
W-3	$2,412	$2,160
W-4	$2,451	$2,262
W-5	$2,499	$2,322
O-1E	$2,319	$2,049
O-2E	$2,400	$2,139
O-3E	$2,460	$2,250
O-1	$2,076	$1,971
O-2	$2,247	$2,037
O-3	$2,409	$2,175
O-4	$2,517	$2,310
O-5	$2,595	$2,346
O-6	$2,619	$2,406
O-7	$2,643	$2,454

Source: http://travisafbhousing.com/bah.php

2.3 Economic Baseline

Initial economic activity throughout the TSS Study Area was centered on the agriculture industry, dating back to early settlement period. Agriculture is still a major component of the Solano County economy. Efforts to diversify Solano County's economy with new sectors have brought substantial growth to the region and the county in the insurance, healthcare, biotech, and retail trade industries. These now represent significant components of the local economy, in addition to hospitality and food services.

Solano County

Solano County's economy is rooted in viable agriculture, Travis AFB, and other major private and public employment sectors, such as government services. However, Solano County's economy increasingly depends on diversified businesses and industries, a highly trained and educated workforce, accessibility to major highways and freeways, available housing at a cost local workers can afford, and infrastructure ready to serve businesses. Employment in Solano County is service-providing based, with 84 percent employment, comparted to jobs that are goods-producing, with 16 percent employment. Table 2-6 shows the major employers in Solano County.

Table 2-6. Major Employers in Solano County, 2016

Major Employers	Number of Employees
Travis AFB	14,353
Kaiser Permanente	6,356
California Department of Corrections and Rehabilitation	3,438
Solano County	3,015
Fairfield-Suisun School District	2,707

Source: State of California Employment Development Department, 2016

As of 2005, health, education, and recreation service jobs represented about 36 percent of employment in Solano County. Manufacturing, wholesale, and transportation was the next largest industry sector, accounting for about 15 percent of Solano County's employment, followed by financial and professional service jobs, at around 14 percent. Travis AFB employed about 14,300 workers in 2016, making it the largest single employer in Solano County and accounting for nearly 10 percent of the county's total employment.

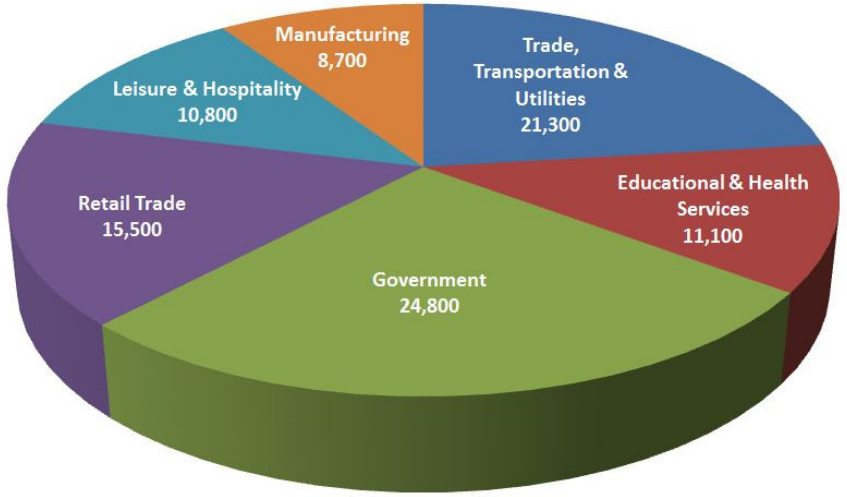
Figure 2-5 illustrates the major industries by number of employees in Solano County for the year 1995 (top) and the year 2015 (bottom). Trade, transportation and utilities, leisure and hospitality, manufacturing, and retail trade sectors have experienced steady growth as the region has diversified. The educational and health services section has experienced the greatest growth in employment, increasing 127 percent. The government sector, which includes Travis AFB, has maintained its employment base from 1995 to 2015.

City of Fairfield

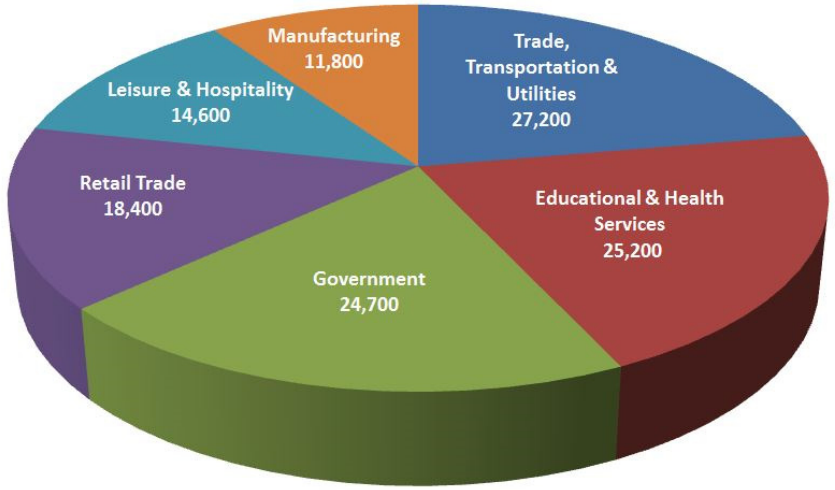
The City of Fairfield is at the center of Solano County, which benefits from an excellent transportation network, availability of developable land, a diverse housing supply, a healthy business mix, and a desirable quality of life.

Throughout its early history, Fairfield's economy was primarily agricultural, which remains an important part of the city's economy and character. When Travis AFB was established and later incorporated into the city, local employment concentrated at the Base. While Travis AFB remains the city's largest employer, economic development over the years has diversified the economic base and provided numerous employment opportunities. Table 2-7 shows the major employers in the City of Fairfield.

Figure 2-5. 1995 (Top) and 2015 (Bottom) Major Economic Sectors by Annual Average Employment



1995



2015

Source: California State Employment Development Department, 2015

Table 2-7. Major Employers in City of Fairfield, Fiscal Year 2013

Major Employers	Number of Employees
Travis AFB	13,414
Solano County	2,850
Fairfield-Suisun School District	2,000
Northbay Medical Center	1,115
Solano Community College	650

Source: City of Fairfield Comprehensive Annual Financial Report Fiscal Year 2013; Travis AFB Economic Impact Analysis, Fiscal Year 2013

The City of Fairfield is an industrial leader in the county, with a major focus in food and beverage manufacturing. Major manufacturers in the city include the Anheuser-Busch brewery, Jelly Belly Candy Company, Abbot Nutrition, Englehart Gourmet Foods, Guittard Chocolate Company, and Calbee America, Inc.

Jelly Belly's Candy Palooza (Source: www.discoverfairfieldca.com)

The city has also seen a growth in businesses supporting the nearby wine industry, including Encore Glass, a wine bottle supplier, C & E Capsules, a wine closures manufacturer, Bruni Glass, a wine bottle distributor, ACI Cork, a cork manufacturer and distributor, Verallia, a glass container manufacturer, Guala Closures, a wine closure producer, and Owens-Illinois Glass Container Inc., a glass bottle manufacturer. Fairfield's water supply, high capacity sewer treatment plant and proximity to the Napa wine region make it an ideal location for wine producers and other wine related industries.

Other major industrial uses in the city include a Primal Pet Foods manufacturing facility, Owen Equipment, one of the top sewer cleaners and street sweepers' dealerships in the US, and S&S Supplies and Solutions, an industrial supply distribution company.

Source: http://businessinfairfield.com/

Suisun City

Between 1989 and 2012, Suisun City implemented a redevelopment program centered on the Old Town Waterfront and Historic Main Street Shopping District. After decades where the value of the waterfront was not taken full advantage of, it is now accessible to the general public via a new Public Marina, Public Promenade, Harbor Square Plaza and the Hampton Inn (Waterfront Hotel). The channel was deepened to allow boating excursions from the San Francisco Bay and the Sacramento Delta.

Suisun City Waterfront (Source: Hampton Inn)

Suisun City also contains large residential neighborhoods with a variety of housing types. Many Suisun City residents work in neighboring Fairfield. Major employers in Suisun City are found in Table 2-8.

Table 2-8. Major Employers in Suisun City, Fiscal Year 2014

Major Employers	Number of Employees
Fairfield-Suisun School District	260
City of Suisun City	140
Old Country Roofing	125
Carlson Drywall and Spraying	100
Raley's Superstores	98

Source: Suisun City Comprehensive Annual Financial Report Fiscal Year 2014

City of Vacaville

The largest industries in the City of Vacaville are education and healthcare, retail, arts, entertainment, recreation, and accommodation and food services, manufacturing, and public administration. Two California Department of Corrections facilities are located in Vacaville, California State Prison-Solano, and the California Medical Facility, a state prison medical facility. The two facilities are the top employers in the city. Other major employers in the City of Vacaville are shown in Table 2-9. The presence of Genentech, Alza Corporation, and Novartis in Vacaville contribute to the city's position as a regional center for the biotech industry. In May 2014, ICON Aircraft announced they would consolidate all company functions in a new 140,000-square-foot facility in Vacaville.

Vacaville Premium Outlets (Source: www.premiumoutlets.com)

The city holds annual Vacaville Fiesta Days downtown, which includes a parade that features public school marching bands, gymnasts, and an electric car showcase, among other things. Other economic contributors include the Vacaville Premium Outlets and the Nut Tree Shopping Center, which is home to numerous stores and dining establishments. Every December, the city holds a Festival of Trees, which includes an ice skating rink and a tree lighting ceremony.

Table 2-9. Major Employers in City of Vacaville, Fiscal Year 2013

Major Employers	Number of Employees
California Department of Corrections	2,092
Kaiser Permanente	1,412
Vacaville Unified School District	1,273
City of Vacaville	771
State Compensation Insurance Co.	671

Source: City of Vacaville Comprehensive Annual Financial Report Fiscal Year 2013

City of Vallejo

The largest industries in the City of Vallejo are healthcare and related support services, followed by retail, and manufacturing. The Kaiser Permanent Medical Center is located in Vallejo and is the leading employer in the city. As shown in Table 2-10, two of the major employers in Vallejo are in the healthcare industry. Six Flags Discovery Kingdom is the second leading employer and draws tourism to the city.

Vallejo Ferry Buildings along the waterfront (Source: http://solanoopenspace.org)

Although the Mare Island Naval Shipyard was closed in 1996, the waterfront remains a historic location and continues to be a place for future development that is compatible with the character of the area. The city holds an annual Vallejo Waterfront Weekend in the fall where the community comes together to participate in or watch outdoor activities along the Napa River.

Table 2-10. Major Employers in City of Vallejo, Fiscal Year 2014

Major Employers	Number of Employees
Kaiser Permanente Medical Center	3,906
Six Flags Discovery Kingdom	1,600
Vallejo Unified School District	1,600
Kaiser Permanente Call Center	950
Sutter Solano Medical Center	690

Source: City of Vallejo Comprehensive Annual Financial Report Fiscal Year 2014

2.4 Current Land Use Overview within the Study Area

The variety of land uses are a result of influential factors such as roads, highways, commercial and industrial development, economic activities and more. Solano County is unique in that the County limits residential and commercial development outside of cities and has preserved approximately 80 percent of unincorporated land for open space or agricultural uses. Much of land surrounding Travis AFB falls under a Resource Conservation Overlay, as well as a Travis Reserve Area. Both Solano County and the City of Fairfield have designated an area surrounding Travis AFB as a Travis Reserve for continued agriculture and open space uses for potential future military use. Additionally, the City of Vacaville has implemented an Urban Growth Boundary as has the City of Fairfield. There is also a designated Greenbelt between the two cities.

Another growth management tool is the establishment of a sphere of influence (SOI). California Government Code § 56076 defines a SOI as a plan for the probable physical boundaries and service area of a local agency, as determined by the Local Agency Formation Commission (LAFCo). Within Solano County, LAFCo is required to determine SOIs for each agency (i.e., city and special district) whose boundaries are subject to LAFCo authority.

More specifically, the purposes of LAFCo are:

- discourage urban sprawl,
- preserve open space and prime agricultural land,
- ensure efficient provision of government services; and
- encourage the orderly formation and development of local agencies.

An agency's SOI can, but not always, covers a larger territory than the agency's authorized service area. Additionally, LAFCo reviews and updates each agency's SOI every five years as necessary.

Land uses surrounding Travis AFB is characterized as follows.

North

North of Travis AFB is mostly agriculture land use, with the City of Vacaville located approximately six miles away. Suburban and residential development has been growing to the south of the city, toward Travis AFB. The two largest employers in the City of Vacaville, California State Prison- Solano and the California Medical Facility, are in the southern portion of the city.

Development south of the city is restricted by the Vacaville-Fairfield-Solano Greenbelt Agreement, which identifies approximately 4,100 acres between Vacaville and Fairfield that must be preserved to serve as a permanent separation between the urban areas of Fairfield and Vacaville. This area must be maintained in agriculture and open space uses consistent with the provisions of the agreement.

Northwest of the installation, about a mile from the Travis Main Gate, is the recently opened Fairfield-Vacaville train station. The station is to be an anchor for the City of Fairfield northeast growth area. Plans call for about 6,000 residences, a Main Street-style business area, and industrial area to be built in the future. Development is to be focused on the west side of Vanden Road, with land north of Travis AFB designated as open space, conservation, mitigation, and greenbelt areas.

East

The land east of Travis AFB is almost entirely open space and agriculture with very limited and sporadic development. Much of this area falls under the Resource Conservation Overlay in Solano County.

South

Land use to the south and southwest of Travis AFB is largely agriculture and open space. About one mile southwest of the Base is the Suisun Marsh, which includes the San Francisco Bay National Estuarine Research Reserve and the Joice Island State Game Refuge.

West

West of Travis AFB is the most developed area near the installation. The City of Fairfield is west of the Base, with a mix of open space, industrial, and commercial uses, with some pockets of residential located close to the Base. Suisun City is also located west of the Base, consisting mostly of single family suburban residential development. Due to the Suisun Marsh, there is limited room for expansion south of the cities. A new Walmart, which has provided approximately 300 jobs, opened in March 2015 near the intersection of Walters Road and US Highway 12. Suisun City has future development planned along Highway 12, including an industrial park.

Transportation

Solano County is served by an excellent transportation network including freeway and rail connections to major metropolitan areas to the east (Sacramento) and the southwest (San Francisco Bay Area). There are two train stations on the capitol corridor and bus routes providing access throughout the region. The local roadway system consists of highways, primary arterials, minor arterials, major and minor collectors, and local residential streets. This roadway system provides mobility and access to the various communities within the TSS Study Area and to connect them to other communities outside the Study Area, including the San Francisco Bay and Sacramento metropolitan areas by providing interstate and regional access.

The following is a brief description of the transportation network in the Study Area, which is illustrated on Figure 2-6.

Solano County has four freeways that are operated and maintained by the California Department of Transportation (Caltrans). Interstate 80 is the major highway that traverses the Study Area, running from northeast to southwest through the county. Interstate 80 is a transcontinental highway that runs from downtown San Francisco to New Jersey and was designated in 1956 as one of the original routes of the Interstate Highway system. It is the second-longest Interstate Highway in the US following I-90 and runs though many major cities, including Cleveland, Ohio; Chicago, Illinois; Omaha, Nebraska; and Salt Lake City, Utah. This freeway varies between three and four lanes in each direction.

I-505 runs north from the I-80 to the Yolo County line. It has two lanes in each direction and connects Solano County with the northern Sacramento Valley and I-2. I-680 runs from I-80 to the Contra Costa County line, connecting Solano County with central Contra Costa County, and has two lanes in each direction. I-780 runs from I-80 to I-680 and connects Vallejo and Benicia with two lanes in each direction.

State Route (SR) 113 and SR-12 are two principle arterials in the Study Area. State Route 113 runs north to south connecting the City of Dixon to SR-12. State Route 12 runs east to west connecting I-80 and the City of Fairfield to the City of Rio Vista. State Route 29 is another arterial that passes through the Study Area, running north to south though Vallejo connecting to SR-12 past Vallejo and to the Napa Valley area.

Another arterial that is in the processes of being completed is Jepson Parkway. The concept of Jepson Parkway, a 12-mile-long, four-lane road connecting eastern Vacaville, eastern Fairfield and rural Solano County, started in 2000. The goal is to create a convenient alternative to I-80 for local trips. The corridor is also intended to better accommodate multimodal transportation, including opportunities for transit, bicycle, and pedestrian travel. Jepson Parkway will also connect with the new Fairfield-Vacaville Train Station. Since 2000, five construction projects have been completed and an updated concept plan has been approved. The Solano County Transportation Authority (STA) has placed Jepson Parkway as one of their top priority projects and has secured funding for nine segments, though six segments remain unfunded.

To help better accommodate commercial traffic at Travis AFB's south gate, Peterson Road was widened, and a third lane was added for truck stacking and queuing. This improvement was completed in May 2016 and includes a new bike lane that leads to the Irving H. Lambrecht Sports Complex. Plans are also in place to improve the north gate area, which includes widening Canon Road from Vanden Road to the Travis AFB guard station.

Transit

Fairfield and Suisun Transit (FAST) operates nine local routes and four express intercity routes. The local routes serve both Fairfield and Suisun City. Route 4 serves Travis AFB, originating at the Walmart on Texas Street. There are two Route 4 bus stops near the main gate and eight stops on the Base.

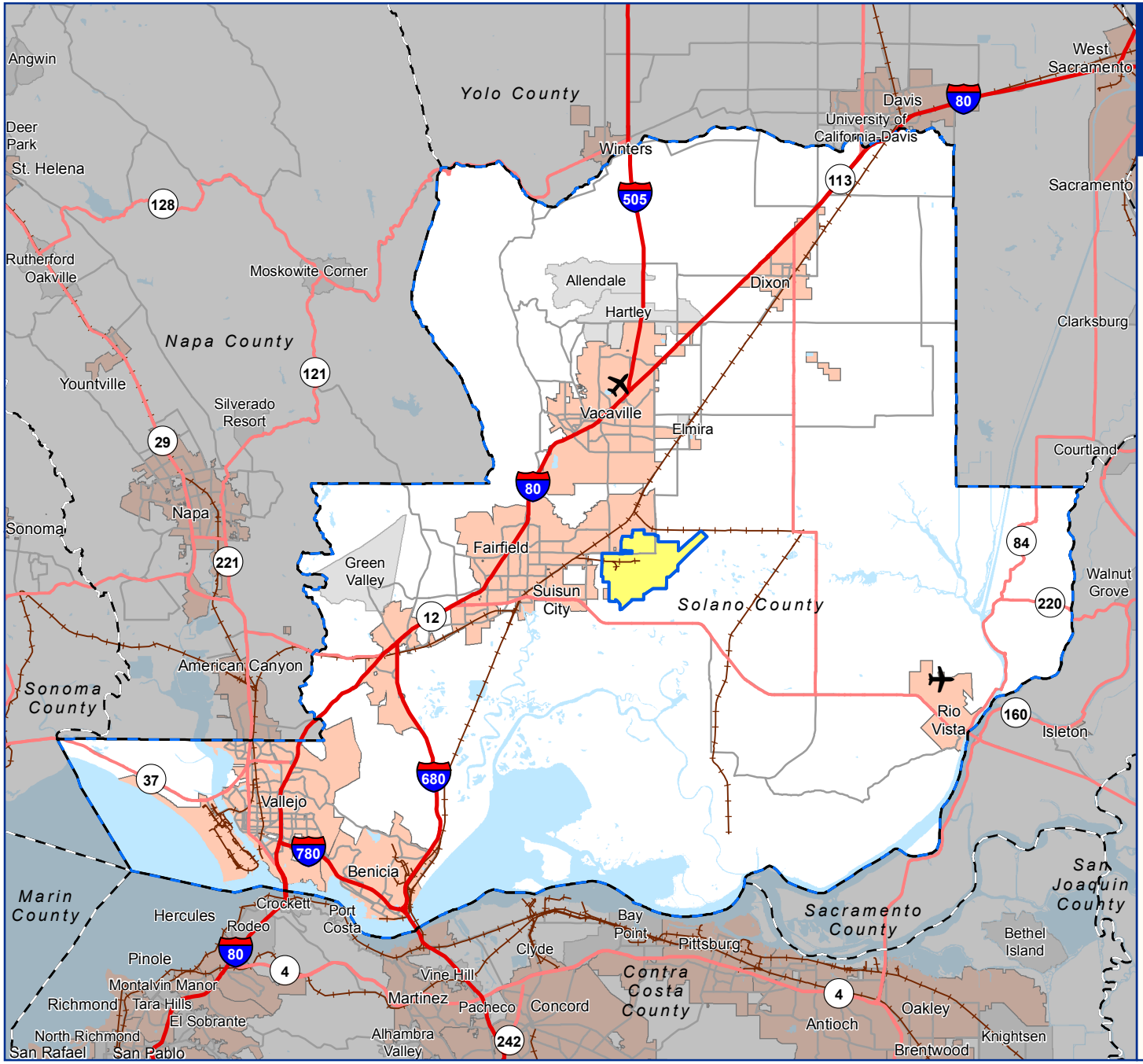


Figure 2-6

TSS Study Area Transportation System

Legend

- Interstate
- Highway
- Major Road
- Nut Tree Airport
- Rio Vista Municipal Airport
- Railroad
- Travis AFB
- Solano County
- Other County
- City
- Unincorporated Place
- Waterbody

Source: Travis AFB, 2016; US Census, 2014; USGS, 2014; ESRI, 2016; Matrix Design Group, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

0 1 2 3 Miles

Matrix DESIGN GROUP

Travis AFB requires a military ID to access the Base. Anyone on the bus without proper ID must leave the bus and reboard once the bus leaves the Base. Route 4 runs every hour, from approximately 6:00 am to 8:00 pm.

The intercity routes include Route 20, with service from Fairfield to Vacaville; Route 30, which runs from Fairfield to Sacramento; Route 40, which connects Vacaville and Fairfield to the Pleasant Hill and Walnut Creek Bay Area Rapid Transit (BART) stations; and Route 90, which connects Fairfield to the BART station in El Cerrito.

FAST local lines do not operate on Sundays and express intercity routes operate only on weekdays. FAST also operates Americans with Disabilities Act (ADA) paratransit and a reduced fare taxi program.

Rail

Rail service in Solano County is provided by several rail lines. Union Pacific Railroad Company (UP) owns and operates mainline railroad right-of-way between Sacramento and the Bay Area. Freight passes through Solano County via the UP tracks, which are part of a major freight line that runs from the Port of Oakland to Chicago, Illinois. In addition, the California Northern Railroad operates a short-line freight route that connects to the main UP tracks at a junction in Suisun City. In 2001, this route supported 17,499 train car loads of freight.

Suisun-Fairfield Amtrak Station (Source: http://www.greatamericanstations.com)

Amtrak California's Capitol Corridor was established in 1991, which provides passenger service between Sacramento and the San Francisco Bay Area. The Suisun-Fairfield Amtrak Station is in downtown Suisun City on Main Street between Spring Street and State Route 12. Amtrak's Capitol Corridor route, which travels along a UP right-of-way, stops at the Suisun / Fairfield Station and at the new Vacaville / Fairfield Train Station. The Capitol Corridor westbound route directly connects Suisun City with Martinez, Richmond, Berkeley, Emeryville, San Francisco, Oakland, Hayward, Fremont, Santa Clara, and San Jose. Eastbound, the Capitol Corridor eastbound route directly connects Suisun City with Davis, Sacramento, Roseville, Rocklin, and Auburn. The single most popular station destination from Suisun City was Sacramento, to the east. In Amtrak's 2009 fiscal year, there were 165,283 total boardings and disembarkments at the Suisun Station.

Air Transportation

There are two general-aviation airports within the TSS Study Area located in Vacaville and Rio Vista. An assessment of local airports is important when considering the flight operations at Travis AFB. The nearest airports offering a full range of domestic and international flights are Oakland International Airport about 50 miles southwest of the Base and Sacramento International Airport about 50 miles northeast of the Base.

Nut Tree Airport

Nut Tree Airport is a county-owned public-use airport located in the City of Vacaville, near the junction of Interstate 80 and Interstate 505. Nut Tree Airport covers an area of 262 acres and has one runway designated 2/20 with an asphalt surface measuring 4,700 by 75 feet. The airport does not have a control tower. In 2013, there were 176 aircraft based at the airport. Airport operations averaged about 278 per day, with 59 percent transient general aviation, 39 percent local general aviation, and one percent air taxi.

In 2014, ICON Aircraft, a manufacturer of an amphibious light sport aircraft, established its headquarters near the Nut Tree Airport. The facility will be used for manufacturing, sales, training, and service while utilizing the nearby airport. The presence of the new aircraft company is expected to greatly increase the use of airport by ICON Aircraft pilots.

Rio Vista Airport

Rio Vista airport, which is located approximately 14 miles east of Travis AFB, is operated by the City of Rio Vista. The general aviation airport covers 273 acres and has two runways and one helipad. The airport is the current base of operations for the Travis AFB Aero Club, which provides flight training to both airmen and their families and civilians from the local communities. It opened in 1993, replacing the original Rio Vista Airport. In 2014, there were 47 aircraft based at the airport. Airport operations averaged about 96 per day, with 50 percent transient general aviation and 50 percent local general aviation.

Cultural Resources

Archeological evidence demonstrates that humans have lived in the TSS Study Area from at least the Lower Archaic period that occurred between 10,000 and 6,000 years BCE. Prehistoric sites have been discovered throughout Solano County that contain shell mounds, milling sites, pottery, and worked stone artifacts. Historic records are available that describe the indigenous peoples at the time of European contact. Much of the county was originally inhabited by the Patwin of the Wintun tribe since 500 A.D. The tribe was later separated in the 1800s into smaller tribal units, consisting of the Ululatos, Labaytos, Malacas, Tolenas, and Suisunes. A small area of the eastern portion of the county may have been inhabited by the Plains Miwok. The California Native American Heritage Commission has identified the presence of an area of traditional, religious, and cultural importance to Native Americans within the county.

Historic sites relevant to different time periods are found throughout the county. The Rancho period occurred in the mid-1800s when Mexican settlers constructed missions and forts in the region. Much of Solano County was divided into land grants, which were primarily used as cattle ranches for the hide- and tallow-based economy. As time progressed, numerous communities were established around the county. Many of the cities and the communities' villages exhibit historical features from the late 1800s and early 1900s, including neighborhoods with small-block street-grid patterns and architectural styles that range from Italianate to vernacular cottages.

Three sites in Suisun City and four in the City of Vacaville have been placed on the National Register of Historic Places. In Suisun City these are the Samuel Martin House, the Suisun Masonic Lodge No. 55, and the Sacramento Northern Railway Historic District. In Vacaville these are the Will H. Buck House, Pena Adobe, Pleasants Ranch, and the Vacaville Town Hall.

Natural Resources

The county's location at the convergence of the San Francisco Bay and the Sacramento–San Joaquin Delta and its varied topography has created a variety of habitat types. Examples of habitat include extensive areas of marshland and wetlands along the Bay and Delta, oak woodlands of the Coastal Range, and vernal pool complexes and riparian corridors found throughout the upland areas of the county. These habitat types support numerous species including rare or threatened animal and plant species such as the California red-legged frog, Callippe butterfly, giant garter snake, Swainson's hawk, fairy shrimp, California tiger salamander, and Boggs Lake hedge-hyssop. Forty species found within the county have been identified as rare, threatened, or species of special concern.

Outside of the cities, Solano County has remained relatively undeveloped, with large portions of the county remaining in agriculture and open space. The Solano Land Trust has worked to permanently protect over 22,000 acres of natural areas and agriculture land in the county. Solano County is home to the Suisun Marsh. Consisting of 88,000 acres it is the largest contiguous estuarine marsh in the entire US. Solano County's has a vast supply of oak woodlands, a resource of great biological and scenic value. The woodlands provide habitat for a wide range of animal and plant species. Additionally, they moderate air and water temperatures, reduce soil erosion, facilitate nutrient cycling, and sustain water quality.

Solano County is rich in a number of non-fuel mineral resources. Mineral resources mined or produced within Solano County include mercury, sand and gravel, clay, stone products, calcium, and sulfur. The location of mineral resources in the county includes areas south and east of Travis AFB. Stone, gravel, sand, and clay mines are spread throughout the county.

San Francisco Bay National Estuarine Research Reserve

In 2003, Rush Ranch Open Space Preserve was designated as part of the San Francisco Bay National Estuarine Research Reserve. Covering approximately 2,000 acres, the preserve is located about two miles south of Suisun City. The reserve has been largely protected from development and alteration and has been a focus for environmental and ecological research. It is an important habitat for numerous fish, bird, and plant species, including threatened and endangered species such as the salt marsh harvest mouse, Suisun ornate shrew, Delta smelt, Suisun song sparrow, and the American white pelican. The space also provides recreational opportunities, including hiking and birdwatching.

Rush Ranch Open Space Preserve (Source: http://www.solanolandtrust.org/)

Grizzly Island Wildlife Area

The Grizzly Island Wildlife Area is approximately 12,900 acres of land, bays and sloughs within the Suisun Marsh. The complex is a patchwork of 10 distinct land parcels, including Grizzly Island, Crescent, Joice Island, Island Slough, Gold Hills, West Family, Goodyear Slough, and Grey Goose. Most of the parcels are not connected and are surrounded by private land. The different areas offer a variety of recreation opportunities and act as a buffer against further marsh development.

The complex combines natural tidal wetlands and artificially diked marshes. Each habitat attracts different kinds of wildlife. Some animals, like the California clapper rail and Suisun shrew, live exclusively in these tidal wetlands. Rare, threatened and endangered species that are found in the Grizzly Island Wildlife Area include the salt marsh harvest mouse, peregrine falcon, California Ridgway's rail, California black rail, bald eagle, Suisun aster, and soft-haired bird's beak.

Inside Chapter 3...

This chapter provides an overview of Travis Air Force Base (AFB), including the installation's history, its location (setting) in the TSS Study Area, the economic and strategic importance of Travis AFB, and a general description of the military operations conducted at the Base and in the region.

Identifying and describing the various activities performed on the installation and in the surrounding airspace provides valuable insight into the importance of Travis AFB as a national strategic asset and as a part of the fabric of the surrounding communities. The purpose of providing this information is to enable stakeholders to make informed decisions about future development and economic growth within communities and institutions near Travis AFB that could potentially impact the viability and future role of the Base, or be impacted by current or future activities at the Base.

3.1 History of Travis AFB

1940s-1950s

Although today Travis AFB is the home of the largest airlift organization in the Air Force, it began as an isolated airstrip set in the middle of a prairie during World War II. Activated in May 1943, the field was named Fairfield-Suisun Army Air Base after the two closest towns. Planned shortly after Pearl Harbor, the Base served as home for medium bombers and fighters assigned to defend the West Coast. The first runway and temporary buildings were constructed by the Army Corps of Engineers in the summer of 1942. They were used initially by army and navy fighter planes for takeoff

and landing practice. For a few months, the outline of an aircraft carrier's deck was painted on the runway to help newly-commissioned navy pilots practice maneuvers.

The Fairfield-Suisun Army Air Base in 1943 (Source: Daily Republic)

Shortly after construction began, the Base's potential as a major aerial port and supply transfer point led the Army Air Corps to assign it to the newly-designated Air Transport Command. The Base officially opened in June 1943, with a primary mission of servicing and ferrying tactical aircraft from California across the Pacific to the war zone. By 1945, the Base had become the West Coast's largest aerial port. The airlift of troops and supplies to Japan and Korea and the processing of returning personnel became the primary mission. In June 1948, the Military Air Transport Service assumed jurisdiction. In July, two of the Base's air transport squadrons left for Europe to assist in the Berlin Airlift.

1950s-1990s

In May 1949, the Strategic Air Command (SAC) gained command of the Base, turning it into a major long-range reconnaissance and intercontinental bombing installation. For the next nine years, airlift operations became secondary while the Base served as home for SAC bombers such as the B-29, B-36, and eventually, the B-52. During this period, new hangers were built, runways were added and widened, and permanent barracks and family living quarters were built, and the Base grew to its present size which encompasses 6,258 acres.

In October 1950, the Base was renamed Travis AFB in honor of Brigadier General Robert F. Travis, who was killed in a B-29 crash at the installation in August of the same year. At the time of his death, the general was commander of the 9th Heavy Bombardment Wing and was the Base's commanding general.

Military Air Transport (MAT) Service took command of Travis AFB in July 1958, after SAC's new dispersal policy led to the transfer of the 14th Air Division to Beale AFB. The Base became headquarters for the 1501st Air Transport Wing in 1955; for MATS's Western Transport Air Force (later Twenty-Second Air Force) in 1958; and the 60th Military Airlift Wing (later the 60th Airlift Wing, and today the 60th Air Mobility Wing) in 1966. The 60th replaced the 1501st as the host unit on Travis AFB in January 1966. The 349 Military Airlift Wing joined with the 60th when it moved from Hamilton AFB in 1969.

1990s-Today

Travis AFB became part of the Air Mobility Command (AMC) in June 1992, when assets from Military Air Command and SAC were fused into a single team. AMC's primary mission is mobility for America's armed forces. Travis AFB supports this capability by deploying air and air mobile forces anywhere in the world and sustains them in a conflict. The Base has become the largest in AMC in terms of aircraft and personnel. Principal aircraft of

the command currently stationed at Travis AFB are the C-5 Galaxy, at Travis since 1970, the KC-10 Extender, added in 1994, and the C-17 Globemaster III, added in 2006.

With the addition of the KC-10 squadron, and with other force structure changes, Travis AFB's construction budget for fiscal years 1993 through 1997 totaled nearly one billion dollars. Two major facilities completed in 1995 were a new Child Development Center and the largest Base Exchange in the Army and Air Force Exchange System.

Today, Travis AFB handles more cargo and passenger traffic through its aerial port than any other military air terminal in the US. Additionally, the Base has had a long and proud history of supporting humanitarian airlift within the US and around the world.

Source: Travis Heritage Center

3.2 Travis AFB Economic Benefit

The TSS Study Area encompasses Solano County and the cities of Fairfield, Suisun City, Vacaville, and Vallejo. The Department of Defense (DOD) is a significant contributor to of the regional and local economies, including all cities in Solano County. Travis AFB is the largest employer in the Study Area with 13,414 personnel (military, DOD, civilian, and contractors) that work for, or are stationed on the Base.

In fiscal year (FY) 2013, Travis AFB contributed approximately $1.6 billion to the local and regional economies through contract expenditures (including the purchase of goods and services), secondary employment, and payment of salaries. Figure 3-1 illustrates the total impact separated into contributing categories.

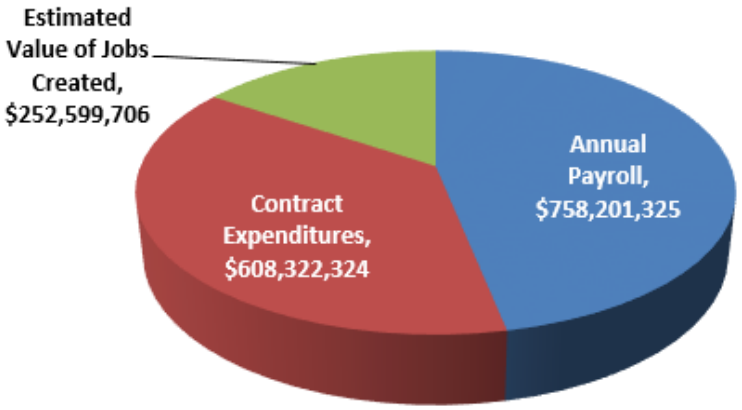


Figure 3-1. FY 2013 Travis AFB Economic Benefit

Source: Travis Air Force Base Economic Impact Analysis, 2013

3.3 Military Strategic Importance

Travis AFB is not only important to the local communities through its economic benefit, but also for the capabilities provided by its mission components in support of a variety of forces located in California and the US. The 60th Air Mobility Wing acts as the command wing for the Base and is the largest air mobility organization in the Air Force. Major tenant commands at Travis AFB include the 15th Expeditionary Mobility Task Force, 615th Contingency Response Wing, 349th Air Mobility Wing, and 52 additional partner organizations, including the Navy's VQ-3 Detachment.

Public Outreach and Involvement

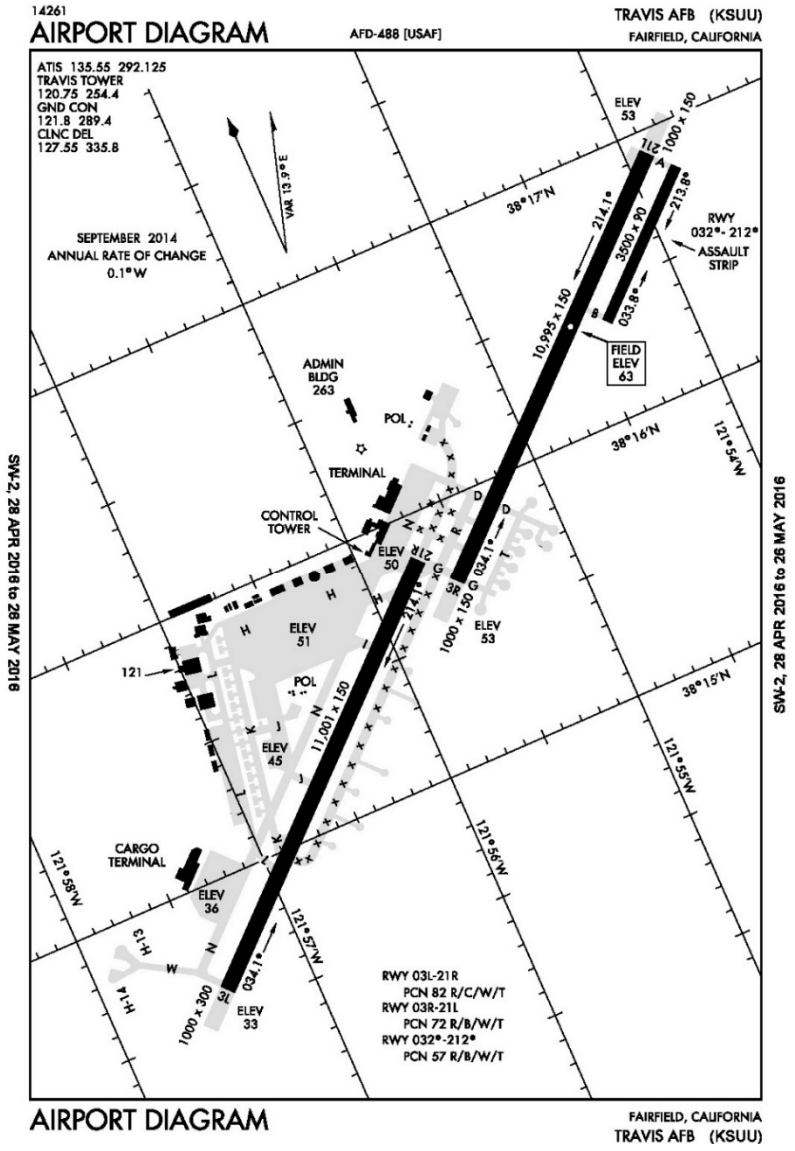
As a community presence, Travis AFB contributes to more than just the local economy. Travis AFB recognizes that continued support of the local population and government officials is invaluable. Travis AFB, both the 60th Air Mobility Wing and other tenants at the Base, engage in many public outreach efforts to make itself a greater part of the local and regional community. An overview of these programs and services is provided in Chapter 1 of this Background Report, in section 1.7 Local Communities Working Together.

3.4 Installation Setting

Aerial view of Travis AFB

Travis AFB is located in Solano County in northern California, midway between Sacramento and San Francisco. The Base covers approximately 6,260 acres of land. Travis AFB has two main runways and an assault landing zone (ALZ) that runs parallel the main runways, all oriented northeast/southwest. Runway 03L/21R is 11,001 feet long and 150 feet wide, while runway 03R/21L is 10,992 feet long and 150 feet wide. Both are Class B runways designed and built for sustained heavy aircraft landings and takeoffs. Assault Landing Zone 03/21 is 3,500 feet long and 90 feet wide and is designed for sustained C-17 assault landings and takeoffs. Runways 03L, 03R and ALZ 03 are used about 20 percent of the time for approaches from the southwest and departures to the northeast. Runways 21L, 21R and ALZ 21 are used about 80 percent of the time for approaches from the northeast and departures to the southwest. Figure 3-2 provides an airport diagram, including the location of the runways, control tower, and terminal.

Figure 3-2. Travis AFB Airport Diagram



Access to Travis AFB is provided through five different gates (see Figure 3-3).

- The Main Gate, located on Air Base Parkway on the west side of the Base, is open 24/7.
- The North Gate, located on North Gate Road, is open from 5:30 a.m. to 9:00 p.m. The North Gate serves as an alternative to the Main Gate for base personnel.
- The Hospital Gate, located near the Main Gate on Parker Road, is open Monday through Friday from 6:00 a.m. to 6:00 p.m. The Hospital Gate provides easy access to the medical center and clinic.
- The South Gate is located off Peterson Road on the south side of the Base and is used for commercial vehicles only. It is open from 6:00 a.m. to 6:00 p.m. Monday through Friday, and 7:00 a.m. to 10:00 a.m. on Saturday.
- The Forbes Gate is a pedestrian gate located on Forbes Street on the west side of the Base and is used to access Golden West Middle School and Vanden High School. The gate is open during the school year from 7:00 a.m. to 9:00 a.m. and from 2:00 p.m. to 5:30 p.m. Monday, Tuesday, Thursday, and Friday and from 9:00 a.m. to 5:30 p.m. Wednesday.

Amenities at the Base include a bowling alley, movie theater, library, auto care center, credit union, bank, lodging at the Westwind Inn, along with other restaurants and stores. Schools on the Base include Travis Elementary, Scandia Elementary, and Brandman University. Brandman University, part of the Chapman University System, offers undergraduate and graduate degrees, certificates, teaching credentials and extended education programs. Travis AFB also has a passenger terminal to provide Space-A travel, by which base personnel are permitted to travel on aircraft when excess capacity allows. Travis AFB is also home to the David Grant US Air Force (USAF) Medical Center, the Fairfield Veterans Affairs (VA) Outpatient Clinic, and the Travis AFB Heritage Center.

Housing on the Base is privately owned and operated by Balfour Beatty Communities. They offer eight different neighborhoods with different types of homes. These are Castle Terrace, March Landing, McClellan Corridor, Moffet Court, Norton Heights, Onizuka Flats North, and Onizuka Flats South. Community amenities include a community center, playground and picnic areas, a dog park, and a community garden.

In addition to the main base, Travis AFB has eight geographically separated units (GSUs):

- **Cypress Lakes Golf Course (206 acres):** Golf course facility located approximately two miles of north of the Base in Solano County. In addition to its recreation function, the golf course also has a well field which supplies approximately ten percent of the installation's potable water.
- **Defense Fuel Supply Point Ozol (75 acres):** A fuel facility within the Carquinez Strait, Contra Costa County.
- **Potrero Hills Annex (27 acres):** Located two miles due south of Travis AFB, the Potrero Hills Annex is a former Nike missile site that had been leased to a third party for private industrial operations.
- **Water Well 1 (10 acres):** A well facility in Solano County.
- **Middle Runway Marker (2 acres):** Airfield infrastructure in Solano County.
- **Tamalpais Radar Site (1 acre):** Former radar site on Mt. Tamalpais, Marin County.

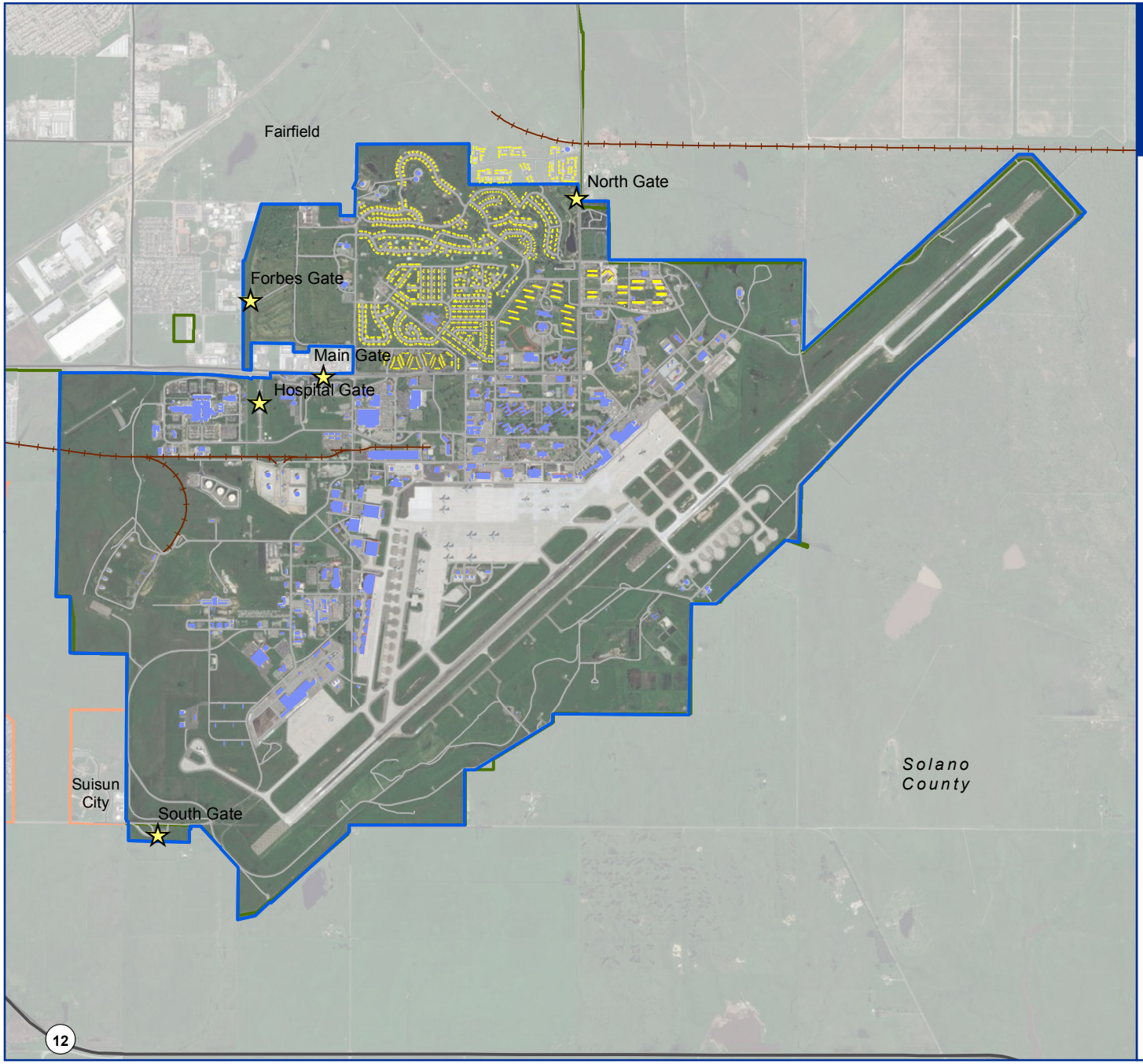


Figure 3-3

Travis AFB Installation Setting

Legend

- Gate
- Housing / Residential / Dormitory
- Other
- Travis AFB
- Fairfield
- Suisun City
- Major Road
- Travis AFB Road
- Railroad

Sources: Travis AFB, 2016; NAIP, 2014.

TRAVIS AFB SUSTAINABILITY STUDY

0 1,000 2,000 Feet

Matrix DESIGN GROUP

- Outer Runway Marker (0.23 acre): Airfield infrastructure in Solano County.
- The right of way (70 acres) of the former Sacramento Northern Railroad in Solano County.

Figure 3-3 shows the installation setting of Travis AFB and Figure 3-4 illustrates the breakdown of land uses on the Base.

3.5 Mission Operations

Air Force Mission

Part of the Air Mobility Command, the 60th Air Mobility Wing (AMW) is responsible for strategic airlift and air refueling missions around the globe. The unit's primary roles are to provide rapid, reliable airlift of American fighting forces anywhere on Earth in support of national objectives and to extend the reach of American and allied air power through mid-air refueling. Wing activity is primarily focused in the Pacific and Indian Ocean areas, including Alaska and Antarctica. However, the 60th AMW crews can fly support missions anywhere in the world to fulfill its motto of being "America's First Choice" for providing true Global Reach.

With the multiple missions that Travis AFB provides, the main supporting action is the installation's ability to provide a safe command and control platform for the President and DOD to carry out their objectives during a time of national crisis. Current flight operations at Travis AFB include straight out departures and straight in approaches, overhead landing patterns, radar closed patterns, closed patterns, and re-entry visual flight rule patterns.

Table 3-1 provides an overview of the three key aircraft that operate at Travis AFB, and their missions.

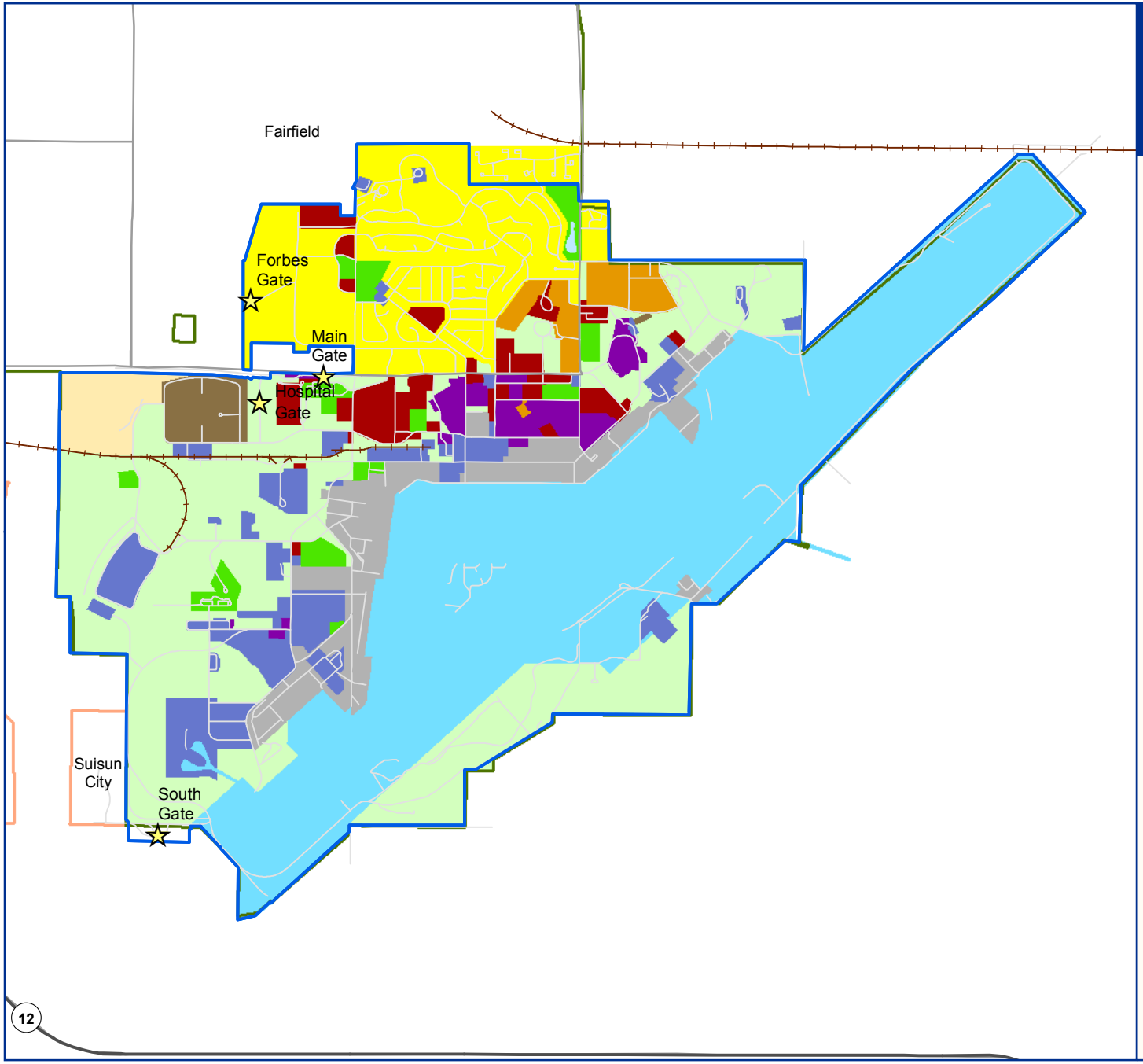
Future Mission Operations

In January 2017, Air Force officials selected Travis AFB as one of two preferred locations to station active duty components of the new Boeing KC-46 Pegasus refueling aircraft. The KC-46A Pegasus is an aerial refueling and strategic military transport aircraft capable of refueling multiple aircraft at the same time. The other base chosen was Joint Base McGuire Dix Lakehurst in New Jersey. Environmental impact analyses will be required before a final basing decision is made to locate 24 KC-46A Pegasus aircraft at Travis AFB, which will replace the existing KC-10 Extender aircraft. In February 2011, the KC-46 Pegasus was selected by the Air Force to replace older KC-10 Extenders. A decision to retire the KC-10 Extenders was made in 2013, but the planned divestiture is intended to be coordinated with arrival of the KC-46A. As of January 2017, it is anticipated that the first KC-46A Pegasus aircraft would arrive at Travis AFB in 2022. The extent of personnel change that will occur at Travis AFB as a result of this change in mission has not been established.

KC-46A Pegasus refuels a C-17 Globemaster III

Figure 3-4

Travis AFB Land Use



Legend

Land Use

- Airfield
- Aircraft Operations and Maintenance
- Administrative
- Community
- Medical
- Industrial
- Housing (Accompanied)
- Housing (Unaccompanied)
- Open Space
- Outdoor Recreation
- Preserve Lands
- Water

- Gate
- Travis AFB
- Fairfield
- Suisun City
- Major Road
- Travis AFB Road
- Railroad
- Waterbody

Source: Travis AFB, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

0 1,000 2,000 Feet

Matrix DESIGN GROUP

Table 3-1. Overview of Key Aircraft at Travis AFB

KC-10 Extender

The KC-10 Extender is an Air Mobility Command advanced tanker and cargo aircraft. Although the KC-10's primary mission is aerial refueling, it can combine the tasks of a tanker and cargo aircraft by refueling fighters and simultaneously carrying the fighter support personnel and equipment on overseas deployments.

Length:	181 feet, 7 inches
Height:	58 feet, 1 inches
Wingspan:	195 feet, 8 inches
Speed:	619 mph
Ceiling	42,000 feet
Range:	3,800 nautical miles with cargo; 10,000 nautical miles without
Crew:	4

C-5 Galaxy

The C-5 Galaxy is one of the largest aircraft in the world and the largest airlifter in the Air Force inventory. The aircraft can carry a fully equipped combat-ready military unit to any point in the world on short notice and then provide the supplies required to help sustain the fighting force.

Length:	247 feet, 1 inches
Height:	65 feet, 1 inches
Wingspan:	222 feet, 9 inches
Speed:	518 mph
Ceiling	35,700 feet
Range:	4,800 nautical miles with cargo, 7,000 nautical miles without
Crew:	7 (2 pilots, 2 flight engineers, and 3 loadmasters)

C-17 Globemaster III

The C-17 Globemaster III is the newest, most flexible cargo aircraft to enter the airlift force. The C-17 is capable of rapid strategic delivery of troops and all types of cargo to main operating Bases or directly to forward Bases in the deployment area. The aircraft can perform tactical airlift and airdrop missions and can transport litters and ambulatory patients during aeromedical evacuations when required.

Length:	174 feet
Height:	55 feet, 1 inches
Wingspan:	169 feet, 10 inches
Speed:	450 knots
Ceiling	45,000 feet
Range:	Global with in-flight refueling
Crew:	3 (2 pilots and 1 loadmaster)

Source: http://www.travis.af.mil/library/aircraft.asp

3.6 Commands and Units at Travis AFB

The Travis AFB mission is supported by multiple units under the direct command of the Travis AFB Base Commander and tenant units (units that report to other organizations and utilize space or facilities at Travis AFB) that enable the missions to be executed on a daily basis. The following pages briefly summarize major units or tenants and their function in the organization.

60th Air Mobility Wing

The 60th AMW is the host command wing at Travis AFB. The Wing is the largest air mobility organization in the Air Force and is responsible for strategic airlift and aerial refueling missions around the world. Its mission is to provide rapid, reliable airlift of personnel and equipment anywhere on earth, and to extend the reach of American and allied air power through mid-air refueling. Wing activity is primarily focused in the Pacific and Indian Ocean areas; however, crews can fly support missions anywhere in the world to fulfill its motto of being "America's First Choice" for providing true Global Reach.

The 60th AMW consists of four groups:

- **60th Operations Group**: The 60th Operations Group is responsible for four flying squadrons - the 21st Airlift Squadron that flies the C-17 Globemaster III, 22nd Airlift Squadron that flies the C-5M Super Galaxy, and the 6th and 9th Refueling Squadrons that fly the KC-10 Extender. The 60th Operations Support Squadron handles functions such as weather monitoring, airfield management, training, and scheduling.
- **60th Maintenance Group:** The 60th Maintenance Group meets the responsibility of aircraft maintenance with the 60th Maintenance Squadron, 60th Aircraft Maintenance Squadron, 660th Aircraft Maintenance Squadron, 860th Aircraft Maintenance Squadron and 60th Aerial Port Squadron. These five squadrons comprise over 2,200 military and civilian personnel.
- **60th Mission Support Group:** The 60th Mission Support Group leads six units and employs more than 1,700 civilian and military personnel. It is made up of the 60th Civil Engineer Squadron, 60th Logistics Readiness Squadron, 60th Contracting Squadron, 60th Communications Squadron, 60th Security Forces Squadron, the 60th Force Support Squadron, and the 60th Logistics Readiness Squadron. They are responsible for mission readiness, aerial port operations, and the day-to-day activities that help Travis AFB operate like a city.
- **60th Medical Group:** The 60th Medical Group is composed of seven squadrons: the 60th Aerospace Medicine Squadron, 60th Dental Squadron, 60th Diagnostics and Therapeutics Squadron, 60th Inpatient Squadron, 60th Medical Operations Squadron, 60th Medical Support Squadron and 60th Surgical Operations Squadron. The 60th Medical Group manages the David Grant US Air Force (USAF) Medical Center which provides a full spectrum of care to eligible patients.

Major Tenants

The 621st Contingency Response Wing

The 621st Contingency Response Wing is highly-specialized in training and rapidly deploying personnel to quickly open airfields and establish, expand, sustain, and coordinate air mobility operations. From wartime taskings to disaster relief, the 621st extends Air Mobility Command's reach in deploying people and equipment around the globe. Also based at Joint Base McGuire-Dix-Lakehurst in New Jersey, the 621st consists of approximately

1,500 Airmen in six groups and 14 squadrons. The 621st have supported numerous operations, including Enduring Freedom, Iraqi Freedom, and New Dawn, as well as humanitarian assistance, including Hurricane Katrina and the Haiti and Pakistan Earthquake relief operations.

349th Air Mobility Wing

The 349th Air Mobility Wing is the largest associate wing in the United States Air Force Reserve. Its mission is to "provide combat ready Airmen and expeditionary support to the war fighter." As a reserve partner, the 349th works alongside 60th AMW personnel, operating and maintaining the all-jet fleet of 26 C-5 Galaxy cargo and 27 KC-10 Extender refueling aircraft. 349th AMW members work in all capacities with active duty personnel, to include Operations, Maintenance, Mission Support, and Medical.

Navy VQ-3 Detachment

The Navy VQ-3 detachment, also known as TACAMO (Take Charge and Move Out), has been based at Travis AFB since 1963. The detachment's mission is an aerial relay platform for important messages which the crew can transmit half way around the world from the air. The crew flies the Boeing E-6B Mercury, which is the Navy's largest aircraft. The aircraft is the world's strongest electromagnetic pulse-protected aircraft and contains four times the communications capability of a nuclear-powered aircraft carrier.

David Grant US Air Force Medical Center

The David Grant USAF Medical Center is the Air Force's largest medical facility on the west coast. A staff of more than 2,400 military and civilian personnel works at David Grant USAF Medical Center. The fully accredited hospital currently serves over 96,000 TRICARE beneficiaries in the region. Many military retirees remain in the area to easily access the medical center. Additionally, the medical center is a major resource for parents with children who have special needs. The David Grant USAF Medical Center is managed by the 60th Medical Group.

Tenant Units and Partner Organizations

There are more than 50 tenant units and partner organizations, each with a unique mission set, who contribute to the greater success of the Travis AFB mission. Table 3-2 identifies each support tenant and provides a mission summary.

Table 3-2. Tenant Units and Partner Organizations

Tenant Name	Mission Summary and Responsibilities
Air Force Office of Special Investigations	The Air Force Office of Special Investigations has been the Air Force's major investigative service since August 1948. The agency operates throughout the full spectrum of conflict, conducts criminal investigations, and provides counterintelligence services. The agency reports to the Inspector General, Office of the Secretary of the Air Force.
Army Air Force Exchange Services	The Army & Air Force Exchange Service's enduring mission is to make the lives of Soldiers and Airmen better through retail goods and services. Exchange earnings provide dividends to support morale, welfare, and recreation programs.
Area Defense Counsel	The Area Defense Counsel program provides independent legal representation to military members suspected of an offense or facing adverse administrative actions.
Defense Commissary Agency	The Defense Commissary Agency operates a worldwide chain of commissaries providing groceries to military personnel, retirees, and their families in a safe and secure shopping environment.

Table 3-2. Tenant Units and Partner Organizations (continued)

Tenant Name	Mission Summary and Responsibilities
Air Force Audit Agency	The Air Force Audit Agency mission is to provide all levels of Air Force management with independent, objective, and quality audit services that include: Reviewing and promoting economy, effectiveness, and efficiency of operations; Evaluating programs and activities and assisting management in achieving intended results; Assessing and improving Air Force fiduciary stewardship and the accuracy of financial reporting.
Civil Air Patrol, Det. 22	Squadron 22, Travis Composite Squadron, is a civilian voluntary auxiliary of the Air Force. The squadron is a volunteer, non-profit organization committed to serving the nation. The three primary mission areas are emergency services, aerospace education, and cadet programs.
Civil Engineer Maintenance Inspection Repair Team	The mission of the Civil Engineer Maintenance Inspection Repair Team is to service the civil engineering commanders in their installations power generation and electrical distribution. They preform various operations, from circuit breaker maintenance and infrared scanning, to generator installation and repair."
Defense Threat Reduction Agency (DTRA)	The focus of the Defense Threat Reduction Agency is to keep weapons of mass destruction (WMD) out of the hands of terrorists and other enemies by locking down, monitoring, and destroying weapons and weapons related materials. They also assist Combatant Commanders with their plans and responses to WMD events and develop and deliver cutting-edge technologies to assist with all of these endeavors.
373rd Training Squadron	The 373rd Training Squadron, detachment 14 based out of Sheppard AFB, trains Travis AFB crew chiefs, electricians, jet mechanics, avionics, and hydraulics troops on aircraft maintenance and repair.
Navy Computer Telecommunications Strategic Communications Unit	The primary mission of the Strategic Communications Unit is to relay Emergency Action Messages from National Command Authority to airborne TACAMO aircraft and Command Centers, and to provide worldwide air-to-ground and ground-to-air voice/data links in support of deployed TACAMO forces.
Defense Logistics Agency - Document Services	The Defense Logistics Agency is the Department of Defense's largest logistics combat support agency, providing worldwide logistics support in both peacetime and wartime to the military services as well as several civilian agencies and foreign countries.
Defense Security Services	The Defense Security Services contributes to national security by serving as an interface between the government and cleared industry. They provide the military services, Defense Agencies, 30 federal agencies, and approximately 13,500 cleared contractor facilities with security support services.
Veterans Affairs Outpatient Clinic	The Fairfield Outpatient Clinic, located adjacent to David Grant Medical Center, offers a wide range of services including primary care, hemodialysis, laboratory, mental health, neurology, neurosurgery, nutrition counseling, otolaryngology (ENT), pharmacy, and physical therapy.
American Federation of Government Employees	The American Federation of Government Employees (AFGE) is the largest federal employee union representing 600,000 federal and D.C. government workers nationwide and overseas. Workers depend upon AFGE for legal representation, legislative advocacy, technical expertise, and informational services.

Table 3-2. Tenant Units and Partner Organizations (continued)

Tenant Name	Mission Summary and Responsibilities
Northrop Grumman	Northrop Grumman is a leading global security company providing innovative systems, products and solutions in autonomous systems, cyber, C4ISR, strike, and logistics and modernization to government and commercial customers worldwide.
Boeing	Boeing is the world's largest aerospace company and leading manufacturer of commercial jetliners and defense, space and security systems. A top US exporter, the company supports airlines and US and allied government customers in 150 countries.
Nakuuruq Solutions	Nakuuruq Solutions is a provider of advanced technology and business services and solutions to the federal government.
Defense Contract Management Agency	The Defense Contract Management Agency (DCMA) is the Department of Defense component that works directly with Defense suppliers to help ensure that supplies and services are delivered on time, at projected cost, and meet all performance requirements.
LightHouse for the Blind and Visually Impaired	The LightHouse for the Blind and Visually Impaired promotes the independence, equality and self-reliance of people who are blind or have low vision by offering blindness skills training and relevant services such as access to employment, education, government, information, recreation, transportation, and the environment.
PRIDE Industries	PRIDE Industries, one of the nation's largest nonprofit employers of people with disabilities, provides outsourcing solutions that meet the manufacturing and service needs of Fortune 500 companies and government agencies nationwide.
United States Air Force Band of the Golden West	The United States Air Force Band of the Golden West is comprised of about 60 Airmen-musicians. In addition to performing for civilian communities throughout the states of California, Washington, Oregon, Idaho, Nevada, Arizona, and Utah, the band supports 13 Air Force Bases, 8 Air Force Reserve Wings, and 6 recruiting squadrons in over 250 annual performances.

Source: http://www.travis.af.mil/Units/60th-Air-Mobility-Wing

3.7 Travis AFB Mission Footprints

Mission activities conducted on and around Travis AFB can potentially generate impacts on surrounding community areas if incompatible land uses are developed. Examples of potential mission impacts on surrounding communities include noise and vibration from overhead flights and the risk of an aircraft accident. Conversely, the military mission is susceptible to hazards and other incompatibilities created by certain types of civilian development or activities, such as obstructions to air space or location of noise sensitive uses in high noise zones. Understanding the overlapping spatial patterns of these compatibility zones on mission footprint is essential to promote compatible and informed land use decisions.

Travis AFB Footprint Elements

There are several elements that make up the mission footprints that extend outside the Travis AFB boundaries. These essential elements play a key role in the installation's viability for sustaining current and future mission operations. These elements are listed as follows and described in more detail on the following pages.

- Airfield Approach and Departure Flight Tracks
- Imaginary Surfaces
- Airfield Accident Potential Zones
- Aircraft Noise Contours
- Airspace Control
- Part 77 Vertical Obstruction Compliance
- Bird / Wildlife Aircraft Strike Hazard (BASH) Relevancy Area

Airfield Approach and Departure Flight Tracks

Flight tracks are developed to provide guidance on the range of standard operations that are associated with the airfield. These are created using information gathered from air traffic controllers, pilots, and other sources. When flight tracks are developed they attempt to avoid urban development as much as possible to reduce impacts and risk to the general public and commercial or general aviation activities. Safety of operations is paramount in the design of these flight tracks. Travis AFB has two runways (03L/21R, 03R/21L) and one assault landing zone (03/21).

Figure 3-5 illustrates the primary flight tracks used by Travis AFB aircraft. Other flight tracks may also be used depending on factors such as weather or mission.

Aircraft operating at Travis AFB use the following flight patterns:

- Straight-out departure
- Straight-in approach
- Precision and non-precision instrument approaches; Overhead and rectangular closed patterns to the southeast side of the runways at 2,000 feet AGL and 1,500 feet AGL
- Spiral down approaches to a landing on the LZ or runways

The closed pattern flight tracks are isolated to areas surrounding the installation and consist of low-level altitude flights. As shown on Figure 3-5, the closed pattern flight tracks tend to stay away from heavily populated areas but go over parts of western Fairfield and southern Vacaville. The operation performed by the aircraft using these flight tracks can potentially create noise and vibration impacts on land uses under these paths.

Source: Air Installation Compatible Use Zone Report, Travis Air Force Base, November 2009

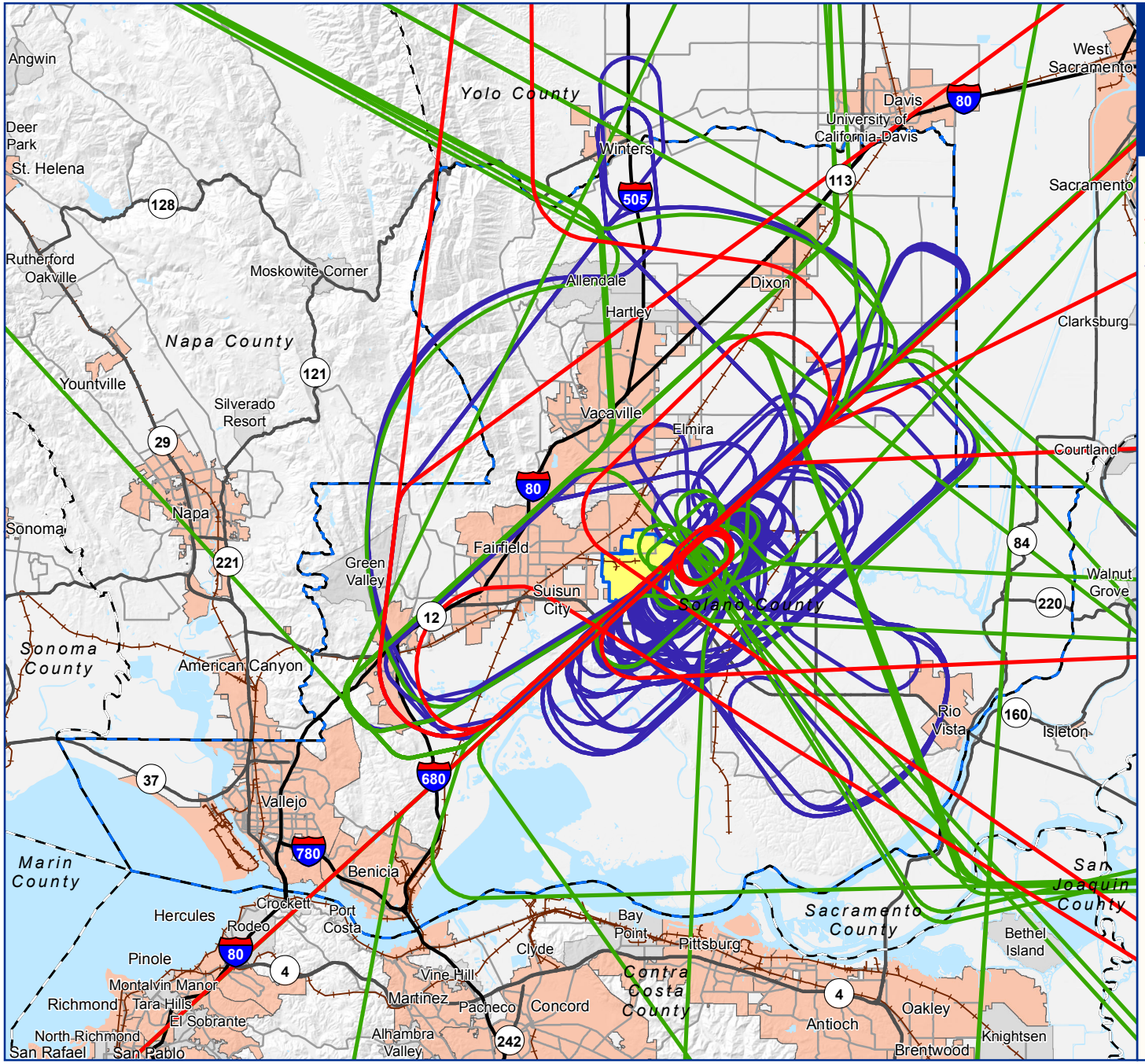


Figure 3-5

Travis AFB Mission Footprint: Flight Tracks

Legend

Flight Tracks
- Departure
- Arrival
- Closed Pattern

- Travis AFB
- Solano County
- County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Railroad
- Waterbody

Source: Travis AFB, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

0 1 2 3 Miles

Matrix DESIGN GROUP

Imaginary Surfaces

Federal Aviation Regulations, Part 77 specifies a series of imaginary height restriction surfaces surrounding an airfield. The imaginary surfaces of an active runway are used to define the required airspace that must remain free of vertical obstructions near aviation operations to optimize safe flight operations. Figure 3-6 shows the slope of the surfaces that help guide military and community planners in land use planning around an airfield. Structures should not exceed these heights to protect the navigable airspace associated with the airfield, the safety of pilots and people, and the land uses on the ground. This is especially important in the clear zone and the approach-departure surfaces.

The extent or size of an imaginary surface depends on the type of runway. Military runways are categorized as either Class A or Class B based on the type of aircraft that use them. Class A runways are for smaller or lighter aircraft, while Class B runways are the category for the majority of military aircraft. The two Travis AFB runways are Class B runways and the relative imaginary surfaces of the runways are shown on Figure 3-7. For a complete technical explanation of the imaginary and transitional surfaces for Travis AFB, see Chapter 5, Compatibility Assessment (Section 5.23 Vertical Obstructions).

The Department of Defense Unified Facilities Criteria 3-260-01, Airfield and Heliport Planning and Design, establishes airspace imaginary surfaces associated with assault landing zones located at Travis AFB.

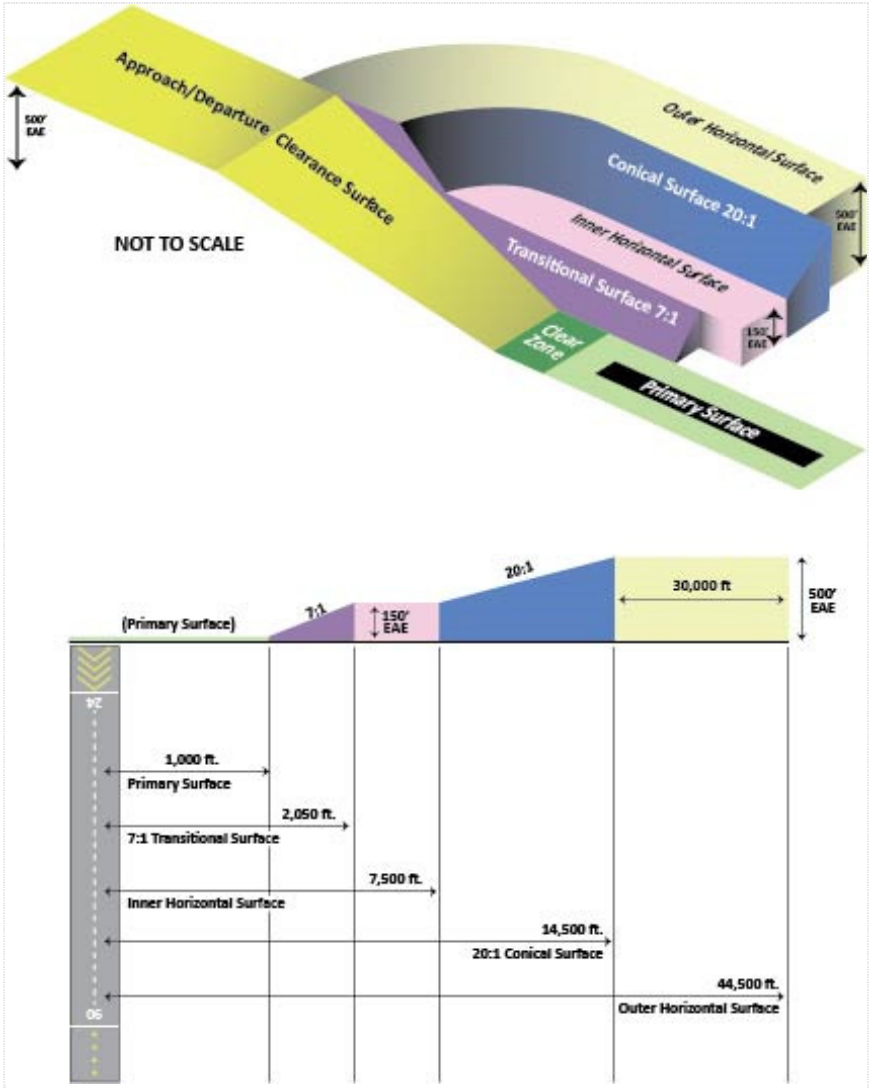


Figure 3-6. Example Views of the Different Imaginary Surface Layers

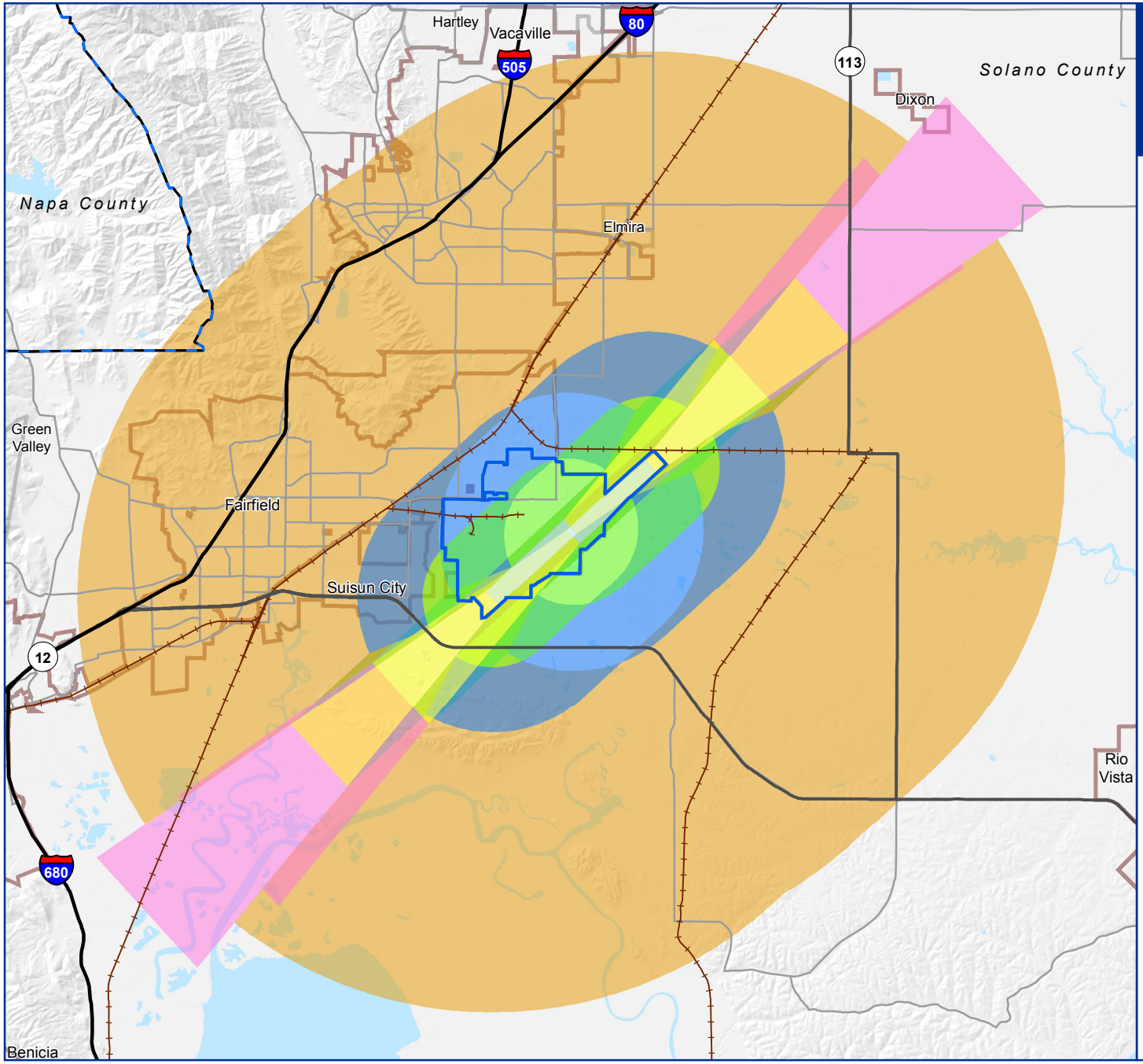


Figure 3-7

Travis AFB Mission Footprint: Imaginary Surfaces

Legend

Airfield Imaginary Surface

- Primary Surface
- Approach/Departure Clearance Surface (glide angle)
- Approach/Departure Clearance Surface (horizontal)
- Inner Horizontal Surface
- Conical Surface
- Outer Horizontal Surface
- Transitional Surface

- Travis AFB
- Solano County
- County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Railroad
- Waterbody

Source: 2009 Travis AFB AICUZ.

TRAVIS AFB SUSTAINABILITY STUDY

0 ¾ 1½ Miles

Matrix DESIGN GROUP

Airfield Accident Potential Zones

Per Air Force regulations, Accident Potential Zones (APZs) are developed to assist military and community planners in developing land uses that are compatible with airfield operations, thereby protecting health and safety. Within these zones, there are recommended types, densities, and intensities of land uses. While the likelihood of an aircraft mishap occurring is remote, the identified APZs provide the best practical solution for fostering public safety.

There are typically three safety zones that extend from each end of a runway: Clear Zone (CZ), APZ I, and APZ II. These three zones occur on each end of runways 03L/21R and 03R/21L. These safety zones are illustrated on Figure 3-8.

The CZ begins at each end of the runway. The CZ for the runway measures 3,000 feet wide by 3,000 feet long. This is the area that has the highest potential of an aircraft incident. It is recommended that no development occur in the CZ unless it is a use that is needed for safe operations of aircraft.

The APZ I is an area beginning at the end of each CZ at a width of 3,000 feet and a length of 5,000 feet. This area has a lower potential for accidents and therefore has less restrictive development restrictions recommended.

The APZ II is an area that begins at the end of each APZ I and is 3,000 feet wide by 7,000 feet long. The accident potential in this area reduces further, and some additional development types are allowed.

There are two smaller safety zones associated with the assault landing zone, the CZ and the APZ-LZ. The landing zone CZ begins at each end of the landing zone, which starts at an inner width which extends out 135 feet to each side of the centerline and tapers out to a width of 250 feet on each side of the centerline. The landing zone CZ extends out for 500 feet along the extended assault strip centerline.

The APZ- LZ for the landing zone begins at the far end of the CZ and extends out for 250 feet on each side of the centerline for 2,500 feet along the extended landing zone centerline.

The Travis AFB AICUZ Report provides a complete listing of the land uses that are not recommended for use in the CZ, APZ I and APZ II. In these recommendations, some land uses also have recommended limits on density and intensity of use. Communities are encouraged to incorporate these land use recommendations into their planning and regulatory documents. This helps to protect public health and safety and maintain compatibility with continued operations at Travis AFB.

Source: Air Installation Compatible Use Zone Report, Travis Air Force Base, November 2009

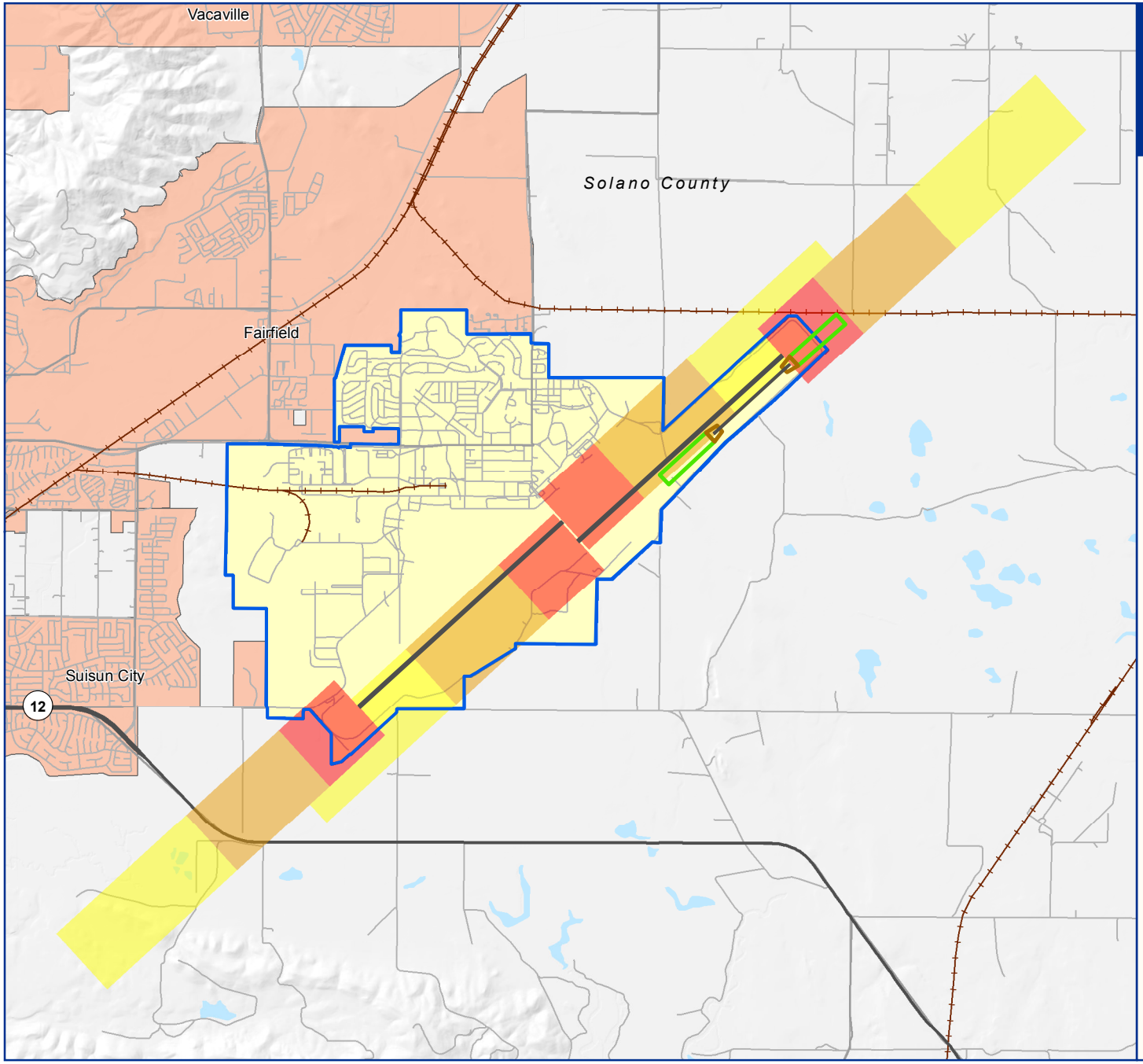


Figure 3-8

Travis AFB Mission Footprint: Accident Potential Zones

Legend

Accident Potential Zones
- APZ I
- APZ II
- Clear Zone

Assault Strip Accident Potential Zones
- APZ-LZ
- Clear Zone

- Travis AFB
- Runway
- Solano County
- County
- City
- Interstate
- Highway
- Major Road
- Local
- Railroad
- Waterbody

Source: 2009 Travis AFB AICUZ.

TRAVIS AFB SUSTAINABILITY STUDY

0 ¼ ½ Mile

Matrix DESIGN GROUP

Aircraft Noise Contours

Aircraft noise is produced from flight operations (overflight, take-offs, landings, touch-and-go operations) and engine maintenance run-ups. An engine run-up is a maintenance procedure performed on the airfield to test for proper engine performance. The Air Force considers how its operations impact the local community by calculating an average-weighted noise level measured as a day-night average sound level (DNL). The Travis AFB AICUZ uses the DOD NOISEMAP program to produce noise contours indicating noise exposure levels from aircraft operations; this is an average of all types of aircraft at Travis AFB.

The contour lines developed in the model range from 60 decibel (dB) DNL to 80 dB DNL and increase in increments of five dB. The 80 dB DNL is the loudest contour line computed and the 60 dB DNL is the quietest. The DNL has been determined to be a reliable measure of community sensitivity to aircraft noise and has become a standard metric used to map aircraft noise impacts.

Instead of DNL, the State of California uses Community Noise Equivalent Level (CNEL) as the standard for aircraft noise contours, in which a five-dB penalty is added to each aircraft operation in the 7:00 p.m. to 10:00 p.m. period, and a 10-dB penalty to each operation in the 10:00 p.m. to 7:00 a.m. period. Air Force uses the DNL metric, which is identical to the CNEL, except that the evening noise penalty is not added on this metric. The DNL metric includes the same 10-dB penalty for operations after 10:00 p.m.

The Travis AFB Land Use Compatibility Plan (LUCP) established CNEL noise contours based on a maximum mission estimate. The LUCP utilized Federal Aviation Administration (FAA) methodology to determine the Annual Service Volume of the Travis AFB runway and taxiway system. By defining the maximum mission annual operations, a realistic level for future noise contours can be established. The LUCP noise contours cover a larger area than the AICUZ noise contours and will be utilized in this TSS to maintain mission noise protection and civilian development. The 2015 maximum mission noise contours are depicted on Figure 3-9.

To the northeast, east, and south of Travis AFB are agricultural and open space uses. Currently, there are no existing incompatible land uses resulting from aircraft noise. However, there is concern for future incompatibility as the surrounding jurisdictions grow and develop. Noise exposure can also be a concern for certain sensitive biological resources that may be near the airfield. In reviewing noise contours, it should be noted that these are annual averages, and noise exposure at any given time will vary based on a number of factors, including weather.

About eight percent of the total daily operations occur during the evening (7:00 p.m.-10:00 p.m.) while 41 percent occur at night (10:00 p.m.-7:00 a.m.). Approximately 22 percent of the aircraft maintenance run-ups at Travis AFB occur during the evening, while 35 percent occur at night. In efforts to minimize noise for citizens in surrounding communities, engine run-up locations have been placed in areas that are less likely to impact day-to-day life. Also, to reduce noise impacts, Travis AFB does not utilize the western flight pattern after 9:00 p.m.

Source: Air Installation Compatible Use Zone Report, Travis Air Force Base, November 2009

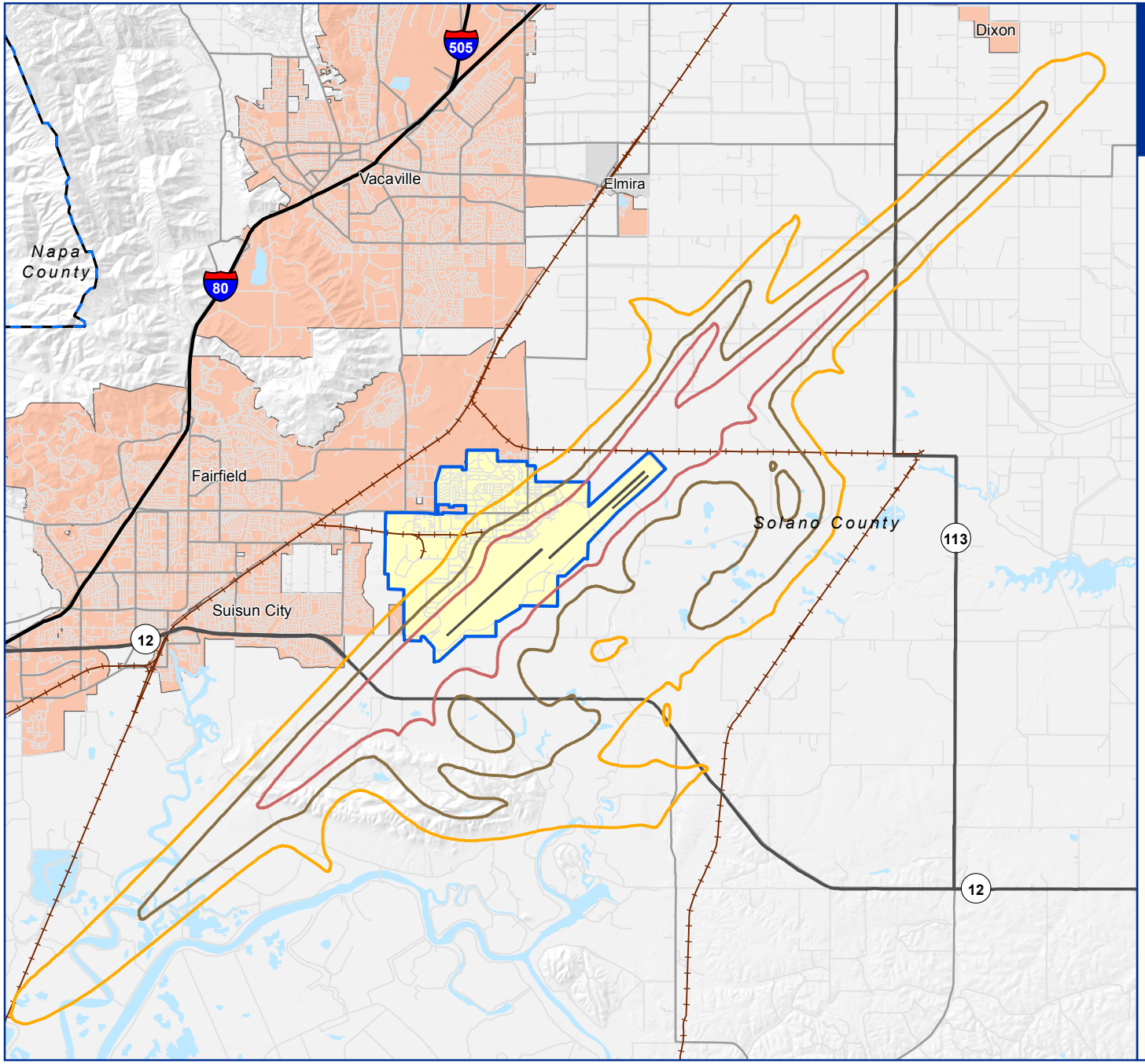


Figure 3-9

Travis AFB Mission Footprint: Noise Contours

Legend

CNEL Noise Contour (dB)

- 65
- 70
- 75

- Travis AFB
- Runway
- Solano County
- County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Local
- Railroad
- Waterbody

Source: Solano County, 2015 (Travis AFB Land Use Compatibility Plan)

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

Airspace Control

To help air traffic controllers and pilots deal with varying traffic conditions in the sky, United States airspace has been separated into six different classes (A, B, C, D, E, and G), illustrated in Figure 3-10. These different classes have different requirements for entry into the airspace, pilot qualifications, radio and transponder equipment, and Visual Flight Rules (VFR) weather minimums.

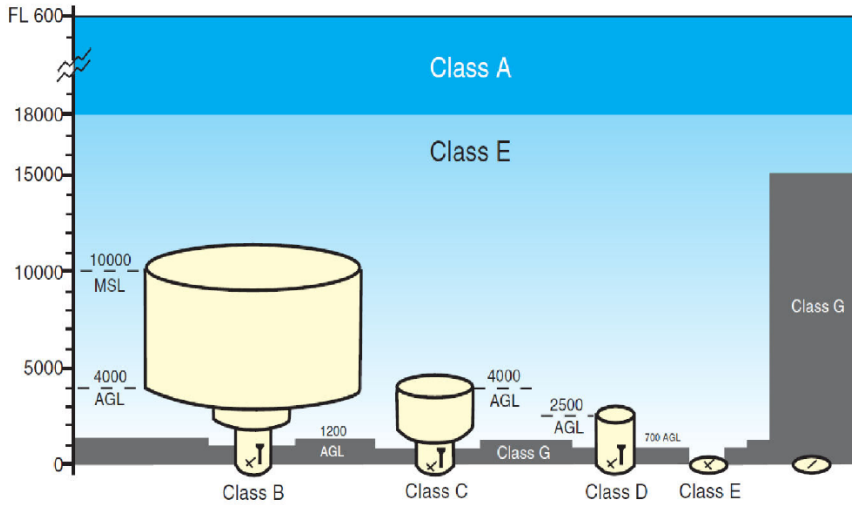


Figure 3-10 Airspace Classification

Within the TSS Study Area, Travis AFB is surrounded by Class D airspace. The vertical boundary is 2,600 feet above the airport elevation (the ceiling). The core surface area has a radius of four nautical miles. Class D airspace reverts to class E or G during hours when the air traffic control tower is closed, or under other special conditions.

Because of Travis AFB's location between Sacramento International Airport and Oakland International Airport, the airspace above the installation is kept open for general aviation access. Two-way communication with air traffic control must be established before entering class D airspace, but no transponder is required. Pilots flying under VFR in Class D airspace must have at least three miles of visibility. They must also maintain a specified distance from the clouds.

Travis AFB is located within Alert Area A-682, which is a designated airspace that may contain a high volume of pilot training or an unusual type of aerial activity. Military aircraft in this area frequently fly approaches into Travis AFB from a variety of different altitudes, airspeeds, and directions. Pilots are advised to be aware when flying in alert areas.

Figure 3-11 shows the FAA Sectional Chart of the area and shows the Class D airspace areas described.

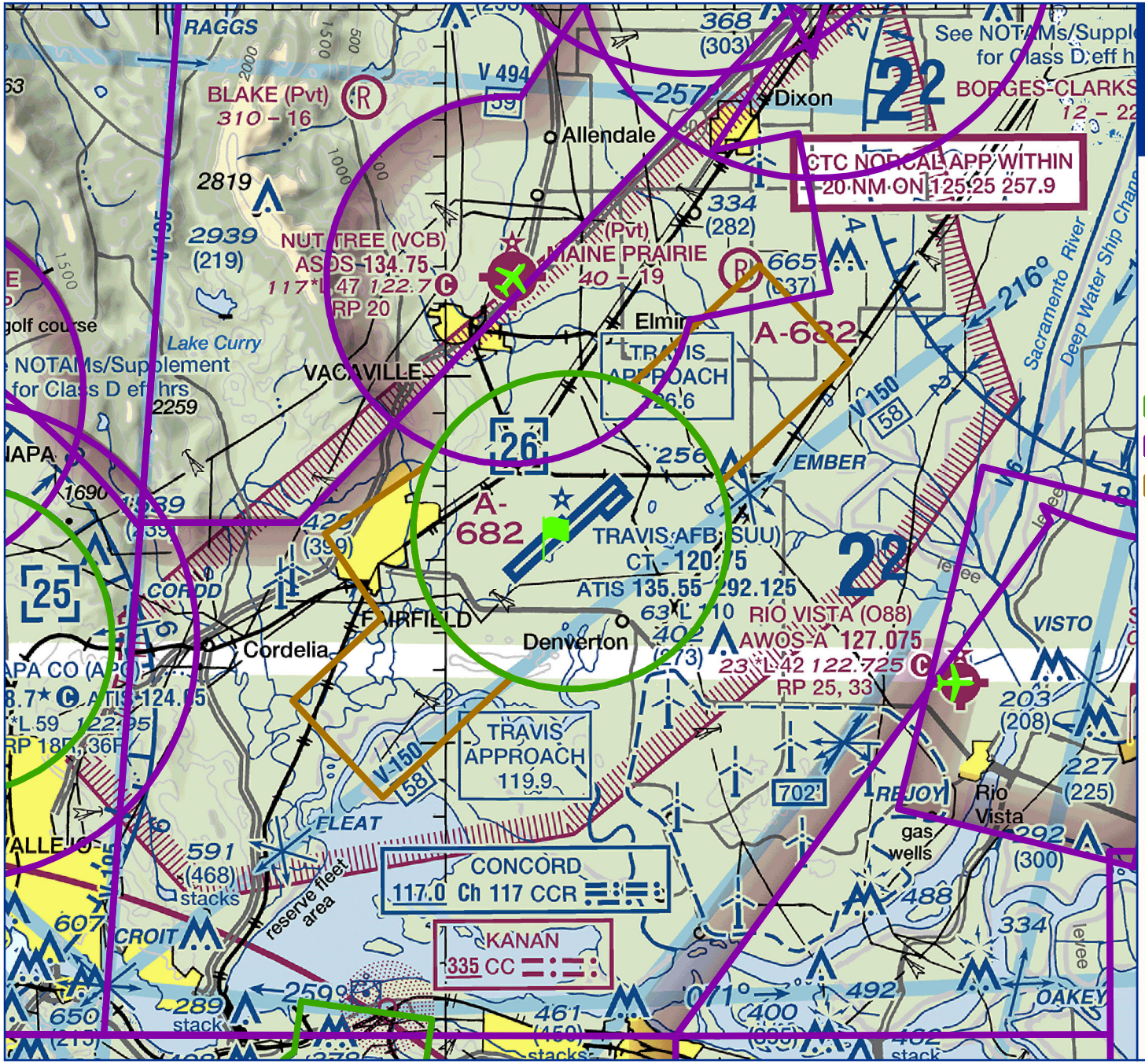


Figure 3-11

Travis AFB Mission Footprint: Airspace Control

Legend

- Travis AFB
- Nut Tree Airport
- Rio Vista Municipal Airport
- Class D Air Space
  Surface to 2600 ft AGL
- Class E Airspace
  700 ft AGL to FL 180
- Class E Airspace
  Floor to FL 180

Source: Federal Aviation Administration (FAA) San Francisco Sectional 98, March 2017. FAA, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

0 1 2 Miles

Matrix DESIGN GROUP

Part 77 Vertical Obstruction Compliance

The Federal Aviation Act was enacted in 1958 to provide methods for overseeing and regulating civilian and military use of airspace over the United States. It requires the Secretary of Transportation to make long-range plans that formulate policy for the orderly development and use of navigable airspace. The intent is to serve the needs of both civilian aeronautics and national defense, but it does not specifically address the needs of military agencies. The Federal Aviation Administration (FAA) was created as a result of the Act for a variety of purposes, including the management of airspace over the US.

The 500-foot rule, promulgated by the FAA, states that every citizen of the United States has "a public right of freedom of transit in air commerce through the navigable air space of the United States." The rule was formally announced in the 1963 Court of Claims ruling in Aaron v. United States and declares that flights 500 feet or more Above Ground Level (AGL) do not represent a compensable taking because they enjoy a free right-of-passage without liability to the owners below.

Another important outcome of the Act is Federal Aviation Regulation Title 14 Part 77, commonly known as Part 77, which provides the basis for evaluation of vertical obstruction compatibility. This regulation provides information to evaluate the potential for a vertical obstruction based on the elevation of the airfield, the height and resulting elevation of the new structure or facility, and the location of the structure or facility relative to the airfield in question. This regulation determines compatibility based on the height of proposed structures or natural features relative to their distance from the ends of a runway. Using a distance formula from this regulation, local jurisdictions can easily assess the height restrictions near airfields. Additional information on Part 77 is located on the FAA website at http://www.faa.gov/.

As of January 29, 2013, the main focus of Part 77.17 is to establish standards to determine obstructions within navigable airspace, typically within a certain distance from an airport or airfield. It defines an obstruction to air navigation as an object that is of greater height than any of several measures. A key reference used for compatibility planning is the following:

> *A height that is 200 feet AGL or above the established airport elevation, whichever is higher, and within three nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length is considered a vertical obstruction. This height increases in the proportion of 100 feet for each additional nautical mile of distance from the airport up to a maximum of 499 feet.*

Figure 3-12 provides an illustration of this measure of vertical obstruction around Travis AFB. Note that this is in addition to, not a replacement of, imaginary surface discussed previously.

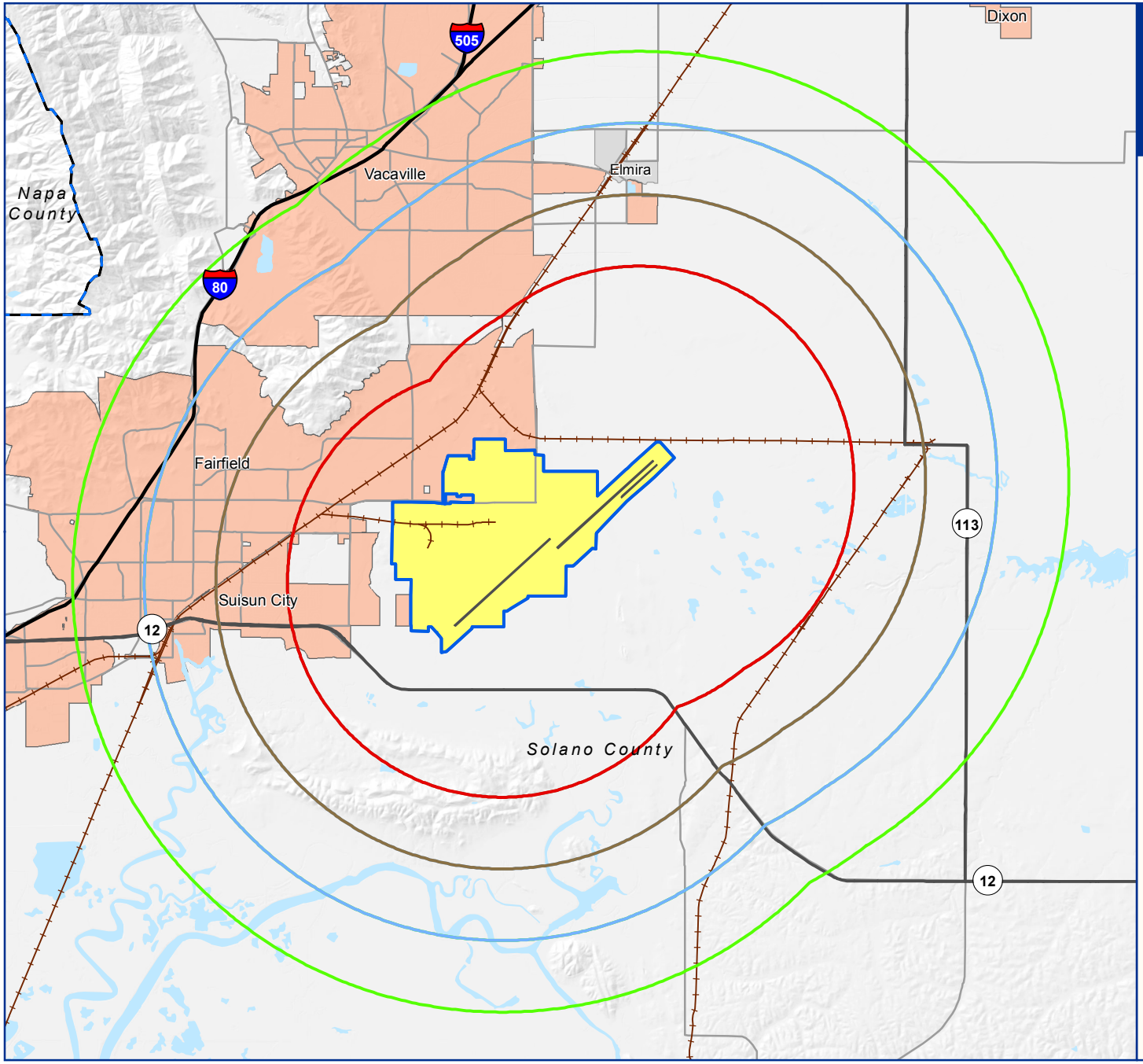


Figure 3-12

Travis AFB Mission Footprint: Part 77 Compliance

Legend

- Up to 200' @ 3NM
- Up to 300' @ 4NM
- Up to 400' @ 5NM
- Up to 500' @ 6NM
- Travis AFB
- Runway
- Solano County
- County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Railroad
- Waterbody

Source: Matrix Design Group, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

Bird / Wildlife Aircraft Strike Hazard Relevancy Area

Birds and animals can present a significant hazard to military flight operations. While fatal accidents resulting from bird or wildlife strikes have been limited, impacts can be a safety concern and cause significant damage to aircraft. At Travis AFB, 232 bird strikes occurred from 2007 to 2015, causing over $870,000 in damage to aircraft.

Certain types of land uses attract birds and wildlife, such as open water areas, standing water, and other natural areas. The location of Travis AFB near several marshes, parks, golf courses, and landfill facilities create potential bird / wildlife hazards. Additionally, agricultural activities and open space surrounding Travis AFB can also attract birds and potential hazards.

A Bird / Wildlife Aircraft Strike Hazard (BASH) program has already been adopted by Travis AFB to reduce the impact of birds on aircraft operations. Figure 3-13 shows a five-mile radius around the Travis AFB airport operations area. Based on FAA statistical analysis, this is the primary area of concern for BASH incidents to occur, and the primary focus of compatibility planning for this issue.

Source: Bird/Wildlife Aircraft Strike Hazard (BASH) Reduction Program, 2008

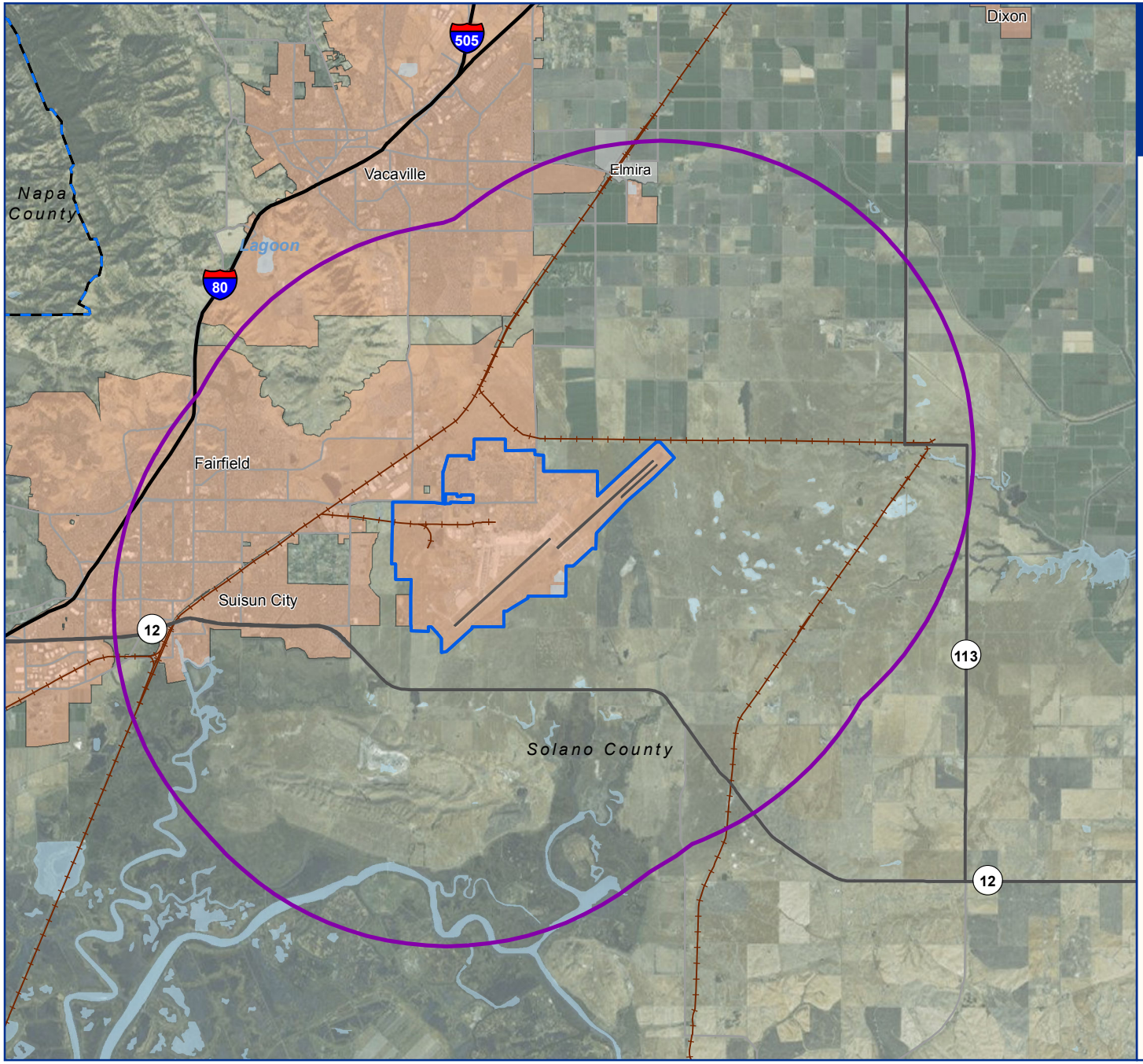


Figure 3-13

Travis AFB Mission Footprint: BASH Relevancy Area

Legend

- 5-mile BASH Relevancy Area
- Travis AFB
- Runway
- Solano County
- County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Railroad
- Waterbody

Source: Matrix Design Group, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

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Existing Compatibility Tools 4

Inside Chapter 4...

There are many existing tools that can be used to encourage, promote, and manage compatibility between military installations and their neighboring communities. This chapter provides an overview of compatibility tools currently used or applied in evaluating and addressing compatibility issues in the Travis Air Force Base (AFB) Sustainability Study (TSS) area. It includes an overview of key plans and programs that impact compatibility planning organized by level of government.

There are three types of planning tools evaluated relative to their applicability: permanent, semi-permanent, and conditional. Permanent planning tools include acquisition programs, either fee simple purchase of property or the purchase of development rights. Semi-permanent tools include regulations such as zoning or adopted legislation. Conditional tools include memorandums of understanding, intergovernmental agreements, and other policy documents such as general plans that can be periodically modified. This review is meant to provide an overview of applicable planning tools and determine how each may apply to compatibility issues identified by the TSS process, as presented under the compatibility factors discussed in Chapter 5, Compatibility Assessment.

The tools listed in this chapter are not exhaustive but are meant to provide a general overview of the primary tools currently utilized in the TSS Study Area. The overview of plans and programs is organized by level of government in the following order:

- *Federal Programs and Policies*
- *State of California Legislation*
- *State of California Plans and Programs*
- *State of California Departments*
- *Local Jurisdiction Planning Tools*
- *Solano County*
- *City of Fairfield*
- *Suisun City*
- *City of Vacaville*
- *City of Vallejo*
- *Other Tools and References*

4.1 Federal Programs and Policies

Federal policy, laws, and programs have evolved to impact almost every aspect of land use. This is particularly true in metropolitan areas that host major military facilities like Travis AFB. A broad range of federal plans, programs, and actions impact Travis AFB both directly and indirectly. However, depending on the subject area, opportunities for vertical integration and cross jurisdictional collaboration vary widely. Federal programs and policies are carried out by the various arms of the federal government, although, in some cases these tools also authorize state, county, regional or local governmental agencies to implement related policies, programs and regulations. The following federal programs and policies were evaluated to assist in determining where areas of improvement could enable better land use compatibility planning at the local level.

The following does not attempt to provide an exhaustive accounting of every relevant Federal law or program, but simply attempts to capture those considered to be most relevant to the assessment of compatibility issues and to the potential strategies stakeholders might employ to avoid or mitigate conflicts.

The federal plans and programs that are included in this section are:

- Air Force Instruction 90-2001
- Clean Air Act
- Clean Water Act
- Comprehensive Environmental Response, Compensation, and Liability Act
- Department of Defense Conservation Partnering Initiative
- DOD Energy Siting Clearinghouse
- DOD Operational Noise Manual
- Department of Housing and Urban Development Noise Regulation
- Endangered Species Act
- Federal Land Management and Policy Act of 1976
- Federal Aviation Act
- National Environmental Policy Act
- National Pollutant Discharge Elimination System
- Noise Control Act of 1972
- National Historic Preservation Act of 1966
- Partners in Flight Program
- Safe Drinking Water Act
- The Sikes Act
- Telecommunications Act of 1996 and the Federal Communications Commission
- US Avian Hazard Advisory System

Air Force Instruction 90-2001

Air Force Instruction 90-2001 was published in September 2014 to implement the Encroachment Management Program. The Instruction applies to all Air Force installations to address encroachment issues and prevent or reduce the impacts of encroachment. The Instruction includes Encroachment Management Framework, which has four elements (Organize, Assess, Act, and Monitor) to address the variety of challenges. Organization involves leadership involvement, a cross-functional management structure, an issue evaluation structure, a designated Executive Director at the installation level, and a geographic scope. Assessment includes studying internal and external relationships and developing encroachment studies, such as an Installation Complex Encroachment Management Action Plan (ICEMAP). Action involves implementation of programs. Lastly, monitoring involves maintaining awareness of mission needs and encroachment issues.

Travis AFB has an ICEMAP, but it was not available for review during the writing of this JLUS.

Clean Air Act

The US Clean Air Act empowers the Environmental Protection Agency (EPA) and state environmental agencies to regulate pollution. The Clean Air Act provides for the EPA and state regulatory agencies to establish heightened air quality regulations in counties designated by the EPA as nonattainment for air quality. A map of these counties is available at http://www.epa.gov/oaqps001/greenbk/mapnpoll.html. A portion of Solano County is located within the Bay Area Air Quality District, which is designated as nonattainment for ozone and particulate matter, two of the National Ambient Air Quality Standards pollutants as recognized by the EPA. These could have some effect on Base operations although it is not of regional use.

Compliance with the CAA is a high priority for Travis AFB and the surrounding communities. Continued designation of nonattainment could require Travis AFB and the surrounding communities to continue to pursue more efficient equipment and operating procedures to reduce air emissions.

Clean Water Act

The Clean Water Act (CWA) governs the management of water resources and controls and monitors water pollution in the US. The CWA establishes goals for eliminating the release of toxic substances and other sources of water pollution to ensure that surface waters meet high quality standards. In so doing the CWA prevents the contamination of nearshore, underground and surface water sources.

The CWA is relevant to Travis AFB because of its proximity to the Suisun Marsh and Suisun Bay. The conservation and protection of water resources is critical to sustaining current and future mission activities.

Comprehensive Environmental Response, Compensation, and Liability Act

This law was designed to assist in the clean-up of sites with hazardous contaminants to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. The Comprehensive Environmental Response, Compensation, and Liability Act:

- established prohibitions and requirements concerning closed and abandoned hazardous waste sites,
- provided for liability of persons responsible for releases of hazardous waste at these sites, and
- established a trust fund to provide for cleanup when no responsible party could be identified.

The Comprehensive Environmental Response, Compensation, and Liability Act has relevance as a potential TSS tool through the Superfund environmental program, established to address hazardous waste sites. Hazardous waste is sometimes present in or around military installations, particularly where airfields are located, and munitions and ordnance are stored and used for training purposes, and if not disposed of properly could be potentially harmful to the installation tenants and surrounding communities. While the Superfund cleanup process may be complex, it protects communities and the environment from further contamination.

Department of Defense Conservation Partnering Initiative

In 2003, Congress amended Title 10 U.S.C. §2684a and §2692a (P.L. 107-314), the National Defense Authorization Act, to add authority to the Department of Defense (DOD) to partner with other federal agencies, states, local governments, and conservation-based Non-Governmental Organizations (NGOs) to set aside lands near military bases for conservation

purposes and to prevent incompatible development from encroaching on, and interfering with, military missions.

This law provides an additional tool to support smart planning, conservation, and environmental stewardship on and off military installations. The purpose of the program is to acquire real property interests, such as conservation easements or development rights to address current and potential encroachment or compatibility threats to an installation's mission.

DOD Readiness and Environmental Protection Integration

To implement the authority provided by the Department of Defense Conservation Partnering Initiative, the DOD established the Readiness and Environmental Protection Integration (REPI). This initiative enables the DOD to work with state and local governments, NGOs, and willing landowners to limit encroachment and incompatible land use.

REPI funds are used to support a variety of DOD partnerships that promote compatible land use. By relieving encroachment pressures, the military can test and train in a more effective and efficient manner. By preserving the land surrounding military installations, habitats for plant and animal species are conserved and protected.

It is important for Travis AFB to ensure that military activities are not encroached upon by incompatible land uses. The REPI gives local agencies an opportunity to partner with the military and other local agencies. This will allow for buffers around the Base to be established to help further protect its mission.

DOD Energy Siting Clearinghouse

Section 358 of the 2011 National Defense Authorization Act authorized the study of the effects of new construction and obstructions on military installations and operations. The Energy Siting Clearinghouse serves to coordinate the DOD review of existing applications for energy projects.

Several key elements of Section 358 include designation of a senior official and lead organization to conduct the review of energy project applications, a specific timeframe for completion of a hazard assessment associated with an application (30 days), specific criteria for DOD objections to projects and a requirement to provide an annual status report to Congress. This legislation facilitates procedural certainty and a predictable process that promotes compatibility between energy independence and military capability. The Siting Clearinghouse also conducts a Mission Compatibility Evaluation Process that provides a timely, transparent, and science-based analysis to identify the mission impacts from energy development projects. This assists in preventing, minimizing, or mitigating adverse impacts on military readiness and operations, including test and evaluation activities.

DOD Operational Noise Manual

The Operational Noise Manual provides a practical reference for military and civilian personnel with duties and responsibilities in operational noise management. The manual assists personnel to understand and implement current DOD environmental policy and guidance. Much of the manual is devoted to the following subjects: Characteristics of Sound; Effects of Noise; Military Noise Sources; Noise Monitoring; Reduction of Noise Conflicts and more.

Department of Housing and Urban Development Noise Regulation

The United States Department of Housing and Urban Development (HUD) has instituted policies through section 24 Code of Federal Regulations (CFR) Part 51 that are designed to promote the creation of controls and standards for community noise abatement by state and local governments. The focus of these regulations is to reduce noise levels within residential developments funded by HUD. Included among the various policies are:

1. a requirement that noise exposure and sources of noise be given adequate consideration as an integral part of urban environment in connection with all HUD programs, which provide financial support to planning;
2. a withholding of HUD assistance for the construction of new dwelling units on sites (which have or are projected to have unacceptable noise exposure), or are in runway Clear Zones or incompatible uses in Accident Potential Zones;
3. encouragement of modernization efforts for existing buildings in noise environments; and
4. grants and allowances to state and local governments to provide acoustical privacy in multifamily dwellings through building design and acoustical treatment.

Generally, external noise exposure within Noise Zone 3 (as identified in an installation's Air Installation Compatible Use Zone [AICUZ] Study) is considered unacceptable without exception and within Noise Zone 2 exposure is normally unacceptable with respect to new construction. HUD funds may also be available to encourage noise abatement planning and acoustical treatment for proposed and existing incompatible land uses within the AICUZ.

Residential construction may be permitted within certain noise contours, provided sound attenuation is accomplished. The added construction expense of sound attenuation, however, may make siting in these noise exposure areas financially less attractive. Because the HUD policy is discretionary, variances may also be permitted, depending on regional interpretation and local conditions. HUD also has a policy (24 CFR 51D) that prohibits funding for projects in runway Clear Zones and Accident Potential Zones, unless the project is compatible with any applicable AICUZ recommendations.

Endangered Species Act

The Endangered Species Act (ESA) establishes a program for the conservation of threatened and endangered plants and animals and their habitats. The US Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) are the lead implementing agencies of the ESA. The ESA requires federal agencies, in consultation with the USFWS and/or the NOAA Fisheries Service, to ensure that actions they "authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species." The law also prohibits any action that causes a taking of any listed species of endangered fish or wildlife. ESA provides a platform for the protection of critical habitat and species that may be at risk of extinction.

Section 7 of the ESA, called Interagency Cooperation, provides the mechanism to ensure that actions taken by federal agencies do not jeopardize the existence of any listed species. As required by Section 7, federal agencies must consult with the USFWS when any action the agency funds, authorizes, or carries out may affect a listed endangered or threatened species. Section 7 consultation is the main way that federal agencies manage takings of species or impacts to critical habitat.

The ESA prohibits the "take" of listed species through direct harm or habitat destruction. In the 1982 ESA amendments, Congress authorized the USFWS (through the Secretary of the Interior) to issue permits for the "incidental take" of endangered and threatened wildlife species (Section 10a (1)(B) of the ESA). Thus, permit holders can proceed with an activity that is legal in all other respects, but may result in the "incidental" taking of a listed species.

There is a variety of permits for the removal of an endangered or threatened species (incidental take permits, enhancement of survival permits, and recovery and interstate commerce permits). Each type of permit has a number of prerequisites.

Incidental take permits are required when non-federal activities will result in take of threatened or endangered species. A habitat conservation plan (HCP) must accompany an application for an incidental take permit. The HCP associated with the permit ensures that the effects of the authorized incidental take are adequately minimized and mitigated. The 1982 amendment requires that permit applicants design, implement, and secure funding for the HCP that minimizes and mitigates harm to the impacted species during the proposed project. HCPs are legally binding agreements between the Secretary of the Interior and the permit holder.

Enhancement of survival permits are issued to non-federal landowners participating in Safe Harbor Agreements or Candidate Conservation Agreements with Assurances. These agreements encourage landowners to take actions to benefit species while also providing assurances that they will not be subject to additional regulatory restrictions as a result of their conservation actions.

Recovery and interstate commerce permits are issued to allow for take as part of activities intended to foster the recovery of listed species. A typical use of a recovery permit is to allow for scientific research on a listed species to understand better the species' long-term survival needs. Interstate commerce permits also allow transport and sale of listed species across state lines (e.g., for purposes such as a breeding program).

However, because some species listed are subject to the Migratory Bird Treaty Act, it is illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. The migratory bird species protected by the Migratory Bird Treaty Act are listed in 50 CFR 10.13.

As authorized by the Migratory Bird Treaty Act, USFWS issues permits to qualified applicants for the following types of activities: falconry, raptor propagation, scientific collecting, special purposes (rehabilitation, educational, migratory game bird propagation, and salvage), take of depredating birds, taxidermy, and waterfowl sale and disposal. Migratory bird permit policy is developed by the Division of Migratory Bird Management and the permits themselves are issued by the Regional Bird Permit Offices. The regulations governing migratory bird permits can be found in 50 CFR part 13 (General Permit Procedures) and 50 CFR Part 21 (Migratory Bird Permits).

Recovery Credit System

The Recovery Credit System (RCS) program was created by the USFWS. An RCS is an optional tool available to federal agencies to promote and enhance the recovery of listed species on non-federal lands. Using RCSs, federal agencies can more clearly show how benefits accrued on non-federal lands offset unavoidable effects of federal actions elsewhere. However, in an RCS, the combined effects of both adverse and beneficial actions must achieve a net benefit to the recovery of the species.

A recovery credit is a unit of measure established by an RCS that quantifies the contribution that an agency's action makes toward the recovery of a listed species. Credits are based on, and linked with, the implementation of specific conservation measures identified in a species' approved recovery plan. If there is no final approved recovery plan, an RCS may employ an equivalent service-approved document that describes specific measures that will contribute to the downlisting or delisting of endangered or threatened species.

The RCS program is a new program, which has thus far only been implemented at one military facility in central Texas. In this case, the RCS is comprised of leases for a term ranging from 5 to 25 years. Landowners are provided confidentiality and, therefore, no public comment is allowed on

the merits of RCS credits for particular tracts. Also, the leases may be organized in terms of repayment schedules and a penalty clause. In a rapidly growing region, temporary leases may not be suitable if the intent is to execute conservation requirements. Traditional conservation easements (which are not revocable and run in perpetuity) may be a more preferable approach.

Federal Land Management and Policy Act of 1976

The Federal Land Management and Policy Act (FLPMA) established the authority for public agencies that possess public lands to manage and plan according to national and local interests. The law mandates that public lands identified for development shall uphold and protect the scientific, scenic, historical, ecological, environmental, and other values unique to specific geographies. This law provides the impetus for the various resource management plans developed and prepared for public agencies.

Federal Aviation Act

The Federal Aviation Act was enacted in 1958 to provide methods for overseeing and regulating civilian and military use of airspace over the United States. The Act requires the Secretary of Transportation to make long-range plans that formulate policy for the orderly development and use of navigable air space. The intent is to serve the needs of both civilian aeronautics and national defense, but does not specifically address the needs of military agencies. Military planning strives to work alongside local, state, and federal aviation law and policies but sometimes must supersede these and other levels of government due to national security interests. The Federal Aviation Administration (FAA) was created as a result of the Act for a variety of purposes, including the management of airspace over the US.

The 500-foot rule, promulgated by the FAA, states that every citizen of the United States has "a public right of freedom of transit in air commerce through the navigable air space of the United States." The rule was formally announced in the 1963 Court of Claims ruling in *Aaron v. United States* and states that flights 500 feet or more above ground level (AGL) do not represent a compensable taking because flights 500 feet AGL enjoy a right of free passage without liability to the owners below.

Another important outcome of the Act is FAA Regulation Title 14 Part 77, commonly known as Part 77, which provides the basis for evaluation of vertical obstruction compatibility. This regulation determines compatibility based on the height of proposed structures or natural features relative to their distance from the ends of a runway. Using a distance formula from this regulation, local jurisdictions can easily assess the height restrictions near airfields. Additional information on Part 77 is located on the FAA Internet site at http://www.faa.gov/.

As of January 29, 2013, the main focus of Part 77.17 is to establish standards to determine obstructions within navigable airspace, typically within a certain distance from an airport or airfield. It defines an obstruction to air navigation as an object that is of greater height than any of the following heights or surfaces in the following manner:

- A height of 499 feet AGL at the site of the object.
- A height that is 200 feet AGL or above the established airport elevation, whichever is higher, within 3 nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length. This height increases in the proportion of 100 feet for each additional nautical mile of distance from the airport up to a maximum of 499 feet.
- A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, which would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance.

- A height within an en route obstacle clearance area, including turn and termination areas, of a federal airway or approved off-airway route, that would increase the minimum obstacle clearance altitude.
- The surface of a takeoff and landing area of a civilian airport or any imaginary surface established under 77.19, Department of Defense (DOD): 77.21, and heliports: 77.2. However, no part of the takeoff or landing area itself will be considered an obstruction.
- Except for traverse ways on or near an airport with an operative ground traffic control service furnished by an airport traffic control tower or by the airport management and coordinated with the air traffic control service, the standards of paragraph (a) of this section apply to traverse ways used or to be used for the passage of mobile objects only after the heights of these traverse ways are increased by:
    - 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance.
    - 15 feet for any other public roadway.
    - 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road.
    - 23 feet for a railroad.
    - For a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it.

The FAA has identified certain imaginary surfaces around runways to determine how structures and facilities are evaluated and identify if they pose a vertical obstruction relative to the airspace around a runway. The levels of imaginary surfaces build upon one another and are designed to eliminate obstructions to air navigation and operations, either natural or man-made. The dimension or size of an imaginary surface depends on the runway classification.

Federal Aviation Administration Order JO 7110.65T

The FAA Order JO 7110.65T became effective in February 2010 and set the provisions for the safe fuel jettisoning or dumping for aircraft. This order established rules for pilots operating in IFR and VFR conditions to dump fuel in certain situations such as emergency situations. This order delineates the means for which fuel dumping should safely occur. This is in response to ensure the safety of the general welfare of the public and the structural integrity of the aircraft during landing operations.

Federal Aviation Administration Modernization and Reform Act of 2012

The FAA Modernization and Reform Act of 2012 established rules for the recreational use of model aircraft, which includes civilian use of UAVs. Under these rules, civilian UAVs are limited to 55 pounds and must be operated to ensure they do not interfere with any manned aircraft. It also established that if the UAV is flown within five miles of an airport, the operator must notify the airport operator and the air traffic control tower; however, the operator does not need approval from the air traffic control tower. The operator must also maintain visual line-of-sight with the UAV.

Federal Aviation Administration Small Unmanned Aircraft Rule

Operational rules for use of commercial UAVs were put into effect by the FAA on August 29, 2016. The rule, 14 CFR Part 107, provides operating requirements, including maintaining a visual line-of-sight and getting approval from the air traffic control tower before operating in Class B, C, D, and E airspace. It also sets operational limitations, including a weight limit of 55 pounds, speed limit of 100 miles per hour, and height limit of 400 feet. Recreational UAVs do not require certification and the rules do not apply to model aircraft.

Part 107 also establishes pilot certification and responsibilities, requiring either a certified UAV pilot, or the supervision of a certified UAV pilot, to operate a UAV. To qualify for a remote pilot certificate, a person must:

- *Demonstrate aeronautical knowledge by either:*
  - *Passing an initial aeronautical knowledge test at an FAA-approved knowledge testing center; or*
  - *Hold a Part 61 pilot certificate other than student pilot, complete a flight review within the previous 24 months, and complete a small UAV online training course provided by the FAA.*
- *Be vetted by the Transportation Security Administration.*
- *Be at least 16 years old.*

Federal Aviation Administration Traditional Aircraft Registration

In December 2015, under 14 CFR Part 47, the FAA established an Unmanned Aerial Vehicle (UAV) registry, requiring anyone who owns a small UAV, weighing between 0.55 and 55 pounds to register it with the FAA before operating it. People who do not register could face civil and criminal penalties. The maximum civil penalty is a fine of up to $27,500, with criminal penalties reaching $250,000 or three years in prison, determined by the FAA. However, the FAA lacks the resources to enforce the rule, so it depends on local law enforcement to help stop unauthorized use of UAVs.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 is a federal law establishing a US national policy to promote the protection and enhancement of the environment and requiring federal agencies to analyze and consider the potential environmental impact of their actions. The purpose of NEPA is to promote informed decision-making by federal agencies by making detailed information concerning significant environmental impacts available to both agency leaders and the public.

All projects receiving federal funding, requiring a federal permit, or occurring on federal property require NEPA compliance and documentation. NEPA is applicable to all federal agencies, including the military. Not all federal actions require a full Environmental Impact Statement (EIS). In some cases, an action may not cause a significant impact, whereby an agency is only required to prepare an Environmental Assessment (EA).

A NEPA document can serve as a valuable planning tool for local planning officials. An EA or EIS can assist in the determination of potential impacts that may result from changing military actions or operations and their effect on municipal policies, plans and programs, and the surrounding community. Public hearings are required for all EIS documents released under NEPA. NEPA requires publishing a draft EA and subsequent Finding of No Significant Impact (FONSI) and allowing public comment for a period of 30 days. An EA may result in a FONSI or Record of Decision concluding that the action will have a significant impact and an EIS is required. The information obtained by the EA / EIS is valuable in planning coordination and policy formation at the local government level.

NEPA mandates that the military analyze the impact of its actions and operations on the environment, including surrounding civilian communities. Inherent in this analysis is an exploration of methods to reduce any adverse environmental impact. The EIS is a public process that welcomes participation by the community.

National Pollutant Discharge Elimination System

Pursuant to the CWA, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into US waters. Point sources are discrete conveyances such as pipes or man-made ditches. According to the law,

individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need a NPDES permit, but industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters.

Noise Control Act of 1972

The Noise Control Act of 1972 identified that noise not adequately controlled has the potential of endangering the health and welfare of people. It states that all Americans are entitled to an environment free from noise that can jeopardize their general health and quality of life. Along with state, local, and territorial governments, actions from the federal government were needed to ensure that the objectives of the Act were met.

Concurrently, military installations were experiencing the impacts from encroaching urban development located adjacent to the installation and the resulting complaints regarding noise from military flight operations. In 1973, the DOD responded by establishing the AICUZ program.

The Noise Control Act and the AICUZ program are important because encroaching development and increased population near military installations often creates compatibility concerns. As communities grow, it is important that the military installation, developers, and the communities work together to mitigate the issue of noise and develop ways to coexist compatibly.

National Historic Preservation Act of 1966

The National Historic Preservation Act (NHPA) of 1966 requires federal agencies to consider the effects of a proposed project on properties listed in, or eligible for listing in, the National Register of Historic Places. Because no specific action is being proposed as part of this planning process, the review of cultural resources is focused on the identification of existing resources and not potential effects that would result from a specific proposed action.

Partners in Flight Program

The DOD has implemented a program entitled Partners in Flight that sustains and enhances the military testing, training, and safety mission through habitat-based management strategies. The program assists natural resource managers in monitoring, inventory, research, and management of birds and their habitats. As part of the Partners in Flight program, a strategic plan is created that can be incorporated into a Bird/Wildlife Aircraft Strike Hazard (BASH) plan. This program reaches beyond the boundaries of the installation to facilitate community partnerships and determine the current status of bird populations to prevent the further endangerment of birds.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) is the main federal law that ensures the quality of drinking water in the United States. The SDWA authorizes the EPA to set national health-based drinking water standards to protect against both naturally-occurring and man-made water contaminants. The SDWA applies to every public water system in the US.

The Sikes Act

The Sikes Act requires the DOD to develop and implement Integrated Natural Resources Management Plans (INRMPs) for military installations. The INRMPs are prepared in cooperation with the USFWS and state fish and wildlife agencies to ensure proper consideration of fish, wildlife, and habitat needs. The Sikes Act requires INRMPs to be reviewed at least every five years by the military and the states. Air Force Instruction 32-7064, Integrated Natural Resources Management, guides the Air Force implementation of the Sikes Act.

Telecommunications Act of 1996 and the Federal Communications Commission

The Telecommunications Act of 1996 was the first comprehensive update to federal telecommunication law in over six decades and was in large part intended to open up the marketplace to greater competition. Changes in the means through which information is produced, accessed, stored and shared made the federal government response imperative. The increasing use and development of personal mobile phones, satellite transmission, high speed fiber optics, and other related factors are often pushing demand beyond the system capacity.

New telecommunication tower siting requires compliance with the Federal Communications Commission's (FCC) environmental review standards and procedures, including NEPA and ESA compliance, National Historic Preservation Act compliance, adherence to any applicable FAA requirements, and structure registration with the FCC. The actual approval of physical installations is subject to state and local permits and approvals; however, state and local authority is limited by FCC law. For instance, states and local jurisdictions cannot base their decisions on any purported environmental effects of radio frequency transmissions.

Telecommunications towers have the potential to cause vertical obstruction issues near Travis AFB. Requirements for tower placement can help to reduce potential incompatibility.

US Avian Hazard Advisory System

The US Avian Hazard Advisory System (USAHAS) is a geographic information system-based bird avoidance model developed by the US Air Force used for "analysis and correlation of bird habitat, migration, and breeding characteristics, combined with key environmental and man-made geospatial data." The model provides up-to-date information – "near real-time" – about bird activity and movements to assist pilots and flight planners in the scheduling and use of flight routes. The model can also be used as a forecasting tool to estimate bird strike risk. Information from the North American Breeding Bird Survey, Audubon Christmas Bird Count, bird refuge databases, and the US Air Force Bird-Aircraft Strike database as well as public domain information regarding landfill locations is used to formulate the bird activity and movement data. The model is available for use by agencies and the general public, accessible from the USAHAS website at http://www.usahas.com/.

4.2 Travis AFB Plans and Programs

The Travis AFB plans and programs are the specific, existing tools that the installation, in collaboration with the Department of the Air Force, has developed to implement various federal statutes. These plans may be modified based on mission changes or requirements and funding availability, so they are considered semi-permanent programs.

The Travis AFB plans and programs that are included in this section are:

- Air Installation Compatible Use Zone Study
- Bird / Wildlife Aircraft Strike Hazard Plan
- Integrated Natural Resources Management Plan
- Integrated Cultural Resources Management Plan
- Installation Development Plan

Air Installation Compatible Use Zone Study

The Air Installation Compatible Use Zone (AICUZ) program was created by the DOD in 1973 to address noise and safety hazards associated with aviation operations. The AICUZ program provides guidance to minimize impacts from aviation operations (noise and accidents) through specific attention to development and land uses. The AICUZ framework evaluates noise from military aircraft and applies the concept of clear zones / accident potential zones, with corresponding recommended development / building densities and intensities designed to encourage compatibility between military operations and communities.

The primary elements of the AICUZ are:

- **Health, Safety, and Welfare.** These elements seek to reduce the nuisance of excessive noise generated by aircraft operations and public danger by discouraging the development of incompatible land uses such as businesses and housing in Accident Potential Zones.
- **Public Investment.** Promoting compatibility between a military installation and local communities safeguards military operations and protects the public's investment in the installation.
- **Public Awareness and Communication.** By working with the community and informing local citizens of operations and safety measures, the military can promote safety for community residents. As local leaders work with military officials to adopt compatible development practices, their relationship is strengthened through the resolution of mutual concerns.

Noise Zone Profile

Noise is the cornerstone of the AICUZ Study. The noise generated by military aircraft operations and the effects of that noise on local communities are presented in a variety of ways in the study (e.g., written text, graphically, etc.). To fully appreciate the findings and recommendations presented in the AICUZ Study, it is beneficial to provide an understanding of how military aircraft noise is measured, evaluated, and graphically illustrated. Day night average sound level (DNL) is a measure of noise commonly used at military installations. The DNL averages the noise levels of all aircraft operations that occur within a 24-hour period. In California, the term Community Noise Equivalent Level (CNEL) is used. CNEL is a weighted average of noise level over time. CNEL is the average sound level over a 24-hour period, with a penalty of 5 dB added between 7:00 p.m. and 10:00 p.m. and a penalty of 10 dB added for the nighttime hours of 10:00 p.m. to 7:00 a.m. The main sources of noise at airfields are flight operations, which include take-offs, landings, and touch-and-go operations, and engine maintenance run-ups. The Air Force considers how its operations impact the local community by calculating the CNEL. The CNEL is depicted as a contour around a noise source connecting points of equal value, usually in 5 decibel increments.

Accident Potential Zones

As part of the AICUZ program, and to aid in land use planning surrounding military bases, the DOD established Accident Potential Zones (APZs). These are made up of Clear Zones (CZ), Accident Potential Zone I (APZ I), and Accident Potential Zone II (APZ II). These zones are determined using a historical and statistical analysis of all DOD aircraft accidents.

APZs typically follow departure, arrival, and pattern flight tracks. The CZ is a square area that extends directly beyond the end of the runway and outward along the extended runway center line.

Height Obstructions

To prevent man-made structures from creating an obstruction that could prevent aircraft from accessing airports or otherwise impact the safety of air navigation, the AICUZ Study provides an overview of height restrictions surrounding Travis AFB. Runway airspace imaginary surfaces are the result of the application of obstruction height criteria to Travis AFB airfield.

The 2009 Travis AFB AICUZ Study is an update to the previous Travis AFB AICUZ Study completed in 1995. It presents a description of the current noise environment around Travis AFB. It reaffirms the Air Force policy of promoting public health, safety, and general welfare in areas near Air Force installations. This study identifies changes in flight operations that have occurred since the 1995 study and provides current noise zones and compatible use guidelines for land areas adjacent to the installation. It is provided as a tool to assist local communities in future planning and zoning activities. Changes that required an update of the AICUZ Study included:

- The basing of C-17 aircraft and the addition of associated operations;
- The retirement of the C-141 aircraft and the elimination of related operations;
- The reduction in the number of C-5 aircraft and associated operations;
- A decrease in the number of based aircraft operations;
- The addition of Assault Landing Zone operations by C-17 and C-130 aircraft;
- The addition, elimination, and modification of aircraft flight tracks to correspond with changes in flying operations; and
- Technical improvements to the NOISEMAP program.

Bird / Wildlife Aircraft Strike Hazard Plan

Travis AFB maintains a Bird / Wildlife Aircraft Strike Hazard (BASH) Plan to minimize the threat of bird strikes to aircraft and protect local wildlife. A BASH Plan is designed to minimize wildlife and bird strike damage to military aircraft by controlling birds, alerting aircrew and operations personnel, and providing increased levels of flight safety, especially during the critical phases of flight, take-off and landing operations.

Specifically, the plan has two phases, Phase I and Phase II. Phase I concentrates on wildlife control and dispersal and is in effect year-round. Phase II is used in conjunction with Phase l procedures and concentrates on wildlife avoidance, using scheduling and airfield operating restrictions. Phase II is implemented during the September through April migration period. The plan also establishes and outlines the responsibilities of the Bird Hazard Working Group that meets to review strike data and recommend actions to reduce hazards. Bird Watch Conditions are also defined, ranging from low to moderate to severe.

Integrated Natural Resources Management Plan

The policy of the DOD is to fully comply with applicable federal, state, and county laws, ordinances, regulations, and guidelines, specifically designed to protect and preserve the environment. The Sikes Act Improvement Amendments of 1997 requires that the DOD manage their natural resources while providing a sustained method for the multiple uses of those resources. The Act also requires the development of the Integrated Natural Resources Management Plan (INRMP) document. To guide natural resource management efforts on-installation, Travis AFB maintains an INRMP, most recently updated in March 2016.

The Travis AFB INRMP describes the surrounding environment and provides an assessment of the impacts to these resources as a result of mission-related activities. The INRMP directs management practices that comply with federal, state, and local standards. Additionally, it is designed to protect natural resources, mitigate negative impacts and enhance the positive effects of Travis AFB's mission on local and regional natural resources. The primary natural resources goals involve implementation of the INRMP, fish and wildlife management, wetland management, threatened and endangered species management, grazing management, and invasive species management.

Integrated Cultural Resources Management Plan

DOD Instruction 4715.3 and Air Force Instruction (AFI) 32-7065 require installations to develop an Integrated Cultural Resources Management Plan (ICRMP) as an internal compliance and management tool integrating the entirety of the cultural resources program with ongoing mission activities. The ICRMP summarizes the history of Travis AFB and reviews past historical and archaeological survey efforts. It outlines and assigns responsibilities for the management of cultural resources, discusses related concerns, and provides standard operating procedures that help preserve the cultural resources of the installation within the context of the mission.

Travis AFB last updated its ICRMP in January 2016. Goals and objectives in the ICRMP include:

- Integrate cultural resources management with future installation plans, projects, and programs and in support of military missions;
- Support the completion of an Installation Tribal Relations Plan;
- Focus on previously overlooked Cold War-era resources as these will be the resources most affected by future actions at Travis AFB; and
- Summarize and integrate all cultural resources studies including the 2013 base wide architectural survey.

Installation Development Plan

The Installation Development Plan (IDP), in accordance with AFI 32-7062, was completed in 2016 and provides a developmental path forward that incorporates current and future mission requirements, development constraints and opportunities, and recommended courses of action to achieve optimal use of lands, facilities, and resources in support of installation performance. The IDP is intended to guide future development decisions, including consolidations, new construction and realignments as mission changes occur. Five goals were established in the Travis AFB IDP to help guide development:

- Achieve a cohesive, total force mobility and contingency projection platform that accommodates all mission partners.
- Enhance existing airfield infrastructure to meet current and future mission requirements.
- Promote conservation, sustainability, and environmental stewardship.
- Protect mission capability through full-spectrum encroachment management and community partnerships.
- Foster Travis AFB quality of life through installation support and services.

Mid-Air Collision Avoidance Pamphlet

The 60th Air Mobility Wing prepared a pamphlet for general aviation pilot in the North San Francisco Bay Area to reduce the potential for mid-air collisions. The pamphlet contains contact information, a list of airspace users, an airspace description, radar limitations, tactical arrivals and departures, and useful resources. The pamphlet also provides mitigation techniques, along with hazard identification and avoidance.

4.3 State of California Legislation

California has a history of collaboration with the military; this section provides an overview of related legislation. At times, compatibility requires legislation to ensure notification, awareness, and review that are inherent in the development process. Compatible growth is related to military training and balanced growth.

Assembly Bill 1108 (2002)

California Assembly Bill (AB) 1108 (Chapter 638, Statutes of 2002) amends the California Environmental Quality Act (CEQA) to require CEQA lead agencies to notify military installations when a project meets certain criteria. The purpose of AB 1108 is to ensure military notification through the CEQA process of proposed projects that could potentially impact military operations.

AB 1108 amends CEQA to provide military agencies with early notice of proposed projects within two miles of installations or underlying training routes and special use airspace. To obtain this information, a military installation such as Travis AFB, must provide local planning agencies within the critical operations areas (COA) within the installation, contact person, the relevant information such as impact areas, and boundaries of the installation's COAs. The local lead agency is required to give notice to

military installations of any project within their boundaries if: (1) the project includes a general plan amendment; (2) the project is of statewide, regional, or area-wide significance; or (3) the project is required to be referred to the Advisory Land Use Committee or appropriately designated body. This notification provides the military installation with an opportunity for early input so potential conflicts can be evaluated and addressed proactively.

Assembly Bill 2776 (2002)

The Aviation Noise Disclosure legislation (AB 2776, Chapter 496, Statutes of 2002) amends the real estate transfer disclosure statute (California Civil Code, Division 2 – Property, Part 4 – Acquisition of Property, Title 4, Chapter 2 – Transfer of Real Property) to require sellers or lessors to disclose airport proximity if a house is within an airport influence area. An airport influence area is defined as the area in which current or future airport-related noise, overflight, safety, or airspace protection factors may significantly affect land uses or necessitate restrictions on those uses. The Travis AFB airport influence area covers all of Solano County. The intent of the legislation is to notify buyers of the potential noise, vibration, odor, annoyances, or other nuisances now or in the future as a result of the normal operation of an existing or proposed airport.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) was enacted in 1970 to protect the environment by requiring public agencies to analyze and disclose the potential environmental impacts of proposed land use decisions. CEQA is modeled after the federal National Environmental Policy Act.

The purpose of CEQA is to inform agency decision-makers and the public about the potential environmental effects of proposed activities. Using this information, decision-makers can identify ways that environmental impacts can be avoided or significantly reduced by requiring the mitigation of significant environmental effects, when feasible.

Senate Bill 1462 (2004)

SB 1462 (Chapter 906, Statutes of 2004) expanded the requirements for local governments to notify military installations of proposed development and planning activities. This statute states that "prior to action by a legislative body to adopt or substantially amend a general plan, the planning agency shall refer the proposed action to the branches of the Armed Forces when the proposed project is located within 1,000 feet of a military installation, beneath a low-level flight path, or within Special Use Airspace (SUA)..."

SB 1462 authorizes any branch of the United States Armed Forces "to request consultation" to avoid potential conflict and to discuss "alternatives, mitigation measures, and the effects of the proposed project on military installations." SB 1462 also requires military review of certain types of proposed projects that could potentially impact installation operations and missions. This allows the military the opportunity to comment on proposed development and express concerns with potential impacts on the installation.

Senate Bill 1468 (2002)

SB 1468 (Chapter 971, Statutes of 2002) requires State Office of Planning and Research (OPR) to include guidance concerning incorporating military installation compatibility into a general plan, and how a general plan should consider the impact of civilian growth on readiness activities at military bases, installations, and training areas. The statute includes the following methods to address military compatibility in a general plan:

> *"In the land use element, consider the impact of new growth on military readiness activities carried out on military bases, installations, and operating and training areas, when proposing zoning ordinances or designating land uses covered by the general plan for land or other territory adjacent to those military facilities, or underlying designated military aviation routes and airspace.*

"In the open-space element, open-space land is defined to include areas adjacent to military installations, military training routes, and restricted airspace.

"In the circulation element, include the general location and extent of existing and proposed military airports and ports."

SB 1468 is part of a state policy package to promote the development of a partnership between communities and the military to collaborate on land use compatibility issues. OPR encourages local jurisdictions near military installations, and under military training routes or restricted airspace, to incorporate these items into their general plans, but they are not currently required by law. The bill specifies that if a funding agreement is reached between OPR and the military to support these efforts, the inclusion of military compatibility issues in a general plan will become mandatory.

State Aeronautics Act

The State Aeronautics Act (Public Utilities Code, Section 21001) requires the preparation of a Land Use Compatibility Plan (LUCP) for nearly all public-use airports and military airfields in the state. In particular, it requires an Airport Land Use Commission to formulate an LUCP for military airfields with the same requirements as public use airports, consistent with the safety and noise standards found in the Air Installation Compatible Use Zone Study. The intent of an LUCP is to encourage compatibility between airports and the various communities that surround them.

In accordance with state law, Solano County has established an airport land use commission (ALUC) to prepare land use compatibility plans for the two public-use airports as well as Travis AFB, in Solano County and to review general plans, proposed changes to zoning codes and ordinances, land use actions and development projects, and airport development plans for consistency with compatibility policies. The ALUC has the authority to coordinate planning at the state, regional and local levels to provide for the orderly development of air transportation, while at the same time protecting the public health, safety, and welfare. State law does not authorize ALUCs to zone property or apply other land use controls normally exercised by local public agencies.

4.4 State of California Plans and Programs

California Advisory Handbook for Community and Military Compatibility Planning

The requirement for a compatibility handbook was reflected in Government Code §65040.9, which directed OPR to prepare "an advisory planning handbook for use by local officials, planners, and builders that explains how to reduce land use conflicts between the effects of civilian development and military readiness activities..."

The Handbook was completed in 2006 and designed to serve as a resource to help develop processes and plans that would sustain local economies, safeguard military readiness, and protect the health and safety of residents living near military bases. The handbook is a useful tool for development of the TSS as it describes in detail the different compatibility issues that should be explored and the types of compatibility tools available to address these identified issues. The handbook can be found at: http://opr.ca.gov/docs/Complete_Advisory_Handbook_2006.pdf

California Farmland Conservancy Program

The California Farmland Conservancy Program (CFCP), established in 1995, authorized by the California Code of Regulations Title 14, Division 2, Chapter 2, is a statewide grant program that supports and encourages local government agencies and eligible non-profit organizations to preserve California's leading industry: agriculture. The CFCP program enables local government agencies to preserve California's valuable land asset by placing farmland into agricultural conservation easements. The easements are essentially deed restrictions that limit development from occurring on lands

within the easement, while providing for the preservation of the natural environment either for scenic views or for commercial agriculture uses. These easements renew annually unless the landowner or the government agencies opt for non-renewal, making it a non-permanent conservation. There is no minimum number of years required to remain in the program and many do so in perpetuity; therefore, the land remains in the agriculture land use category even if the land changes ownership.

California Land Conservation Act / Williamson Act

The California Land Conservation Act, or the Williamson Act, was enacted in 1965 under Governor Pat Brown with the aim of preserving and protecting California's leading agriculture industry. The Williamson Act enables local governments to enter into contracts with private landowners for the purpose of designating certain parcels of land for only agriculture use or open space. This designation results in lower property tax assessments to landowners and a state subsidy to local governments for foregone tax revenues associated with private landowner participation. A Land Conservation Agreement (LCA) through the Williamson Act allows for reduction in tax assessment during the period of time the agreement is in effect. It continues to run but is not a permanent solution as the property owner can request termination. The LCA values the property as agriculture rather than having a speculative value included as well. Instead of automatically renewing for another year, the agreement would then terminate in 10 years (earlier if findings are made and repayment of taxes are made). An alternative option to this program is to place the land into a permanent agricultural conservation easement, in which the land will remain agricultural in perpetuity.

Source: www.conservation.ca.gov/dlrp/Pages/index.aspx

California Military Land Use Compatibility Analyst

The California Military Land Use Compatibility Analyst (CMLUCA) was developed by OPR to assist the development community and local governments in determining if a project affects military training areas and airspace. The CMLUCA is a mapping tool that identifies where a project is relative to the nearest military installation. This mapping application enables users to determine compliance with state legislation requiring the development community and local government agencies to notify the military of any project that may affect military readiness.

California Wildfire Coordinating Group

The California Wildfire Coordinating Group (CWCG) is an inter-agency group whose purpose is to strengthen coordination, communication, and cooperation for the provision of support in the event of a wildfire. The CWCG comprises various agencies that are involved in fighting wildland fires. The organizations are:

- Bureau of Indian Affairs – Pacific Region
- Bureau of Land Management
- CAL FIRE
- California Emergency Management Agency
- US Forest Service – Pacific Southwest Region
- National Park Service – Pacific West Region
- US Fish and Wildlife Service – Pacific Southwest Region
- Cooperating Fire Agencies

The CWCG operates two field offices—the Northern California office in Redding and the Southern California office in Riverside. These offices provide a multitude of services to the wildland firefighting community. Such services include:

- Fire and weather intelligence,
- Product information relative to wildland fire assessment,
- Software applications, and
- Training.

The CWCG serves as an information repository to enable efficient, quick, and effective solutions for decisions related to fighting wildfires.

The Airport Land Use Planning Handbook, Caltrans

Prepared by the Caltrans Division of Aeronautics in 2002, supports implementation of the State Aeronautics Act (California Public Utilities Code, Section 21670 et seq.), which established statewide requirements for the conduct of airport land use compatibility planning. The Handbook can be found at: www.dot.ca.gov/hq/planning/aeronaut/documents/alucp/AirportLandUsePlanningHandbook.pdf

4.5 State of California Departments

California Environmental Protection Agency

The California Environmental Protection Agency (Cal/EPA) is the agency responsible for the development and implementation of the state's environmental protection laws that provide for clean air, water, and soil and safe pesticides and waste reduction and recycling. The Cal/EPA has several financial assistance programs for both public and private entities to assist with the costs of environmental planning and development. Such programs consist of grants and loans for education and training while other financial assistance programs are loans that subsidize the cost of water resource planning and agricultural drainage planning. Cal/EPA provides the Environmental Enforcement and Training Grants to public and private entities to educate and train public servants, such as fire fighters and peace officers, about environmental enforcement actions. The Agricultural Drainage Loan Program provides assistance through low-interest loans to projects that address treatment, storage, and conveyance of agricultural drainage that threatens the state's natural water resources.

The Cal/EPA offers several programs for technical assistance and environmental education and awareness. One such program is the National Environmental Information Exchange Network Grant Program. This system is a partnership among states, tribes, and the US Environmental Protection Agency to share environmental information. The information is organized by medium:

- Air
- Facilities
- Hazardous Materials
- Water

Source: California Environmental Protection Agency, http://www.calepa.ca.gov/Programs/

California Department of Conservation

The Department of Conservation is the state agency responsible for educating and promoting the environmental health through informed land use decisions and enabling sound land management practices that protect California's natural resources. California's Department of Conservation offers several programs to conserve and preserve the agricultural geography and value that is unique to the state; such programs include grant programs like the Sustainable Community Planning Incentive Grants and Watershed Coordinator Grants. The grants are offered to public agencies and quasi-public agencies, i.e. Metropolitan Planning Organizations and Councils of Government, and larger grant awards are considered for partnering agencies. The Sustainable Community Planning Incentive Grant is a state grant with the goal of reducing greenhouse gas emissions and promoting several sustainable program objectives such as improving air and water quality, promoting equitable and affordable living, and promoting water conservation.

Additionally, the Watershed Coordinator Grants offer financial assistance to special districts, non-profit groups, and local governments for collaborative planning to promote watershed management and to improve watershed infrastructure. Travis AFB is largely surrounded by agricultural lands for

which irrigation and crop management practices are in place. These state grants assist local governments with water conservation and resource management for the area.

California Department of Fish and Wildlife

The California Department of Fish and Wildlife (CDFW) is the state's agency responsible for overseeing and managing California's wildlife and natural communities. CDFW provides protection and maintenance of wildlife habitat, and administers California's natural communities for educational, recreational, commercial, and scientific uses. CDFW assists local governments and private organizations through conservation planning programs, including integrated resource management plans, conservation, and mitigation banks that assist developers by providing off-site environmental alternatives for projects that cannot conserve or mitigate within the site. CDFW also assists when private and public agencies partner to protect land through easements to ensure species and habitat preservation.

CDFW provides planning assistance grants to local governments and private sector organizations to aid in the development of community conservation plans or integrated resource management plans. These grants are also used to acquire land to enable habitat preservation.

Travis AFB is situated near wetlands and wildlife habitat that provides refuge for various threatened and endangered species; thus, providing impetus for coordination and conservation planning with CDFW.

Source: http://www.dfg.ca.gov/about/

California Department of Transportation

The California Department of Transportation (Caltrans) is the state agency responsible for planning, construction, maintenance, and regional coordination of the state's roadway infrastructure, including highways and railways. Solano County is part of Caltrans District Four. In 2009, Caltrans, together with its partners, completed more than $100 million in improvements to Interstate 80 (I-80) in Solano County. These improvements include approximately 27 miles of new paving and new High Occupancy Vehicle lanes in Fairfield.

4.6 State of California Local Jurisdiction Planning Tools

The planning tools used by the TSS Study Area jurisdictions were analyzed and categorized as permanent, semi-permanent, or conditional. In California, as in many other states, cities and counties may exercise land use and development regulatory authority. Cities and counties are legally bound by state statute to adopt general plans.

Table 4-1 provides an overview of existing planning tools by jurisdiction and an assessment of their applicability to military compatibility.

General Plans

California law requires every city and county to prepare and adopt a comprehensive, long-range general plan complete with text and a map, to serve as a guide for the physical development of that community. The law requires that, at a minimum, the general plan identify issues and provide policies for seven broad areas, called elements: land use, circulation, housing, open space, conservation, noise, safety, environmental justice and air quality. The law permits other issues to be addressed, either within the required elements or as additional ones. State law requires that day-to-day decisions of a city follow logically from and be consistent with the general plan.

Zoning Ordinances / Regulations

The purpose of the zoning ordinance is to serve the general welfare, safety, and health of the city and its residents and to recognize specific, sustainable, and compatible uses for areas within its jurisdiction. In order to be effective in accomplishing the jurisdiction's goals and visions, a zoning ordinance / regulation should coincide with the adopted general plan. Zoning ordinances / regulations are considered semi-permanent planning tools because they can be amended and lands can change their zoning designation if they go through the proper process. Zoning is not required by California law.

Table 4-1. City and County Planning Tools

Jurisdiction	Planning							
	General Plan	Zoning Code Height Restrictions	Zoning Code Dark Sky	Zoning Code Sound Attenuation	Airport Land Use Compatibility Plan	Subdivision Regulations	Special / Specific Area Plans	Building Code
Solano County	■	■	■	■	■	■	■	■
City of Fairfield	■	■	■	■	■	■	■	■
City of Suisun City	■	■	■	■	■	■	■	■
City of Vacaville	■	■	■	■	■	■	■	■
City of Vallejo	■	■	■	■	■	■	■	■

Legend: ■ = The tool exists but does not address land use issue(s) related to military compatibility. ■ = The tool exists but only partially addresses land use issue(s) related to military compatibility. ■ =The jurisdiction does not employ this tool. ■ = The tool exists and addresses land use issue(s) related to military compatibility.

Subdivision Regulations

Subdivision regulations outline requirements to implement functional streets, and to provide the community with sufficient lot sizes and open space, while conforming with the general plan to develop land in an orderly manner.

While subdivision regulations typically define the standards, procedures, and other requirements for land division, they can also help to prevent or limit future encroachment into an installation or adjacent operational areas by specifying allowable types of infrastructure improvements associated with a subdivision, such as street lights. Subdivision regulations can be used as a foundation to ensure mission sustainability, particularly with dark sky provisions and development density.

Building Codes

Building codes are intended to regulate building construction, materials, alteration and occupancy to ensure health, safety, and welfare. Building codes can regulate building construction such that it is compatible with military operations, including sound attenuation for residences within applicable noise zones. Building codes, similar to other regulatory tools, are considered semi-permanent.

Annexation

The location and boundary of each city and special district within Solano County can influence a range of land use, infrastructure and resource decisions that can have an impact on long-term compatibility with Travis AFB. Relative to land use planning and regulation, Solano County and the cities within the county have this primary responsibility. The cities within their incorporated boundaries and the county in the unincorporated areas.

Over time jurisdictional boundaries can change through the process of annexation. For a city, annexation is the means by which the corporate boundaries of the city are expanded. Once an area is annexed, it comes under the land use authority of that city.

In the TSS Study Area, the annexation process is regulated by the Solano Local Agency Formation Commission (LAFCO). The Solano LAFCO is composed of elected officials from Solano County and cities within the county as well as a member of the public. Within the county, the Solano LAFCO is charged with the review, approval (with or without amendment) or denial of proposals for boundary changes for cities or special districts.

4.7 Solano County

The following is a review of the existing planning tools utilized by Solano County along with a brief analysis identifying their ability to address land use and military compatibility, and where potential improvements can be made. The following planning tools are evaluated:

- Travis AFB Land Use Compatibility Plan
- Solano County Local Agency Formation Commission
- Solano County General Plan
- Solano County Zoning Ordinance
- Solano County Subdivision Ordinance
- Solano County Building Code

Land Use Compatibility Plan

The Travis Air Force Base Land Use Compatibility Plan (LUCP) sets forth land use compatibility policies applicable to future development near the Base. The plan holds an advisory status within the Travis AFB airport influence area (AIA), consisting of the entirety of Solano County. The policies are designed to ensure that future land uses in the surrounding area will be compatible with the realistically foreseeable, potential aircraft activity at Travis AFB. As adopted by the Solano County Airport Land Use Commission (ALUC), these policies provide the basis by which the commission can carry

out its review of certain proposals for general plans, specific plans, zoning ordinances, and certain land use development proposals near the Travis AFB for compatibility with aircraft operations at the Base.

The compatibility criteria defined by the policies are also intended to be reflected in the general plans and other policy instruments adopted by the entities having jurisdiction over land near Travis AFB. Specifically, the Travis AFB LUCP affects and requires action by the County and Cities in the County.

The LUCP was last adopted in October 2015, an update to the previous 2002 plan. The updated plan was needed to ensure consistency with the policies and standards set by the Solano County ALUC Review Procedures and the California Department of Transportation (Caltrans) 2011 California Airport Land Use Planning Handbook. The update also addresses compatibility issues associated with renewable energy projects and assault landing zone operations.

Compatibility Zones

The Travis AFB LUCP establishes six compatibility zones - A, B1, B2, C, D, and E - as well as two overlay zones - the Assault Landing Zone (ALZ) Training Overlay Zone and the Height Review Overlay Zone.

Compatibility Zone A consists of the Travis AFB runways, together with immediately adjoining areas within the runway primary surface and clear zones.

Compatibility Zone B1 comprises APZ I.

Compatibility Zone B2 is comparable to APZ II but is expanded to encompass approach and departure flight tracks that are not aligned with the runway.

Compatibility Zone C encompasses locations exposed to potential noise in excess of approximately 60 decibel (dB) Community Noise Equivalent Level (CNEL) together with additional areas occasionally affected by concentrated numbers of low-altitude aircraft overflights.

Compatibility Zone D includes all other locations beneath any of the Travis AFB airspace protection surfaces delineated in accordance with Federal Aviation Regulation (FAR) Part 77 as well as areas subject to frequent aircraft overflight.

Compatibility Zone E includes the area located between Zone D and the Travis AFB AIA boundary, which is coterminous with the Solano County boundaries.

The **ALZ Training Overlay Zone** is based on the combat arrival and departure simulations that occur at a minimum elevation of 500 feet Above Ground Level (AGL).

The **Height Review Overlay Zone** covers locations where the terrain exceeds or comes within 35 feet of any of the FAR Part 77 airspace protection surfaces for Travis AFB.

Each compatibility zone and overlay zone have specific requirements and regulations, such as maximum densities and intensities (indoor, outdoor, and single acre intensity), uses that are prohibited within the given zone, and additional development conditions. These regulations are separated into General Standards, Noise Criteria, Safety Criteria, Airspace Protection Criteria, and Avigation Easement Dedication.

Solano County Local Agency Formation Commission

The Solano County Local Agency Formation Commission (LAFCO) is responsible for coordinating changes in local governmental boundaries, conducting special studies that review governmental structure, and preparing a sphere of influence for each city and special district within the county.

The Solano County LAFCO regulates, through approval or denial, the boundary changes proposed by other public agencies or individuals. The LAFCO does not have the power to initiate boundary changes on its own.

The Solano County LAFCO also has the power to determine spheres of influence for all local governmental agencies. A sphere of influence is a planning boundary outside of an agency's legal boundary that designates the agency's probable future boundary and service area. Factors considered in a sphere of influence review focus on the current and future land use, the current and future need and capacity for service, and any relevant communities of interest. Spheres of influence are reviewed every five years.

General Plan

The General Plan is the guide for both development and conservation within the unincorporated county through 2030.

The General Plan is the primary document used by the County to regulate land use under California law. Zoning and development codes, specific plans, and individual public and private development proposals must be consistent with General Plan goals, policies, and standards.

The Solano County General Plan was adopted in 2008. The plan contains elements such as land use, resources, public health and safety, economic development, transportation, parks and recreation, and housing.

One of the proactive land use designations in the General Plan relative to protecting Base operations is the Travis Reserve Area. The land within the overlay is to be used for continued agriculture, grazing and associated habitat uses until a military or airport use is proposed. No residential uses are permitted in the area. The area allows for future expansion of Travis AFB and support facilities for the Base. If the status of the Base changes, the construction of nonmilitary airport and support uses may be permitted. The overlay encompasses 7,971 acres surrounding the Base.

The following General Plan policies and goals relates to military compatibility with Travis AFB:

> *Resources Implementation (RS.I-50): Wind turbine generators shall not be located in areas that conflict with the mission of Travis Air Force Base or other air operation facilities.*
>
> *Public Health and Safety Policy (HS.P-50): Ensure that development in the vicinity of the Travis Air Force Base or the Rio Vista or Nut Tree airports is compatible with existing and projected airport noise levels.*
>
> *Economic Development Policy (ED.P-11): Work with the cities and Travis Air Force Base to support the base's mission. This includes designating areas surrounding the base meant for potential expansion, and following base protection guidelines set forth by the Governor's Office of Planning and Research.*
>
> *Economic Development Implementation (ED.I-9): Work with the U.S. Department of Defense and Solano County's congressional delegation to seek and pursue funding to support the economic role and mission of Travis Air Force Base. Work with cities and continue to preserve land within the Travis Reserve Area to allow for base expansion. If the status of the base changes, the construction of nonmilitary airport and support uses may be permitted.*

Transportation and Circulation Policy (TC.P-21): Support improved rail access for Travis Air Force Base and Mare Island. Monitor the potential for a joint-use agreement with Travis Air Force Base to provide for future development of improved local options for commercial aviation. If the status of the base changes, the construction of nonmilitary airport and support uses may be permitted.

Zoning Ordinance

The Zoning Ordinance of Solano County was last amended in October 2015. The zoning ordinance divides the land within the county into 18 districts comprised of traditional zoning districts including residential districts, commercial and industrial districts, resource conservation districts, and agricultural districts.

There is no overlay or regulations regarding land use surrounding Travis AFB designated by the ordinance to ensure Compatibility. The ordinance refers to the Travis AFB LUCP and the Solano County Airport Land Use Commission. Any land uses within an airport area of influence or area of concern are to conform with the applicable compatibility policies and criteria set forth in the Travis AFB LUCP. The County's zoing map does show largely agricultral zoning districts within larger lot sizes abutting and in vicinty of Travis AFB.

Other regulations pertaining to Travis AFB Compatibility include Section 28.99 of the ordinance, Airport Flight Obstruction Area. The section establishes obstruction areas for each classifcation of airport. The purpose of the Airport Flight Obstruction Area is to prevent the creation of flight obstruction and thereby protect the lives and property of users of airports and of occupants of land in the vicinity of airports, and to prevent destruction or impairment of the utility of airports.

The following compatibility concerns are based on a review of the zoning ordinance:

- The topics of noise, vibration, and lighting associated with compatibility to the military activitites are not addressed in the ordinance.

Subdivision Ordinance

Chapter 26 of the Solano County Code establishes the Subdivision Ordinance. The purpose of the chapter is to regulate and control subdivisions of land and to implement the County's General Plan. The regulations apply to all divisions, reversions to acreage, lot line adjustments, and mergers respecting real property located wholly or partially within the unincorporated areas of Solano County.

There are no compatibility concerns based on a review of the subdivision regulations. Compatibility issues with Travis AFB are appropriately addressed in other County Planing and Policy documents.

Building Regulations

Chapter 6.3 of the Solano County General Ordinances outlines the Building Standards and Codes for the county. Solano County has adopted the following building codes:

- 2013 California Building Code
- 2013 California Residential Code
- 2013 California Electrical Code
- 2013 California Mechanical Code
- 2013 California Energy Code
- 2013 California Fire Code
- 2013 California Building Standards Administrative Code
- 2013 California Green Building Standards Code
- 2012 International Wildland Urban Interface Code

Several of the state codes have been amended by the county to better apply to unique local conditions.

4.8 City of Fairfield

The following is a review of the existing planning tools utilized by Fairfield along with a brief analysis identifying their efficiency in addressing land use and military compatibility and where potential improvements can be made. The following planning tools were evaluated:

- City of Fairfield General Plan
- City of Fairfield Zoning Ordinance
- City of Fairfield Subdivision Ordinance
- City of Fairfield Building Code

General Plan

The 2003 City of Fairfield General Plan contains elements outlining the community goals, issues and opportunities, policies and implementation program. Elements in the plan are Agriculture, Circulation, Economic Development, Housing, Land Use, Open Space, Public Facilities, Urban Design, and Health and Safety. The General Plan also includes an element for Travis Air Force Base Protection to protect the mission and operation of the Base. Many of the policies contained in this element are also discussed in other elements of the General Plan. Grouping these components into one cohesive element ensures that pertinent general plan policies related to the protection of Travis AFB can be recognized and used easily. The Travis AFB element contains five objectives along with numerous policies to achieve these objectives.

The following objectives and policies were found to help Travis AFB:

> *Travis Protection Objective (TP 1): Ensure that future land uses are compatible with the continued operation of Travis AFB.*

> *Travis Protection Policy (TP1.3): Proposed land uses shall be consistent with the land use compatibility policies and criteria of the 2002 Land Use Compatibility Plan (LUCP) for Travis Air Force Base.*

> *Travis Protection Objective (TP 2):Protect the citizens of Fairfield from excessive noise and protect Travis Air Force Base from noise complaints by preventing incompatible land uses from encroaching upon the base.*

> *Travis Protection Policy (TP 2.1): All new land use proposals shall comply with the noise and overflight policies of the 2002 LUCP for Travis Air Force Base.*

> *Travis Protection Objective (TP 5):Protect the viability of Travis AFB to accommodate expansions and new and/or different missions consistent with the changing world role of the United States.*

The following land use objective and policy were noted relevant to military compatibility:

> *Land Use Objective (LU 3): Establish an urban limit line that allows development to be satisfactorily planned before it occurs.*

> *Land Use Policy (LU 3.3): A voter initiative reaffirmed and readopted the "Travis Reserve" land use designation and the boundaries of the Travis Reserve.*

The designated Travis Reserve land consists of 1,848 acres that is limited by a deed restriction to agricultural uses and prohibits the construction of any improvements on the property, unless and until that property should be needed for air facility expansion.

All the goals and policies associated with Travis AFB for the city's future land use are good compatibility tools.

Since the establishment of the 2003 General Plan, an updated AICUZ Study was conducted in 2009 and a new Land Use Compatibility Plan was adopted in 2015.

Zoning Ordinance

The Zoning Ordinance of the City of Fairfield was last amended in December 2015. The zoning ordinance divides the land within the city into 22 base districts and 4 overlay districts. The zoning ordinance requires that new land use proposals must comply with the Travis AFB LUCP and the Travis Aero Club LUCP.

Chapter 18 of the municipal code establishes a mechanism to disclose information associated with property impacted by Travis AFB operations. Any transfer of real property zoned for residential use located north of Air Base Parkway and east of Clay Bank Road, or south of Air Base Parkway and east of Walters Road must include the following statement:

> *You are hereby notified that the residential property that you may purchase at_____ is located within the vicinity of Travis Air Force Base. Travis Air Force Base is located in the eastern portion of the City of Fairfield. The City of Fairfield does not permit residential development at a noise level in excess of 60-decibel noise contour for the maximum mission of Travis Air Force Base (as represented in the 2002 Travis AFB Land Use Compatibility Plan). However, residents of Fairfield within the vicinity of Travis Air Force Base may experience noise from aircraft operations at the Travis Air Force Base. The amount of noise may change over time depending on the mission and operations of the base. Further information on this disclosure may be obtained from the Fairfield Planning and Development Department, 1000 Webster Street, Second Floor, Fairfield, California 94533; telephone: (707)428-7461.*

There are no other regulations regarding land use surrounding Travis AFB designated by the ordinance to ensure Compatibility. The ordinance refers to the Travis AFB LUCP and the Solano County ALUC. Any land uses within an airport area of influence or area of concern are to conform with the applicable compatibility policies and criteria set forth in the Travis AFB LUCP.

The following items concerning military compatibility are based on a review of the zoning regulations:

- Compatibility with Travis AFB depends on the applicable compatibility policies and criteria set forth in the Travis AFB LUCP.
- The topics of noise, vibration, and lighting associated with compatibility to the military activitites are not addressed in the ordinance.

Subdivision Ordinance

The purpose of the City of Fairfield Subdivision Ordinance is to control and regulate the division of any land for any purpose whatsoever within the city. The subdivision ordiance requires the distribution of subdivision information to impacted public facilities, which includes Travis AFB. The secretary of the planning commission coordinantes all distribution of information regarding the proposed subdivision of land.

Building Regulations

Chapter 5 of the City of Fairfield Municipal Code includes the Building and Housing Codes. The City of Fairfield has adopted the following building codes:

- 2007 California Building Code
- 2013 California Electrical Code
- 2007 California Energy Code
- 2013 California Mechanical Code
- 2013 California Plumbing Code
- 2013 California Residential Code
- 2013 California Green Building Standards Code
- 1997 Uniform Housing Code
- California Building Standards Code

The city has amended several of the state codes. None of the amendments involve sound attenuation associated with noise impacts from Travis AFB.

4.9 City of Suisun City

The following is a review of the existing planning tools utilized by Suisun City along with a brief analysis identifying their efficiency in addressing land use and military compatibility and where potential improvements can be made. The following planning tools were evaluated:

- Suisun City General Plan
- Suisun City Zoning Ordinance
- Suisun City Subdivision Ordinance
- Suisun City Building Regulations

General Plan

The 2035 General Plan provides the basis for Suisun City's regulation of the overall amount, character, and location of urban development, as well as preservation and natural resource conservation, economic development, transportation, safety, public facilities and services, and housing.

The general plan addresses the following elements: land use, circulation, housing, economic development, conservation, open space, noise, and safety. Goals, programs, objectives, and policies pertaining to Travis AFB are included in the Public Health and Safety Element.

The following objectives and policies were found to help Travis AFB:

> *Policy PHS-1.6: Lands within the 65 CNEL noise contour of Travis AFB shall be maintained in agricultural, open space, commercial, industrial, or other uses permitted by Travis AFB Land Use Compatibility Plan (LUCP) and consistent with the recommendations of the Travis AFB Protection Element, including noise contours associated with future air base operations, as appropriate.*
>
> *Policy PHS-5.6: The City will consult with appropriate regional, state, and federal agencies to monitor water quality and address local sources of groundwater and soil contamination, including possible contamination from activities at Travis AFB, underground storage tanks, septic tanks, and industrial uses, as necessary, to achieve state and federal water quality standards.*
>
> *Policy PHS-10.6 The City will require that all hazardous waste transfer stations, disposal facilities, and residual repositories be sited at least 2,000 feet away from Travis AFB accident potential zones.*
>
> *Goal PHS-16 Reduce the Potential for Human Injury or Property Damage Resulting from Activities at Travis Air Force Base*

Objective PHS-16 Promote the ongoing mission of Travis AFB, while avoiding local risks related to ongoing operations.

Policy PHS-16.1 The City will regularly coordinate closely with Travis AFB to ensure that existing and future land uses do not interfere with existing or planned operations at the Base.

Policy PHS-16.2 Notwithstanding other provisions of the plan, the City will restrict land uses and the height of development according to the requirements of the Travis AFB Airport Land Use Compatibility Plan.

Policy PHS-16.3 The City shall prohibit the future development of sensitive land uses, including residential and schools, critical facilities, or uses that could result in large gatherings of people, within the Base's Accident Potential Zone 1 boundary, or in other areas that the Base determines to be at a greater risk of upset.

Policy PHS-16.4 The City will communicate with the Army Corps of Engineers and Travis AFB on site investigations that may be required to determine the presence of potential hazards, including soil and groundwater contamination and unexploded ordnance, outside of the Base, but within the City's Planning Area.

The Public Health and Safety Element also includes two programs associated with Travis AFB:

Program PHS-1.4: Travis AFB Land Use Compatibility Review
The City will require new developments within areas addressed by the Travis AFB Land Use Compatibility Plan to submit plans for review and conditioning by the Solano County Airport Land Use Commission.

Program PHS-16.1 Travis Air Force Base Consultation
The City will consult with representatives from Travis AFB to discuss land use issues. Discussion will include potential land use conflicts, new development under consideration by the City, hazardous conditions, and possible changes in Base operations that could potentially have an effect on implementation of the 2035 General Plan.

Discussions will also include efforts to provide biological resources mitigation in areas near Travis AFB that do not conflict with ongoing operations. The Community Development Department, along with the Fire Department representatives and other relevant department representatives will be involved, as appropriate.

All of these programs, goals, objectives, and policies for the city's future land use are good compatibility tools.

Zoning Ordinance

The zoning regulation divides the land within the city into 16 zoning districts. Chapter 18 of the ordinance describes the regulations and permitted uses for each district.

Consistent with the General Plan policies, the Zoning Ordinance contains a provision which states, "Notwithstanding any other provision of this chapter (or code), all development shall be consistent with the adopted current version of the Travis Air Force Base Land Use Compatibility Plan, which as of writing of this document is the one adopted on October 8, 2015 (Resolution 15-17)."

There are no other regulations regarding land use surrounding Travis AFB designated by the ordinance to ensure Compatibility. The ordinance refers to the Travis AFB LUCP and the Solano County Airport Land Use Commission. Any land uses within an airport area of influence or area of concern are to

conform with the applicable compatibility policies and criteria set forth in the Travis AFB LUCP.

The following items concerning military compatibility are based on a review of the zoning regulations:

- Compatibility with Travis AFB depends on the applicable compatibility policies and criteria set forth in the Travis AFB LUCP.
- The topics of noise, vibration, and lighting associated with compatibility to the military activitites are not addressed in the ordinance.

Subdivision Ordinance

Title 17 of the Suisun City Code of Ordinances establishes the city's Subdivision Ordinance and applies to the establishment of any real property wholly or partly within the city. The ordinance includes general provisions for subdividing land.

Building Regulations

Title 15 of the Suisun City Code of Ordinances establishes the Building and Construction Ordinance for the city. Suisun City has adopted the following building regulations:

- 2013 California Building Code
- 2013 California Residential Code
- 2013 California Electrical Code
- 2013 California Mechanical Code
- 2013 California Fire Code
- 2013 California Building Standards Administrative Code
- 2013 California Green Building Standards Code
- 1997 Uniform Housing Code
- 2013 California Plumbing Code

The city has amended parts of the state codes. None of the amendments involve sound attenuation or military copmatability with Travis AFB.

4.10 City of Vacaville

The following is a review of the existing planning tools utilized by the City of Vacaville along with a brief analysis identifying their efficiency in addressing land use and military compatibility and where potential improvements can be made. The following planning tools were evaluated:

- City of Vacaville General Plan
- City of Vacaville Zoning Ordinance
- City of Vacaville Building Code

General Plan

The General Plan provides a vision for the future and establishes a framework for how Vacaville should grow and change over the next two decades. While embracing change, this General Plan also establishes goals, policies, and actions that empower the City and the community to maintain the goals and values that make Vacaville the place it is today. The City of Vacaville last updated their general plan in 2015.

The general plan addresses the elements of land use, circulation, conservation and open space, parks and recreation, public facilities and services, noise, and safety. Goals, programs, objectives, and policies pertaining to Travis AFB are included in the land use, conservation and open space, and noise elements.

Much of the city is located within Compatibility Zone D of Travis Air Force Base Land Use Compatibility Plan. Compatibility Zone D does not place any restrictions on the types of land uses allowed, except for land uses that could cause hazard to flight, such as physical, visual, and electric forms of interference and land uses that attract birds. Any object over 200 feet tall requires airspace review. The only development condition for Compatibility Zone E, within which the rest of the Planning Area is located, is the requirement for airspace review for objects over 200 feet tall.

The following goals, actions, and policies were found to help Travis AFB:

Goal LU-27: Ensure that development near the Nut Tree Airport and Travis Air Force Base is compatible with airport uses and conforms to safety requirements.

Policy LU-P27.3: Ensure that land uses in the vicinity of Nut Tree Airport, or potentially affected by Travis Air Force Base, are compatible with airport operations and are consistent with the Airport Land Use Compatibility Plans for both airports.

Policy LU-P27.5: Continue to refer development proposals within the Nut Tree Airport and Travis Air Force Base Compatibility Districts to the Solano County Airport Land Use Commission.

Policy LU-P27.7: Notwithstanding other provisions of the General Plan, land use changes and development approvals within the Vacaville Planning Area shall be consistent with the Nut Tree Airport and Travis Air Force Base Airport Land Use Compatibility Plans (ALUCP).

Action LU-A27.1: Continue to implement the Airport Land Use Compatibility Plans for the Nut Tree Airport and Travis Air Force Base through the Land Use and Development Code.

Goal COS-15: Coordinate with the Travis Air Force Base on planning issues within its Area of Influence.

Policy COS-P15.1: Consult Travis Air Force Base officials for review and comment on proposed development projects, General Plan changes, zoning changes, policy and specific plans, and other comprehensive plans that have the potential for significant impacts within the Base's Area of Influence.

Policy COS-P15.2: Consider the needs of Travis Air Force Base for new and expanded infrastructure, as well as on-going maintenance needs for those infrastructure systems, within the Base's Area of Influence.

The Vacaville General Plan also addresses the noise impact from Travis AFB. The city uses the more restrictive 60 dB CNEL contour, instead of the 65 dB CNEL recommended by the Air Force, limiting residential uses to ensure compatibility. The following policy and action is included in the General Plan that addresses noise:

Policy NOI-P1.4: Prohibit new residential land uses where the exterior noise associated with aircraft operations at Nut Tree Airport or Travis Air Force Base exceeds 60 dB CNEL.

Action NOI-A3.1: Update aircraft noise projections as future operations at the Nut Tree Airport and Travis Air Force Base are projected to change.

The previous 2008 General Plan established a 20-year urban growth boundary. Land beyond the growth boundary cannot be annexed into the city and can only be designated public parks, open space, agriculture, or hillside agriculture until March 2028. Additionally, the location and policies of the boundary can only be amended by the voters of Vacaville. This boundary helps control the city's growth and prevent incompatible development north of Travis AFB.

These actions, goals, and policies for the city's future land use are good compatibility tools.

Zoning Ordinance

The zoning ordinance divides the land within the city into 20 zoning districts and five overlay districts. Chapter 14 of the ordinance describes the regulations and permitted uses for each district.

Chapter 14.09.134 of the ordinance establishes supplemental standards for airport land use compatibility to provide for the safe and orderly development of Travis AFB by protecting users of the airport from hazardous encroachments into areas of avigational operation and preventing the creation of hazardous encroachments into defined airspace. The ordinance also implements the policies of the Travis AFB LUCP and protects persons and property near Travis AFB from unreasonable hazards or impacts associated with airport operations.

There are no other regulations regarding land use surrounding Travis AFB designated by the ordinance to ensure Compatibility. The ordinance refers to the Travis AFB Land Use Compatibility Plan and the Solano County Airport Land Use Commission. Any land use within an airport area of influence or area of concern are to conform with the applicable compatibility policies and criteria set forth in the Travis AFB LUCP.

The following items concerning military compatibility are based on a review of the zoning regulations:

- Compatibility with Travis AFB depends on the applicable compatibility policies and criteria set forth in the Travis AFB Land Use Compatibility Plan.
- The topics of noise, vibration, and lighting associated with compatibility to the military activitites are not addressed in the ordinance.

Subdivision Ordinance

The City of Vacaville Subdivision Ordinance addresses the regulation and control of subdivision of land. Issues of compatibility with Travis AFB are addressed in other City policies and ordinance and would affect how subdivisions are evaluated.

Building Regulations

Title 15 of the City of Vacaville Municipal Code establishes the Building and Construction Ordinance for the city. The City of Vacaville has adopted the following building codes:

- 2010 California Building Code
- 2010 California Electrical Code
- 2010 California Energy Code
- 2010 California Plumbing Code
- 2010 California Mechanical Code
- 2010 California Fire Code
- California Building Standards Code

The city has amended parts of the state codes. None of the amended state codes address military Compatibility.

4.11 City of Vallejo

The following is a review of the existing planning tools utilized by the City of Vallejo along with a brief analysis identifying their efficiency in addressing land use and military compatibility and where potential improvements can be made. The following planning tools were evaluated:

- City of Vallejo General Plan
- City of Vallejo Zoning Ordinance
- City of Vallejo Subdivision Ordinance
- City of Vallejo Building Code

General Plan

The General Plan provides a description for how the City of Vallejo intends to develop in the future. The plan established goals and policies that support the future of the city. The current City of Vallejo General Plan was adopted in 1999, with elements updated as recently as 2015.

The General Plan addresses the elements of land use, circulation and transportation, housing, education facilities, public facilities and other services, safety, noise, air quality, and natural resources.

Goals, programs, objectives, and policies pertaining to Travis AFB are included in the noise element. Although Vallejo is not currently located in the noise contours of Travis AFB, policy 9 of the Noise goal states:

> *Monitor any proposals to expand the Travis Air Force Base, or the Napa County Airport in terms of increased noise levels in Vallejo.*

The General Plan also established a physcial boundary or sphere of influence where open space between the cities of Fairfield, Benecia, and Vallejo will continue to be preserved. This 10,000-acre area is known as the Tri-City and County Cooperative Planning Area for Agriculture and Open Space.

Zoning Ordinance

Title 16 of the Vallejo Code of Ordinances established the zoning code. The zoning ordinance divides the land within the city into 15 zoning districts and 14 special zoning districts. Part II of the ordinance describes the regulations and permitted uses for each district.

Due to its distance from Travis AFB, Vallejo is not within any of the mission footprints of Travis AFB, except that military aircraft may occasionally fly over the city. Therefore, the city's zoning ordinance does not include any districts related to Travis AFB, nor are they necessary at this time.

Subdivision Ordinance

Title 15 of the Vallejo Code of Ordinances establishes the city's Subdivision Ordinance. The ordinance includes provisions for subdivisions, land divisions, and mergers for property that is located entirely or partially within the incorporated limits of the city.

Due to its distance from Travis AFB, Vallejo is not within any of the mission footprints of Travis AFB, except that military aircraft may occasionally fly over the city. Therefore, the city's subdivision ordinance does not include any regulations regarding compatibility to Travis AFB, nor are they necessary at this time.

Building Code

Title 12 of the City of Vallejo Municipal Code establishes the Building and Construction Ordinance for the city. The City of Vallejo has adopted the following building codes:

- 2013 California Building Code, with amendments

Due to its distance from Travis AFB, Vallejo is not within any of the mission footprints of Travis AFB, except that military aircraft may occasionally fly over the city. Therefore, the city's building code does not include any regulations regarding compatibility to Travis AFB, nor are they necessary at this time.

4.12 Other Resources

In the interest of land use compatibility between the military and local communities, the DOD Office of Economic Adjustment (OEA) and other public interest groups, such as the National Association of Counties (NACo), have prepared educational documents and videos that educate and inform the public about encroachment issues and methods that can be used to address existing or future compatibility concerns. The following are five resources that have been published to inform the public on land use compatibility.

Guides

The Practical Guide to Compatible Civilian Development near Military Installations (July 2007), OEA

This guide offers general information on community development and civilian encroachment issues. The guide can be found at: http://www.oea.gov/.

Joint Land Use Study Program Guidance Manual (November 2006)

This manual provides guidance on the Joint Land Use Study program, process, and efforts to support compatible development. This manual can be obtained on the OEA internet site at the following address: http://www.oea.gov/.

Encouraging Compatible Land Use between Local Governments and Military Installations: A Best Practices Guide (April 2007), NACo

This guidebook presents case studies of best practices between the military and communities through communication, regulatory approaches, and Joint Land Use Studies. The guide can be accessed on the NACo internet site at the following address: http://www.naco.org/.

Videos

The Base Next Door: Community Planning and the Joint Land Use Study Program, OEA

This informative video discusses the issue of encroachment near military installations as urban development occurs within the vicinity. This video can be accessed on the official OEA YouTube channel at: http://www.youtube.com/watch?v=6UiyWDgLeJM

Managing Growth, Communities Respond, OEA

This video highlights the lessons learned from three communities (Kitsap Naval Base in Bangor, Washington; Fort Drum in Jefferson County, New York; and Fort Leonard Wood in Pulaski County, Missouri) that have successful programs for managing growth near their respective military installations. This video can be accessed on the official OEA YouTube channel at: http://www.youtube.com/watch?v=rea6d3bDp3c

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Compatibility Assessment 5

Inside Chapter 5...

Compatibility Assessment

Compatibility, in relation to military readiness, can be defined as the balance or compromise between community needs and interests and military needs and interests. The goal of compatibility planning is to promote an environment where both community and military entities communicate, coordinate, and implement mutually supportive actions that allow both to achieve their respective objectives.

A number of factors assist in determining whether community and military plans, programs, and activities are compatible or in conflict with joint land uses such as community activities and military installations. For the Travis AFB Sustainability Study (TSS), 24 compatibility factors were used to categorize the compatibility issues to be evaluated in the TSS. These compatibility factors are listed in the column to the right.

An action undertaken by either the military or community that minimizes, hinders or presents an obstacle to the other is characterized as an issue. The issues identified during this TSS process are grouped into one of the 24 compatibility factors and described in this chapter. For each identified issue, a compatibility assessment is provided discussing the nature and cause or source of the issue followed by applicable existing tools currently used or that may be used to mitigate encroachment or prevent the emergence of encroachment in the future. For existing tools, an assessment of their effectiveness will also be provided.

COMPATIBILITY FACTORS

AQ	Air Quality	LU	Land Use
AT	Anti-Terrorism / Force Protection	LEG	Legislative Initiatives
BIO	Biological Resources	LG	Light and Glare
COM	Coordination / Communication	MAR	Marine Environments
CR	Cultural Resources	NOI	Noise
DSS	Dust / Smoke / Steam	PT	Public Trespassing
ED	Energy Development	RC	Roadway Capacity
FSC	Frequency Spectrum Capacity	SA	Safety Zones
FSI	Frequency Spectrum Impedance / Interference	SNR	Scarce Natural Resources
		VO	Vertical Obstructions
LHA	Local Housing Availability	V	Vibration
IE	Infrastructure Extensions	WQQ	Water Quality / Quantity
LAS	Land / Air / Sea Spaces		

Methodology and Evaluation

The methodology for the TSS consisted of a comprehensive and inclusive discovery process to identify issues associated with the compatibility factors. At the initial Policy Committee (PC) and Technical Advisory Committee (TAC) workshops and first public workshop, stakeholders were asked to identify the location and type of issues they thought existed today or could occur in the future. As a part of the evaluation phase, the PC, TAC, and the public examined and prioritized the compatibility issues that could impact land within the TSS Study Area. Other factors and associated issues were analyzed based on available information and similarity with other community compatibility assessment projects around the country.

The selection and inclusion of strategies is directly and indirectly affected by the evaluation of issues. Issues were prioritized into four different categories with an associated time frame and presented to the PC and TAC for review. Since the PC and TAC accepted the priorities as is, the priorities will be used

to determine the timeframe for initiating strategies by the primary and partner agencies.

When reviewing the assessment information in this chapter, it is important to note the following:

- This chapter provides a technical background on the factors and issues discussed based on available information. The intent is to provide an adequate context for awareness, education, and development of TSS recommendations. It is not designed or intended to be utilized as an exhaustive technical evaluation of existing or future conditions within the Study Area.
- Of the 24 compatibility factors considered, the following nine were determined to have no major issues relative to this TSS:
    - Air Quality
    - Cultural Resources
    - Dust / Smoke / Steam
    - Frequency Spectrum Capacity
    - Legislative Initiatives
    - Marine Environments
    - Public Trespassing
    - Scarce Natural Resources
    - Vibration

Organization of the Issues

Chapter 5 is organized into two main sections: Minor Issues and Major Issues. Minor Issues are compatibility issues that were identified during the TSS process but were determined through further analysis during the TSS to be adequately managed, or a solution was developed and / or implemented during the TSS project timeframe and they are no longer issues that require further action. The Minor Issues were isolated from the original set of compatibility issues as they were determined not to be as significant as the Major Issues. Thus, the Minor Issues did not warrant in-depth analysis or any strategies to address them.

The Major Issues section provides more in-depth analysis of the more significant issues for the TSS. Each of the 24 compatibility factors are identified with a section number and the name of the factor, e.g., 5.2 Air Quality, 5.3 Anti-Terrorism / Force Protection, etc. The factor's definition, technical background (if applicable), and key terms information will also be found in each numbered subsection. For factors that did not have any compatibility issues identified, only the factor definition is presented.

5.1 Minor Issues

Issues that were identified during the TSS process but were later determined to be adequately managed and do not require any strategies to address them are discussed in this section. Issues are identified with the word "MINOR", followed by a numerical identifier (e.g., MINOR-1).

ISSUE MINOR-1	**Communicating between Travis AFB and communities** Travis AFB personnel, such as fire fighters, who often communicate with local communities, have to use different frequencies because the communities cannot use DOD frequencies.

Compatibility Assessment

A new land mobile radio system was launched in 2013, which operates on the 380-400m megahertz (MHz) frequency. The DOD has exclusive use of this frequency range. However, Travis AFB has difficulties communicating with outside civilian users, such as outside fire departments, requiring the use of a different frequency on a different radio. It is important that Travis AFB personnel coordinate quickly and easily with outside departments during emergency situations. Because civilians cannot utilize the DOD frequency range, DOD personnel must carry two radios to communicate with people both on and off the Base.

This issue was brought up at the beginning of the TSS, but during the course of the TSS, 39 new radios were purchased for Travis AFB fire and emergency services. These radios, received by the 60th Civil Engineering Squadron Fire Emergency Services in February 2017, allow Travis AFB firefighters to communicate on all frequencies, giving them seamless communication with base personnel and local fire departments in the counties of Solano, Contra Costa, Napa, Sacramento, San Joaquin, and Yolo, and Cal Fire without the need to carry multiple radios. Thanks to this new equipment, this issue is now adequately managed and does not require any strategies to address.

60th Civil Engineering Squadron Fire Emergency Services at Travis AFB receiving new radio communication equipment

Findings

- This issue was identified at the beginning of the TSS process, but through the acquisition of new radio equipment, it is now adequately managed and does not require any strategies to address.

ISSUE MINOR-2	**Economic impacts from alternative energy restrictions** The Travis AFB Land Use Compatibility Plan restrictions on alternative energy may impact future business opportunities, including the siting of energy testing facilities.

Compatibility Assessment

Businesses across the US have been increasingly using and investing in alternative energy. According to the Business Council for Sustainable Energy, alternative energy was the biggest source of new power added to US electricity grids in 2015. Developers installed 16 gigawatts of clean energy in 2015, or 68 percent of all new capacity. The biggest growth came from wind farms, with 8.5 gigawatts of new generation capacity installed. Clean-energy investments rose to $56 billion in 2015, up 7.5 percent from 2014, with $30.2 billion going to solar and $11.6 billion into wind energy.

In addition to reducing environmental impacts, using renewable energy also reduces long-term costs. As alternative energy becomes more and more popular, businesses are drawn to the benefits from alternative energy. For example, the Anheuser-Busch brewery in Fairfield installed two wind turbines and a solar array, which produces approximately 30 percent of the factory's electricity. Other businesses have installed private solar arrays, including Meyer, Alza Corporation, and Novartis in Vacaville.

The updated 2015 Travis AFB LUCP establishes policies for wind turbines and solar facilities in Solano County, which were not addressed in the 2002 LUCP. Wind turbines are limited in the area because they can create radar interference and vertical obstruction hazards for aircraft operations at Travis AFB, as outlined in issues FSI-1 and VO-1.

The LUCP establishes renewable energy standards that focus on commercial-scale facilities, which place appropriate restrictions considering the potential impact of these facilities. For example, a commercial wind farm would have a much larger impact on radar capabilities than the placement of a single wind turbine. However, the regulations only focus on height and location and do not delineate between a single wind turbine and a wind farm. The restrictions placed on commercial facilities could inhibit the placement of a single turbine associated with a business or testing facility with a lower impact, depending on its height. Even single wind turbines can have impacts on Base radar.

Source: Travis AFB LUCP,www.bcse.org/sustainableenergyfactbook/

Findings

- The development and use of renewable energy has increased as businesses are investing in alternative energy sources.
- Limits established by the LUCP restrict the placement of wind turbines over 100 feet AGL in Solano County.
- Solano County has established restrictions on placement of commercial scale solar facilities in agriculturally zoned areas effectively limits potential glint and glare impacts in large areas adjacent and in vicinity to Travis AFB.

ISSUE MINOR-3	**Land mobile radios can interfere with Part 15 devices** Frequencies used by Travis AFB operations may interfere with Part 15 devices in the local communities, such as garage door openers.

Compatibility Assessment

Radio frequency (RF) is a valuable resource requiring its use to be regulated by the government; however, not all equipment that uses RF energy is required to have a license. Part 15 is the portion of the FCC rules that regulates unlicensed RF devices, referred to as "Part 15 devices". Because of their limited, ultra-low power outputs, they are conditionally permitted to operate in almost all RF bands, including those heavily utilized by the DOD.

Part 15 devices include common commercial items such as baby monitors, cordless telephones, laptop computers, wireless computer mice, remote keys, wireless headsets, garage door openers, low-powered walkie-talkies, and wireless modems. Part 15 devices use the same RF resources as the licensed users of the electromagnetic spectrum, including the DOD, fire stations, hospitals, and police forces. As such, civilian use of Part 15 devices can interfere with military equipment and military equipment can interfere with Part 15 devices owned by private individuals.

The interference associated with Part 15 devices and land mobile radio systems was reviewed by the US Government Accountability Office in December 2005. The review found that the when the DOD began implementing new land mobile radio systems in 2004, it resulted in various cases of garage door interference. Issues of interference range from intermittent to complete inoperability, with some area experiencing no interference. The DOD is under no obligation to mitigate interference with Part 15 devices because the DOD is the authorized user of the 380-399.9 megahertz (MHz) frequency. However, because the issue can be difficult to correct, efforts of proactive community outreach and coordination with manufacturers has helped to resolve complaints.

A new land mobile radio system at Travis AFB was launched in 2013, which operates on the 380-399.9 MHz frequency. The installation was able to replace components in these openers to operate at a different frequency. There have been instances of the radio interfering with garage door openers in the housing area on-base, which operate at a 390 MHz frequency. There have been no reports of garage door interference outside of the Base, so at this time there is no compatibility issue. If future development moves closer to the Base, it could be impacted, and Part 15 devices may experience problems.

This issue is managed adequately and does not require any strategies to address.

Findings

- Military equipment has the potential to interfere with Part 15 devices off-base.
- Currently, there are no known issues associated with military interference; however, it could become an issue if future development moves close to the Base.

ISSUE MINOR-4	**Impacts to VORTAC radio navigation beacon** The Sonoma Raceway has caused operational impacts to the VORTAC radio navigation beacon at Skaggs Island that have caused it to be shut down for periods of time.

Compatibility Assessment

Skaggs Island Naval Communication Station is a former US Navy installation located near California SR 37 in Sonoma County, between the cities of Novato and Vallejo. The naval base engaged in several communications and intelligence gathering functions for the Navy and other federal intelligence organizations until it closed in 1993. However, the VORTAC radio navigation beacon remains operational at the site.

Sonoma Raceway, a 2.52-mile racetrack, is located about four miles west of Skaggs Island in the southern Sonoma Mountains. The raceway hosts the NASCAR Sprint Cup Series races each year, the Verizon Indy Car Series, and several other auto and motorcycle races. During major races, with additional seating added to the raceway, the seating capacity at the raceway expands to 102,000 seats.

Large raceway events can cause a spectrum overload due to thousands of communication devices (cell phones, radios, etc.), interfering with the VORTAC radio navigation beacon. At one time, this resulted in the FAA having to shut down the beacon and notify Travis AFB of the outage during large events to prevent interference. Since that time, the issue has been fixed with equipment / software upgrades and the beacon no longer has to be shut down during events at the raceway. While this issue was brought up during the TSS process, it is adequately managed and does not require any strategies to address it.

Findings

- At one time, the VORTAC radio navigation had be shut down during large events at the Sonoma Raceway due to spectrum overload, but this issue has been fixed through equipment / software upgrades and the beacon no longer has to be shut down.

ISSUE MINOR-5	**Impacts from the Airport Land Use Commission review** Cities are required to send every rezoning application through the ALUC for commission hearing and approval.

Compatibility Assessment

The California State Aeronautical Act requires that the Solano County ALUC review plans, ordinances, and future development for consistency with the Travis AFB LUCP. The Solano County ALUC Review Procedures apply to all lands within the Airport Influence Area (AIA), which covers all of Solano County. This review is conducted to ensure future development is compatible with Travis AFB operations. The types of actions that are reviewed by the ALUC include:

- The adoption or approval of any amendment to a general or specific plan affecting the property within an AIA.
- The adoption or approval of a zoning ordinance or amendment there of building regulation that affects property within the AIA.
- Proposed redevelopment of a property for which the existing use is consistent with the local general plan and/or specific plan, but nonconforming with the LUCP compatibility criteria.

- Major land use actions, such as expansion of the sphere of influence of a city, any off-airport, non-aviation use of land within a clear zone, any project having the potential to attract hazardous wildlife, and any object having a height which requires review by the FAA.

The review of these actions is conducted to better assess the compatibility criteria set forth in the Travis AFB LUCP. While a thorough review of all changes is important to protect Travis AFB, the AIA associated with the installation is expansive compared to typical public use airport AIAs. With the whole county under the AIA, submittals of certain items for review are not relevant to base operations and review done by the ALUC may not be necessary. For example, a zoning change from commercial to residential on the west side of Suisun City or Fairfield is not likely to impact operations at the Base.

Findings

- Review by the ALUC is required by state law.
- The expertise of ALUC board members is necessary to ensure compatibility.
- The ALUC must review land use and policy changes for all land in the AIA, which covers the whole county.
- Some changes may not be relevant to Travis AFB operations, but must still be reviewed at some capacity.

ISSUE MINOR-6	**Hazardous materials in pipelines** Hazardous materials, such as jet fuel, travel through pipelines in the communities as they bring supplies to Travis AFB. Concerns over transit, potential for spills, and ensure adequate standoff distances.

Compatibility Assessment

Travis AFB currently gets its fuel from a pipeline built, operated, and maintained by Kinder Morgan Energy Partners. The pipeline contains kerosene-based Jet Propellant 8 (JP-8), which is considered less hazardous than earlier jet fuel formulas. The pipeline runs from Travis along Hanger Avenue to the Kinder Morgan Concord to Sacramento pipeline along Walters Road. A computerized Supervisory Control and Data Acquisition (SCADA) system operates the pipeline. Leak detection for the pipeline is based on computerized surveillance and all pumps are equipped with maximum and minimum shut-down devices. These devices automatically shut down the pipeline if a pressure anomaly is detected. A jet fuel storage facility on the Base, which consists of three 150,000 barrel tanks, ensures that the pipeline is not constantly in use and is regularly emptied and maintained.

An old jet fuel pipeline previously serviced Travis AFB that ran east to west along State Route (SR) 12, originating near Civic Center Boulevard and Driftwood Drive in Suisun City. The pipeline went through Suisun City, along with Pacific Gas and Electric (PG&E) natural gas lines, entering the south end of the Base along Peterson Road. The original pipeline was installed in the late 1960s and removed from service in June 2012.

Before the pipeline was removed from service, a fuel leak was discovered in February 2009 along the old pipeline's right of way, near the intersection of SR 12 and Lawler Ranch Parkway. The biggest concerns regarding the leak were public health protection and keeping the fuel out of the Suisun Marsh.

Officials identified the source of the leak, shut down the pipeline temporarily, and began fuel recovery operations. Travis AFB began collecting and analyzing soil and groundwater samples to determine the nature and extent of the petroleum contamination. Beginning in October 2010, Travis AFB conducted an excavation of the fuel-contaminated soil along the pipeline. A Dual-Phase Extraction (DPE) system was installed in 2013 to extract as much fuel from the subsurface as possible. After the DPE system was run, a chemical oxidant was introduced that stimulated the growth of naturally-occurring microbes that broke down the remaining fuel into harmless compounds.

By January 2016, it appeared that the oxidant had broken down the residual fuel. In order to verify that the cleanup is complete, two additional monitoring wells were installed to analyze water samples. In addition, multiple soil samples from different depths will be collected and analyzed for any sign of remaining fuel. All impacted property in the right of way is expected to be back to its original condition by the middle of 2017.

Source: Site Assessment of the February 2009 Jet Fuel Pipeline Leak, http://www.travis.af.mil/About-Us/Environment/Search; Biological Opinion for the Proposed Travis Air Force Base JP-8 Pipeline, 2009

Findings

- A fuel leak from a pipeline serving Travis AFB was discovered in Suisun City in 2009. Clean up was conducted and completed in 2017.
- Travis AFB no longer utilizes the pipeline that resulted in a fuel leak. The current pipeline is operated by a computerized system that is equipped with leak detection.

ISSUE MINOR-7	**Clear Zone** Not all of the Clear Zone for Travis AFB is on government land.

Compatibility Assessment

DOD airfields have designated safety zones composed of clear zones (CZ) and accident potential zones (APZ) that extend out from each end of a runway. Development is a concern in these areas because this is statistically where aircraft mishaps are more likely to occur. The AICUZ Study provides recommendations for compatible land uses within the safety zones. Incompatible development in these areas increases the safety risk for the general public and aircraft crews.

The CZs have the highest risk because they are closest to the end of the runway, where mishaps are most likely to occur. The AICUZ Study recommends that only open space and agricultural uses should be allowed in the CZs. The CZs start at the ends of the runway and measure 3,000 feet wide by 3,000 feet long, covering about 413 acres of land. 235 acres of the CZs extend outside of the Base boundary, onto private property which the DOD does not own. Travis AFB holds three easements with private property owners covering the 235 acres beyond the installation boundaries to prevent development within the CZs.

Findings

- The CZs associated with the Travis AFB airfield include 235 acres of land beyond the installation boundary. Travis AFB maintains easements with the private property owners of these lands to prevent incompatible development.

ISSUE MINOR-8	**Wind turbines** Some existing wind turbines south of Travis AFB are planned to be switched out for taller models.

Compatibility Assessment

The High Winds, Montezuma Wind II, Shiloh I, Shiloh 2, Shiloh III, Shiloh IV, and Solano Wind farms are located in the Montezuma Hills, approximately nine miles southeast of Travis AFB, consisting of 607 wind turbines. The total heights of the turbines range from roughly 300 to 400 feet above ground level. A portion of the wind turbines are located within the Outer Horizontal Surface imaginary surface, which recommends that no structure be constructed at more than 500 feet above the elevation of the airfield. Some new commercial tower heights have increased to over 400 feet above ground level, to reach better wind resources. The construction of taller wind turbines could penetrate the Outer Horizontal Surface and create vertical obstruction hazards for aircraft operations at Travis AFB. In addition to being vertical obstructions, taller wind turbines may also have a negative effect on the radar viewshed and create interference issues, as described in Issue FSI-1.

The updated 2015 Travis AFB LUCP establishes policies for wind turbines in Solano County. The LUCP states that existing wind turbines can be replaced at the same dimensions and material without review by the ALUC. However, if the replacement wind turbines are a different dimension and are greater than 100 feet above ground level, they must not be within a line-of-sight to the Travis DASR, shown on Figures 5.8-2, 5.8-3, 5.8-4, 5.8-5, and 5.8-6, and be reviewed by the ALUC.

Montezuma Wind Energy Wind Farm

Findings

- The construction of taller wind turbines could create potential vertical obstruction hazards for aircraft operations at Travis AFB.
- Replacing the existing wind turbines with taller wind turbines would trigger a review by the ALUC to ensure they would not be within the line-of-sight of the DASR. Changes that would further impede radar would not be allowed.

ISSUE MINOR-9	**Flooding of Union Creek onto Travis AFB** Union Creek on the south side of the airfield sometimes floods due to blockage at outfall where the creek leaves Travis AFB.

Compatibility Assessment

The main surface drainage for Travis AFB is Union Creek, a stream that flows in two branches to the southwest. Storm drains on-base generally flow south in underground pipes and concrete vaults with outfalls to Union Creek near the southern boundary of the Base. Six outfall locations drain storm water from Travis AFB.

One of the outfalls just outside of the Base on private property is not adequate for handling storm water. The outfall tends to flood and backs up onto base during heavy rain. Travis AFB has an easement to clear vegetation at its expense along the length of Union Creek on private property located southwest of the Base to ensure the "free flow of waters of Union Creek" through the private property. The work described in the easement was proposed in Union Creek Restoration Work Plan 2015 and was planned to be completed by September 2015. However, annual funding was not secured to maintain the creek and outflows.

Findings

- Travis AFB has an easement to clear vegetation at its expense along the length of Union Creek on private property located southwest of the Base to ensure the "free flow of waters of Union Creek" through the private property.

ISSUE MINOR-10	**Pollution plumes** There are historic plumes that extend off Travis AFB.

Compatibility Assessment

The DOD established an Installation Restoration Program, now called the Environmental Restoration Program, in 1975 to provide guidance and funding for the investigation and remediation of hazardous waste sites caused by historical disposal activities at military installations. The Environmental Restoration Program investigates and, if necessary, cleans up former disposal and test areas, some of which were used before the disposal of chemicals was regulated or even fully understood. Installations now follow current environmental guidelines for the management and disposal of hazardous materials and waste. In 1989, Travis AFB was placed on the National Priorities List by the EPA and began investigating contamination from past activities, establishing 19 restoration sites. Three of the sites have instances of groundwater contamination that migrated off-base, two on the southern Base boundary and one on the north. The primary contaminant in the off-base groundwater is Trichloroethene (TCE) which was a solvent used at Travis until 1980. The following describes the off-base sites:

- Site FT005: An area used for fire training exercises from approximately 1962 through 1987. During this period, waste fuels, oils, and solvents were burned on open ground. Historical practices resulted in groundwater contamination with chlorinated volatile organic compounds (VOCs). 41.6 acres of the plume extend off-base.

- Subarea LF007C: A general landfill that used trench and cover methods from approximately 1950 through 1970. Historical practices resulted in groundwater contamination with chlorinated VOCs, dioxins, and polychlorinated biphenyls (PCBs). 1.6 acres of the plume extends off-base.
- Site SS030: Mostly undeveloped land near the southern base boundary. Historical practices associated with Building 1125 are believed to have resulted in groundwater contamination with chlorinated VOCs. 91.6 acres of the plume extend off-base.

To carry out the necessary cleanup activities on private property, Travis AFB purchased access and environmental response easements from the landowners. These easements contain legal restrictions that prevent landowners from engaging in water development or soil disturbing activities that could interfere with cleanup activities. Cleanup activities involving extracting, treating, and discharging the groundwater began in 1998 and still take place today. At the other contaminated sites on-base, the cleanup actions and monitoring have minimized the migration of contaminated groundwater, preventing any additional off-base migration.

Each month, over four million gallons of groundwater are extracted from contaminated groundwater plumes under Travis AFB, treated on-base, and discharged to Union Creek. This treated groundwater, which meets strict clean water standards, supplements the flow of the eastern branch of Union Creek. After more than a decade of cleanup activities, the contaminant levels are much lower than their initial values but are still high enough to require additional clean up action.

Source: Final Proposed Plan for Groundwater Cleanup, Final Travis AFB Groundwater Record of Decision

Findings

- Three sites with contaminated groundwater extend off-base. Travis AFB maintains an easement for these areas and is currently conducting cleanup of this contamination.

ISSUE MINOR-11	**Air quality attainment** Travis AFB is within a region that is not in attainment for PM2.5 and Ozone.

Compatibility Assessment

In California, the California Air Resources Board has established CAAQS in addition to the federal standards established under the Clean Air Act. Areas are classified as either in attainment or nonattainment under both federal and state standards.

California is divided into 15 air basins, based on the topography of the state. Solano County is split between two air basins. The eastern side of Solano County is within the Sacramento Valley Air Basin and the western side is within the San Francisco Bay Area Air Basin. Travis AFB is located within the San Francisco Bay Area Air Basin and falls under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD).

To estimate the sources and quantities of pollution, the California Air Resources Board maintains an inventory of California emission trends through on-going monitoring. The San Francisco Bay Area Air Basin contains 20 air monitoring stations. The closest station to Travis AFB is the Fairfield station, which is located on Chadbourne Road and monitors ozone levels. The Vallejo monitoring station on Tuolumne Street, the next closest station to Travis AFB, monitors Carbon Monoxide, Nitrogen Dioxide, Sulfur Dioxide,

PM10, and PM2.5. While air pollution levels vary from station to station, the entire air basin is designated either in attainment or nonattainment based on the total average level of pollutants within the basin. Therefore, the region must work together to achieve attainment.

Table 5.1-1 shows pollutant levels for the San Francisco Bay Area Air Basin as well as station levels closest to Travis AFB. The most recent pollution levels for the San Francisco Area Air Basin available from the BAAQMD were from 2011. The table also includes ambient air quality standards and attainment status. The San Francisco Bay Area Air Basin is designated nonattainment for state ozone standards, PM10, and PM2.5. For federal standards, the basin is designated nonattainment for 8-hour ozone and PM2.5. All other criteria pollutants are designated attainment or are unclassified.

Table 5.1-2 contains past trends for ozone, PM2.5, and PM10 for the San Francisco Bay Area Air Basin. Overall, pollutant levels in the Study Area have been slowly decreasing. Ozone levels have declined by an average of nearly 17 percent from 1992 to 2012. PM2.5 concentrations have decreased 36 percent from 2001 to 2011.

Ozone concentrations exceeded the NAAQS (8-hour) and CAAQS (1-hour and 8-hour) every year in the San Francisco Bay Area Air Basin from 1992 to 2012. 8-hour ozone concentrations ranged from 0.073 to 0.087 parts per million (ppm) during the 12-year timeframe, with the highest level (0.087 ppm) recorded in 2000. The lowest was recorded in 2012, only 0.003 ppm above the state and national standard.

High levels of ozone are generally attributed to specific meteorological patterns combined with increases in emissions during summer months. Urban vehicle emissions, industrial emissions, and higher temperatures in the basin contribute to summer ozone generation and nonattainment of the state and federal ambient air quality standards.

Particulate matter is generated within the area by agricultural and industrial operations, construction activities, combustion of wood and fossil fuels, and wind during dry conditions. Particulate matter levels tend to be elevated during winter because of cold temperatures and stagnant air and because of wood smoke, and windy conditions. 24-hour PM10 concentrations ranged from 55.4 to 113.9 micrograms per cubic meter (µg/m3), exceeding the CAAQS during the 12-year time period. However, during the same period, the 24-hour PM10 NAAQS was not exceeded.

The San Francisco Bay Area has seen progress in reducing its PM2.5 values. 24-hour PM2.5 concentrations in the basin ranged from 71 µg/m3 in 2001 to 27 µg/m3 in 2011. Although the basin is designated as nonattainment for the 24-hour national PM2.5 standard, recent monitoring data has shown that the basin meets the 24-hour PM2.5 standard. The EPA approved a "clean data determination" for the 24-hour PM2.5 standard for the basin in January 2013. The basin must still meet the requirements for redesignation to be redesignated to attainment.

While the San Francisco Bay Area Air Basin is currently in attainment for most air pollutants, the EPA has the authority to raise air quality standards, which could bring levels into nonattainment. In November 2014, the EPA proposed increasing the ozone standard from 0.075 ppm to a range from 0.065 to 0.070 ppm. During the public comment period for the proposed rule, many groups urged the EPA to keep the 0.075 ppm standard. However, in October 2015, under a court-ordered deadline, the EPA finalized the ozone NAAQS standard at 0.070 ppm.

Travis AFB currently holds a Synthetic Minor Operating Permit which acknowledges that its potential emissions could exceed air quality standards in the San Francisco Bay Area Air Basin but that actual annual emissions are below those levels. The permit allows Travis AFB to operate without the need for a higher-level (Title V) permit with additional restrictions by self-regulating their potential to emit.

Table 5.1-1. Air Quality Standards and Pollution Levels for the San Francisco Bay Area Air Basin and the Fairfield / Vallejo Air Station

Pollutant	Averaging Time	San Francisco Basin, 2011	Fairfield / Vallejo Monitoring Stations, 2011	CAAQS		NAAQS	
				Standard	State Status	Standard	Federal Status
Ozone	8-Hour	0.073 ppm	0.076 ppm	0.070 ppm	Nonattainment	0.070 ppm	Nonattainment
	1-Hour	0.100 ppm	0.094 ppm	0.09 ppm	Nonattainment	N/A	N/A
Carbon Monoxide	8-Hour	2.1 ppm	2.1 ppm	9.0 ppm	Attainment	9.0 ppm	Attainment
	1-Hour	2.8 ppm	3 ppm	20 ppm	Attainment	35 ppm	Attainment
Nitrogen Dioxide	1-Hour	0.047 ppm	0.040 ppm	0.18 ppm	Attainment	0.100 ppm	Unclassified
	Annual Mean	0.010 ppm	0.010 ppm	0.030 ppm	N/A	0.053 ppm	Attainment
Sulfur Dioxide	24-Hour	0.002 ppm	0.0026 ppm	0.04 ppm	Attainment	0.14 ppm	Attainment
	1-Hour	0.008 ppm	0.0074 ppm	0.25 ppm	Attainment	0.075 ppm	Attainment
	Annual Average	0.0009 ppm	0.0008 ppm	N/A	N/A	0.030 ppm	Attainment
PM10	Annual Average	20.2 µg/m^3	9.1 µg/m^3	20 µg/m^3	Nonattainment	N/A	N/A
	24-Hour	73.4 µg/m^3	31 µg/m^3	50 µg/m^3	Nonattainment	150 µg/m^3	Unclassified
PM2.5	Annual Average	9.1 µg/m^3	10.1 µg/m^3	12 µg/m^3	Nonattainment	12 µg/m^3	Unclassified
	24-Hour	27 µg/m^3	31 µg/m^3	N/A	N/A	35 µg/m^3	Nonattainment

Source: Bay Area Air Quality Management District Air Quality Standards and Attainment Status http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status; San Francisco Bay Area Air Basin Almanac 2013

Notes: ppm=parts per million, µg/m3=micrograms per cubic meter, N/A= not applicable

Table 5.1-2. Air Quality Trends for the San Francisco Bay Area Air Basin from 2000-2012

Pollutant	Time	CAAQS Standard	NAAQS Standard	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Ozone	8-Hour	0.070 ppm	0.070 ppm	0.087	0.082	0.082	0.086	0.084	0.078	0.080	0.077	0.081	0.078	0.080	0.076	0.073
	1-Hour	0.09 ppm	N/A	0.139	0.126	0.124	0.123	0.123	0.113	0.118	0.120	0.121	0.120	0.127	0.109	0.100
PM10	Annual Mean	20 µg/m^3	N/A	27.7	29.6	26.3	24.7	25.9	24.1	35	25.6	24.1	20.3	19.5	20.2	18.8
	24-Hour	50 µg/m^3	150 µg/m^3	80	113.9	83.5	59.5	65.0	80.8	106.3	77.8	77.0	55.4	69.6	73.4	59.6
PM2.5	Annual Mean	12 µg/m^3	12 µg/m^3	13.6	12.8	14	11.7	11.6	11.8	10.8	10.7	11.5	10.1	10.5	10.1	9.5
	24-Hour	N/A	35 µg/m^3	N/A	71	63	47	45	39	39	38	36	36	31	27	N/A

Source: San Francisco Bay Area Air Basin Almanac 2013

Notes: ppm=parts per million, µg/m3=micrograms per cubic meter, N/A= not applicable

Travis AFB's primary air emissions are from mobile sources such as aircraft and vehicles. Currently the Base meets all emissions regulations and is not classified as a major source of hazardous air pollutants.

If the nonattainment status for PM2.5 or ozone increased to severe, or if the EPA increases NAAQS standards, then Travis AFB would possibly need a Title V operating permit. Operating under a Title V permit requires recording and reporting air emissions, which can include daily, weekly, or hourly monitoring of emissions. Additionally, operating under a Title V operating permit involves offsetting emissions at a 1.15 to 1.0 ratio, i.e., for every one-ton increase in emissions Travis AFB would need to create an offset equivalent to 1.15 tons. These requirements for environmental compliance could result in the need of new equipment and technologies to reduce emissions, impacting costs at Travis AFB and possibly impacting operations, including flying time, associated with air emissions contributing to ozone formation. As part of the San Francisco Bay Area Air Basin, Travis AFB must rely on regional cooperation to achieve attainment.

Because the current air quality levels are well below severe non-attainment status, this is an issue requiring awareness and ongoing monitoring but is currently not a significant issue.

Source: http://www.arb.ca.gov/, http://www.baaqmd.gov/, The California Almanac of Emissions and Air Quality - 2013 Edition, Travis AFB Installation Development Plan

Findings

- The state is working with local governments in the San Francisco Area Air Basin to bring the region into attainment; however, if the nonattainment standard for ozone or PM2.5 increases, Travis AFB may need to obtain a higher-level operating permit.
- Operating under a higher-level permit would require additional limits on emissions, offsetting efforts, and increased emissions monitoring.

  Travis AFB currently holds a Synthetic Minor Operating Permit which does not require additional regulations.

5.2 Air Quality (AQ)

Air quality is defined by numerous components regulated at the federal and state level. For compatibility, the primary concerns are pollutants that limit visibility, such as particulates, ozone, etc. and potential non-attainment of air quality standards that may limit future changes in operations at the installation or in the area.

There were no Major Issues identified for Air Quality in the TSS.

5.3 Anti-Terrorism / Force Protection (AT)

Anti-Terrorism / Force Protection (AT / FP) relates to the safety of personnel, facilities, and information on an installation from outside threats. Security concerns and trespassing can present immediate compatibility concerns for installations. Due to current global conditions and recent events, military installations are required to implement more restrictive standards to address AT / FP concerns. These measures include increased security checks at installation gates and physical changes (such as new gate / entry designs).

The Department of Defense (DOD) AT / FP standards require all DOD components to adhere to design / planning criteria and minimum construction standards to mitigate vulnerabilities and threats to an installation and its occupants. Important aspects of these criteria and standards include minimum standoff distances or required separation between buildings and roadways and parking lots and buildings and trash enclosures.

Key Terms

Clear Zones. Clear zones are areas established around the fence to provide an unobstructed view to enhance detection and assessment around fences. This is different than the term "clear zone" used to describe suggested land use protections around an airfield.

Fence Line. The term fence line in this section refers to the exterior fence around Travis AFB. Fence lines are often inset from a property line if possible.

Sight-lines (lines-of-sight). This refers to the angles of lines-of-sight from off-installation structures to on-installation structures and vice versa. Lines-of-sight are necessary to maintain an unobstructed view of the installation and to ensure that visual access to the installation does not occur where inappropriate and occurs where appropriate such as for communications and frequencies.

ISSUE AT-1	**Development near Travis AFB Main Gate** Redevelopment in the commercial center on Parker Ave could become a security concern if additional floors are added that could provide a visual of the gate and into the installation.

Compatibility Assessment

There is a commercial area along Parker Road that runs parallel to Air Base Parkway, north of the Travis AFB Main Gate, which has the potential to become a security concern. Though trees and a fence provide a partial barrier along the stretch of Parker Road, adding additional stories to the buildings in the area could provide enough elevation to observe activity at the Main Gate or on the Base.

Minimal landscape screening and fence in front of the Main Gate along Parker Road (Source: Google Maps)

The area is zoned Thoroughfare Commercial (CT) by the City of Fairfield and establishes a building height limit of 35 feet, or about three stories. Land uses in the CT zoning district include commercial and light industrial uses. The zoning ordinance for the City of Fairfield also states that residential land use may be allowed on land zoned CT as part of a mixed-use development.

If the area was to be redeveloped the vertical profile of buildings in the area could change. Additional height could provide views and vantage points into Travis AFB, creating a potential security risk.

Effective AT / FP at Travis AFB is necessary to ensure sensitive operations are protected from observation by unauthorized parties outside of the Base. While it is important for the installation to maintain clear lines-of-sight to view outside the fenceline and adjacent uses, lines-of-sight that provide viewing and vantage points into the installation create a security concern.

The proximity of future development adjacent to the Base could also create encroachment issues. For the security of the installation, development must be an appropriate distance from the fenceline of the installation. Parker Road, as sited, provides a good buffer along the fenceline.

The Unified Facilities Criteria (UFC) program, initiated by the Department of Defense, provides standards for military facilities. Section 2-4.1.3 of UFC 4-010-01 states that the fire of weapons from a terrorist is predicated on direct lines-of-sight and the assumption that weapons could be fired from vantage points outside the control of an installation or facility. Obscuring or screening that minimizes targeting opportunities is the primary means of protecting DOD personnel. Section B-3.2.3 of the standards recommends screening or blocking sight-lines of building entries from multiple vantage points. Travis AFB utilizes these methods of screening the Main Gate, but only at ground level.

Findings

- Because of the proximity to the Main Gate, a two- or three-story building could provide views and vantage points into the installation, creating a potential security risk.
- Redevelopment and revitalization in the area could involve higher density mixed-use buildings with more than one story.
- Design review of the future development would allow the City and Base to address lines of site issues into the Base.

ISSUE AT-2	**Security concerns at hospital** If a medical emergency happens in the surrounding area and Travis's hospital is the nearest to it, patients are taken there with or without background check / security clearance.

Compatibility Assessment

The David Grant US Air Force (USAF) Medical Center provides a full spectrum of health care and treatment for military personnel, dependents, and veterans. The Medical Center is a fully operational hospital that offers emergency care services and accepts outside civilians during emergency situations. Due to the time sensitivity of an emergency event, a background check may not be performed before allowing entrance to Travis AFB. The hospital and the adjacent Fairfield Veterans Affairs (VA) Outpatient Clinic also provide mental health services. Outside visitors can visit patients, after a background check is preformed, from 7:00am to 10:00pm.

The USAF Medical Center is a designated Level III Trauma Center, with the highest level being a Level I. The different levels of designation for trauma centers refer to the kinds of resources available at the trauma center and the number of patients admitted yearly, with Level I being the most comprehensive. A Level I Trauma Center is a comprehensive regional resource that is a tertiary care facility central to the trauma system. A Level I Trauma Center can provide total care for every aspect of injury – from prevention through rehabilitation. A Level II Trauma Center can initiate

definitive care for all injured patients. A Level III Trauma Center has demonstrated an ability to provide prompt assessment, resuscitation, surgery, intensive care and stabilization of injured patients and emergency operations.

About six miles west of the USAF Medical Center is the NorthBay Medical Center, a verified Level II Trauma Center. The NorthBay Medical Center is the closest alternative to the USAF Medical Center. Kaiser Permanente Vacaville Medical Center, another Level II Trauma Center, about ten miles north of the USAF Medical Center, is also an alternative. The closest Level I Trauma Center is the UC Davis Medical Center in Sacramento.

As of March 2016, there are 38,048 patients enrolled at David Grant USAF Medical Center. There is a total of 86,000 TRICARE beneficiaries that could potentially be served by the hospital within the Northern California Prime Service Area.

The hospital treats patients with a range of backgrounds, some suffering from drug and alcohol abuse or they may have a criminal history. These types of patients are entitled to medical care from the USAF Medical Center and clinic, but because the facility is located on the Base, there are some security and safety concerns associated with these patients and visitors. Those patients that do not pass a background check are typically either denied entry or escorted by Base personnel.

Source: Travis Installation Development Plan

Findings

- The USAF Medical Center provides emergency services to civilians during emergency situations. Due to the time sensitivity of an emergency event, a background check may not be performed before allowing entrance to the Base.
- Patients who are entitled to treatment may be denied entry to the Base if they do not pass a background check.

5.4 Biological Resources (BIO)

Biological resources include federal and state listed species (threatened and endangered species) and their habitats. These resources may also include habitat such as wetlands and migratory corridors that are critical to the overall health and productivity of an ecosystem. The presence of sensitive biological resources may require special development considerations and should be included early in the planning process.

Key Terms

Airfield Operations Area. The Airfield Operations Area is an area used or intended to be used for landing, takeoff, or surface maneuvering of aircraft, including the runway and associated paved areas.

Bird / Wildlife Aircraft Strike Hazard (BASH). BASH refers to the likely occurrence for a collision between an airborne animal (usually a bird) and a human-made vehicle, particularly aircraft.

BASH Relevancy Area. The BASH Relevancy Area is a five-statute mile area from the airfield operations area, including the runway. This area has been determined by the FAA as an area where BASH incidences are likely to occur due to the types of flying operations that occur near the airfield, such operations are typically at slower speeds and lower altitudes making the conditions for BASH opportune.

Critical Habitat. Specific areas found to be essential to the conservation of a threatened or endangered species and which may require special considerations or protection. Under this designation, the US Fish and Wildlife Service (USFWS) must review all federal government activities within a designated critical habitat area to ensure that threatened and endangered species are protected.

Depredation. The capture or killing of birds to reduce damage caused by birds or to protect other interests such as human health and safety or personal property.

Endangered Species. Plant or animal species that have a very small population and are at greater risk of becoming extinct. The presence of threatened and endangered species may require special development considerations, could halt development, and could impact the performance of military missions.

Federal Endangered Species Act (FESA). FESA provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead federal agencies for implementing FESA are the USFWS and the US National Oceanic and Atmospheric Administration (NOAA) Fisheries Service. Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees.

Threatened Species. According to the ESA a threatened species is "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

Vernal pools. Temporary pools of water that provide habitat for distinctive plants and animals. They are considered to be a distinctive type of wetland usually devoid of fish, and thus allow the safe development of natal amphibian and insect species unable to withstand competition or predation by fish.

ISSUE BIO-1	**Location of federally listed species on Travis AFB, including critical habitat** There are several federally listed threatened and endangered species located on Travis AFB that impact Base operations.

Compatibility Assessment

Seven special status species have been identified at Travis AFB. These are the Contra Costa goldfield, California tiger salamander, Swainson's hawk, tricolored blackbird, western burrowing owl, vernal pool fairy shrimp, and vernal pool tadpole shrimp. These species are protected by the federal Endangered Species Act, the California Endangered Species Act, or the Migratory Bird Treaty Act.

Contra Costa Goldfield

The Contra Costa goldfield is a federally endangered wildflower. The flower has been found in vernal pools and grasslands on Travis AFB. The installation contains 13 acres of US Fish and Wildlife Service (USFWS) designated critical habitat near the South Gate for the Contra Costa goldfield, along with the vernal pool fairy shrimp and vernal pool tadpole shrimp.

Swainson's Hawk

The Swainson's hawk is a state threatened species and federally protected by the Migratory Bird Treaty Act. The hawk is a Neotropical migrant, wintering in Mexico and South America and returning to North America in the spring to nest. On and around Travis AFB they tend to nest in large trees and forage in nearby grassland and agricultural fields. Although the hawk is not federally protected by the Endangered Species Act, the Air Force gives the same protection for state-listed species, when practical.

Western Burrowing Owl

The western burrowing owl is state listed as a species of special concern, meaning the species is on the decline, but overall populations are enough that danger is not immediate. Travis AFB supports a population of burrowing owls within the grasslands sporadically spaced across the Base. The Base maintains a Burrowing Owl Management Plan to help protect the species and mitigate impacts.

Tricolored Blackbird

The tricolored blackbird is a state endangered species, federally protected by the Migratory Bird Treaty Act, and federally listed as a species of conservation concern. As of September 2015, the status of the species is under review at the federal level and may be formally listed under the Endangered Species Act. The birds nest in large flocks in vegetation near wetlands or water. Tricolored blackbirds have been observed on Travis AFB in vegetation growing along Union Creek, near the runway.

California Tiger Salamander

The California tiger salamander is a federally and state threatened species that occurs as both adult and larval forms on Travis AFB. The salamander breeds in the vernal pools and ponds surrounding the Castle Terrace Housing project area and within a half mile of the Base's eastern boundary. California tiger salamanders have been recorded dispersing up to 1.3 miles from their breeding ponds. To protect the species, a 1.3-mile impact buffer is maintained around ponds on the Base to assess any impact development may have on the salamander.

Vernal Pool Fairy Shrimp

The vernal pool fairy shrimp is a federally listed threatened species that reside in the vernal pools located on Travis AFB. Along with vernal pools, the shrimp have also been found in temporary surface waters and marshes. The loss of vernal pools is the primary threat to the species' survival, which have been designated as critical habitat by USFWS. 13 acres of vernal pool fairy shrimp critical habitat are located on the Base.

Vernal Pool Tadpole Shrimp

The vernal pool tadpole shrimp is a federally listed endangered species that resides in the vernal pools located on the Base. The species has the same threats, critical habitat, and management considerations as the vernal pool fairy shrimp.

Protected Habitat

Different types of habitat that support threatened and endangered species are also located on and near the Base. Critical habitat is currently designated by the USFWS for the California tiger salamander, Contra Costa goldfields, vernal pool fairy shrimp, and vernal pool tadpole shrimp. In addition to the species that are found on-Base, there are five species that have critical habitat in the TSS Study Area. These species are the Delta green ground beetle, conservancy fairy shrimp, delta smelt, Suisun thistle, and soft bird's-beak. These critical habitat designations include wetlands, vernal pools, and grasslands commonly found at Travis AFB and near the Base south of the cities of Fairfield and Suisun City, as shown on Figure 5.4-1.

As compensation for damage to vernal pools, three areas on-Base were designated as vernal pool preservation areas. Because the Base contains numerous natural resources, it must comply with the requirements of the state and federal Endangered Species Acts and federal Migratory Bird Treaty Act, which has the potential to impose mission constraints. Protection of habitat for endangered and threatened species limits available area for future development and mission expansion.

Existing biological opinions associated with the Base have designated certain areas on-Base for the protection of habitat. In order to off-set the impact of development on-Base, the Castle Terrance Housing Open Space / Wetlands Preserve Area, the former Aero Club Preserve Area, and the South Gate Construction Gate Area preserve areas have been established to protect the species living on the Base.

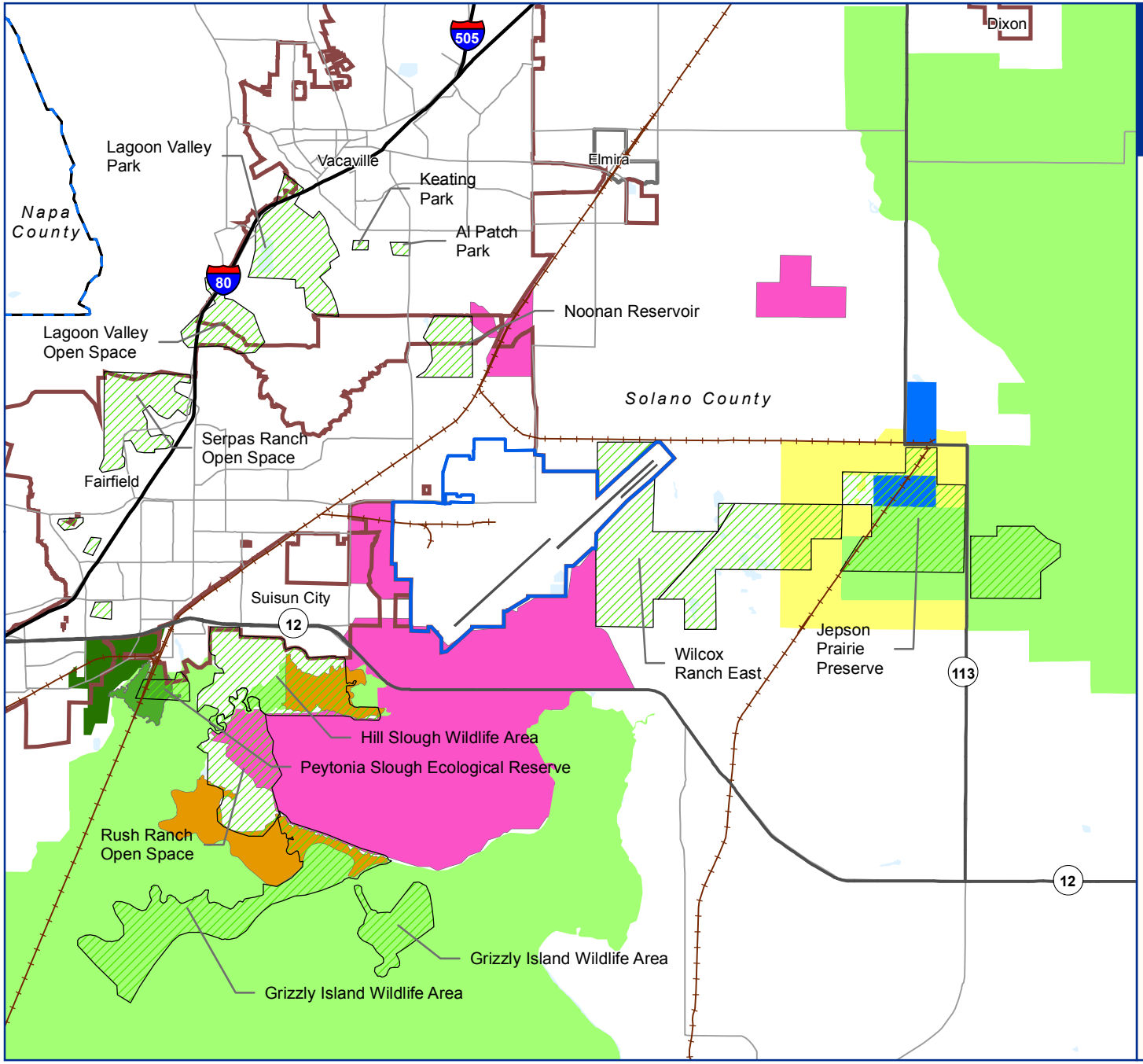

Figure 5.4-1

Conservation and Preservation Areas Near Travis AFB

Legend

- Conservation Areas

Critical Habitat

- California tiger salamander
- Conservancy fairy shrimp
- Contra Costa goldfields
- Delta green ground beetle
- Delta smelt
- Soft bird's-beak
- Suisun thistle
- Vernal pool fairy shrimp
- Vernal pool tadpole shrimp

- Travis AFB
- Runway
- Solano County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Railroad
- Waterbody

Conservation areas are approximate.

Sources: Travis AFB, 2016; US Census, 2014; Matrix Design Group, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

Conservation and preservation areas are also located near Travis AFB, which are shown on Figure 5.4-1. Wilcox Ranch is a 1,342-acre area that directly borders the east side of Travis AFB. The ranch, which contains vernal pool critical habitat, is protected by conservation easements and is owned by the Solano Land Trust, Solano County, and the City of Fairfield. The 1,566-acre Jepson Prairie Preserve is owned by the Solano Land Trust and is located approximately four miles east of Travis AFB. The prairie contains vernal pools and grassland critical habitat. Species known to inhabit these areas are Contra Costa goldfield, Swainson's hawk, western burrowing owl, California tiger salamander, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

Critical habitat and preserve areas surrounding Travis AFB could affect future expansion of the Base boundary should that be deemed necessary. In areas that are not protected by easements, the cost of land acquisition and mitigation can be very high. For example, the compensation ratio is $19,000 for one acre of California tiger salamander habitat impacted.

While the nearby conservation areas serve as a refuge for various threatened and endangered species, these species may migrate onto Travis AFB due to the proximity of the areas. The Base has similar habitats, which are federally protected and managed.

Source: Travis AFB Integrated Natural Resources Management Plan, 2016

Findings

- Future Base expansion would need to address any impacts on threatened and endangered species.

ISSUE BIO-2	**Bird / wildlife aircraft strike hazards** Travis is located in the Pacific Flyway and has many water areas around it, which are natural bird attractants, causing potential for bird / wildlife aircraft strike hazards. Siting of habitat areas near Travis AFB flight paths and operation areas could attract additional birds to the area and increase bird-aircraft strike hazards.

Compatibility Assessment

Bird / wildlife aircraft strike hazard (BASH) is a very serious concern for the military. Bird aircraft strikes can cause damage to aircraft and in some cases, may render aircraft completely irreparable or result in a mishap.

The region surrounding Travis AFB hosts a diverse collection of wildlife. Seasonal wetlands, annual grasslands and riparian and marsh habitats are found along Union Creek south of the airfield on Travis AFB, which attract birds. Bird strike data indicates that larger flocking birds, such as gulls, wading birds, and waterfowl, are considered to be more of a potential threat to aviation safety. Smaller birds such as blackbirds and feral pigeons can also present significant hazards to aircraft due to the formation of tight flocks. Solitary birds, such as raptors and turkey vultures present a concern due to their size, soaring, and hunting behavior.

Table 5.4-1 shows the strike history by type of bird at Travis AFB from 2007 to 2015. Some types of birds have a larger impact than others. For example, although waterfowl strikes only represent 4 percent of total bird strikes, they encompass 37 percent of damaging bird strikes. These numbers are important to determine what birds are hit the most, what type of land uses they are attracted to, and how to control them.

Table 5.4-1. Bird Strike History from 2007-2015

Species	Percent of Strikes	Number of Strikes	Cost of Damage
Perching Birds	44%	102	$66,669
No Remains / Unknown	19%	43	$24,473
Swallows / Swifts	12%	28	$38
Raptors and Vultures	9%	21	$56,619
Waterfowl	4%	10	$319,576
Shorebirds and Wading Birds	4%	8	$43,913
Pigeons and Doves	3%	6	$764
Mammals	3%	6	$169,002
European Starlings / Blackbirds	2%	5	$187,155
Gulls	<1%	2	N/A
Crows and Ravens	<1%	1	$3,939
Total	100%	232	$872,148

Source: Travis AFB Wildlife Hazard Assessment

The presence of birds can impact flight operations at Travis AFB. A Bird Watch Condition is maintained by the Airfield Manager, the Wildlife Control Team, and the Tower Watch Supervisor on-Base. Condition levels that are used to warn aircrew and support personnel of bird threats are low, moderate, and severe.

- A low condition level indicates normal wildlife activity, fewer than five large birds or 15 small birds on or above the airfield. Operations are only limited under low conditions during sunrise and sunset during migratory waterfowl season, typically September to April.
- A moderate condition level indicates an increased wildlife population, five to 15 large birds or 15 to 30 small birds in the area. Under moderate conditions, all aircraft departures require approval by the Operations Group Commander and all local traffic pattern activity is stopped. Additionally, takeoffs and landings are only allowed once routes avoid identified bird activity under moderate conditions.
- A severe condition level indicates a high wildlife population, more than 15 large birds or 15 to 30 small birds in the area. All flight operations are prohibited under severe conditions. These limits can delay or prevent mission operations, costing time and money.

To help limit bird activity on the Base, Travis AFB maintains a BASH program. The BASH program's principle focus is to mitigate wildlife hazards through preventative measures that include identification and monitoring of threats, habitat modification, and harassment and relocation to discourage birds and wildlife. When preventative methods fail, depredation occurs as a last resort. The Travis AFB BASH Program is implemented in two operational phases. Phase I focuses on bird and wildlife control and dispersal and is in effect year-round. Phase II, in conjunction with Phase I, concentrates on bird and wildlife avoidance and restricts airfield operations during the September through April migration period.

Existing Off-Base BASH Hazards

The BASH program helps control BASH hazards on-Base, but Travis AFB does not have the authority to control bird attractants off-Base. Figure 5.4-2 illustrates the location of existing BASH areas of concern within the five-mile BASH Relevancy Area. The BASH Relevancy Area is a five-mile area extending from the airfield operations area, including the runway. The BASH Relevancy Area has been designated by the FAA as an area where BASH incidences are likely to occur due to the types of flying operations that occur near the airfield. Table 5.4-2 provides a list of land use types and the species that are attracted to those land use types.

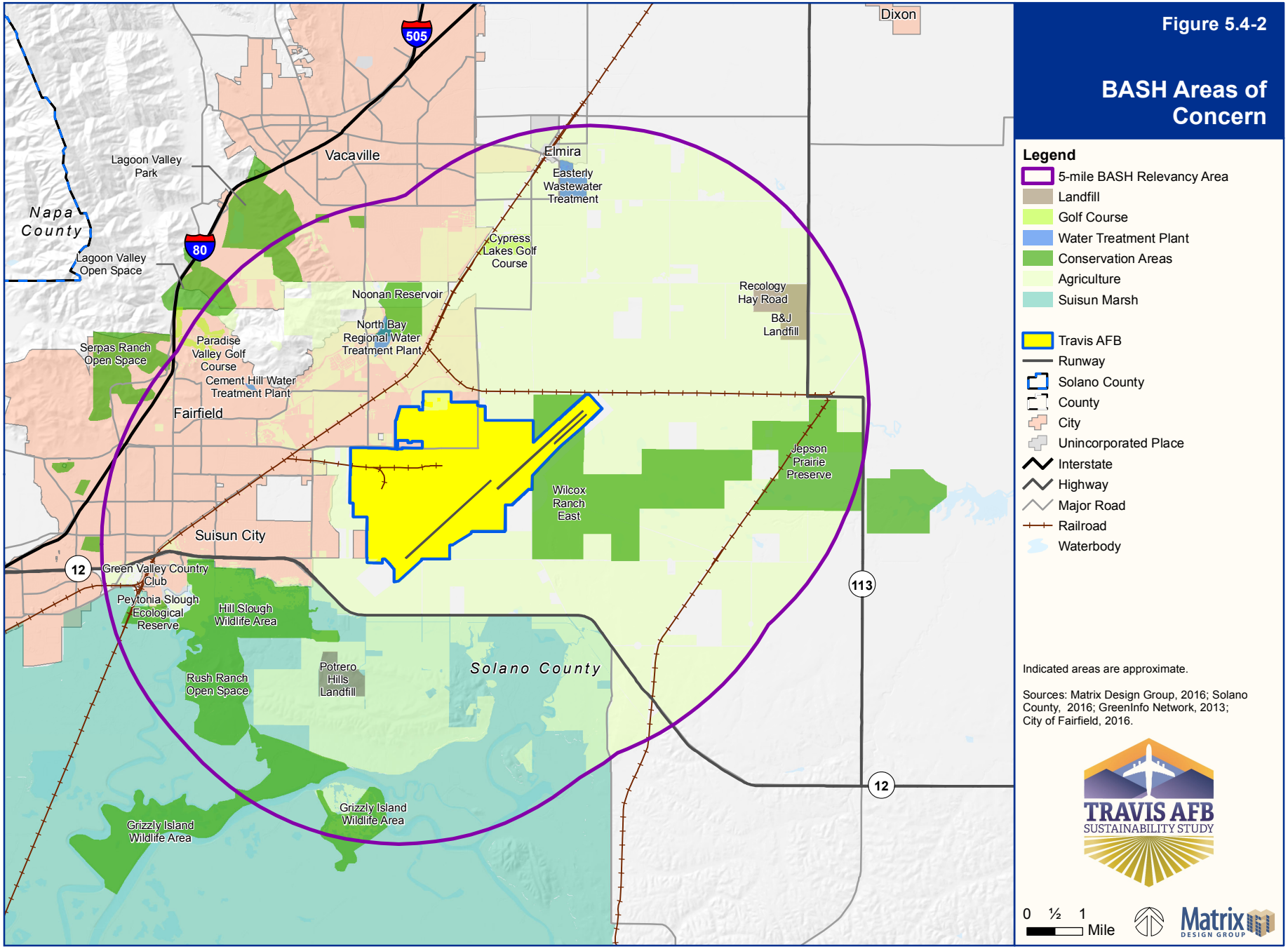
Figure 5.4-2
BASH Areas of Concern
Legend
5-mile BASH Relevancy Area
Landfill
Golf Course
Water Treatment Plant
Conservation Areas
Agriculture
Suisun Marsh
Travis AFB
Runway
Solano County
County
City
Unincorporated Place
Interstate
Highway
Major Road
Railroad
Waterbody
Indicated areas are approximate.
Sources: Matrix Design Group, 2016; Solano County, 2016; GreenInfo Network, 2013; City of Fairfield, 2016.
TRAVIS AFB SUSTAINABILITY STUDY
0 ½ 1 Mile
Matrix DESIGN GROUP
Dixon
505
Vacaville
Lagoon Valley Park
Napa County
80
Lagoon Valley Open Space
Elmira
Easterly Wastewater Treatment
Cypress Lakes Golf Course
Noonan Reservoir
Recology Hay Road
B&J Landfill
North Bay Regional Water Treatment Plant
Serpas Ranch Open Space
Paradise Valley Golf Course
Cement Hill Water Treatment Plant
Fairfield
Jepson Prairie Preserve
Wilcox Ranch East
Suisun City
12
Green Valley Country Club
Peytonia Slough Ecological Reserve
Hill Slough Wildlife Area
113
Solano County
Potrero Hills Landfill
Rush Ranch Open Space
12
Grizzly Island Wildlife Area
Grizzly Island Wildlife Area

Table 5.4-2. Species Known to be Attracted to Land Use Type Nearby Travis AFB

Land Use Type	Species Known to be Attracted to Land Use Type
Public Parks	Swallows, sparrows, blackbirds / starlings, crows / ravens, doves, pigeons, geese and ducks
Golf Courses	Geese and ducks, blackbirds / starlings, sparrows, swallows
Water Treatment Plants	Geese and ducks, cormorants / pelicans, herons, shorebirds
Landfills	Gulls, blackbirds / starlings, vultures
Agricultural Lands	Hawks, vultures, blackbirds / starlings, crows / ravens
Rivers and Creeks	Egrets, songbirds, geese and ducks, mammals such as raccoons and otters
Estuarine / Wetland Habitat	Shore birds, blackbirds, geese and ducks, egrets, cormorants, pelicans
Open Space	Hawks, swallows, sparrows, kestrels, coyote, owls, turkey / pheasants, osprey, eagles, vultures

Source: Travis AFB Land Use Compatibility Plan

B&J Landfill / Recology Hay Road are located 1.5 miles north and Potrero Hill Landfill is four miles south of the Travis AFB runways. These landfills attract a large amount of gull and vulture activity that increases BASH risk. The North Bay Regional Water Treatment Plant is located about three miles northwest of Travis. The Easterly Wastewater Treatment Plant is about four miles north of Travis. Water treatment plants attract geese and ducks. The Base is also located nearby several parks and golf courses, which attract swallows, sparrows, blackbirds, and starlings

Potrero Hill Landfill (Source: Daily Republic)

Travis AFB is located within the Pacific Flyway, illustrated on Figure 5.4-3, which is a major migration corridor for birds. The Pacific Flyway stretches along the Pacific Coast from Mexico north to Alaska, with at least one billion birds migrating along the flyway each year. Migratory birds travel some or all the distance heading north as early as March and then migrating south as early as August. Suisun Marsh is a notable location that provides a unique habitat along the flyway. The 116,000-acre Suisun Marsh, the largest contiguous brackish marsh in the western US, is located just a few miles south of Travis AFB. The marsh attracts shore birds, blackbirds, geese and ducks, egrets, cormorants, and pelicans.

Figure 5.4-3. Pacific Flyway Migration Routes

Source: http://www.birdfeeders.com/blog/wild-bird/pacific-flyway-migration/
Note: Approximate location of Travis AFB added by Matrix Design Group

Wilcox Ranch is a 1,342-acre area that directly borders the east side of Travis AFB. The 1,566-acre Jepson Prairie Preserve is owned by the Solano Land Trust and is located approximately four miles east of Travis AFB. These open spaces have the potential to attract hawks, swallows, sparrows, owls, eagles, and vultures.

Other conservation areas nearby Travis are located within the Suisun Marsh, about two miles south of Travis AFB. The Hill Slough Wildlife Area consists of about 1,700 acres of salt tidal marsh, managed marshes, sloughs and upland grassland and the Peytonia Slough Ecological Reserve consists of 117 acres of brackish and salt marsh and low uplands. Another preserve south of Travis is Rush Ranch, 2,070 acres of marsh and rolling grassland and is designated a part of the San Francisco Bay National Estuarine Research Reserve. The Grizzly Island Wildlife Areas, also south of Travis, consist of 88,000 acres of land, bays and sloughs and are managed by the California Department of Fish and Wildlife. Conservation areas within the Suisun Marsh have the potential to attract shore birds, blackbirds, geese and ducks, egrets, cormorants, and pelicans.

Potential Future Off-Base BASH Hazards

Travis AFB contains and is surrounded by areas with relatively undisturbed natural resources. While Travis AFB supports the conservation of natural resources and complies with federal and state regulations, the Base also works to limit bird activity on and around the Base to prevent bird / wildlife aircraft strike hazards (BASH). These efforts include reducing bird attractants by controlling vegetation, modifying habitat, and the elimination of roosting sites. Travis AFB meets and communicates with California Department of Fish and Wildlife (CDFW) representatives to monitor and discourage industries that attract birds to the local area, especially in the approach and departure corridors. Figure 5.4-1 shows the conservation and preservation areas nearby Travis AFB, along with the five-mile BASH Relevancy Area.

As resource management agencies, including the CDFW, work to protect and manage wildlife and their habitats, which involves the acquisition, preservation, and restoration of wildlife areas, these activities can increase BASH potential. The California EcoRestore initiative being carried out by the California Natural Resources Agency is working to restore 30,000 acres of critical habitat in the Sacramento-San Joaquin Delta. Projects within

Solano County include five delta habitat restoration projects, restoring over 1,600 acres of wetlands in the vicinity.

One of the restoration projects closest to Travis AFB is the Hill Slough Wildlife Area, located directly south of Suisun City, less than two miles from the end of the runway. The CDFW, along with the California Wildlife Foundation and Solano County Public Works, is working to restore the marsh near the corner of Highway 12 and Grizzly Island Road. The goal of the project is to create about 750 acres of restored tidal marsh and upland habitat. Another restoration project, Goat Island Tidal Marsh Restoration, is located directly south of the Hill Slough Wildlife Area within Rush Ranch. The Goat Island Tidal Marsh Restoration will add 80 additional acres of tidal marsh. With tidal marsh and upland habitat being ideal for waterfowl and other bird species, such as shore birds, blackbirds, geese, and ducks, the creation of new wetlands in the vicinity would increase BASH risk in the area.

Suisun Bay (Source: http://www.watereducation.org/)

The other restoration projects associated with California EcoRestore within Solano County are the Bradmoor Island Restoration and Tule Red Restoration to the south of Travis AFB within Suisun Marsh and the Lindsey Slough Tidal Marsh Restoration several miles to the east of Travis AFB. Additional restoration projects have the potential to be initiated throughout the Suisun Marsh area south of Travis AFB and the Lindsey Slough area northeast of Travis AFB.

The Fairfield Train Station Specific Plan, a rail-oriented specific plan located north of Travis AFB, includes the establishment of approximately 1,532 acres of open space that would preserve habitat in the Specific Plan area. The Noonan Ranch Conservation Bank has already been established on 203 acres in the southern portion of the Specific Plan area, east of Vanden Road. The Noonan Ranch Conservation Bank preserves seasonal drainage, freshwater marsh, and vernal pools in a grassland area. Another 450-acre conservation area would be designated adjacent to the established Noonan Ranch Conservation Bank as part of the Specific Plan area. These open space conservation areas could potentially attract birds and increase the BASH risk.

The City of Vacaville has experienced flooding resulting in part from the large amount of flow coming from the Vaca Mountains. In order to reduce the flooding, Vacaville built several regional detention basins that reduce the flow in the creeks before reaching the city. The City maintains the Storm Drainage Master Plan, which identifies storm drainage deficiencies and improvements needed to address existing localized flooding problems. The Storm Drainage Master Plan identifies regional detention basins to mitigate the increase in runoff from new development. New development is required to provide 100-year level flood protection within the proposed development area and ensure that developed areas are not adversely impacted.

Future growth areas within the city's urban growth boundary are concentrated on the east side of the city. Policy LU-P17.10 in the Vacaville General Plan requires specific plans within the East of Leisure Town

Road Growth Area to incorporate detention basins, agricultural buffer areas, and public open spaces into the physical amenities designed into the neighborhoods. Design Standard 4-12 of the City of Vacaville Standard Specifications and Standard Drawings requires that new development mitigate the increase of the 10- and 100-year peak runoff from a project site over the predevelopment conditions. The developer must either provide onsite storage or pay into the City Development Impact Fee for Storm Drain Detention. Development impact fees, established by Chapter 11.01 in the Vacaville Municipal Code, fund the necessary storm drainage improvements required for new development in Vacaville.

Drainage area in Vacaville (Source: http://www.westyost.com/)

Future drainage areas are anticipated to be constructed along with eastern edges of the city. The most recent drainage basin was completed north of Fry Road, near Leisure Town Road. Figure 5.4-4 shows Travis AFB flight tracks and City of Vacaville drainage basins within the BASH relevancy area. These future drainage basins have the potential to attract birds, which could increase BASH in the area. Travis AFB operations utilize the area north of the Base, to the east of Vacaville, for closed pattern flight tracks. Additional bird attractants could create increased BASH hazards for these types of operations.

Travis AFB Land Use Compatibility Plan

To help prevent the future creation of bird attractant land uses, the Travis AFB LUCP established a Bird Strike Hazard Zone, which is defined by a radius 14,500 feet from the runway centerlines. The plan also establishes an Outer Perimeter, located five miles from the farthest edge of the Base's airfield operations area, which the FAA recommends for any hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.

Within the Bird Strike Hazard Zone, reviewing agencies are required to prepare a Wildlife Hazard Assessment (WHA) for projects that have the potential to attract wildlife that could cause bird strikes. The WHA must demonstrate wildlife movement that may pose hazards to aircraft in flight will be minimized. Based on the findings of the WHA, all reasonable mitigation measures must be incorporated into the planned land use. For areas outside of the Bird Strike Hazard Zone but within the Outer Perimeter, any new or expanded land use that has the potential to attract the movement of wildlife that could cause bird strikes are required to prepare a WHA.

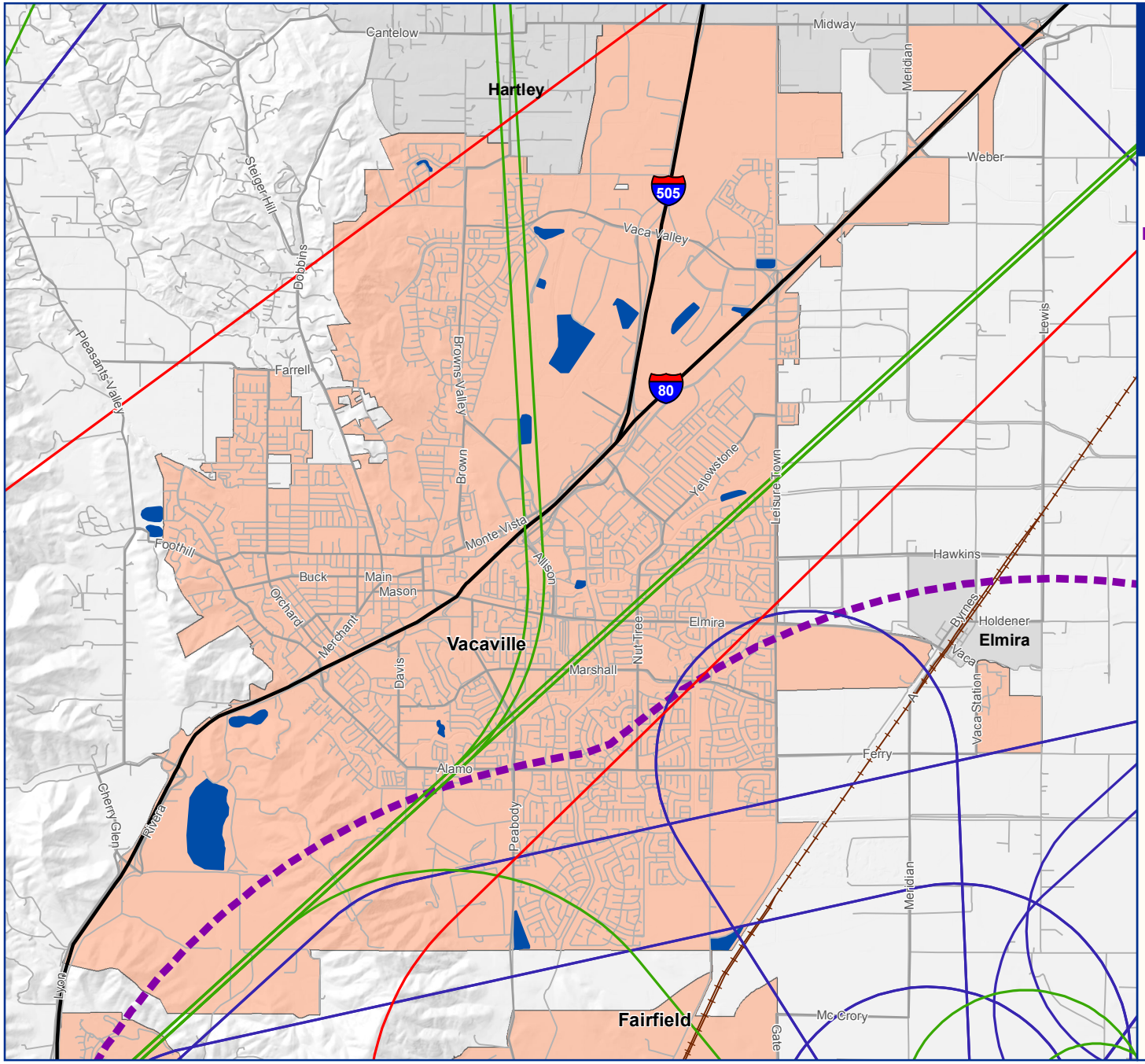

Figure 5.4-4

Travis AFB Flight Tracks Over Detention Storage

Legend

- Existing Detention Storage
- 5-mile BASH Relevancy Area Outer Perimeter

Flight Tracks

- Departure
- Arrival
- Closed Pattern

- City
- Unincorporated Place
- Interstate
- Major Road
- Local Road
- Railroad

Sources: Travis AFB, 2016; Matrix Design Group, 2016; US Census, 2014.

TRAVIS AFB SUSTAINABILITY STUDY

0 ¼ ½ Mile

Matrix DESIGN GROUP

The LUCP does not provide specific restricted land uses within the Bird Strike Hazard Zone and the Outer Perimeter; however, the avoidance of landfills and agriculture is emphasized. The ALUC has the authority to find a land use inconsistent if bird mitigation is not adequate, preventing the development, unless the ALUC's determination is overruled. Part of the implementation program of the LUCP is for the ALUC to take steps to clarify the specific limitations for land uses that have the potential to attract wildlife hazards.

Findings

- The presence of birds in aircraft operation areas can impact the mission at Travis AFB, posing a safety risk and costing time and money.
- There are multiple land uses, including open space, wetlands, parks, landfills, and golf courses outside of Travis AFB that attract birds to the area.
- The creation of new agricultural land, wetlands, drainage facilities, and preserves in the BASH Relevancy Area outer perimeter would increase the chances of future BASH incidents.
- Travis AFB is located within the Pacific Flyway, with Suisun Marsh being a notable stopping location for migratory birds.
- Restoration and conservation projects, such as California EcoRestore and the Fairfield Train Station Specific Plan, have the potential to attract birds to areas in the general vicinity of Travis AFB.
- While the CDFW and other resource agencies work to protect and restore wildlife areas that tend to attract birds, Travis AFB works to keep birds clear of the Base and the surrounding areas to protect aircraft. The addition or enhancement of wetlands and bird habitat near Travis may increase BASH risks.
- Drainage basins along the eastern edge of the City of Vacaville that are required to prevent flooding could potentially attract birds to the area north of Travis AFB and under flight tracks.

5.5 Communication / Coordination (COM)

This discussion refers to the programs and plans that promote interagency coordination. Interagency communication serves the general welfare by promoting a more comprehensive planning process inclusive of all affected stakeholders. Interagency coordination also seeks to develop and include mutually beneficial policies for both communities and the military in local planning documents, such as general plans.

Key Terms

Land Mobile Radio System. Land mobile radio system, also called public land mobile radio or private land mobile radio, is a wireless communications system intended for use by users in vehicles or on foot.

ISSUE COM-1	**Cannot hear radio communication from Nut Tree Airport** Air Traffic Control Tower at Travis AFB cannot receive radio communications from pilots at Nut Tree Airport because of a hill between the two facilities that interferes with the communication frequency.

Compatibility Assessment

Nut Tree Airport in Vacaville is surrounded by Class E Airspace (see Section 5.13 Land / Air / Sea Space Competition for more information), which requires Instrument Flight Rule (IFR) flights to be able to communicate with air traffic control before takeoff. The airspace is serviced by Travis Radar Approach Control (RAPCON) located at Travis AFB. Travis RAPCON uses radar to monitor and guide aircraft within the 1,800 square miles it is responsible for controlling.

Without an airport traffic control tower at Nut Tree Airport, pilots communicate with RAPCON to coordinate take-off. However, because of the topography of the area, radio communication cannot be established before take-off. Users at Nut Tree Airport usually do not need to notify Travis AFB RAPCON that they are taking off unless there is inclement weather that may impair a pilot's visual ability to see other aircraft. Pilots at Nut Tree Airport typically use their cell phones to call the tower to coordinate take-off. There is no formal communication process in place, so if a pilot is not aware of the blocked signal and the procedure to call RAPCON, a departure could occur without coordination. This lack of procedure can create safety issues if Travis AFB is not aware of planes taking off at Nut Tree Airport. Travis AFB stated that there have been no issues to date of aircraft from Nut Tree Airport interfering with aircraft traffic at Travis AFB or vice versa.

Findings

- Blocked radio communication from Nut Tree Airport can prevent aircraft from coordinating with RAPCON. This lack of communication can create safety issues if there is no knowledge of other aircraft operating in the area.
- Users at Nut Tree Airport usually do not need to notify Travis AFB RAPCON that they are taking off unless there is inclement weather.
- Pilots typically use cell phones to contact RAPCON, but there is not a formal process for alerting pilots to coordinate with the Travis AFB RAPCON.
- Travis AFB stated that there have been no issues to date of aircraft from Nut Tree Airport interfering with aircraft traffic at Travis AFB or vice versa.

ISSUE COM-2	**Informal communication between Travis AFB and surrounding jurisdictions** While there is generally good communication between Travis AFB and the surrounding communities, it is often done informally on a person-to-person basis and does not have a standardized procedure or established points of contact.

Compatibility Assessment

Coordination and communication between Travis AFB and surrounding jurisdictions is important to protect Travis AFB's mission viability and economic development in surrounding communities. Currently, community representatives communicate with Travis AFB based on common practice for notification and engagement. This informal means of communication can result in unresolved issues and / or incomplete information getting to the right person in a timely manner. The routine rotation of military personnel can present challenges and potential missed opportunities for maintaining continuity in communication and coordination without formal procedures in place.

In order to make land use decisions that are compatible with the military mission, communities need access to information and resources to make informed development decisions. Through shared information, community development can grow in a way that protects the safety, welfare and quality of life of its residents while being sensitive to the operational needs of Travis AFB.

This lack of formal coordination can also impact other issues, such as housing availability. Military personnel at Travis AFB require affordable and quality housing off-Base, yet jurisdictions may be unaware of this need. Jurisdictions must work with the Base to determine the needs of personnel- what type of housing is in demand and the best area to locate new housing (see Issue HA-1).

Zoning and general plan amendments and certain land use development proposals are reviewed by the Solano County Airport Land Use Commission (ALUC) for compatibility. The Travis AFB Land Use Compatibility Plan (LUCP) established compatibility zones and overlay zones for noise, safety, height, overflight, aircraft protection, renewable energy, and wildlife hazards that the ALUC reviews.

It is important that Travis AFB is included in the review of proposed development plans, especially when it may impact Base operations. The review allows for the evaluation of impacts the proposed development could have on missions at Travis AFB. When Travis AFB is consulted before incompatible development occurs, there is a better chance of issues being mitigated before construction begins. For local jurisdictions, development proposals are typically sent to Travis AFB for coordination, but the processes whereby this occurs are informally set by each jurisdiction and varies to some degree. Early consultations could help resolve issues before a project concept is fully developed.

Findings

- There is no formal document, such as a memorandum of agreement that delineates the process of engaging Travis AFB for community planning projects.
- Early consultation could allow for issues to be addressed in a more proactive manner.

ISSUE COM-3	**Technical guidance on compatibility** Local jurisdictions need clearer input from the Air Force regarding planning and development decisions and whether they are compatible with Travis AFB and its missions.

Compatibility Assessment

When surrounding communities reach out to Travis AFB, the Base tends not to directly oppose or support development in the communities outside of the Base. The Base works to maintain a neutral position to not directly interfere in local decision making. Local jurisdictions may seek out an opinion from Travis AFB for planning and development decisions, in addition to the review by the ALUC, to determine compatibility. However, while five members of the ALUC must have aviation expertise, there are no representatives from Travis AFB involved in the review.

Findings

- Local jurisdictions do not have clear processes to get technical input on development proposals.
- The ALUC does not have representatives from Travis AFB involved in the review of land use development proposals that may impact the Base.

5.6 Cultural Resources (CR)

Cultural resources are valued by or significantly representative of a culture or contain significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. Tangible cultural resources are categorized as artifacts, records, districts, pre-contact archaeological sites, historic archaeological sites, buildings, structures, and objects. Historic properties are cultural resources that are eligible or listed on the National Register of Historic Places. Cultural resources may prevent development, require development constraints, or require special access by Native American tribal governments or other authorities.

There were no Major Issues identified for Cultural Resources in the TSS.

5.7 Dust / Smoke / Steam (DSS)

Dust results from the suspension of particulate matter in the air. Dust (and smoke) can be created by fire (controlled or prescribed burns, agricultural burning, and artillery exercises), ground disturbance (agricultural activities, military operations, grading), industrial activities, or other similar processes. Dust, smoke and steam are compatibility issues if sufficient in quantity to impact flight operations (such as reduced visibility or cause equipment damage).

There were no Major Issues identified for Dust / Smoke / Steam in the TSS.

5.8 Energy Development (ED)

Development of energy sources, including alternative energy sources (such as solar, wind, geothermal, or biofuels) could pose compatibility issues related to glare (solar energy), vertical obstruction (wind generation), frequency interference and impedance (wind generation), or water quality / quantity (geothermal).

In the Travis AFB Study Area, wind generation and solar facilities are key items of concern.

Key Terms

Alternative Energy. The term alternative energy is applied broadly to energy derived from nontraditional sources (e.g., solar, hydroelectric, wind).

ISSUE ED-1	**Development of new or modification of existing wind farms** Potential for development of new wind farms or modifications of existing wind farms can create compatibility issues including frequency interference and vertical height concerns if not planned and sited with compatibility in mind in the region.

Compatibility Assessment

The moving blades of a wind turbine create disturbances that can interfere with radio transmissions between air traffic controllers and aircraft and other types of communications, such as satellites. Recent studies indicate that large numbers of wind turbines located between five and eight miles from a radar system can have a negative impact on the system and interfere with readings. The impacts on radar are increased with the height, number, and clustering of turbines. The greatest impact is caused by their location proximate to the radar system. Although research is still being conducted, it is not fully known how tall, large, or how many wind turbines must be present to compromise radar operations.

With the increase in both energy demand and renewable energy technology, renewable energy facilities have developed across several parts of Solano County, including more than 600 wind turbines in the Montezuma Hills between Suisun City and Rio Vista. Solano County is considered a wind resource area, with average wind speeds reaching up to eight meters per second (over 17 miles per hour) at a height of 80 meters (over 260 feet). Figure 5.8-1 shows wind resource potential and the locations of the High Winds, Montezuma Wind II, Shiloh I, Shiloh 2, Shiloh III, Shiloh IV, and Solano Wind farms in Solano County.

Installation of the wind turbine at the Anheuser-Busch brewery (Source: Daily Republic)

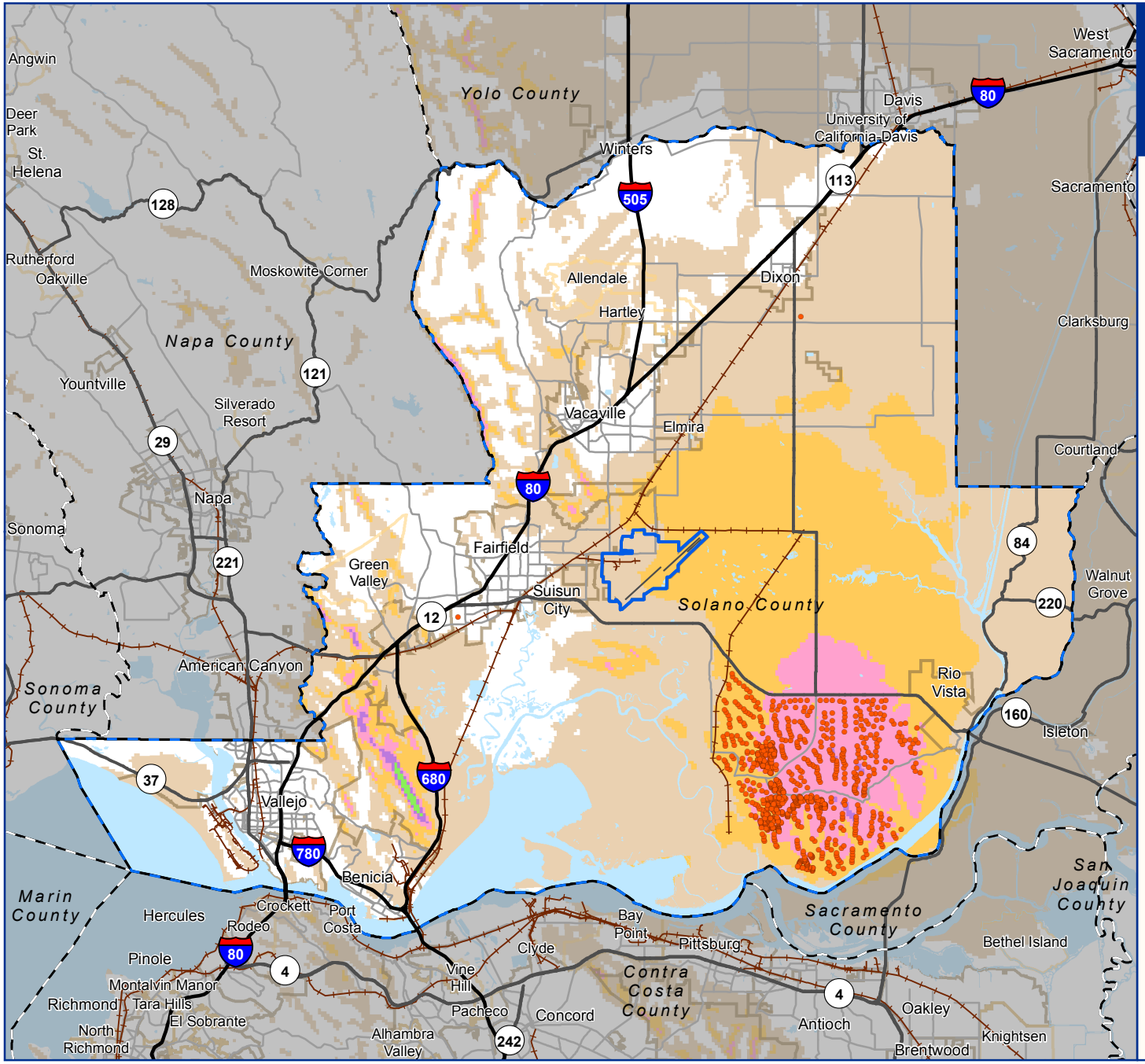

Figure 5.8-1

Wind Energy Potential

Legend

- Onshore Industrial Wind Turbine

Wind Resource Potential (m/s)

- Poor (0.0 - 5.6)
- Marginal (5.6 - 6.4)
- Fair (6.4 - 7.0)
- Good (7.0 - 7.5)
- Excellent (7.5 - 8.0)
- Outstanding (8.0 - 8.8)

- Travis AFB
- Runway
- Solano County
- Other County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Railroad
- Waterbody

Note: Indicated areas are approximate.

Source: National Renewable Energy Laboratory, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

0 1 2 3 Miles

Matrix DESIGN GROUP

Commercial wind turbines typically reach a total height over 300 feet above ground level (AGL), often ranging between 300 to 400 feet AGL, with newer models increasing to over 400 feet AGL, to reach better wind resources. It is required by the LUCP that new wind turbines over 100 feet AGL must not be within a line-of-sight of the Travis AFB Digital Airport Surveillance Radar (DASR), with placement reviewed by the ALUC. Appendix H of the LUCP provides viewsheds where 100-foot, 200-foot, 300-foot, 400-foot, and 500-foot tall objects would likely be within the line-of-sight of the Travis AFB DASR. These viewsheds are shown on Figures 5.8-2, 5.8-3, 5.8-4, 5.8-5, and 5.8-6. A comparison of the Travis AFB DASR line-of-sight viewshed with the map of wind energy potential, in Figure 5.8-1, shows that placement of wind turbines greater than 100 feet AGL is limited in areas that are considered outstanding and excellent for wind resource potential. Wind turbine placement is also limited in the eastern portion of the county where wind resource potential is considered fair and marginal.

Since the 2015 Travis LUCP update has been in place, there have been no new wind facilities proposed.

Relative to solar energy, solar facilities could cause glare depending on their type, location, angle and direction, resulting in a reduction of a pilot's view, even at a very high altitude.

Solar facilities are regulated by the Travis AFB LUCP to prevent any reflective glint and glare hazards to aircraft pilots and air traffic controllers. Travis AFB uses the Sandia National Laboratories-developed Solar Glare Hazard Analysis Tool (SGHAT) that analyzes proposed solar array systems and recommends mitigation methods if needed. This method provides predictions of potential glare impacts and allows for evaluation of design alternatives to avoid those impacts.

Regulations for solar energy in the Travis AFB LUCP include restricting commercial-scale solar facilities with the potential for glint or glare that would impact an existing or planned airport traffic control tower or approach path. All new or expansion of existing commercial-scale solar facilities must be reviewed by the ALUC and are required to conduct a glint and glare study based on the SGHAT model. Solano County has adopted an ordinance prohibiting commercial scale solar facilities to prevent conversion of agricultural lands. Commercial solar facilities are considered any solar array that coverts solar energy to utility power for the primary purpose of resale or off-site use. There are no regulations restricting non-commercial or residential solar panels.

Source: Travis AFB LUCP, /www.bcse.org/sustainableenergyfactbook/

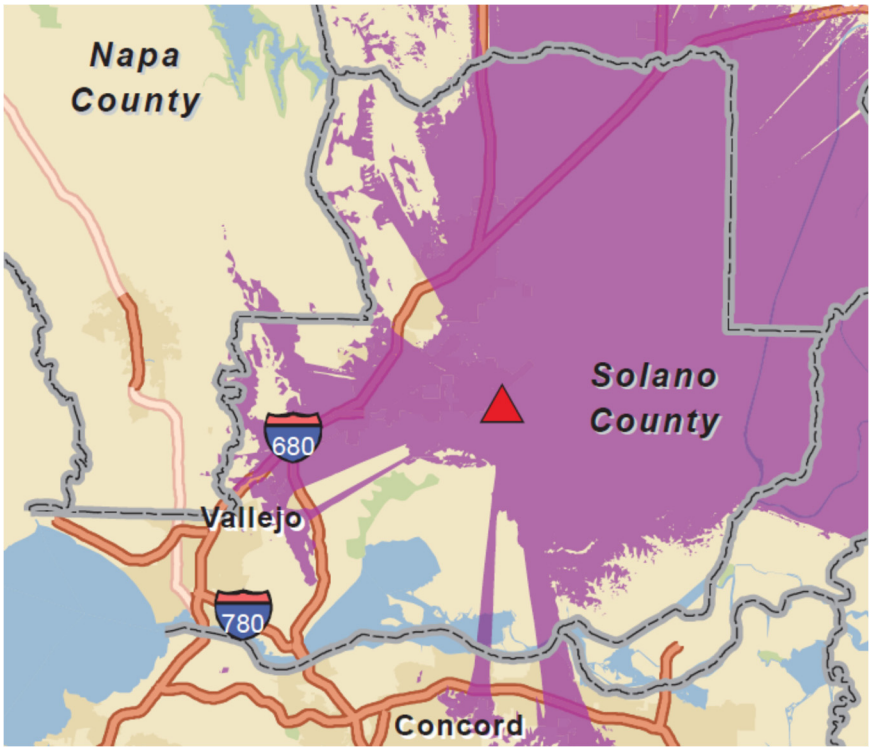

Figure 5.8-2. DASR Line-of-Sight Viewshed for 100 Foot Objects

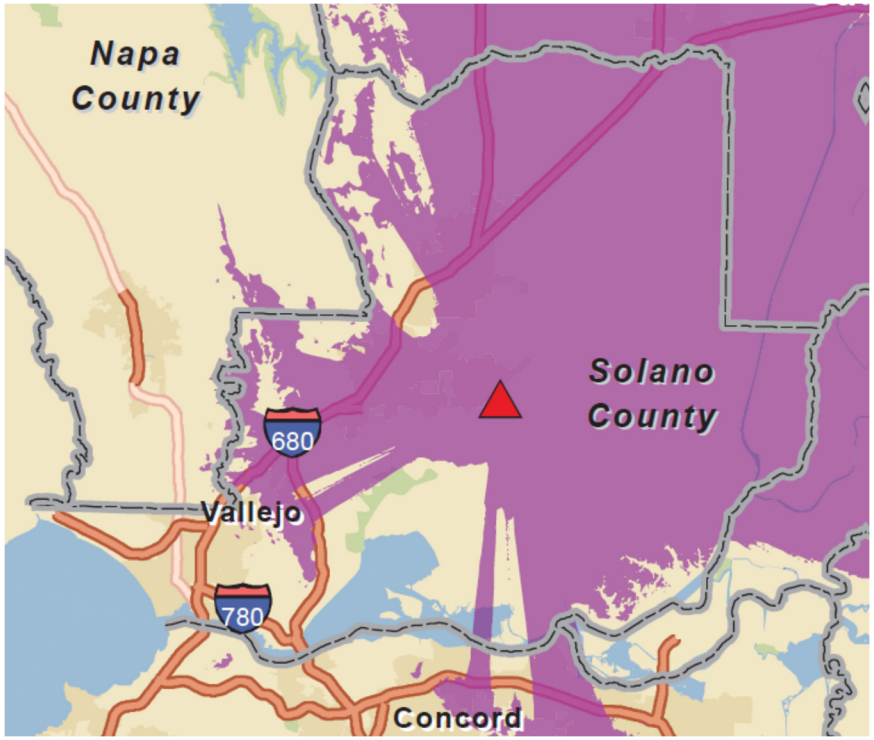

Figure 5.8-3. DASR Line-of-Sight Viewshed for 200 Foot Objects

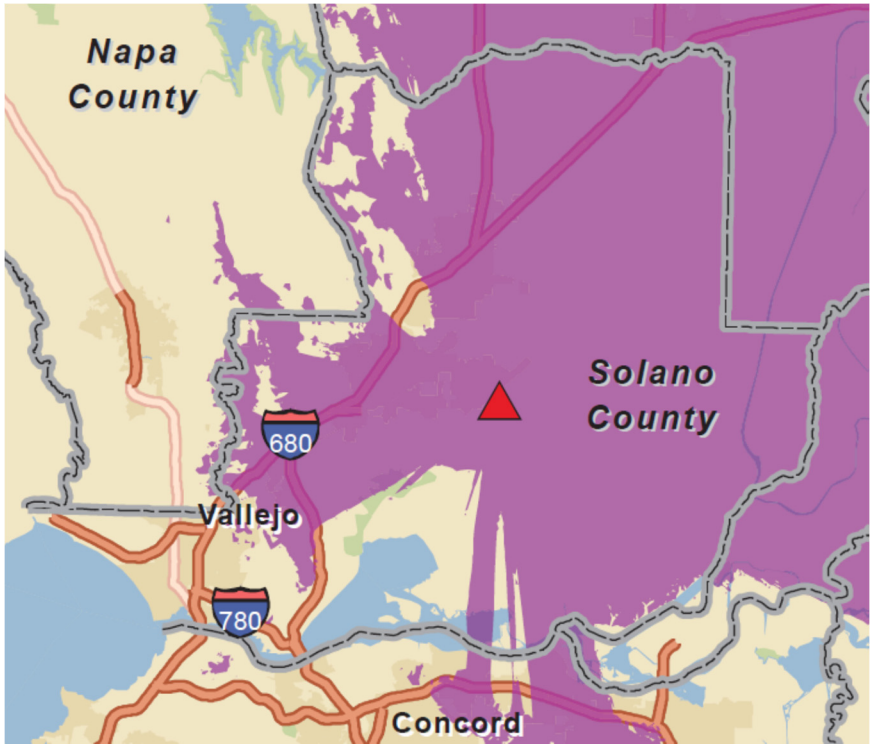

Figure 5.8-4. DASR Line-of-Sight Viewshed for 300 Foot Objects

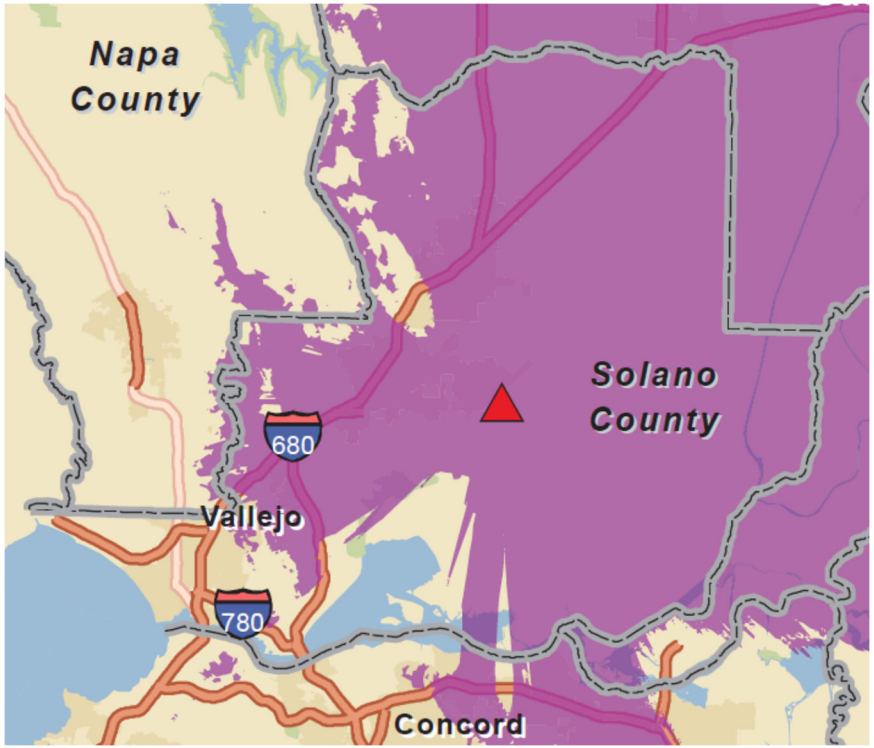

Figure 5.8-5. DASR Line-of-Sight Viewshed for 400 Foot Objects

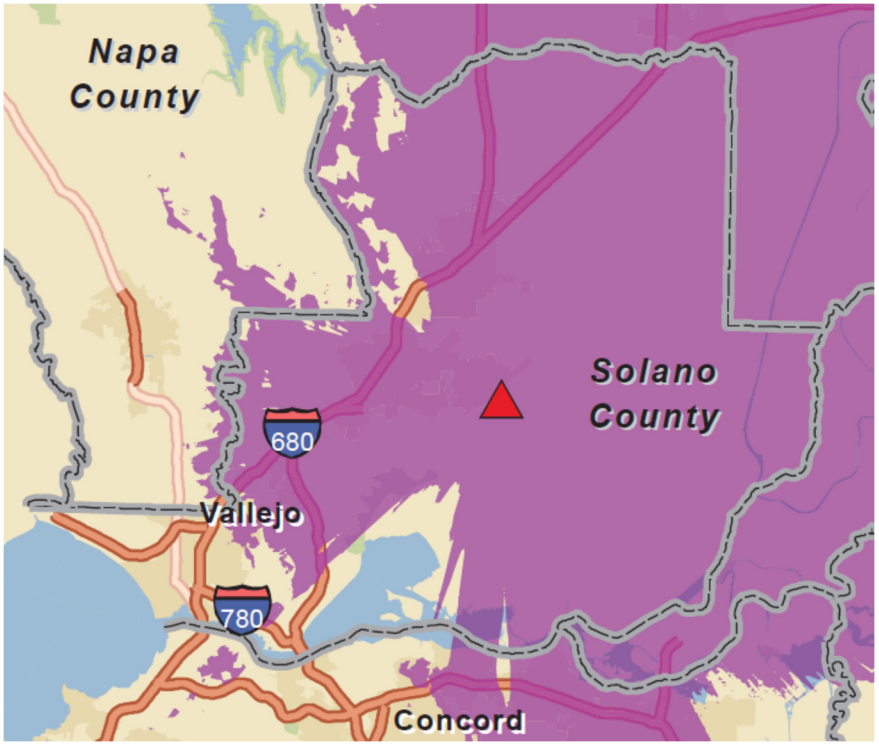

Figure 5.8-6. DASR Line-of-Sight Viewshed for 500 Foot Objects

Findings

- The moving blades of a wind turbine create disturbances that can interfere with radio transmissions between air traffic controllers and aircraft and other types of communications, such as satellites.
- Over 600 wind turbines have been built in the Montezuma Hills between Suisun City and Rio Vista, ranging from total heights between 300 feet to 400 feet.
- Since the 2015 Travis LUCP update has been in place, there have been no new wind facilities proposed.
- Travis AFB uses the Sandia National Laboratories-developed Solar Glare Hazard Analysis Tool (SGHAT) that analyzes proposed solar array systems and recommends mitigation methods if needed.
- Future alternative energy facilities are not likely to cause impacts to Travis AFB as their development is regulated by the ALUC and no new projects will be approved that would impact Travis AFB operations.

5.9 Frequency Spectrum Capacity (FSC)

Frequency spectrum refers to the range of electromagnetic waves capable of carrying signals for point-to-point wireless communications. In a defined area, the frequency spectrum is limited and increasing demand for frequency bandwidth from commercial applications such as cellular phones, computer networking, GPS units, and mobile radios, is in direct competition with the capacity necessary for maintaining existing and future missions and communications on installations.

There were no Major Issues identified for Frequency Spectrum Capacity in the TSS. Related issues for Frequency Spectrum Impedance / Interference are presented in Section 5.10.

5.10 Frequency Spectrum Impedance / Interference (FSI)

Frequency spectrum is the entire range of electromagnetic frequencies used for communications and other transmissions, which includes communication channels for radio, cellular phones, and television. In the performance of typical operations, the military relies on a range of frequencies for communications and support systems. Similarly, public and private users rely on a range of frequencies in the use of cellular telephones and other wireless devices on a daily basis.

Key Terms

Doppler shift. The change in frequency of a wave (or other periodic event) for an observer moving relative to its source, or the source moving relative to the observer.

Frequency Spectrum. The frequency spectrum is the entire range of electromagnetic frequencies used for communications and other transmissions, which includes communication channels used for radio, cellular phones, and television. In the performance of typical operations, the military relies on a range of frequencies for communications and support systems. Similarly, public and private users rely on a range of frequencies in the use of cellular telephones and other wireless devices used on a daily basis.

Impedance. Impedance is the interruption of electronic signals due to the existence of a structure or object between the source of the signal and its destination (receptor). Certain structures have the potential to block, or impede, the transmission of signals from antennas, satellite dishes, or other transmission / reception devices affected by line-of-sight requirements.

Interference. Interference is the inability to effectively distribute or receive a particular frequency because of similar frequency competition. As the use of the frequency spectrum increases (such as the rapid increase in cellular phone technology over the last decade) and as development expands near military installations and operational areas, the potential for frequency spectrum interference increases.

VORTAC radio navigation beacon. A very high frequency (VHF) omnidirectional range and tactical air navigation system (VORTAC) is a navigational aid for aircraft pilots consisting of a VHF omnidirectional range (VOR) beacon and a tactical air navigation system (TACAN) beacon. Both beacons provide low-level en-route navigation, with the VOR system typically used by civilian aircraft and the TACAN system used by military aircraft, including Travis AFB aircraft. The beacons provide pilots with location information to assist with navigation.

Technical Background

The DOD use of frequency spectrum allows for safe operations and the effective delivery of weapons on target without interference. The DOD's frequency spectrum needs for testing, evaluation, and training is constantly increasing, while the spectrum available for DOD use is decreasing. The National Telecommunications Industry Association (NTIA) Office of Spectrum Management (OSM) explains that:

> *…almost every agency of the Federal Government uses the spectrum in performing mandated missions. The DOD uses the spectrum extensively for tactical uses and non-tactical uses. In the United States tactical uses are generally limited to a number of specific testing sites and training facilities, but DOD's non-tactical applications are extensive and include aircraft command and control, mobile communication in and around military bases, and air fields and long distance communications using satellites.*

Frequency interference is related to other transmission sources. Interference can result from several factors, including:

- Using a new transmission frequency that is near an existing frequency;
- Reducing the distance between two antennas transmitting on a similar frequency;
- Increasing the power of a similar transmission signal;
- Using poorly adjusted transmission devices that transmits outside their assigned frequency or produces an electromagnetic signal that interferes with a signal transmission;
- Existing electronic sources and uses created by portable systems affecting entire communities utilizing Wi-Fi broadband systems; and
- Industrial sources that produce electronic noise by-product.

The military relies on a range of frequencies for communications and support systems. Since 1993, Congress has been selling federal spectrum bands for reallocation to the private sector, promoting the development of new telecommunications technologies, products and services. The expanding public and commercial use of the frequency spectrum from wireless transmitters to consumer electronics can encroach on the military's use of the frequency spectrum. Increasing community and DOD demands for this important resource can create conflicts for all users.

ISSUE FSI-1	**Radar impacts from wind turbines** Location of wind turbines south of Travis AFB impact radar field of view. Turbines are creating false positives. This becomes more of an issue with lots of small aircraft going through the radar on their way to Napa County and the Bay Area. The County and the Airport Land Use Commission have adopted Standards that effectively limit any future geographic expansion of areas where turbines are allowed.

Compatibility Assessment

The High Winds, Montezuma Wind II, Shiloh I, Shiloh 2, Shiloh III, Shiloh IV, and Solano Wind farms are located in the Montezuma Hills, about nine miles southeast of Travis AFB, and consist of over 600 wind turbines. The total heights of the turbines range between roughly 300 to 500 feet above ground level. The presence of these large, commercial wind turbines present challenges to the Travis AFB flying mission, such as radio frequency (RF) interference, clutter, or screening. RF clutter sources, such as wind turbines, have the potential to corrupt the accuracy of radar signals critical to flight operations by the rotating turbine blades creating undesired Doppler shift on the radar signal. Wind farms heighten this effect due to the increase in density of wind turbines.

Radar towers at Travis AFB (Source: http://www.thepapertrailnews.com/)

The presence of large wind farms can have negative effects on radar systems depending on the number and height of turbines, the distance between the turbines, and the distance from the radar. The two main impacts of large wind farms are screening or blocking out portions of the "field of view" so that it cannot see aircraft that fly behind the "screen"; and causing false readings on the radar that make it appear there are aircraft flying in the area that are not really there. Travis AFB has addressed this issue by masking the area impacted by interference from the wind farms. Masking the wind farms eliminates the detection of the turbines by the radar, but it also inhibits the radar from accurately identifying aircraft that are operating in the masked area, leaving a blind spot in the radar's field of view.

The development of new or modification of existing wind farms may have a negative effect on the radar viewshed and create additional interference issues. To mitigate this impact, the updated 2015 Travis AFB LUCP establishes policies for future wind turbine placement in Solano County.

New wind turbines over 100 feet above ground level (AGL) must not be within a line-of-sight of the Travis AFB DASR, as shown on Figures 5.8-2, 5.8-3, 5.8-4, 5.8-5, and 5.8-6, with placement reviewed by the ALUC. Existing wind turbines can be replaced at the same dimensions and material without review by the ALUC. However, if the replacement wind turbines are a different dimension and are over 100 feet, they must be reviewed by the ALUC and must not be within the line-of-sight of the Travis DASR.

The LUCP adequately manages wind turbine development in Solano County, but has no authority outside the county. Future placement of wind turbines outside Solano County could lead to radar impacts if they are developed within the field of view of Travis AFB's DASR radar. Generally, turbines greater than 30 miles away from the radar would not be a concern. The 30-mile radius around the radar includes land in the counties of Yolo, Sacramento, San Joaquin, Contra Costa, Sonoma, and Napa.

Findings

- The presence of large, commercial wind farms presents challenges to the Travis AFB flying mission by impeding radar tracking of aircraft near the Base.
- The ALUC regulates the placement of new and replacement wind turbines over 100 feet AGL in Solano County. However, wind turbines outside of the county may be an issue for aircraft operations, as Solano County ALUC has no authority outside the county. Generally, turbines greater than 30 miles away from Travis AFB's DASR radar would not be a concern.
- Travis AFB has addressed wind turbine impacts by masking portions of the radar's field of view, but this reduces the radar's ability to track and monitor aircraft in that area.

5.11 Housing Availability (HA)

Local housing availability addresses the supply and demand for housing in the region, the competition for housing that may result from changes in the number of military personnel, and the supply of military family housing provided by the installation.

Key Terms

Basic Allowance for Housing. Basic Allowance for Housing (BAH) refers to a monthly military entitlement granted to military members for providing housing for themselves and their dependents, when they do not live in on-Base housing. Factors determining BAH include, pay grade, location, and number of dependents.

ISSUE HA-1	**Availability of housing**
	Airmen stationed at Travis AFB, especially enlisted personnel, can find it challenging to find housing that is affordable in the local communities, although housing in Solano County is significantly more affordable than communities to the south in the greater San Francisco Bay Area.

Compatibility Assessment

The attractiveness of communities in the TSS Study Area as a suburban extension of the San Francisco metropolitan region has a strong influence on increases in housing and rental costs, and overall high cost of living relative to housing. Table 5.11-1 shows the increase in housing prices in the counties southwest of Travis AFB over the past 15 years compared to Solano County. In 2015, according to the National Low Income Housing Coalition, California was the second most expensive state to rent in, with Solano County ranking 27 out of 90 on the list of least affordable rental markets in the state. While Solano County can be considered a more affordable option in comparison to the Bay Area, high housing and rental costs can impact affordable housing availability for Travis AFB personnel. In addition, there is a low inventory of apartments in the area, with most development focused on single family homes.

Table 5.11-1. Regional Median Housing Values, 2000-2015

Jurisdiction	2000	2015	Number Change	Percent Change
California	**$211,500**	**$449,100**	**$237,600**	**112%**
Alameda County	$303,100	$656,700	$353,600	117%
Contra Costa County	$267,800	$522,500	$254,700	95%
San Francisco County	$396,400	$941,400	$545,000	137%
Solano County	$178,300	$344,900	$166,600	93%

Source: US Census Bureau, Median Gross Housing Value (Dollars) 2000, Amercian Community Survey 2015

Over 13,000 personnel work at Travis AFB. There are 1,293 housing units on-Base, which maintain a 98 percent occupancy rate, leaving much of personnel to seek housing off-Base. As of June 2016, there were 514 Travis AFB personnel on the waiting list for on-Base housing.

On-Base Housing at Travis AFB (http://www.travisfamilyhomes.com/)

Because military personnel are mobile, and the income level of enlisted personnel is relatively low, they need rental housing that is affordable and available on a monthly basis. Personnel with dependents also need affordable family housing. Military personnel receive a BAH to apply towards housing for themselves and their dependents. Table 5.11-2 shows the 2016 Travis AFB BAH rates.

Table 5.11-2. Travis AFB BAH for Military Personnel 2016

Grade	Rank	With Dependents	Without Dependents
E-1	Airman Basic	$2,010.00	$1,659.00
E-2	Airman	$2,010.00	$1,659.00
E-3	Airman First Class	$2,010.00	$1,659.00
E-4	Senior Airman	$2,010.00	$1,659.00
E-5	Staff Sergeant	$2,049.00	$1,863.00
E-6	Technical Sergeant	$2,250.00	$1,974.00
E-7	Master Sergeant, First Sergeant	$2,310.00	$2,013.00
E-8	Senior Master Sergeant, First Sergeant	$2,370.00	$2,091.00
E-9	Chief Master Sergeant, First Sergeant, Command Chief Master Sergeant, Chief Master Sergeant of the Air Force	$2,439.00	$2,151.00
W-1	Warrant Officer 1	$2,256.00	$1,998.00
W-2	Warrant Officer 2	$2,334.00	$2,088.00
W-3	Warrant Officer 3	$2,412.00	$2,160.00
W-4	Warrant Officer 4	$2,451.00	$2,262.00
W-5	Warrant Officer 5	$2,499.00	$2,322.00
O-1E	Second Lieutenant	$2,319.00	$2,049.00
O-2E	First Lieutenant	$2,400.00	$2,139.00
O-3E	Captain	$2,460.00	$2,250.00
O-1	Second Lieutenant	$2,076.00	$1,971.00
O-2	First Lieutenant	$2,247.00	$2,037.00
O-3	Captain	$2,409.00	$2,175.00
O-4	Major	$2,517.00	$2,310.00
O-5	Lieutenant Colonel	$2,595.00	$2,346.00
O-6	Colonel	$2,619.00	$2,406.00
O-7	Brigadier General	$2,643.00	$2,454.00

Source: http://travisafbhousing.com/bah.php

All the jurisdictions within the TSS Study Area have experienced an increase in both median gross rent and median housing values, while there was only a small increase in the number of housing units. Table 5.11-3 shows the change in median monthly rents for communities in the TSS Study Area from 2000 to 2010. During this timeframe, the median monthly rent increased by an average of 51 percent among the Study Area jurisdictions.

Table 5.11-3. TSS Study Area Median Monthly Rents, 2000-2010

Jurisdiction	2000	2010	Number Change	Percent Change
California	**$747**	**$1,147**	**$400**	**54%**
Solano County	$797	$1,195	$398	50%
City of Fairfield	$778	$1,172	$394	51%
Suisun City	$870	$1,320	$450	52%
City of Vacaville	$842	$1,256	$414	50%

Source: US Census Bureau, Median Gross Rent (Dollars) 2000, 2010

The lowest BAH rate for Travis AFB is $1,659, without dependents. While the rate is above the median monthly rent, it may not cover the cost of an apartment depending on location. Limited apartment availability in the area also reduces the selection of available apartments.

Table 5.11-4 provides the median housing value trends in the Study Area from 2000 to 2010. Median housing values have experienced substantial growth throughout the TSS Study Area. From 2000 to 2010, the median housing value increased by an average of 116 percent within the Study Area jurisdictions.

Table 5.11-4. TSS Study Area Median Housing Value, 2000-2010

Jurisdiction	2000	2010	Number Change	Percent Change
California	**$211,500**	**$458,500**	**$247,000**	**117%**
Solano County	$178,300	$389,800	$211,500	119%
City of Fairfield	$174,700	$392,700	$218,000	125%
Suisun City	$160,700	$341,400	$180,700	112%
City of Vacaville	$181,300	$377,900	$196,600	108%

Source: US Census Bureau, Median Gross Housing Value (Dollars) 2000, 2010

Based on a 30-year loan with a 4.5% interest rate and 10% down payment, a homeowner will owe a monthly loan payment of roughly $1,778. Assuming up to 30% of a household's income is an affordable rate to spend on housing, a homeowner must have an annual income of approximately $71,120 or more to purchase a home they can afford in Solano County.

To help better accommodate Travis AFB personnel, local jurisdictions have established different policies and program in their general plans. The Housing Element in the City of Fairfield General Plan includes Policy HO7.5 to support efforts to meet the housing needs of Travis AFB personnel. Actions involved in the policy are as follows.

- Identify appropriate locations for affordable rental housing projects that could serve military personnel and their families.
- Work with Air Force officials to market housing opportunities to for-profit developers interested in constructing such housing.
- Identify and apply for local, state, and federal funding sources for affordable military housing.

Suisun City's General Plan states that the city will cooperate with Travis AFB officials to identify any unmet needs among military personnel for affordable housing in Suisun City. A guiding policy in the City of Vacaville's General Plan is to ensure the viability of Travis AFB through the provision of an adequate supply of affordable housing for military families. Implementation of the policy involves identifying sites that are appropriate for military families based at Travis AFB and working with Air Force housing officials and non-profit housing groups to build off-Base housing units that are affordable to active military families at Travis AFB. All the jurisdictions have policies to address the housing needs of Travis AFB personnel in their general plans, yet these policies cannot be accomplished without the support of Travis AFB. There is a need for Travis AFB to communicate its housing needs to the local communities to help improve availability for military personnel.

New development and infill projects may assist with the issue. Development surrounding the new Fairfield Train Station northwest of Travis AFB will be incorporating a range of housing options, adding 6,800 dwelling units to the area on 504 acres. One of the key concepts of the Fairfield Train Station Specific Plan involves providing housing choices that are economically and physically accessible to service people and civilian employees at the Base.

Two other housing developments located nearby the future train station development have been approved by the City of Fairfield and the Solano County ALUC, Hawthorne Mill and Cooper's Landing. Hawthorne Mill, located south of Cement Hill Road and west of Peabody Road, includes approximately 625 residential dwelling units. Cooper's Landing, located near the intersection of Air Base Parkway and the Union Pacific Railroad, involves 169 residential dwelling units. Figure 5.11-1 shows the future housing development nearby Travis AFB.

Source: nlihc.org/sites/default/files/oor/OOR_2015_FULL.pdf

Findings

- The attractiveness of communities in the area as a suburban extension of the San Francisco metropolitan region has a strong influence on increases in housing costs, creating affordability issues for Travis AFB personnel.
- There is a need for Travis AFB to communicate its housing needs to the local communities to help them carry out their housing policies and improve availability for military personnel.
- New housing development and infill projects in proximity to Travis AFB have the potential to provide additional housing that is affordable to Base personnel.

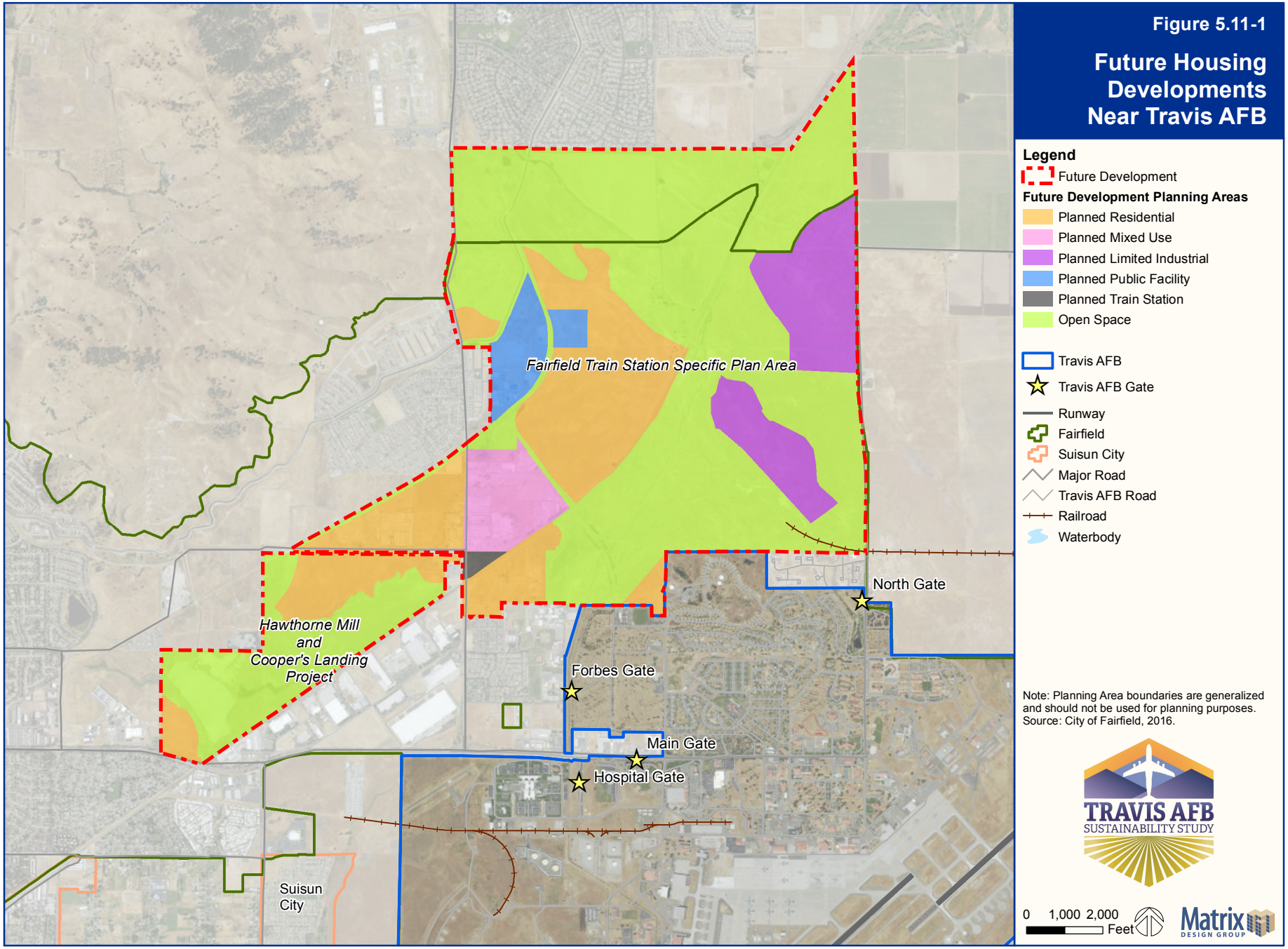
Figure 5.11-1
Future Housing Developments Near Travis AFB
Legend
Future Development
Future Development Planning Areas
Planned Residential
Planned Mixed Use
Planned Limited Industrial
Planned Public Facility
Planned Train Station
Open Space
Travis AFB
Travis AFB Gate
Runway
Fairfield
Suisun City
Major Road
Travis AFB Road
Railroad
Waterbody
Fairfield Train Station Specific Plan Area
Hawthorne Mill and Cooper's Landing Project
North Gate
Forbes Gate
Main Gate
Hospital Gate
Suisun City
Note: Planning Area boundaries are generalized and should not be used for planning purposes.
Source: City of Fairfield, 2016.
TRAVIS AFB SUSTAINABILITY STUDY
0 1,000 2,000 Feet
Matrix DESIGN GROUP

5.12 Infrastructure Extensions (IE)

Infrastructure refers to public facilities and services such as sewers, water, electric, and roadways that are required to support development (existing and proposed).

Public facilities and services should be appropriate for the type of urban or rural development they serve, but also limited to the existing and planned needs and requirements of the area. For example, the provision of a safe transportation system, including all modes of transportation (automobile, mass transit, railway, highway, bicycle, pedestrian, air, etc.), is an important infrastructure component. Adequate transportation infrastructure contributes to local, regional, and state accessibility.

Infrastructure plays an important role in land use compatibility. Infrastructure can enhance the operations of an installation and community by providing needed services. Conversely, infrastructure can create encroachment issues if expanded without consideration of the consequences of future development. The extension or expansion of community infrastructure to areas proximate to an installation has the potential to induce growth, potentially resulting in incompatible uses and conflicts between a military mission and communities. Within general planning, infrastructure extensions can serve as a mechanism to guide development into appropriate areas, protect sensitive land uses, and improve opportunities for compatibility between community land uses and military missions.

Key Terms

Infrastructure. In a broad sense, the word infrastructure in this section refers to public facilities and services such as sewer, water, electric, and roadways that are required to support development (existing and future).

ISSUE IE-1	**Infrastructure growth outside southwest edge of Travis AFB** Suisun City's General Plan shows a new interchange for an industrial park along Highway 12, within the city's Special Planning Area in its Sphere of Influence. This will also require infrastructure extensions to serve the area.

Compatibility Assessment

The 2035 City of Suisun City General Plan includes a potential new interchange along Highway 12, within the city's Special Planning Area in its Sphere of Influence, illustrated on Figure 5.12-1. A new interchange along this route could potentially attract new growth and spur development further east of Suisun City, south of Travis AFB. Plans for the potential interchange are expected to be solidified after 2035. Land surrounding the potential interchange is located within APZ I, APZ II and the LUCP Compatibility Zones B1, B2, and C (see Issue LU-1 for more information on Compatibility Zones B1 and B2, and Issue NOI-1 for more information on Compatibility Zone C).

Suisun City has received an application for an industrial use in the area north of Highway 12, east of Walters Road, and south of Peterson Road. The future industrial use would require the extension of utilities to serve the area, which could accommodate future growth. Development is also anticipated on vacant land north of Peterson Road, just west of the Irving H. Lambrecht Sports Complex. The area surrounding Walters Road and Highway 12 are located within Compatibility Zone C and Zone D (see Issue LAS-2 for more information on Compatibility Zone D).

Improvements being made to Walters Road, including the installation of a median and traffic signal improvements, and the completion of Jepson Parkway, may attract future development.

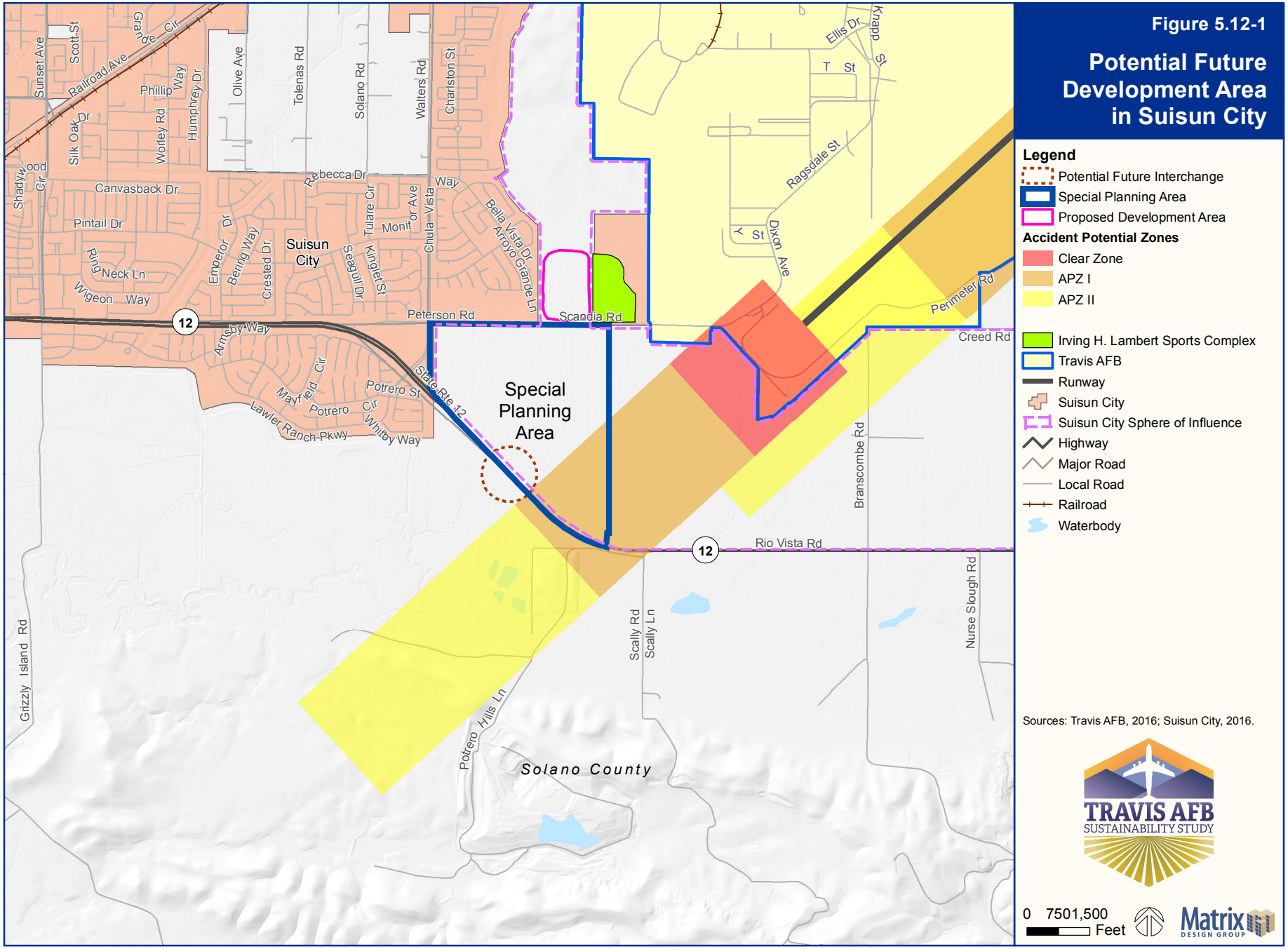

Figure 5.12-1

Potential Future Development Area in Suisun City

Legend

- Potential Future Interchange
- Special Planning Area
- Proposed Development Area

Accident Potential Zones

- Clear Zone
- APZ I
- APZ II

- Irving H. Lambert Sports Complex
- Travis AFB
- Runway
- Suisun City
- Suisun City Sphere of Influence
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Sources: Travis AFB, 2016; Suisun City, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

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Matrix DESIGN GROUP

As future development occurs, it is important that it does not interfere with Travis AFB operations. Because the land is located within Travis AFB LUCP compatibility zones, future development would need to be consistent with the Travis AFB LUCP. Changes to zoning or general plan designations, if revised in the future, would need to be submitted to the ALUC for approval. Future land use in this area is further discussed in Issues LU-1 and LU-5.

Findings

- Improved access from the potential new interchange and the completion of Jepson Parkway could attract future non-industrial uses, like convenience commercial along Highway 12, south of Travis AFB.
- Land use in the eastern end of Suisun City located in LUCP zones should be closely evaluated for compatibility with Travis AFB before development is proposed or approved. This has potential to introduce occupancy intensity changes and light and glare that are not compatible with flight operations.

ISSUE IE-2	**Enhanced Use Lease development infrastructure** Development of the Enhanced Use Lease area on Travis AFB would require outside sources to provide utilities (water, sewer), services (fire, police), and traffic / roadway maintenance.

Compatibility Assessment

Travis AFB contains a vacant 53-acre area in the northwestern corner of the Base. The area was previously occupied by housing, which was destroyed by a fire in 2008 before it was scheduled to be demolished. With this vacant land area, Travis AFB has the opportunity to pursue an Enhanced Use Lease (EUL) project. An EUL is a method for funding development on federal property by allowing a private developer to lease federal property, with rent paid by the developer. Installations are then able to use the profit for improvements of property or facilities, construction or acquisition of new facilities, and other services to maintain the Base.

The future uses that will occupy the area will require additional infrastructure and services, including water and sewer service, law enforcement and emergency services, and roadway maintenance. Because the future uses have not been determined, the scope of additional infrastructure and services cannot be determined at this time. The City of Vallejo is provider of water to Travis AFB, and any proposed EUL development would require consultation with the City of Vallejo to determine their capacity to provide water service for such development. Law enforcement and emergency services would likely be provided by the City of Fairfield due to its proximity to the proposed EUL area.

Development of the EUL will require the service providers to reevaluate service and modify existing fee structures in the area. These additional needs must be better coordinated between the Base and the providers to deliver sufficient services and infrastructure to the EUL.

Findings

- The EUL will require additional infrastructure and services, most likely provided by the cities of Fairfield and Vallejo. The use that is developed will determine the level of service required from the cities.
- Improved coordination between the cities and Travis AFB will be required to successfully supply the EUL with sufficient services and infrastructure.
- The fee structure for infrastructure services for this area may require reassessment.

5.13 Land / Air / Sea Space Competition (LAS)

The military manages or uses land and air space to accomplish testing, training, and operational missions. These resources must be available and of a sufficient size, cohesiveness, and quality to accommodate effective training and testing. Military and civilian air and sea operations can compete for limited air and sea space, especially when the usage areas are near each other. Use of this shared resource can impact future growth in operations for all users.

Key Terms

Instrument flight rules. Instrument flight rules (IFR) are rules and regulations established by the Federal Aviation Administration (FAA) to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals.

Visual flight rules. Visual flight rules (VFR) are rules and regulations established by the FAA under which a pilot operates the aircraft with visual reference to the ground and by visually avoiding obstructions and other aircraft.

Unmanned aerial systems. Unmanned aerial systems (UAS) are aircraft that are capable of operating without an internal pilot; are tethered by a radio control link; and can be preprogrammed for both flight and payload operations prior to launch.

Technical Background

As requirements and capabilities of military weapons and command and control systems continue to improve, collaboration between military and civilian users of training areas, airspace, and sea space become more important.

The land, air, and sea spaces used by the military can be directly managed by the DOD, designated for DOD use by a federal or state agency, provided through easements or other agreements with public or private entities, or maintained as a historic usage right. Public and private requests to share or assume some of these resources may have a negative impact on military training and test objectives.

Controlled and Uncontrolled Airspace Descriptions

To help air traffic controllers and pilots deal with varying traffic conditions in the sky, United States airspace is divided into six different classes (A, B, C, D, E, and G). These classes each have different requirements for entry into the airspace, pilot qualifications, radio and transponder equipment, and VFR weather minimums. Figure 3-10 in Chapter 3 Travis AFB Profile provides a graphical representation of the various airspace classifications. Class D and E airspace are both in the TSS Study Area and are defined as follows.

Class D Airspace. Use of Class D airspace requires the use of two-way communication with Air Traffic Control, which must be established prior to entering Class D airspace. No transponder is required. VFR flights in Class D airspace must have three miles of visibility, and fly an altitude at least 500 feet below, 1,000 feet above, and 2,000 feet laterally from clouds.

Class E Airspace. If the airspace is not Class A, B, C, or D, and is controlled airspace, then it is Class E airspace. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Class E airspace is also used for non-towered airports with instrument approach, beginning at either 700 or 1,200 feet above ground level (AGL).

ISSUE LAS-1	**New ICON aircraft pilot school** Nut Tree Airport has potential for expansion of facilities and operations, including a new pilot school for the ICON aircraft.

Compatibility Assessment

In 2014, ICON Aircraft, a manufacturer of an amphibious light sport aircraft, the ICON A5, established its headquarters adjacent to the Nut Tree Airport. The facility is used for manufacturing, sales, training, and service while utilizing the airport for flight training. The presence of the new aircraft company is expected to greatly increase flight operations from of the airport.

ICON Aircraft was founded in 2006, with the first concept aircraft built and flown in 2008. Beginning in the first quarter of 2015, the company began operating a 140,000-square-foot facility in Vacaville, with the first delivery of the aircraft in July 2015. The two-seater plane can reach speeds up to 138 miles per hour (mph), has a wingspan of about 34 feet, and costs around $200,000 to purchase. The ICON is classified as a Light Sports Aircraft and is targeted at recreational pilots. While the demand for the plane is high, the company is not prepared for high-rate production, planning to produce only about 20 planes in 2016.

ICON A5 aircraft (Source: http://iconaircraft.com/)

ICON Aircraft offers flight training courses to pilots who purchase the ICON A5 aircraft, including a complete training course for beginner pilots. A Sport Pilot License (SPL) is given at the end of the 14-day course, which requires 30 flight hours. While the plane itself is advertised as easy to fly, new and inexperienced pilots may lack knowledge of the surrounding airspace and proper airspace procedures. During typical training to obtain a general pilot's license, pilots are instructed to watch for conflicting traffic, keeping their eyes outside the cockpit. However, there is usually little formal instruction or procedures to identify potential collision threats. The SPL allows pilots to only fly under visual flight rule (VFR) conditions, making them unable to fly at night or during inclement weather. The aircraft is also limited to a maximum altitude of 10,000 feet mean sea level (MSL). Flight in controlled airspace requires additional training and instructor sign-off that is not part of standard training.

Travis AFB is located seven nautical miles (approximately eight statute miles) southeast of Nut Tree Airport. Aircraft based at Travis AFB are large aircraft, which are flown for training and mission operations. In addition to these

local military aircraft, transient (i.e., not based at Travis AFB) military aircraft (heavy and fighter aircraft) also frequently operate at Travis AFB. General aviation traffic also tends to be funneled through the area, due to the proximity of international airports in San Francisco, Oakland, and Sacramento.

The Travis AFB Mid-Air Collision Avoidance Guide indicates significant air space traffic in the vicinity of Travis AFB and the Nut Tree Airport. There have been 11 near mid-air collisions in the area surrounding Nut Tree Airport and Travis AFB since 1987. However, the most recent recorded event occurred in September 1999, indicating a recent awareness of potential for collisions and procedures to prevent them.

Local airspace surrounding the Nut Tree Airport consists of Class E Surface Airspace. The Class E Surface Airspace includes a five-statute-mile radius circular area around the airport and any extension necessary to include instrument approach and departure paths. Radio communications and transponders are not required to operate within Class E airspace under VFR conditions. However, two-way communication with Travis Approach and Departure Control must be established before entering the Class D airspace surrounding Travis AFB. Figure 5.13-1 shows the airspace surrounding Nut Tree Airport and Travis AFB.

Travis AFB is also located within Alert Area A-682, with Nut Tree Airport located along the edge of the area. Alert areas are designated airspace that may contain a high volume of pilot training or an unusual type of aerial activity. Military aircraft in this area frequently fly approaches into Travis AFB from a variety of different altitudes, airspeeds, and directions. Pilots are advised to be aware when flying in alert areas. According to the FAA Aeronautical Information Manual, pilots of participating aircraft as well as pilots traversing the area are equally responsible for collision avoidance.

Operating an aircraft in crowded airspace requires extra vigilance by pilots. To help promote flight safety and inform new pilots about the collision potential with military aircraft in the area, Travis AFB developed a Mid-Air Collision Avoidance (MACA) Program. The MACA Program stresses extreme caution to pilots flying in the alert area due to the wake turbulence generated by heavy military aircraft, as well as high rate climbs and descents, and random maneuvering by heavy aircraft over the top and within the vicinity of the alert area. The program also offers mitigation techniques, along with useful resources to help educate pilots and prevent mid-air collisions.

In addition to the MACA program, Travis Radar Approach Control (RAPCON) and ICON Aircraft flight operations maintain a letter of agreement. The agreement establishes procedures for ICON student pilots to follow, including call-sign designations, initiating radio contact, and obtaining approval before entering Travis AFB airspace. Because of blocked radio communication between Nut Tree Airport departing aircraft and Travis AFB RAPCON, as outlined in Issue COM-1, these procedures offer alternative methods of communication.

Source: Nut Tree Airport Master Plan, Travis AFB Mid-Air Avoidance Guide, FAA Aeronautical Information Manual, http://iconaircraft.com/

Findings

- The airspace surrounding both Travis AFB and Nut Tree Airport is heavily used by general and commercial aviation aircraft along with large military aircraft, creating congested airspace.
- New and inexperienced pilots in the area surrounding Travis AFB may lack knowledge and training to how on best identify conflicts and avoid mid-air collisions.
- The Travis AFB MACA program and the letter of agreement between Travis AFB and ICON Aircraft have been implemented to improve this issue, but further efforts to ensure pilot awareness may be needed.
- Communications constraints on Nut Tree Airport pilots contacting Travis AFB RAPCON is a concern (see Issue COM-1).

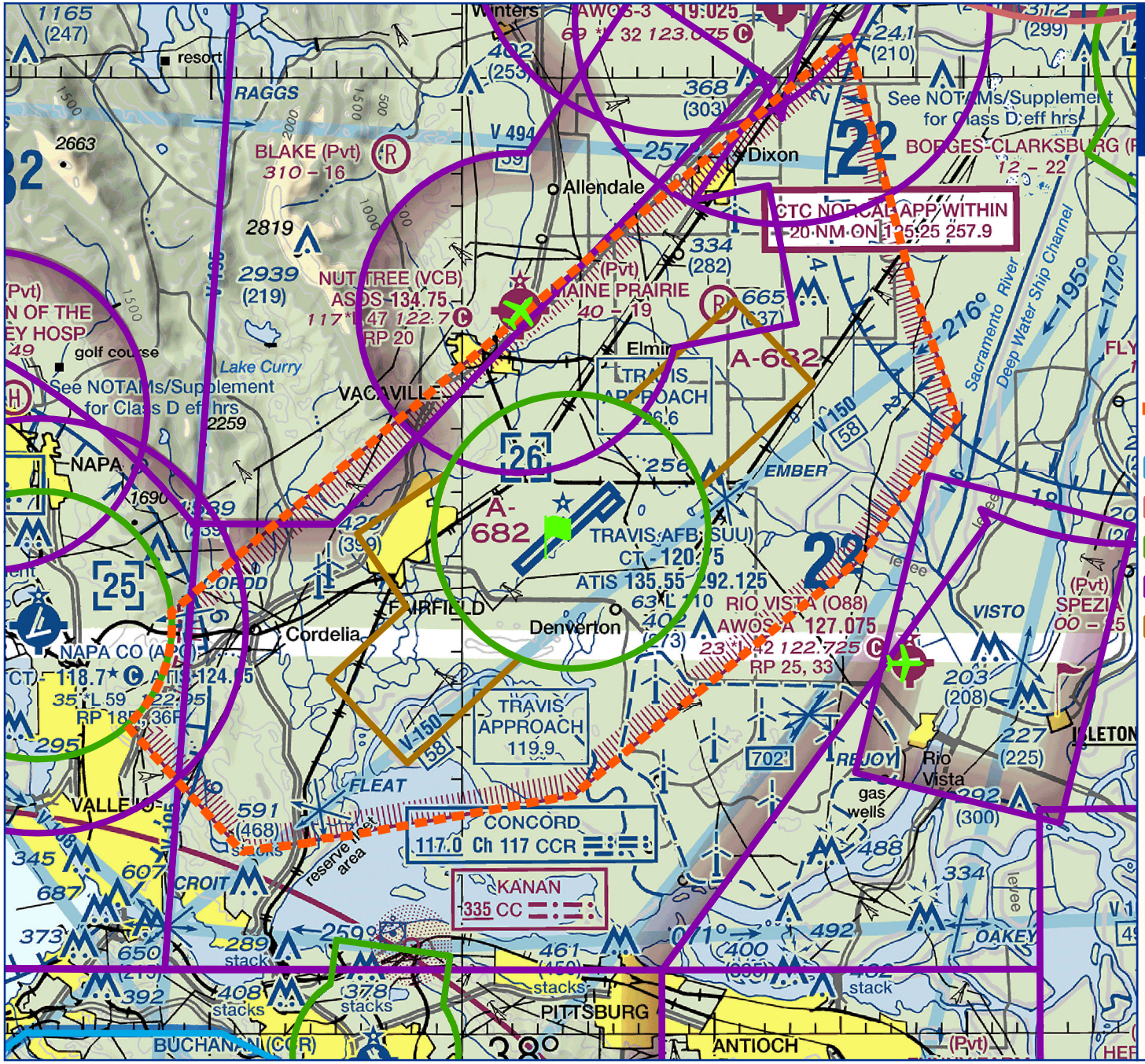

Figure 5.13-1

Airspace Surrounding Travis AFB and Nut Tree Airport

Legend

- Travis AFB
- Nut Tree Airport
- Rio Vista Municipal Airport
- Alert Area A-682 Surface to 6,000 ft AGL

FAA Airspace Control Class

- Class B Airspace Surface to 10,000 ft AGL
- Class C Airspace Surface to 4,000 ft AGL
- Class D Air Space Surface to 2,600 ft AGL
- Class E Airspace 700 ft AGL to FL 180
- Class E Airspace Floor to FL 180
- Waterbody

Source: Federal Aviation Administration (FAA) San Francisco Sectional 98, March 2017. FAA, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

0 1 2 Miles

Matrix DESIGN GROUP

ISSUE LAS-2	**Lack of airspace control** The Class D airspace around Travis AFB does not have the usual restrictions other military installations operate under, leaving it open to general aviation and allowing congested airspace.

Compatibility Assessment

Oftentimes, military installations have designated special use airspace (SUA) such as Military Operating Areas (MOAs), where they can perform maneuvers and training without interference from other aircraft. However, Travis AFB is surrounded by Class D airspace and does not have any designated SUA protecting Base operations. All general and commercial aviation traffic is allowed into Class D airspace, but two-way communication with the Travis AFB aircraft control tower must be established before entering. With the proximity of multiple international airports, the airspace is kept open and general aviation is funneled through the area.

Part of the Travis AFB mission involves military aircraft that approach the Base from a variety of different altitudes, airspeeds, and directions. Non-military aircraft in the area can create a hazard to these operations and open airspace is ideal to perform the approaches. Travis AFB is located within Alert Area A-682, which does offer enhanced awareness of the Base's operations. Alert areas are designated airspace on FAA sectional charts that may contain a high volume of pilot training or an unusual type of aerial activity, but aircraft are not restricted from entering.

The Travis AFB LUCP addresses development and activity within important airspace used by Travis AFB. Compatibility Zone D includes all other locations outside of zones A through B beneath any of the Travis AFB airspace protection surfaces delineated in accordance with Federal Aviation Regulation Part 77 as well as areas subject to frequent aircraft overflight. Limitations on the height of structures and notice of aircraft overflights are the only compatibility factors within this zone.

Findings

- Travis AFB is surrounded by Class D airspace, which general aviation aircraft can enter. Additional general aviation traffic can create congested airspace.
- The mission at Travis AFB involves different approaches and other aircraft and congested airspace can create hazards or interfere with the maneuvers.

ISSUE LAS-3	**Usage of unmanned aerial systems** There is a potential that an increase in unmanned aerial systems (also known as drones) usage could cause safety concerns for aircraft. This is an emerging issue at all military installations.

Compatibility Assessment

Use of unmanned aerial systems (UASs), commonly called drones, has increased dramatically as they have become cheaper, smaller, and easier to use. In the US, around 700,000 UASs were sold in 2015, according to the Consumer Electronics Association. The FAA has a ban on UASs flying over areas such as national parks, military Bases, and within a five-mile radius of airports. However, the FAA has seen a large increase in the number of UASs flying too close to airports and aircraft. From August 2015 to January 2016, there were nearly 600 incidents in the US reported to the FAA, compared to 238 incidents in all of 2014. Drones have also been spotted at dangerous operating altitudes, up to 10,000 feet. These UASs pose a hazard to aircraft safety, creating potential mid-air collision scenarios. Technology can be utilized to limit the range of UASs using geofencing, which uses GPS or Radio

Frequency identification to create a geographic boundary that location-aware devices know to avoid. However, few manufacturers have incorporated this technology into their drones as it is not required.

The FAA Modernization and Reform Act of 2012 established rules for the recreational use of model aircraft, which includes civilian use of UASs. Under these rules, civilian UASs are limited to 55 pounds and must be operated to ensure they do not interfere with any manned aircraft. It also established that if the UAS is flown within five miles of an airport, the operator must notify the airport operator and the air traffic control tower. The operator must also maintain visual line-of-sight with the UAS.

The FAA finalized the operational rules for use of commercial drones in June 2016. The new rule, Federal Aviation Regulations Part 107, provides operating requirements, including maintaining a view of the drone and getting approval before operating in Class B, C, D, and E airspace from the air traffic control tower. It sets a weight limit of 55 pounds, speed limit of 100 miles per hour, and height limit of 400 feet.

Source: www.techtimes.com

In December 2015, the FAA established a UAS registry, requiring anyone who owns a small unmanned aircraft more than 0.55 pounds to register it before flying it outdoors. People who do not register could face civil and criminal penalties. The maximum civil penalty is a fine of up to $27,500, with criminal penalties reaching $250,000 or three years in prison. However, the FAA lacks the resources to enforce the rule, so it depends on local law enforcement to stop unauthorized use of UASs. The FAA released a law enforcement guide, Law Enforcement Guidance for Suspected Unauthorized UAS Operations, in January 2015 to explain how first responders and others can provide assistance to the FAA by:

- *Identifying potential witnesses and conducting initial interviews;*
- *Contacting the suspected operators of the UAS or model aircraft;*
- *Viewing and recording the location of the event;*
- *Collecting evidence;*
- *Identifying if the UAS operation was in a sensitive location, event or activity; and*
- *Notifying one of the FAA's Regional Operation Centers about the operation as soon as possible.*

Local bills have been introduced in California, but none have been passed yet to regulate the use of drones.

In more rural parts of the US, UASs are becoming increasingly used for agricultural purposes to monitor crops and livestock. Most of the area east of Travis AFB is currently used for agriculture or open space. This area may attract recreational UAS use or farms may begin to utilize the new technology. As the number of UASs increases, there will be the increased risk of UASs flying too close to military installations without prior coordination. Citizens may also be unaware of FAA regulations of UASs.

The proximity of UASs being flown near Travis AFB also raises security concerns as many UASs are equipped with camera equipment. A UAS could provide a line-of-sight into the Base. The FAA does not restrict the use of camera equipment on UASs. A drone following the regulations outlined by the FAA could still create an issue if the drone can record activities taking place on the Base.

Source: http://www.faa.gov/uas/registration/, http://www.faa.gov/news/updates/?newsId=85229, https://www.faa.gov/news/updates/?newsId=81244

In April 2016, Travis AFB established UAS policy for operation on-Base. The memorandum establishes restrictions and provides pre-coordinated authorized areas to fly UASs. UAS operation is allowed in a Preferred Use Area and Caution Use Areas. The Preferred Use Area includes the old housing area, west of Twin Peaks Drive, restricting UAS flight below 400 feet. The Caution Use Areas include Base housing, dorms, duck pond, and Johnson Recreation Fields, allowing UASs below the height of tree tops, light poles, or nearby buildings. Establishing these areas gives Base personnel and their families an area to fly UASs without requiring coordination with the air traffic control tower.

Findings

- In recent years, civilian use of UASs has increased rapidly, and using them near military operating areas can cause safety hazards for pilots.
- The FAA depends on local law enforcement to stop and report the unauthorized use of UASs. Both citizens and law enforcement officials may be unaware of the FAA regulations associated with UASs.
- Even when abiding by the FAA regulations, UASs could provide line-of-sight into the Base or interfere with flight operations.
- The old Base housing, west of Twin Peaks Drive, is a designated Preferred Use Area for UAS operation at Travis AFB. However, this area is only available to Base personnel and not accessible by the general public.

ISSUE LAS-4	**Crop dusting activities near Travis AFB** Crop dusting activities in the vicinity of Travis AFB could cause safety concerns during flight operations. There have been minimal reported problems to date.

Compatibility Assessment

Travis AFB is surrounded by agricultural land to the north, east, and south. Crop dusting aircraft operations, also referred to as agricultural aircraft operations, are conducted in the area around the Base. These activities are a concern because aircraft used for aerial applications can operate at low altitudes and with frequent passes in the area. Agricultural aircraft, over non-congested areas, are permitted to operate below 500 feet above the surface and 500 feet from individuals, vehicles, and structures.

Operations at Travis involve military aircraft that approach the Base from a variety of different altitudes, airspeeds, and directions. It is important for all crop duster pilots to be aware of Travis AFB operations, which can create a hazard for these military operations.

Travis AFB is surrounded by about 250 square miles of Class D airspace, with the airspace beyond categorized as Class E airspace, as shown on Figure 5.13-1. According to FAA regulation, Advisory Circular 137-1A, pilots are not allowed to operate within Class D airspace without authorization from the Travis AFB air traffic control (ATC) facility. IFR flights within Class E airspace must communicate with air traffic control before takeoff. However, no ATC clearance or radio communication is required for VFR flights in Class E airspace. The FAA circular states that the operator is responsible for coordinating with airport management and air traffic control before conducting agricultural operations in and around airports, but there is no coordination required in Class E airspace.

The lack of required coordination creates a safety issue for both agricultural and military aircraft operations in the area. Operating an aircraft in crowded airspace and at low altitudes requires extra awareness by pilots.

Findings

- Agricultural aircraft have the potential to interfere with Travis AFB operations, especially at low altitudes.
- Coordination and communication with the Travis AFB ATC is not required for agricultural aircraft operations within Class E airspace.
- To date, there have been no significant incidents relative to crop dusting operations.

5.14 Land Use (LU)

The basis of land use planning and regulation relates to the government's role in protecting the public's health, safety, and welfare. Local jurisdictions' general plans and zoning ordinances can be the most effective tools for preventing or resolving land use compatibility issues. These tools ensure the separation of land uses that differ significantly in character. Land use separation also applies to properties where the use of one property may adversely impact the use of another. For instance, industrial uses are often separated from residential uses to avoid impacts from noise, odors, and lighting, although in recent times there is an interest in mixed-use development.

Key Terms

Accident Potential Zone I (APZ I). APZ I is an area beginning at the end of each clear zone (see definition below) and continuing out to a length of 5,000 feet long by 3,000 feet wide. APZ I follows a curved shape to reflect the predominant flight tracks and can even split to reflect differences in standard approaches / departures and closed pattern tracks. This area has a lower potential for mishaps and therefore has less restrictive development restrictions recommended.

Accident Potential Zone II (APZ II). APZ II is an area that begins at the end of each APZ I and extends an additional 7,000 feet long by 3,000 feet wide. This APZ can also be curved as the flight tracks are considered in designating this APZ. Again, the mishap potential in this area reduces further, and with this, some additional development types are allowed.

Clear Zone (CZ). The CZ is the area that has the highest statistical potential of an aircraft incident (but again, a very low probability). As the name reflects, this area should be kept clear of all structures, including fences. A CZ begins at the physical end of a runway and extends outward, typically covering an area that is 3,000 feet wide by 3,000 feet long. Travis AFB's CZs are different than the typical CZs because the operational end of the runway ends before the physical end of the runway. As a result, the CZs at Travis are larger than normal so that the Base can protect the maximum amount of land based on the physical end of the runway. Travis AFB's CZ on the northwestern end of the runway is 3,000 feet wide by 3,800 feet long and the CZ on the southeastern end of the runway is 3,000 feet wide by 3,997 feet long.

Land Use Planning. Land use planning stems from the Supreme Court decision of *Euclid vs. Ambler* which enabled jurisdictions to regulate land use through zoning land to protect the public's health, safety, morals, and welfare. Zoning is a land use regulation tool used by local jurisdictions that generally controls use, density, intensity, building heights, and setbacks on a parcel or lot. Most states, like Nebraska, enacted enabling legislation for local jurisdictions to also create and adopt general plans which are land use documents that broadly establish a vision, goals, policies, and implementation activities for a jurisdiction over a long-range period of time, typically ten to twenty years, to promote compatible land use, guide growth and logical development. California has a comprehensive set of policies and regulations relative to land use.

Local jurisdictions' general plans and zoning ordinances are the most effective tools to avoid and resolve land use compatibility issues. These tools ensure similar and compatible land uses are properly located and can co-exist while separating land uses that differ significantly in use and potential nuisance.

Sensitive Land Uses. In terms of compatibility assessment, sensitive land uses are uses that are susceptible to, and effected by, nuisances such as noise, dust and air pollution. Sensitive land uses typically include residential areas, hospitals, convalescent homes and facilities, schools, libraries, churches, recreational areas, and other similar land uses.

Technical Background

Land use planning around military installations is similar to the process for evaluating land uses in other areas. For instance, local jurisdictions consider compatibility factors such as noise when locating residential developments near commercial or industrial uses. As the land between local municipalities is developed – or the land between a local municipality and the perimeter of a military installation is developed, both entities are affected. New residents, tenants, or building owners are typically not fully aware of the implications of locating near an active military installation and / or training area.

Among the most pressing factors causing incompatibility with installations containing a military airfield are the proximate areas of encroaching development, as well as off-installation vertical obstructions from that development which may impact the military operations. The development of land uses incompatible with the installations military operations can threaten the installation's mission success and operations.

ISSUE LU-1	**Land development in APZs** There is some interest in developing land in Travis AFB's southern APZ that could pose a compatibility issue, depending on the type of use that is developed.

Compatibility Assessment

The purpose of the Air Installation Compatible Use Zone (AICUZ) Study is to identify and recommend compatible land uses in areas subject to aircraft mishap potential and noise to protect the general public from aviation impacts. While the Accident Potential Zones (APZs) only cover unincorporated land in Solano County, Suisun City's sphere of influence extends about four miles to the east of the city limits, into the APZs. As Suisun City grows further east, future development is expected within the southern APZs.

As future development occurs, it is important that it does not interfere with Travis AFB operations. Increased development in the area has the potential to bring traffic, increased ambient light, and increased density for occupied buildings. Additionally, Base operations may generate noise and safety impacts for those living and working in areas near the Base.

The ALUC adopted the LUCP, which provides direction for future use of lands near the Travis AFB. Standards for the ALUC determination of consistency are similar to the land use compatibility standards of the Travis AFB AICUZ Study. The compatibility zones (see Figure 5.14-1) prohibit certain uses and limit the maximum density and intensity of uses. Table 5.14-1 outlines the LUCP compatibility criteria related to land use. Table 5.14-2 identifies the uses and restrictions within the AICUZ safety and noise zones.

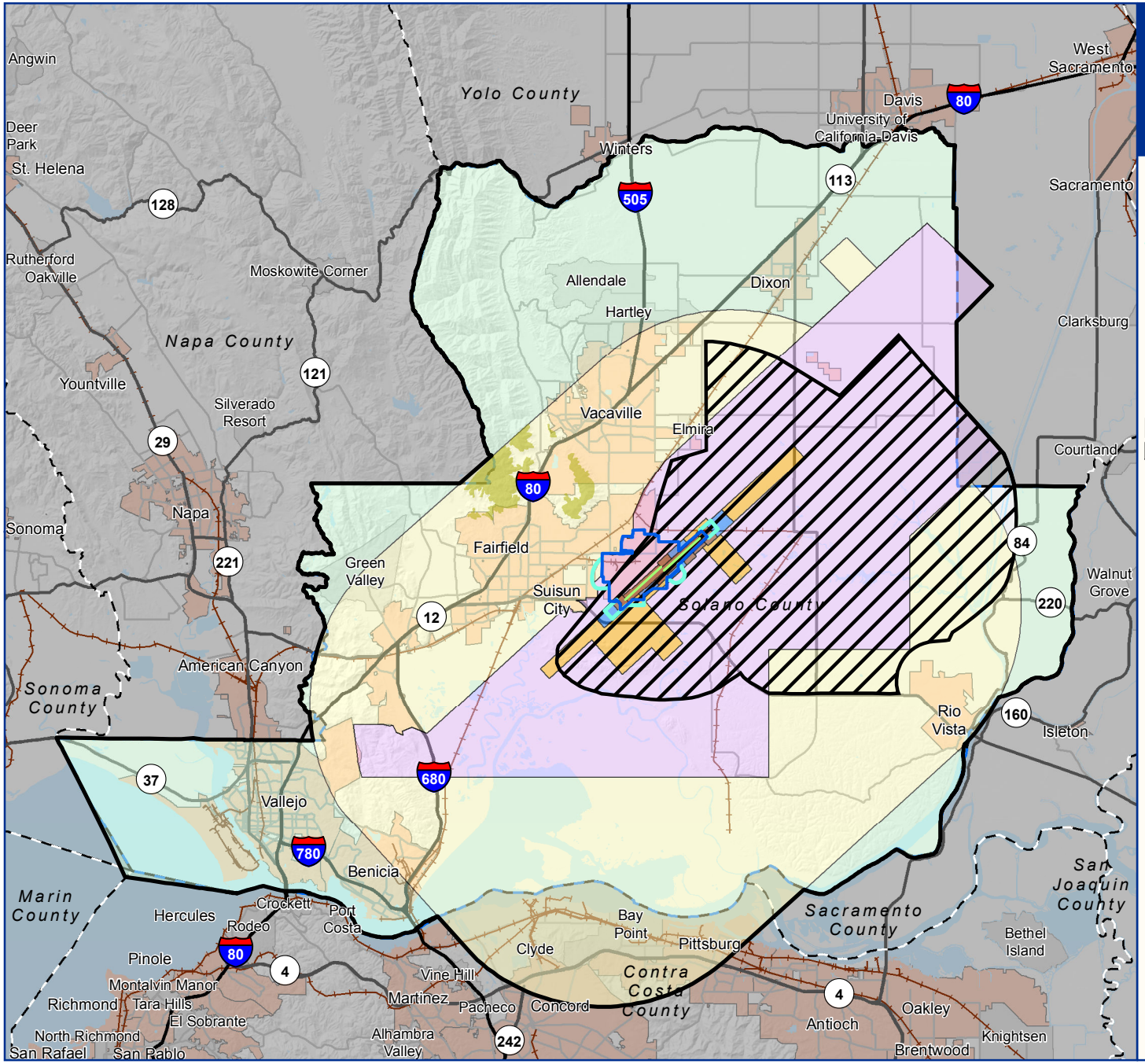

Figure 5.14-1

Travis AFB Land Use Compatibility Plan Compatibility Zones

Legend

- Runways
- Assault Landing Zone
- Travis AFB Easement
- Zone A
- Zone B1
- Zone B2
- Zone C
- Zone D
- Zone E
- Height Review Overlay Zone
- ALZ Training Area Overlay
- Airport Influence Area
- Travis AFB
- Solano County
- Other County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Railroad
- Waterbody

Source: Solano County, 2015 (Travis AFB Land Use Compatibility Plan).

TRAVIS AFB SUSTAINABILITY STUDY

0 1 2 3 Miles

Matrix DESIGN GROUP

Table 5.14-1. LUCP Compatibility Use Criteria

Zone	Locations	Prohibited Uses	Other Conditions
B1	Inner Approach / Departure Zone	▪ Children's schools, day care centers, libraries ▪ Theatres, meeting halls, and other assembly uses ▪ Office buildings greater than three stories in height ▪ Labor-intensive industrial uses ▪ Stadiums, group recreational uses ▪ Hospitals, nursing homes ▪ Highly noise-sensitive uses (e.g. outdoor theaters) ▪ Aboveground bulk storage of hazardous materials Hazards to flight	▪ No new residential development is permitted ▪ Locate structures maximum distance from extended runway centerline ▪ Minimum noise level reduction (NLR) of 40 dB in buildings with noise-sensitive uses ▪ ALUC review required for objects greater than 35 feet above ground level (AGL)
B2	Extended Approach / Departure Zone	▪ Children's schools, day care centers, libraries ▪ Stadiums, group recreational uses ▪ Hospitals, nursing homes ▪ Highly noise-sensitive uses (e.g. outdoor theaters) ▪ Aboveground bulk storage of hazardous materials ▪ Hazards to flight	▪ No new residential development is permitted. ▪ Minimum NLR of 35 dB in residences (including mobile homes) and buildings with noise-sensitive uses ▪ ALUC review required for objects greater than 50 feet AGL

Source: Travis AFB Land Use Compatibility Plan

Table 5.14-2. Recommended Land Uses for Airfield Safety Zones

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	**Land Use Name**	**Clear Zone**	**APZ I**	**APZ II**	**Density**
10	**Residential**				
11	Household units				
11.11	Single units: detached	N	N	Y[2]	Maximum density of 2 Du / Ac
11.12	Single units: semi-detached	N	N	N	
11.13	Single units: attached row	N	N	N	
11.21	Two units: side-by-side	N	N	N	
11.22	Two units: one above the other	N	N	N	
11.31	Apartments: walk-up	N	N	N	
11.32	Apartment: elevator	N	N	N	
12	Group quarters	N	N	N	
13	Residential hotels	N	N	N	
14	Mobile home parks or courts	N	N	N	
15	Transient lodgings	N	N	N	
16	Other residential	N	N	N	
20	**Manufacturing[3]**				
21	Food and kindred products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
22	Textile mill products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	N	N	N	
24	Lumber and wood products (except furniture); manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
25	Furniture and fixtures; manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
26	Paper and allied products; manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
27	Printing, publishing, and allied industries	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II

Table 5.14-2. Recommended Land Uses for Airfield Safety Zones (continued)

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	**Land Use Name**	**Clear Zone**	**APZ I**	**APZ II**	**Density**
28	Chemicals and allied products; manufacturing	N	N	N	
29	Petroleum refining and related industries	N	N	N	
30	**Manufacturing[3] (continued)**				
31	Rubber and miscellaneous plastic products; manufacturing	N	N	N	
32	Stone, clay, and glass products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
33	Primary metal products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
34	Fabricated metal products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks	N	N	N	
39	Miscellaneous manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
40	**Transportation, communication, and utilities[3,4]**				
41	Railroad, rapid rail transit, and street railway transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
42	Motor vehicle transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
43	Aircraft transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
44	Marine craft transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
45	Highway and street right-of-way	Y[5]	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
46	Automobile parking	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
47	Communication	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
48	Utilities[7]	N	Y[6]	Y[6]	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II

Table 5.14-2. Recommended Land Uses for Airfield Safety Zones (continued)

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	**Land Use Name**	**Clear Zone**	**APZ I**	**APZ II**	**Density**
48.5	Solid waste disposal (landfills, incinerators, etc.)	N	N	N	
49	Other transportation, communication, and utilities	N	Y[6]	Y	See note 6 below
50	**Trade**				
51	Wholesale trade	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
52	Retail trade – building materials, hardware and farm equipment	N	Y	Y	See note 8 below
53	Retail trade – including discount clubs, home improvement stores, electronics superstores, etc.	N	N	Y	Maximum FAR 0.16 in APZ II
53	Shopping centers-Neighborhood, Community, Regional, Super-regional[9]	N	N	N	
54	Retail trade - food	N	N	Y	Maximum FAR 0.24 in APZ II
55	Retail trade – automotive, marine craft, aircraft, and accessories	N	Y	Y	Maximum FAR 0.14 in APZ I & 0.28 in APZ II
56	Retail trade – apparel and accessories	N	N	Y	Maximum FAR 0.28 in APZ II
57	Retail trade – furniture, home furnishings and equipment	N	N	Y	Maximum FAR 0.28 in APZ II
58	Retail trade – eating and drinking establishments	N	N	N	
59	Other retail trade	N	N	Y	Maximum FAR 0.16 in APZ II
60	**Services[10]**				
61	Finance, insurance and real estate services	N	N	Y	Maximum FAR 0.22 in APZ II
62	Personal services	N	N	Y	Office uses only. Maximum FAR 0.22 in APZ II
62.4	Cemeteries	N	Y[11]	Y[11]	
63	Business services (credit reporting; mail, stenographic, reproduction; advertising)	N	N	Y	Maximum FAR 0.22 in APZ II
63.7	Warehousing and storage services[12]	N	Y	Y	Maximum FAR 1.0 in APZ I; 2.0 in APZ II

Table 5.14-2. Recommended Land Uses for Airfield Safety Zones (continued)

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	**Land Use Name**	**Clear Zone**	**APZ I**	**APZ II**	**Density**
64	Repair services	N	Y	Y	Maximum FAR 0.11 in APZ I; 0.22 in APZ II
65	Professional services	N	N	Y	Maximum FAR 0.22 in APZ II
65.1	Hospitals, nursing homes	N	N	N	
65.1	Other medical facilities	N	N	N	
66	Contract construction services	N	Y	Y	Maximum FAR 0.11 in APZ I; 0.22 in APZ II
67	Government services	N	N	Y	Maximum FAR 0.24 in APZ II
68	Educational services	N	N	N	
68.1	Child care services, child development centers, and nurseries	N	N	N	
69	Miscellaneous services	N	N	Y	Maximum FAR 0.22 in APZ II
69.1	Religious activities (including places of worship)	N	N	N	
70	**Cultural, entertainment and recreational**				
71	Cultural activities	N	N	N	
71.2	Nature exhibits	N	Y[13]	Y[13]	
72	Public Assembly	N	N	N	
72.1	Auditoriums, concert halls	N	N	N	
72.11	Outdoor music shells, amphitheaters	N	N	N	
72.2	Outdoor sports arenas, spectator sports	N	N	N	
73	Amusements – fairgrounds, miniature golf, driving ranges; amusement parks, etc.	N	N	Y[20]	
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y[13]	Y[13]	Maximum FAR 0.11 in APZ I; 0.22 in APZ II
75	Resorts and group camps	N	N	N	
76	Parks	N	Y[13]	Y[13]	Maximum FAR 0.11 in APZ I; 0.22 in APZ II
79	Other cultural, entertainment and recreation	N	Y[11]	Y[11]	Maximum FAR 0.11 in APZ I; 0.22 in APZ II

Table 5.14-2. Recommended Land Uses for Airfield Safety Zones (continued)

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	**Land Use Name**	**Clear Zone**	**APZ I**	**APZ II**	**Density**
80	**Resource production and extraction**				
81	Agriculture (except livestock)	Y[4]	Y[14]	Y[14]	
81.5-81.7	Agriculture-Livestock farming, including grazing and feedlots	N	Y[14]	Y[14]	
82	Agriculture related activities	N	Y[15]	Y[15]	Maximum FAR 0.28 in APZ I; 0.56 in APZ II; no activity which produces smoke, glare, or involves explosives
83	Forestry activities[16]	N	Y	Y	Maximum FAR 0.28 in APZ I; 0.56 in APZ II; no activity which produces smoke, glare, or involves explosives
84	Fishing activities[17]	N[17]	Y	Y	Maximum FAR 0.28 in APZ I; 0.56 in APZ II; no activity which produces smoke, glare, or involves explosives
85	Mining activities[18]	N	Y[18]	Y[18]	Maximum FAR 0.28 in APZ I; 0.56 in APZ II; no activity which produces smoke, glare, or involves explosives
89	Other resource production or extraction	N	Y	Y	Maximum FAR 0.28 in APZ I; 0.56 in APZ II; no activity which produces smoke, glare, or involves explosives
90	**Other**				
91	Undeveloped land	Y	Y	Y	
93	Water areas[19]	N[19]	N[19]	N[19]	

Source: Air Force Instruction AFI 32-7063, Rev. December 2015

Key to Table:

SLUCM - Standard Land Use Coding Manual, US Department of Transportation, FAR = floor area ratio, Du / AC – dwelling unit per acre

Table 5.14-2. Recommended Land Uses for Airfield Safety Zones (continued)

Notes:

1. A "Yes": (Y) or a "No" (N) designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of the densities of people and structures. In order to assist air installations and local governments, general suggestions as to FARs are provided as a guide to density in some categories. In general, land use restrictions that limit occupants, including employees, of commercial, service, or industrial buildings or structures to 25 an acre in APZ I and 50 an acre in APZ II are considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people an acre in APZ I and 50 people an acre in APZ II. Recommended FARs are calculated using standard parking generation rates for various land uses, vehicle occupancy rates, and desired density in APZ I and II. For APZ I, the formula is FAR = 25 people an acre / (Average Vehicle Occupancy x Average Parking Rate x (43560/1000)). The formula for APZ II is FAR = 50/(Average Vehicle Occupancy x Average Parking Rate x (43560/1000)).
2. The suggested maximum density for detached single-family housing is two Du / Ac. In a planned unit development (PUD) of single-family detached units, where clustered housing development results in large open areas, this density could possibly be increased slightly provided the amount of surface area covered by structures does not exceed 20 percent of the PUD total area. PUD encourages clustered development that leaves large open areas.
3. Other factors to be considered: labor intensity, structural coverage, explosive characteristics, air pollution, electronic interference with aircraft, height of structures, and potential glare to pilots.
4. No structures (except airfield lighting and navigational aids necessary for the safe operation of the airfield when there are no other siting options), buildings, or above-ground utility and communications lines should normally be located in Clear Zone areas on or off the air installation. The Clear Zone is subject to the most severe restrictions.
5. Roads within the graded portion of the Clear Zone are prohibited. All roads within the Clear Zone are discouraged, but if required, they should not be wider than two lanes and the rights-of-way should be fenced (frangible) and not include sidewalks or bicycle trails. Nothing associated with these roads should violate obstacle clearance criteria.
6. No above ground passenger terminals and no above ground power transmission or distribution lines. Prohibited power lines include high-voltage transmission lines and distribution lines that provide power to cities, towns, or regional power for unincorporated areas.
7. Development of renewable energy resources, including solar and geothermal facilities and wind turbines, may impact military operations through hazards to flight or electromagnetic interference. Each new development should to be analyzed for compatibility issues on a case-by-case basis that considers both the proposal and potentially affected mission.
8. Within SLUCM Code 52, maximum FARs for lumberyards (SLUCM Code 521) are 0.20 in APZ-I and 0.40 in APZ-11; the maximum FARs for hardware, paint, and farm equipment stores, (SLUCM Code 525), are 0.12 in APZ I and 0.24 in APZ II.
9. A shopping center is an integrated group of commercial establishments that is planned, developed, owned, or managed as a unit. Shopping center types include strip, neighborhood, community, regional, and super-regional facilities anchored by small businesses, a supermarket or drug store, discount retailer, department store, or several department stores, respectively.
10. Ancillary uses such as meeting places, auditoriums, etc. are not recommended.
11. No chapels or houses of worship are allowed within APZ I or APZ II.
12. Big box home improvement stores are not included as part of this category.
13. Facilities must be low intensity, and provide no playgrounds, etc. Facilities such as club houses, meeting places, auditoriums, large classes, etc., are not recommended.
14. Activities that attract concentrations of birds creating a hazard to aircraft operations should be excluded.

Table 5.14-2. Recommended Land Uses for Airfield Safety Zones (continued)

15. Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.
16. Lumber and timber products removed due to establishment, expansion, or maintenance of Clear Zone lands owned in fee will be disposed of in accordance with applicable DOD guidance.
17. Controlled hunting and fishing may be permitted for the purpose of wildlife management.
18. Surface mining operations that could create retention ponds that may attract waterfowl and present bird / wildlife aircraft strike hazards (BASH), or operations that produce dust or light emissions that could affect pilot vision are not compatible.
19. Naturally occurring water features (e.g., rivers, lakes, streams, wetlands) are pre-existing, nonconforming land uses. Naturally occurring water features that attract waterfowl present a potential BASH. Actions to expand naturally occurring water features or construction of new water features should not be encouraged. If construction of new features is necessary for storm water retention, such features should be designed so that they do not attract waterfowl.
20. Amusement centers, family entertainment centers or amusement parks designed or operated at a scale that could attract or result in concentrations of people, including employees and visitors, greater than 50 people per acre at any given time are incompatible in APZ II.

Compatibility Zone B1 consists of APZ I. This is an area of risk situated within 7,500 feet of the runway ends. It is also subject to potential noise levels in excess of CNEL 80 dB (see Issue NOI-1 for further discussion on noise).

Compatibility Zone B2 includes APZ II but is expanded to encompass approach and departure flight tracks that are not aligned with the runway. The general standards provide specific maximum density requirements, outlined in Table 5.14-3, limit noise sensitive uses, and prohibit hazards to flight. Hazards to flight include physical, visual, and electronic forms of interference with the safety of aircraft operations.

Table 5.14-3. LUCP Compatibility Density Criteria

Zone	Residential (dwelling unit / acre)	Indoor Uses (people / acre)	Outdoor Uses (people / acre)	Single Acre (people / acre)
B1	0	15	20	30
B2	0	25	40	60

Source: Travis AFB Land Use Compatibility Plan

As a condition for development approval, the LUCP requires that the owner of any property proposed for development within the Compatibility Zones B1 or B2 must dedicate an avigation easement to the County of Solano. The avigation easement must, to the maximum extent permitted by law:

(a) Provide the right of flight in the airspace above the property;

(b) Allow the generation of noise and other impacts associated with aircraft overflight, including but not limited to noise, vibrations, turbulence, odors, vapors, fumes, fuel particle emissions, exhaust, smoke, and dust;

(c) Restrict the height of structures, trees, and other objects;

(d) Permit access to the property for the removal or aeronautical marking and lighting of objects exceeding the established height limit; and

(e) Prohibit from being created on the property electrical and electronic interference, glint, glare, and other conditions that would impair the vision of pilots, high-velocity exhaust plumes, and other interference with radio, radar, microwave, or means of aircraft communication, and uses or features that make it difficult for pilots to distinguish between airfield navigation lights and visual aids and other lights, and other potential hazards to flight from being created on the property.

The LUCP standards for the density of future development cannot be directly compared to guidelines provided in the Travis AFB AICUZ Study. The LUCP utilizes people per acre to measure density and the AICUZ utilizes floor area ratio of buildings to measure density. The LUCP also goes beyond the AICUZ compatibility issues of safety and noise, incorporating height, bird aircraft strike hazards, and glint and glare restrictions. The avigation easement required by the LUCP ensures that property owners do not construct future incompatible uses.

Figures 5.14-2, 5.14-3, 5.14-4, and 5.14-5 illustrate the existing land use, zoning, Solano County General Plan future land use, and Suisun City General Plan future land uses, respectively, in the safety zones, as well as an assessment of compatibility based on recommendations in the AICUZ.

Tables 5.14-4, 5.14-5, and 5.14-6 provide the acreage of each existing land uses, zoning, and future land use underneath within the safety zones, respectively.

Travis AFB holds three easements with private property owners covering the 235 acres beyond the installation boundaries to prevent development within the CZs. The APZs are currently clear of incompatible uses and are mostly used for agriculture. However, as the area around Travis AFB continues to grow, these open areas may be developed with uses that could be incompatible with Base operations.

Table 5.14-4. Existing Land Use Acreage within the Safety Zones

Existing Land Use	CZ	APZ I	APZ II	Total
Agriculture	105	618	996	1,719
Employment Areas	8	24	52	83
Forest Land	0	0	15	15
Military	123	114	5	242
Rangeland	1	16	128	145
Residential	0	0	18	18
Sparsely Vegetated Land	0	0	7	7
Water	0	0	20	20
Wetlands	0	0	71	72

Source: Association of Bay Area Government, 2006; Travis AFB AICUZ, 2009; Matrix Design Group, 2016

Figure 5.14-2

Existing Land Use and Safety Zone Compatibility

Legend

Compatibility
- Yes
- Yes with Restrictions
- No

Existing Land Use
- Agriculture
- Employment Areas
- Forest Land
- Military
- Rangeland
- Residential
- Sparsely Vegetated Land
- Water
- Wetlands

Accident Potential Zones
- Clear Zone
- APZ I
- APZ II

- Travis AFB
- Runway
- City
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Sources: Association of Bay Area Governments, 2006; Matrix Design Group, 2016. 2009 Travis AFB AICUZ.

TRAVIS AFB SUSTAINABILITY STUDY

0 ¼ ½ Mile

Matrix DESIGN GROUP

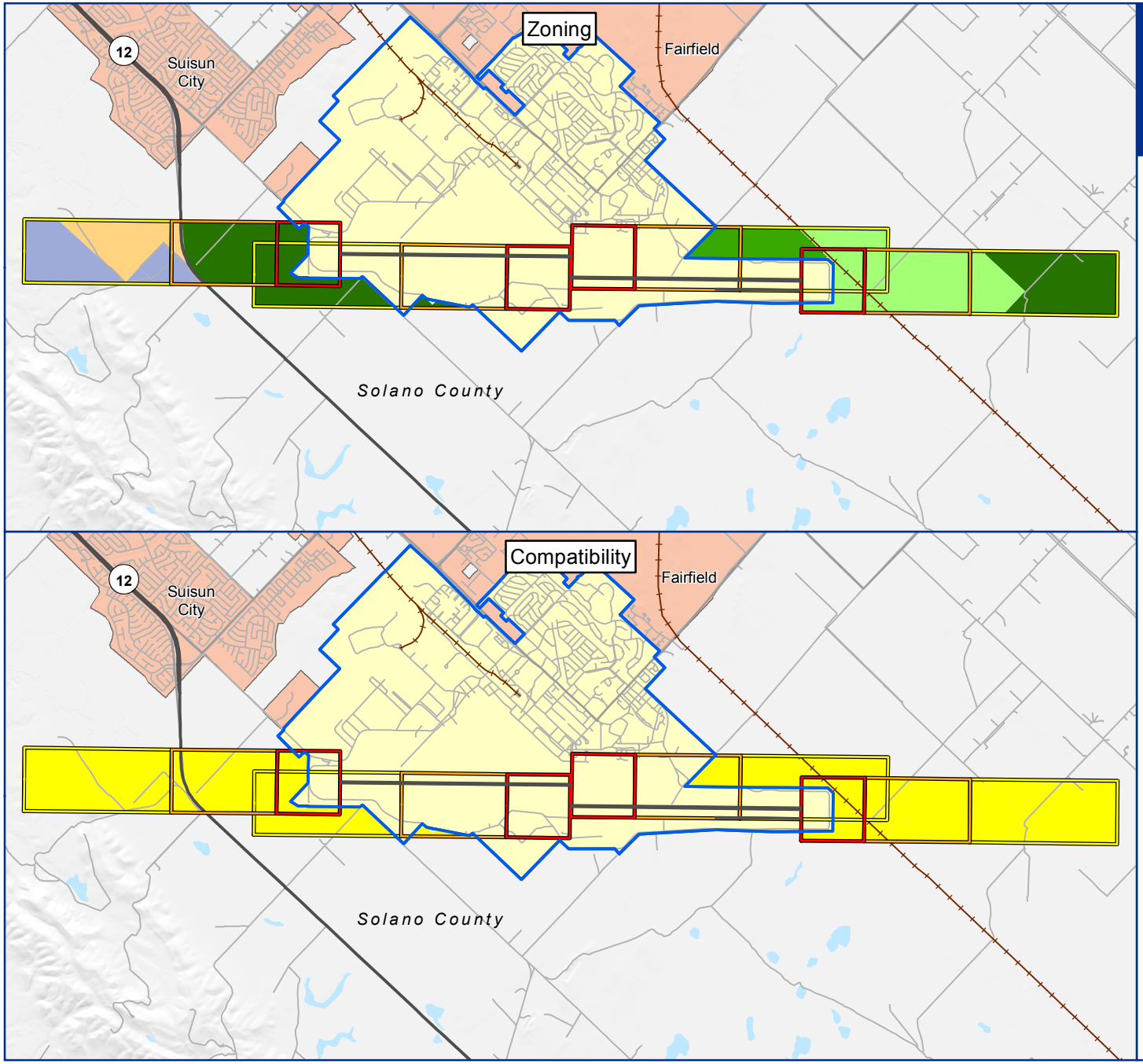

Figure 5.14-3

Zoning and Safety Zone Compatibility

Legend

Compatibility
- Yes with Restrictions

Zoning
- Exclusive Agriculture A-160
- Exclusive Agriculture A-20
- Exclusive Agriculture A-80
- Marsh Preservation MP
- Suisun Marsh Agriculture ASM-160

Accident Potential Zones
- Clear Zone
- APZ I
- APZ II

- Travis AFB
- Runway
- City
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Sources: Solano County Zoning, 2013; Matrix Design Group, 2016. 2009 Travis AFB AICUZ.

TRAVIS AFB SUSTAINABILITY STUDY

0 ¼ ½ Mile

Matrix DESIGN GROUP

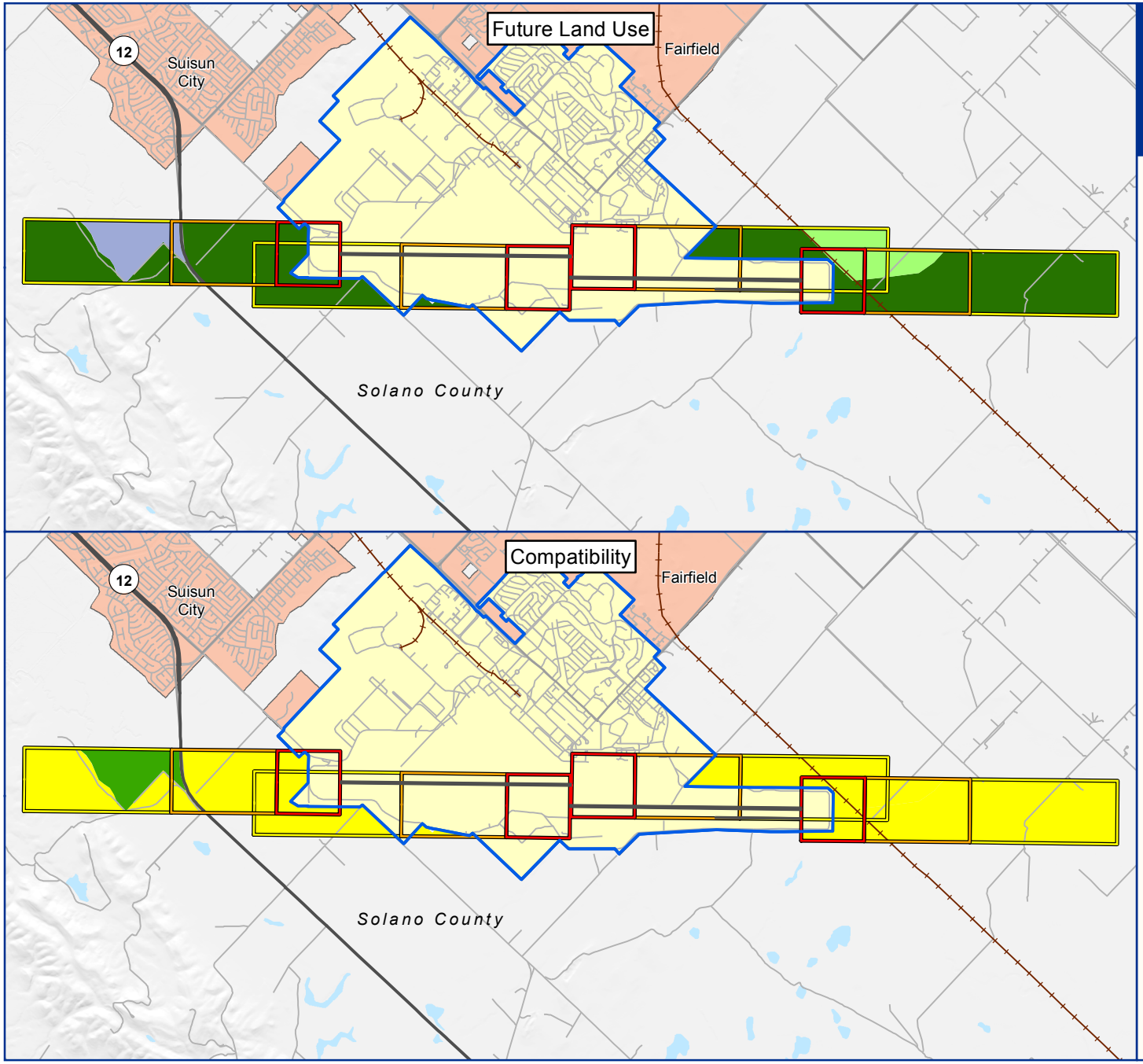

Figure 5.14-4

Solano County Future Land Use and Safety Zone Compatibility

Legend

Compatibility
- Yes
- Yes with Restrictions

Future Land Use
- Extensive Agriculture
- Intensive Agriculture
- Marsh

Accident Potential Zones
- Clear Zone
- APZ I
- APZ II

- Travis AFB
- Runway
- City
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Sources: Solano County General Plan, 2006; Matrix Design Group, 2016. 2009 Travis AFB AICUZ.

TRAVIS AFB SUSTAINABILITY STUDY

0 ¼ ½ Mile

Matrix DESIGN GROUP

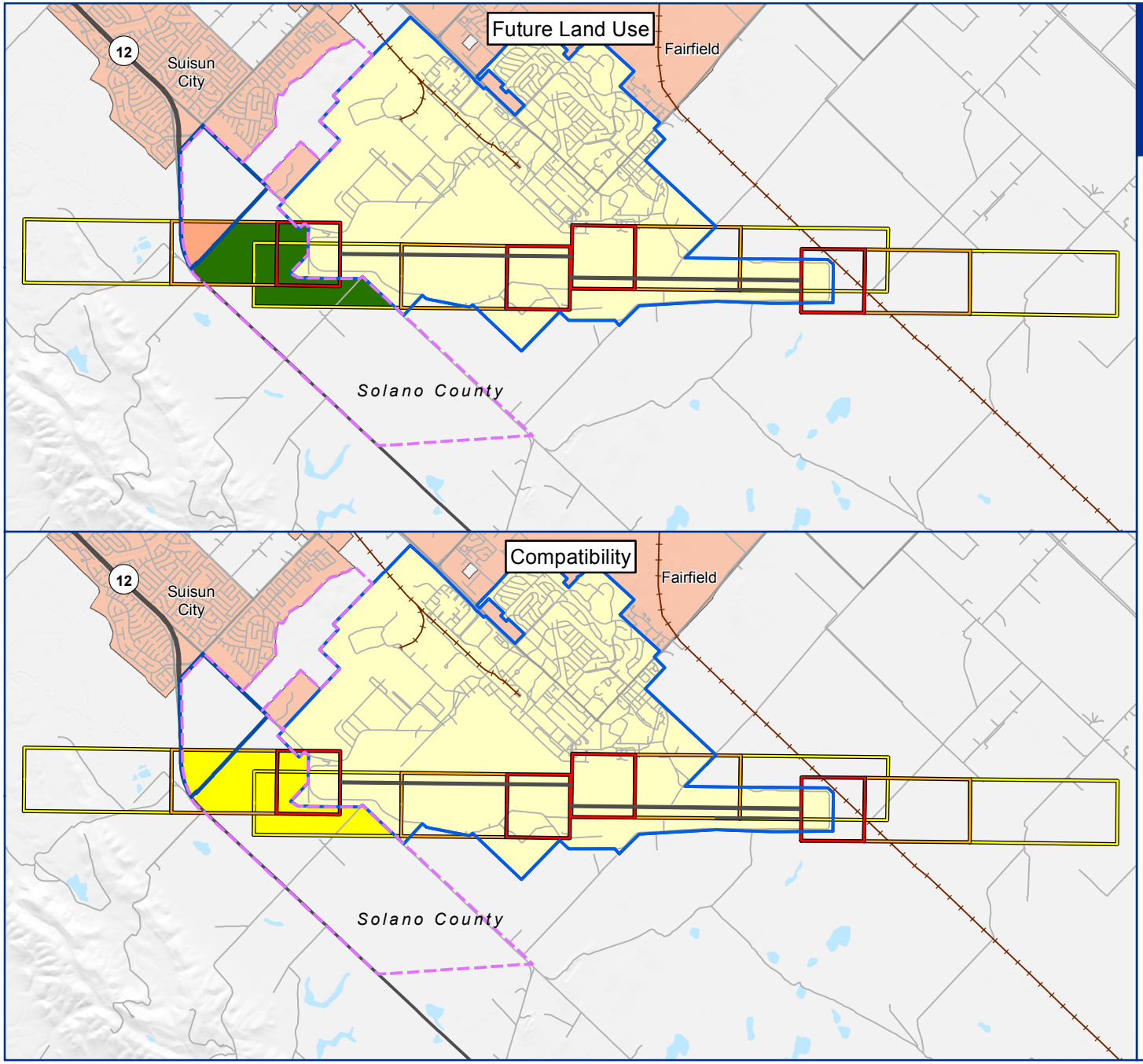

Figure 5.14-5

Suisun City Future Land Use and Safety Zone Compatibility

Legend

Compatibility
- Yes with Restrictions

Future Land Use
- Agriculture and Open Space
- Special Planning Area

Accident Potential Zones
- Clear Zone
- APZ I
- APZ II

- Special Planning Area
- Travis AFB
- Runway
- Suisun City Sphere of Influence
- City
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Sources: Suisun City Future Land Use, 2015; Matrix Design Group, 2016. 2009 Travis AFB AICUZ.

TRAVIS AFB SUSTAINABILITY STUDY

0 ¼ ½ Mile

Matrix DESIGN GROUP

Table 5.14-5. Zoning District Acreage within the Safety Zones

Zoning District	CZ	APZ I	APZ II	Total
A-160 (Exclusive Agriculture A-160)	100	312	510	922
A-20 (Exclusive Agriculture A-20)	12	65	107	184
A-80 (Exclusive Agriculture A-80)	124	344	209	678
ASM-160 (Suisun Marsh Agriculture ASM-160)	0	32	283	314
MP (Marsh Preservation MP)	0	17	199	216

Source: Solano County Zoning, 2013; Travis AFB AICUZ, 2009; Matrix Design Group, 2016

Table 5.14-6. Future Land Use Acreage within the Safety Zones

Future Land Use	CZ	APZ I	APZ II	Total
Solano County				
Extensive Agriculture	189	664	1,057	1,910
Intensive Agriculture	46	91	86	223
Marsh	0	16	168	183
Suisun City				
Agriculture	99	219	153	471
Special Planning Area	0	76	0	76

Source: Solano County General Plan, 2006; Suisun City General Plan, 2015; Travis AFB AICUZ, 2009; Matrix Design Group, 2016

Existing Land Uses

Figure 5.14-2 illustrates the conditionally compatible and incompatible land uses under the runway safety zones. Table 5.14-4 provides the acreage of each existing land use within the safety zones.

There are several conditionally compatible land uses in the CZs and the APZs. Agriculture land is generally compatible, but if a structure or earth movement were to occur on this land in the CZs, then this use would be deemed incompatible as the CZ is designated as an area that should remain free and clear of any kind of development, including earth movement like stacking bales of hay. Agricultural uses without livestock are compatible within APZ I and APZ II, under the condition that activities that attract concentrations of birds are excluded. Additionally, labor intensity, structural coverage, explosive characteristics, and air pollution are all factors that should be considered before allowing agricultural uses.

Employment Areas are generally compatible within APZ I and APZ II, as long as recommended density restrictions are met. There is one acre of incompatible rangeland located within the CZ, which must remain clear of livestock. The eight acres of Employment Area within the CZ is the former Sacramento Northern Railroad right of way. The railroad is no longer active and is one of Travis AFB's geographically separated units. Railroads are considered incompatible within the CZ, but because it is no longer active and owned by Travis AFB, it is no longer a concern.

The 18 acres of residential land within APZ II is compatible if the maximum density of units is two dwelling units per acre of land.

Zoning

Figure 5.14-3 illustrates the zoning within the runway safety zones. Table 5.14-5 provides the acreage of land within each zoning district under the safety zones. Higher densities and uses that encourage large gatherings of people are considered to be incompatible for safety reasons.

It is important to note that Figure 5.14-3 does not incorporate Section 28.70.10.D of the Solano County Zoning Regulations, which states that land uses within an area of influence must conform to the policies and criteria established in the LUCP. Therefore, all future land uses in the county within the safety zones would be reviewed for compatibility and must meet the standards of the LUCP. As such, it restricts certain types of uses in the safety zones that are defined to be incompatible in the Travis AFB LUCP.

The land within the CZs is currently zoned Exclusive Agriculture, which is compatible as long as the area remains free and clear of any kind of development (structures) and livestock operations. Travis AFB holds easements with private property owners to prevent any future incompatible development within the CZs.

As shown on Figure 5.14-3, all the zoning districts within the APZ are compatible with restrictions. Uses allowed in areas zoned Exclusively Agriculture are generally compatible within APZ I and APZ II, although agriculture uses that attract birds are not recommended. Exclusively Agriculture zoning also permits a primary dwelling and secondary dwelling. Residential use is not recommended in APZ I and should be low density (two dwelling units per acre or less) within APZ II.

Marsh Preservation and Suisun Marsh Agriculture zoning districts permit dwelling units, which are an incompatible use within APZ I and should be low density (two dwelling units per acre or less) within APZ II. Agriculture and resource conservation, permitted uses within the Marsh Preservation and Suisun Marsh Agriculture zoning districts, are compatible within APZ I and APZ II. However, actions to expand naturally occurring water features or construction of new water features should not be allowed, as they may attract birds.

Future Land Uses

Figure 5.14-4 illustrates the future land uses within the safety zones of the airfield in Solano County and Figure 5.14-5 illustrates the future land uses within the safety zones of the airfield in Suisun City. Table 5.14-6 provides the acreage of each future land use within the safety zones.

About 93 percent of the future land use acreage within the safety zones is dedicated to agricultural use. Agricultural use without residential dwellings, structures, and livestock is compatible within all the safety zones. Agricultural uses with dwellings are not recommended in APZ I and must be low density (two dwelling units per acre or less) within APZ II. Marshes are compatible within APZ I and APZ II. However, actions to expand naturally occurring water features or construction of new water features should not be encouraged within the safety zones, as they may attract birds.

The Suisun City Special Planning Area shown on Figure 5.14-5 has special guidelines for the areas future development in the Suisun City General Plan. These guidelines include the protection of Travis AFB with development consistent with the LUCP. These guidelines should help ensure that future development within the Special Planning Area will be compatible with Travis AFB.

Findings

- While Open land within Travis AFB's southern APZ has the potential to attract new development as Suisun City continues to grow east, compliance with AICUZ and LUCP recommendations on all future development approvals will ensure long-term compatibility.
- The LUCP standards for Compatibility Zones B1 and B2 restrict incompatible development within APZ I and APZ II and require an avigation easement.

ISSUE LU-2	**Compatibility of future Enhanced Use Lease development on Travis AFB** Close coordination will be required to ensure any future Enhanced Use Lease development on Travis is compatible with surrounding areas and is not competitive with planned community development.

Compatibility Assessment

Travis AFB currently has a vacant 53-acre area in the northwestern corner of the Base. The area was previously occupied by housing, which was destroyed by a fire in 2008 before it was scheduled to be demolished. With this vacant land, Travis AFB has the opportunity to pursue an Enhanced Use Lease (EUL) project. An EUL is a method for funding development on federal property by allowing a private developer to lease federal property, with rent paid by the developer. Installations are then able to use the profit for improvements of property or facilities, construction or acquisition of new facilities, and other services to maintain the Base. An EUL offers an installation numerous benefits, including reducing Base operating costs, stimulating the local job market, and helping foster cooperation between the military and the private sector.

Potential uses for EUL could include energy production, restaurants, offices, labs, or other commercial or industrial uses. According to the Travis AFB Installation Development Plan, the EUL will capitalize on the proximity of the new Fairfield Train Station. Currently, there are no specific plans for the future use of the EUL area.

A key local concern is that the EUL should be compatible with the surrounding economic development area, not competing with local businesses and economic development plans. The area is in proximity to many industrial uses, along with the future Fairfield Train Station Specific Plan. The Moving Solano Forward Study, an economic diversification study prepared for Solano County in 2014, found that construction, health care and associated services, and educational services are anticipated to experience the greatest levels of growth in the county. The study also suggests a need to maintain and grow the county's manufacturing sector. Surrounding uses and economic diversification should be considered when permitting future EUL development.

The City of Fairfield Train Station Specific Plan provides a guide for the development of the planning area. Figure 5.11-1 (see Section 5.11, Housing) illustrates the layout of the Fairfield Train Station Specific Plan. The vision for the area includes industrial development east of the railroad and retail and office employment west of the railroad. The Specific Plan area hopes to capture the unmet demand for industrial and manufacturing space in the region. While there are yet to be specific development projects approved within the Specific Plan area, the objectives and concepts included in the plan should be considered when developing the EUL area.

Any proposed development on Travis AFB should also be coordinated with outside service providers, such as the City of Vallejo, who is the water service provider for the installation. It will be important to ensure that service providers have the capability to support any new development or can plan for capacity changes that may be needed to meet new service demands.

Findings

- The EUL needs to be designed to be compatible with the new development planned by the Fairfield Train Station Specific Plan and other development surrounding the EUL.
- An economic diversification study found that there is a need to maintain and grow the county's manufacturing sector.

- Significant coordination between Travis AFB and the City of Fairfield will be required.
- Any proposed development on Travis AFB should be coordinated with outside service providers to ensure there is enough capacity to support such development.

ISSUE LU-3	**Flight tracks** When the Air Force changes its flight tracks, it affects land planning and policy in the communities.

Compatibility Assessment

Flight tracks are developed to provide guidance on the range of standard operations that are associated with the airfield. These are created using information gathered from air traffic controllers, pilots, and other sources. When flight tracks are developed they attempt to avoid urban development as much as possible to reduce impacts and risk to the general public and commercial or general aviation activities. Safety of operations is paramount in the design of these patterns.

Figure 3-5 in Chapter 3 Travis AFB Profile illustrates the primary flight tracks used by Travis AFB aircraft. Other flight tracks may also be used depending on factors such as weather or mission.

Aircraft operating at Travis AFB use the following flight tracks:

- Straight-out departure.
- Straight-in approach.
- Precision and non-precision instrument approaches; Overhead and rectangular closed patterns to the southeast side of the runways at 2,000 feet above ground level (AGL) and 1,500 feet AGL.
- Spiral down approaches to a landing on the landing zone or runways.

The closed pattern flight tracks are isolated to areas surrounding the installation and consist of low-level altitude flights. The closed pattern flight tracks tend to stay away from heavily populated areas but go over parts of western Fairfield and southern Vacaville. The operation performed by the aircraft using these flight tracks can create noise and vibration impacts on land uses under these paths.

The cities of Fairfield, Suisun City, and Vacaville, and Solano County all have general plans to help guide land development within each of their jurisdictions. These plans are maintained and updated establishing future land use plans. In order to plan compatible development, communities use established flight tracks to ensure noise sensitive uses are not places underneath the tracks. When Travis AFB changes its flight tracks without consulting communities it can impact future planning.

Findings

- Noise sensitive uses should be avoided underneath Travis AFB flight tracks, which generate noise and vibration.
- When Travis AFB makes changes to its flight tracks it can impact the efforts put forth by the surrounding communities to plan appropriate compatible uses underneath the flight tracks.

ISSUE LU-4	**Future development south of Travis AFB** City of Suisun City has received plans for development south of Travis AFB, including a potential interchange.

Compatibility Assessment

As Suisun City grows further east, future development is expected south of Travis AFB, along Highway 12. Expansion of the city is limited in the north and west by the City of Fairfield and to the south by the Suisun Marsh.

The city's sphere of influence, established by the Solano County Local Agency Formation Commission, extends about four miles to the east from the city limits, south of Travis AFB and north of Highway 12.

The Suisun City General Plan designates a portion of the land within the sphere of influence, adjacent to the city limits and north of Highway 12, as a Special Planning Area. While the area lacks specific use restrictions, guidelines for the development of this area are as follows.

- Promote development that enhances existing opportunities and builds on community vision and goals.
- Foster development that benefits the City over the long term.
- Protect Travis AFB and its mission, while encouraging development that benefits the Base.
- Identify infrastructure needed to serve development anticipated through 2035.
- Plan development with sensitivity to environmental resources.
- Streamline the development application and entitlement review process.

The Suisun Commerce and Logistics Center is a proposed 224-acre industrial development within the Special Planning Area. A final proposed land use plan has not been developed, but this project could allow up to 4,236,864 square feet of new development of warehouses, manufacturing, office, and commercial. In addition to the 224 acres, it has a proposed 128.6 acres of open space. The site is within Compatibility Zone C and Zone B1, as identified in the Travis AFB LUCP. These zones establish maximum densities and prohibit certain uses, including labor-intensive industrial. A preliminary review done by the ALUC of the application was found consistent with the LUCP.

Development is also anticipated north of Peterson Road, west of the Irving H. Lambrecht Sports Complex. There is a 55-acre site owned by the Mount Calvary Baptist Church Corporation that is proposed to be developed into a multi-use facility, potentially including senior housing, a sanctuary, and day care.

The site is located within Zone C. Zone C establishes maximum densities and prohibits certain uses, including schools, day care centers, libraries, and nursing homes. Zone C is also located within the noise impact area, which establishes interior noise level criteria for certain uses. The LUCP requires a minimum noise level reduction of 20 decibels for building with noise-sensitive uses, including churches. A preliminary hearing was held for this property with the ALUC on March 10, 2016, but no issues were raised with the property in terms of potential noise concerns.

While the final decisions for future development that will occur in these areas have not been completed, it is possible that future proposals in the area may exceed densities or propose incompatible uses. However, the Suisun City General Plan established Policy PHS-16.2:

> *Notwithstanding other provisions of the plan, the City will restrict land uses and the height of development according to the requirements of the Travis AFB Airport Land Use Compatibility Plan.*

With this policy in place and based on clarification on facility loading in the current LUCP, future land use should be consistent with the Travis AFB LUCP. Compatibility zones established by the LUCP become more restrictive the closer the land is to the runway. If Suisun City continues to expand and develop within these areas, it is important that future uses are compatible with Travis AFB operations.

Findings

- Future growth of Suisun City is expected south of Travis AFB, into Zone C and Zone B1 of the Travis AFB LUCP compatibility zones.
- There are currently two development proposals for land southwest of Travis AFB. The Suisun Commerce and Logistics Center is a proposed industrial development that would likely be compatible with Travis AFB operations, while the proposed Mount Calvary Baptist Church development within the noise zones may require mitigation measures to ensure noise issues are addressed.
- Policy established by the Suisun City General Plan restricts land uses according to the requirements of the LUCP, ensuring future compatibility.

ISSUE LU-5	**Travis Reserve Area** The protective Travis Reserve land use designation expires in 2020. After 2020, the designation can be renewed, adjusted, or removed.

Compatibility Assessment

The City of Fairfield and Solano County have incorporated measures to limit growth around Travis AFB and support future expansion of the Base. There are future plans at Travis AFB to construct a parallel taxiway along Runway 03R/21L, which would require the expansion of the Base perimeter northwest into the protected area. A timeframe for this expansion has not been determined; however, the measures to limit growth were voted into action and are only in effect for a limited time period. Once the time period is over, the measures would need to be approved by voters.

One of the measures is a component of the City of Fairfield General Plan, the Travis Reserve land use designation, which includes unincorporated land located north and east of Travis AFB, illustrated on Figure 5.14-6. Land in the Travis Reserve is set aside for future expansion of Travis AFB only. If the status of the Base changes, the construction of a non-military airport and support uses are permitted in the Travis Reserve. Until a military or airport use is proposed, the city supports its continued use for agriculture and grazing. No residential uses are permitted in the Travis Reserve.

Approval of the Travis Reserve designation was passed by voters in 2003, under Measure L. The initiative prevents the Fairfield City Council from changing major portions of the General Plan without voter approval until 2020. Unless voters approve changes to the Fairfield General Plan, no unplanned growth will occur in the Travis Reserve.

The City of Fairfield is expected to update its General Plan in the next few years, which will either include a measure to renew, adjust, or remove the Travis Reserve designation. If the City experiences a push from voters who want to see development in the area, the measure could potentially not pass.

The Solano County General Plan also has a Travis Reserve land use designation, which consists of 7,971 acres, also illustrated on Figure 5.14-6. The Travis Reserve for Solano County covers the Fairfield Travis Reserve and extends further south covering more area. The reserve protects the land within the overlay for continued agriculture, grazing and associated habitat uses until a military or airport use is proposed. Only if the status of Travis AFB changes would the construction of nonmilitary airport and support uses be permitted. This area was included in the county's General Plan, but not by vote.

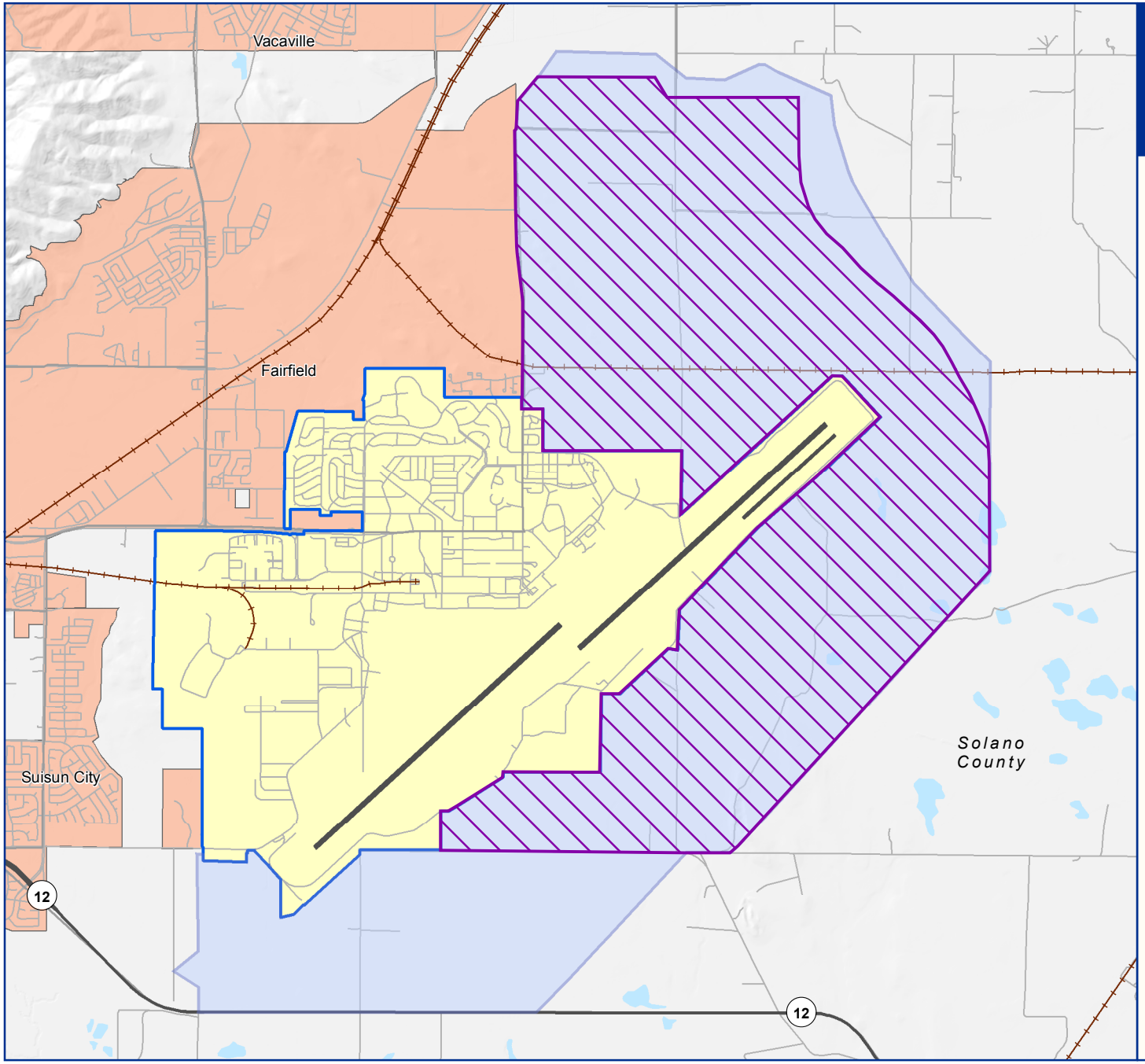

Figure 5.14-6

Travis Reserve Areas

Legend

- Fairfield Travis Reserve
- Solano County Travis Reserve Area
- Travis AFB
- Runway
- City
- Interstate
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Sources: Travis AFB, 2016; City of Fairfield, 2016; Solano County, 2016.

TRAVIS AFB SUSTAINABILITY STUDY

0 ¼ ½ Mile

Matrix DESIGN GROUP

In 2008, the Solano County Orderly Growth Initiative, Proposition A, was extended by voters through 2028. Under the provisions of the Orderly Growth Initiative, a popular vote is required to redesignate unincorporated agriculture or open space lands to another land use category or to increase the density of development on designated agriculture or open space lands. A majority of the county land surrounding Travis AFB is currently designated agriculture, which restricts development under the initiative. The Orderly Growth Initiative is similar to the Travis Reserve in that it regulates development and maintains agriculture and open space, but it encompasses the entire unincorporated county, beyond the Travis Reserve. If the initiative, which has been in place by voters since 1984, is not extended after 2028 it would open the area around Travis AFB to redesignation and potential incompatible development.

Findings

- The City of Fairfield Travis Reserve land use designation was a voter approved measure to set aside land for the future expansion of Travis AFB.
- The Solano County Travis Reserve land use designation is similar to the Fairfield Travis Reserve, but it extends further south protecting a larger area. The Solano Travis Reserve was not voted on by the public.
- The Solano County Orderly Growth Initiative was a voter approved measure that regulates the development of agriculture and open space throughout the entire unincorporated county, including the area surrounding Travis AFB.
- If voters do not readopt the Travis Reserve designation in Fairfield in 2020 and the Solano County Orderly Growth Initiative in 2028, land surrounding Travis AFB may become vulnerable to incompatible development. To provide some perspective similar measures have been adopted by County voters since the 1980s.

5.15 Legislative Initiatives (LEG)

Legislative initiatives are proposed changes in relevant policies, laws, regulations or programs which could potentially have a significant impact on one or more substantive areas of concern to both the facility and to the stakeholder communities. The focus of this compatibility issue is on initiatives with general and broad implications.

There were no Major Issues identified for Legislative Initiatives in the TSS.

5.16 Light and Glare (LG)

This factor refers to man-made lighting (street lights, airfield lighting, building lights) and glare (direct or reflected light) that disrupts vision. Light sources from commercial, industrial, recreational, and residential uses at night can cause excessive glare and illumination, impacting the use of military night vision devices and air operations. Conversely, high intensity light sources generated from a military area (such as ramp lighting) may have a negative impact on the adjacent community.

Key Terms

Glare (glint). The presence of excessively bright light, such as direct or reflected sunlight, or artificial light, such as sport field and stadium lights at night. Glare reduces visibility and can completely impair vision when very intense.

Light Pollution. This type of pollution is created by the artificial brightening of sky caused by development, including street lights and other man-made sources. This has a disruptive effect on the natural cycles and inhibits the observation of stars and planets and can render night vision devices ineffective.

Technical Background

The amount of ambient light experienced on the ground is a function of:

- Intensity of nearby light sources (up to 20 miles away);
- Distance from the sources;
- Spectra of the light sources (blue light decays faster in the atmosphere);
- Density of the cloud deck;
- Height of the cloud; and
- Relative humidity.

When measuring light pollution, the proximity to a community has a significant effect on the amount of light pollution that saturates the sky. Proximity twice as close to a community makes its sky glow appear approximately six times brighter.

ISSUE LG-1	**Potential for glint and glare from solar arrays**
	There is a potential that new solar energy development could cause glint and glare that could impact pilots' vision. The County has adopted an ordinance that minimizes this potential in unincorporated areas by requiring detailed study of glint glare impacts from potential projects. Further, the County has adopted an ordinance that limits commercial solar energy development on agricultural land.

Compatibility Assessment

Solar energy development is growing in use as technology becomes more readily available. In an area such as California, solar energy development is a practical alternative to fossil fuels. While the best areas for solar development in California are concentrated in the southeastern portion of the state, there has been some development of solar arrays in Solano County.

In April 2009, SunEdison installed a 1.2-megawatt solar array on six acres at the Anheuser-Busch brewery. The Fairfield-Suisun Sewer District Wastewater Treatment Plant, near the brewery, also has a one-megawatt solar array. Both systems are located approximately eight miles to the west of Travis AFB. Other businesses have installed private solar arrays, including Meyer, Alza Corporation, and Novartis in Vacaville. In September 2013, a 1.1-megawatt solar array was installed at the North Bay Regional Water Treatment Plant. The system, located about two miles northwest of Travis AFB, covers seven acres and uses technology to rotate the solar panels to follow the sun's path.

One of the biggest future solar projects in the area is the future Ryer Island Solar Farm, which will be installed and operated by SolAgra, and will begin as a 2.2-acre project of solar panels and a research facility. SolAgra stated they

utilized a solar glare hazard analysis tool to verify a no-glare result to ensure compatibility with Travis AFB operations. SolAgra hopes to eventually expand the project to cover over 2,000 acres, producing 721 megawatts of power. This would require a significant change to County regulations, which currently prohibit such a development. Ryer Island is located north of Rio Vista, about 15 miles east of Travis AFB.

Solar facilities are regulated by the Travis AFB LUCP to prevent any reflective glint and glare hazards to aircraft pilots and air traffic controllers. While most new solar panels are constructed with an anti-reflective coating, the glass panels can still produce glare. Travis AFB uses the Solar Glare Hazard Analysis Tool (SGHAT) developed by Sandia National Laboratories that determines when and where solar glare can occur throughout the year from specific observation points. This method provides the potential visual impact from the glare, along with design alternatives to avoid glare impacts.

Solar array at North Bay Regional Water Treatment plant in Vacaville (Source: http://www.solarworld-usa.com/)

Regulations for solar energy in the LUCP include restricting commercial-scale solar facility with the potential for glint or glare that would impact an existing or planned airport traffic control tower or approach path. All new or expansion of existing commercial-scale solar facilities must be reviewed by the ALUC and are required to conduct a glint and glare study based on the SGHAT model. A commercial solar facility is a facility that converts solar energy to utility power for the primary purpose of off-site use.

Because there are no regulations restricting small-scale solar panels, that use solar energy on site, the existing solar arrays in the county associated with the private businesses and the water treatment plants are considered compatible with the LUCP regulations. The potential future Ryer Island Solar Farm, which will be a commercial-scale facility, is the only solar array that has the potential to be incompatible with Travis AFB. However, the project is in the beginning stages and has worked with Travis AFB to ensure compatibility.

Source: /www.solanocounty.com/SubApp/SolanoIndex/Reports/ Solano_EnergyCluster.pdf

Findings

- All commercial-scale solar facilities must be analyzed by the SGHAT model and reviewed by the ALUC. Facilities found to produce too much glare must be redesigned and retested before approval.
- Existing County regulations prohibit commercial scale solar in agricultural areas.
- Existing private solar arrays are considered compatible and not regulated by the Travis AFB LUCP. A potential commercial-scale solar facility on Ryer Island has the potential to produce glare that could impact Travis AFB operations.

5.17 Marine Environments (MAR)

Regulatory or permit requirements protecting marine and ocean resources can cumulatively affect the military's ability to conduct operations, training exercises, or testing in a water-based environment.

There were no Major Issues identified for Marine Environments in the TSS.

5.18 Noise (NOI)

Sound that reaches unwanted levels is referred to as noise. The central issue with noise is the impact, or perceived impact, on people, animals (wild and domestic), and general land use compatibility. Exposure to high noise levels can have a significant impact on human activity, health, and safety. The decibel (dB) scale is used to quantify sound intensity. To understand the relevance of decibels, a normal conversation often occurs at 60 dB, while an ambulance siren from 100 feet away is about 100 dB. Noise associated with military operations (arrival / departure of military aircraft, firing of weapons, etc.) may create noises in higher dB ranges.

Key Terms

Ambient Noise. The total noise associated with an existing environment (built or natural) and usually comprising sounds from many sources, both near and far, is referred to as ambient noise.

Attenuation. Attenuation is a reduction in the level of sound resulting from an object's distance from the noise source or absorption by the surrounding topography, the atmosphere, barriers, construction techniques and materials, and other factors. Sound attenuation in buildings can be achieved using special construction practices that reduce the amount of noise that penetrates the windows, doors, and walls of a building. Sound attenuation measures may be incorporated during initial construction for new buildings or as additional construction for existing buildings.

Community Noise Equivalent Level. Community Noise Equivalent Level (CNEL) is a weighted average of noise level over time. CNEL is the average sound level over a 24-hour period, with a penalty of 5 dB added between 7:00 p.m. and 10:00 p.m. and a penalty of 10 dB added for the nighttime hours of 10:00 p.m. to 7:00 a.m.

Day-Night Average Sound Level. Day-Night Average Sound Level (DNL) represents an average sound exposure over a 24-hour period. During the nighttime period (10:00 p.m. to 7:00 a.m.), averages are artificially increased by 10 dB. This weighting reflects the added intrusiveness and the greater disturbance potential of nighttime noise events attributable to the fact that community background noise typically decreases by 10 dB at night.

Decibel (dB). A decibel is the physical unit commonly used to describe noise levels. It is a unit for describing the amplitude of sound, as heard by the human ear.

Noise. Defining noise from a technical perspective, sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. More simply stated, sound is what we hear. As sounds reach unwanted levels, this is referred to as noise.

Noise Contour. Noise contours consist of noise impact lines constructed by connecting points of equal noise level measured in dB and identify areas on a map that fall within that particular dB noise contour.

Noise Sensitive Receptors / Sensitive Land Uses. Sensitive receptors are locations and uses typically more sensitive to noise, including residential areas, hospitals, convalescent homes and facilities, schools, libraries, churches, recreational areas, and other similar land uses.

NOISEMAP Program. The Department of Defense noise models are based on NOISEMAP technology, using linear acoustics and an integrated formulation to determine the impact of noise.

Sensitive Land Uses. In terms of compatibility assessment, sensitive land uses are uses that are susceptible to, and effected by, nuisances such as noise, dust and air pollution. Sensitive land uses typically include residential areas, hospitals, convalescent homes and facilities, schools, libraries, churches, recreational areas, and other similar land uses.

Technical Background

Due to the technical nature of this resource topic and its importance to the TSS process, this section provides a discussion of the characteristics of sound and the modeling process used to evaluate noise impacts.

Characteristics of Sound

It is important to understand that there is no single perfect way of measuring sound, due to variations used by different entities when conducting sound studies or sound modeling. Sound is characterized by various parameters that include the oscillation rate of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. The decibel (dB) scale is used to quantify sound intensity. Because sound pressure can vary by over one trillion times within the range of human hearing, a logarithmic loudness scale, i.e., the dB scale, is used to present sound intensity levels in a convenient format.

The human ear is not equally sensitive to all frequencies within the entire spectrum, so noise measurements are weighted more heavily within those frequencies of maximum human sensitivity in a process called “A-weighting” written as dBA. The human ear can detect changes in sound levels of approximately 3-dBA under normal conditions. Changes of 1 to 3-dBA are typically noticeable under controlled conditions, while changes of less than 1dBA are only discernible under controlled, extremely quiet conditions.

A change of 5-dBA is typically noticeable to the average person in an outdoor environment. Figure 5.18-1 summarizes typical A-weighted sound levels for a range of indoor and outdoor activities.

Environmental noise fluctuates over time. While some noise fluctuations are minor, others can be substantial. These fluctuations include regular and random patterns, how fast the noise fluctuates, and the amount of variation. Weather patterns can have a strong effect on how far sound travels and how loud it is. Certain weather events can change the consistency of the air and either cause sound to travel further and be louder or reduce the distance traveled and the level at which the sound can be heard. Temperature and wind velocity are prime examples of factors that can affect sound travel. Sound tends to travel further in cold temperatures. Specific combinations of temperature and wind direction can create atmospheric refraction. Atmospheric refraction occurs when atmospheric conditions bend and / or focus sound waves towards some areas and away from others. When describing noise impacts, it is common to look at the average noise levels over an entire average day.

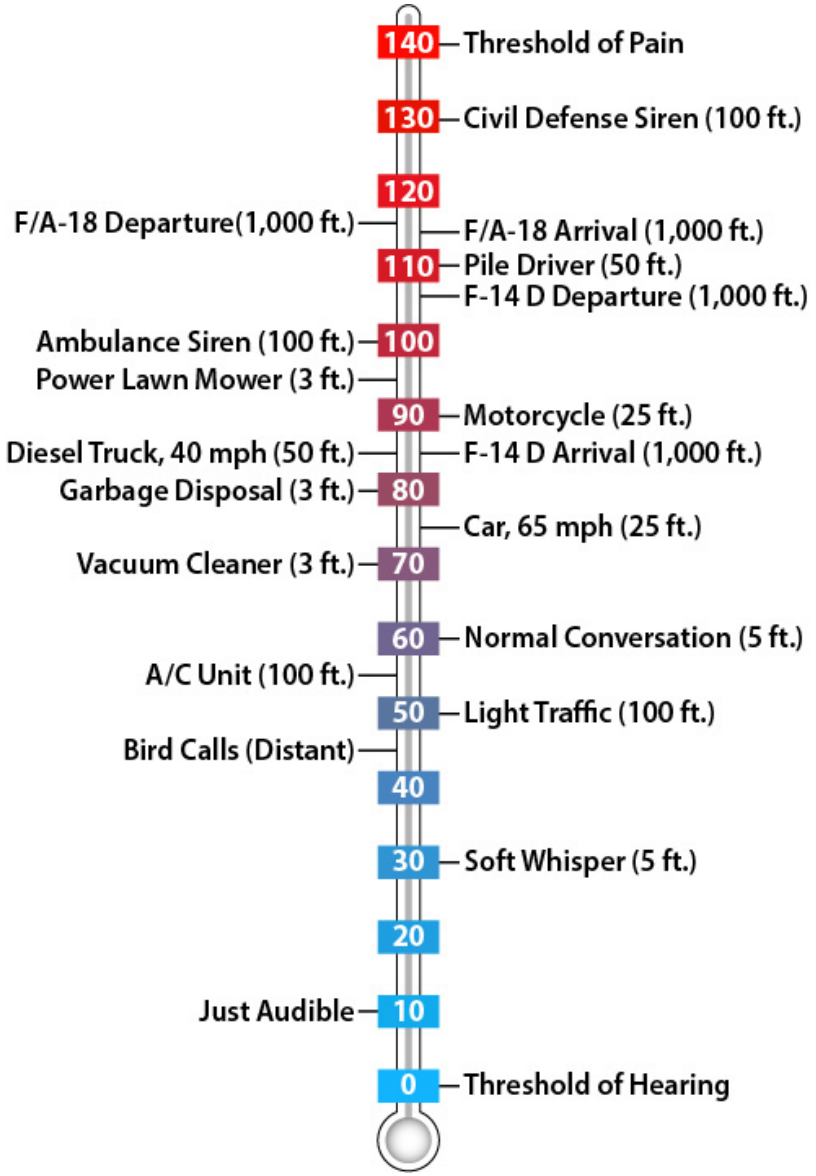

Figure 5.18-1. Sound Levels Comparison in dB

ISSUE NOI-1	**Noise from aircraft operations** The aircraft operations that occur at Travis AFB produce noise that can be heard outside the boundaries of the Base, within surrounding communities.

Compatibility Assessment

Travis AFB is an active air base with multiple aviation missions. Travis AFB aircraft average approximately 170 daily operations, while transient aircraft account for an average of approximately 209 operations per day.

Noise associated with aircraft is usually considered a nuisance where land uses are incompatible with the aircraft activity. Residential and other noise sensitive uses under aircraft corridors are most likely to consider the noise to be an annoyance. This is a concern as numerous noise complaints resulting from land use planning decisions made by local jurisdictions can result in major encroachment issues for an air base in the future. Noise complaints can result in lost revenue and economic development opportunities for the affected communities and degraded military readiness for Travis AFB.

The 2009 Travis AFB Air Installation Compatible Use Zone (AICUZ) Study established noise zones to reflect aircraft noise based on existing aircraft operations at Travis AFB. The AICUZ noise zones cover noise exposure within the 65 dB and greater. The AICUZ provides recommended land use guidelines for compatible development within the noise zones, as shown in Table 5.18-1. According to the AICUZ Study, the existing land use and zoning of land within the noise zones surrounding Travis AFB do not contain any existing incompatible uses. However, the land use in the AICUZ is generalized and is only categorized as agriculture and open space.

Table 5.18-1. Recommended Land Uses under Aircraft Noise Contours

Land Use		Suggested Land Use Compatibility				
SLUCM No.	**Land Use Name**	**65-69 dB**	**70-74 dB**	**75-79 dB**	**80-84 dB**	**85+ dB**
10	**Residential**					
11	Household units	N[1]	N[1]	N	N	N
11.11	Single units: detached	N[1]	N[1]	N	N	N
11.12	Single units: semidetached	N[1]	N[1]	N	N	N
11.13	Single units: attached row	N[1]	N[1]	N	N	N
11.21	Two units: side-by-side	N[1]	N[1]	N	N	N
11.22	Two units: one above the other	N[1]	N[1]	N	N	N
11.31	Apartments: walk-up	N[1]	N[1]	N	N	N
11.32	Apartments: elevator	N[1]	N[1]	N	N	N
12	Group quarters	N[1]	N[1]	N	N	N
13	Residential hotels	N[1]	N[1]	N	N	N
14	Mobile home parks or courts	N	N	N	N	N
15	Transient lodgings	N[1]	N[1]	N[1]	N	N
16	Other residential	N[1]	N[1]	N	N	N
20	**Manufacturing**					
21	Food and kindred products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
22	Textile mill products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
23	Apparel and other finished products; products made from fabrics, leather, and similar materials; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
24	Lumber and wood products (except furniture); manufacturing	Y	Y[2]	Y[3]	Y[4]	N
25	Furniture and fixtures; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
26	Paper and allied products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
27	Printing, publishing, and allied industries	Y	Y[2]	Y[3]	Y[4]	N

Table 5.18-1. Recommended Land Uses under Aircraft Noise Contours (continued)

Land Use		Suggested Land Use Compatibility				
SLUCM No.	**Land Use Name**	**65-69 dB**	**70-74 dB**	**75-79 dB**	**80-84 dB**	**85+ dB**
28	Chemicals and allied products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
29	Petroleum refining and related industries	Y	Y[2]	Y[3]	Y[4]	N
30	**Manufacturing (continued)**					
31	Rubber and misc. plastic products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
32	Stone, clay and glass products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
33	Primary metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
34	Fabricated metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y[2]	Y[3]	Y[4]	N
40	**Transportation, communication and utilities**					
41	Railroad, rapid rail transit, and street railway transportation	Y	Y[2]	Y[3]	Y[4]	N
42	Motor vehicle transportation	Y	Y[2]	Y[3]	Y[4]	N
43	Aircraft transportation	Y	Y[2]	Y[3]	Y[4]	N
44	Marine craft transportation	Y	Y[2]	Y[3]	Y[4]	N
45	Highway and street right-of-way	Y	Y	Y	Y	N
46	Automobile parking	Y	Y	Y	Y	N
47	Communication	Y	25[5]	30[5]	N	N
48	Utilities	Y	Y[2]	Y[3]	Y[4]	N
49	Other transportation, communication and utilities	Y	25[5]	30[5]	N	N
50	**Trade**					
51	Wholesale trade	Y	Y[2]	Y[3]	Y[4]	N
52	Retail trade – building materials, hardware and farm equipment	Y	25	30	Y[4]	N

Table 5.18-1. Recommended Land Uses under Aircraft Noise Contours (continued)

Land Use		Suggested Land Use Compatibility				
SLUCM No.	**Land Use Name**	**65-69 dB**	**70-74 dB**	**75-79 dB**	**80-84 dB**	**85+ dB**
53	Retail trade – including shopping centers, discount clubs, home improvement stores, electronics superstores, etc.	Y	25	30	N	N
54	Retail trade – food	Y	25	30	N	N
55	Retail trade – automotive, marine craft, aircraft and accessories	Y	25	30	N	N
56	Retail trade – apparel and accessories	Y	25	30	N	N
57	Retail trade – furniture, home, furnishings and equipment	Y	25	30	N	N
58	Retail trade – eating and drinking establishments	Y	25	30	N	N
59	Other retail trade	Y	25	30	N	N
60	**Services**					
61	Finance, insurance and real estate services	Y	25	30	N	N
62	Personal services	Y	25	30	N	N
62.4	Cemeteries	Y	Y[2]	Y[3]	Y[4,11]	Y[6,11]
63	Business services	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y[2]	Y[3]	Y[4]	N
64	Repair services	Y	Y[2]	Y[3]	Y[4]	N
65	Professional services	Y	25	30	N	N
65.1	Hospitals, other medical facilities	25	30	N	N	N
65.16	Nursing homes	N[1]	N[1]	N	N	N
66	Contract construction services	Y	25	30	N	N
67	Government services	Y[1]	25	30	N	N
68	Educational services	25	30	N	N	N
68.1	Child care services, child development centers, and nurseries	25	30	N	N	N

Table 5.18-1. Recommended Land Uses under Aircraft Noise Contours (continued)

Land Use		Suggested Land Use Compatibility				
SLUCM No.	**Land Use Name**	**65-69 dB**	**70-74 dB**	**75-79 dB**	**80-84 dB**	**85+ dB**
69	Miscellaneous services	Y	25	30	N	N
69.1	Religious activities (including places of worship)	Y	25	30	N	N
70	**Cultural, entertainment and recreational**					
71	Cultural activities	25	30	N	N	N
71.2	Nature exhibits	Y[1]	N	N	N	N
72	Public assembly	Y	N	N	N	N
72.1	Auditoriums, concert halls	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	Y[7]	Y[7]	N	N	N
73	Amusements	Y	Y	N	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	Y	25	30	N	N
75	Resorts and group camps	Y	25	N	N	N
76	Parks	Y	25	N	N	N
79	Other cultural, entertainment and recreation	Y	25	N	N	N
80	**Resource production and extraction**					
81	Agriculture (except livestock)	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
81.5-81.7	Agriculture-Livestock farming including grazing and feedlots	Y[8]	Y[9]	N	N	N
82	Agriculture related activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
83	Forestry activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
84	Fishing activities	Y	Y	Y	Y	Y
85	Mining activities	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y

Source: Air Force Instruction AFI32-7063, Rev. December 2015

Table 5.18-1. Recommended Land Uses under Aircraft Noise Contours (continued)

Key:

SLUCM – Standard Land Use Coding Manual, U.S. Department of Transportation

Y (Yes) – Land use and related structures compatible without restrictions.

N (No) – Land use and related structures are not compatible and should be prohibited.

Y^x – Yes with restrictions. The land use and related structures generally are compatible. However, see note(s) indicated by the superscript.

N^x – No with exceptions. The land use and related structures are generally incompatible. However, see note(s) indicated by the superscript.

25, 30, or 35 – The numbers refer to noise level reduction (NLR) levels. NLR (outdoor to indoor) is achieved through the incorporation of noise attenuation into the design and construction of a structure. Land use and related structures are generally compatible; however, measures to achieve NLR of 25, 30, or 35 must be incorporated into design and construction of structures. However, measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with one of these numbers.

DNL – Day-Night Average Sound Level.

Ldn – Mathematical symbol for DNL.

1. General

a. Although local conditions regarding the need for housing may require residential use in these zones, residential use is discouraged in DNL 65-69 and strongly discouraged in DNL 70-74. The absence of viable alternative development options should be determined, and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones. Existing residential development is considered as pre-existing, incompatible land uses.

b. Where the community determines that these uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 decibels (dB) in DNL 65-69 and 30 dB in DNL 70-74 should be incorporated into building codes and be considered in individual approvals; for transient housing, an NLR of at least 35 dB should be incorporated in DNL 75-79.

c. Normal permanent construction can be expected to provide an NLR of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors, and closed windows year-round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

d. NLR criteria will not eliminate outdoor noise problems. However, building location, site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

2. Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

3. Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

4. Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

5. If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.

Table 5.18-1. Recommended Land Uses under Aircraft Noise Contours (continued)

6. Buildings are not permitted.

7. Land use is compatible provided special sound reinforcement systems are installed.

8. Residential buildings require an NLR of 25 dB.

9. Residential buildings require an NLR of 30 dB.

10. Residential buildings are not permitted.

11. Land use that involves outdoor activities is not recommended, but if the community allows such activities, hearing protection devices should be worn when noise sources are present. Long-term exposure (multiple hours per day over many years) to high noise levels can cause hearing loss in some unprotected individuals.

The LUCP establishes 2015 Maximum Mission CNEL Contours, similar to the AICUZ noise contours, but instead of modeling current mission operations, the LUCP contains a maximum noise impact from current and future annual operations based on potential future activity levels. However, because the LUCP noise contours represent a maximum mission instead of the current mission average, they cover a larger area than the AICUZ noise contours. The LUCP also includes a 60 dB noise contour and the AICUZ noise contour only go to 65 dB contours. Due to the limitations of the AICUZ recommendations, only the 65 dB noise contours and over are evaluated in the TSS. Above CNEL 65 dB, the LUCP prohibits new residential uses. The LUCP also establishes compatibility criteria for noise for nonresidential uses, outlined in Table 5.18-2.

In addition to the compatibility criteria established for the noise contours, compatibility criteria for noise are also established for each Compatibility Zone in the LUCP. Compatibility Zone C encompasses locations exposed to potential noise in excess of approximately 60 dB along with areas occasionally affected by low-altitude aircraft overflights. One of the objectives of the LUCP is to minimize new residential development within areas impacted by noise from Travis AFB. The ALUC assesses whether proposed land use development near Travis AFB is compatible with the noise impacts of aircraft activity following the standards established in LUCP. The zones prohibit certain noise sensitive uses and require different levels of noise level reduction (NLR) to be incorporated into the construction of buildings near Travis AFB. Table 5.18-3 outlines the LUCP compatibility criteria related to noise.

Overall, the LUCP noise compatibility criteria are either the same or more restrictive than the AICUZ land use compatibility guidelines. The LUCP zones cover a larger area than the noise zones established by the AICUZ Study to include the Travis AFB traffic pattern and areas impacted by low-altitude overflight. However, the LUCP does not list all the specific noise sensitive uses, using a more generalized list of land uses for its recommendations.

Communication is another important tool utilized to reduce the amount of noise complaints. A lack of notification of unique or unusual operational activities can lead to increased noise complaints. Currently, Travis AFB does not announce when to anticipate unusual noise activity.

Given the operations conducted and the undeveloped nature of areas in higher noise zones, noise complaints are minimal currently.

It is important to note that the Travis AFB LUCP utilizes the 2015 Maximum Mission CNEL Contours to protect the military mission and enable for potential increased missions at Travis AFB in the future. As such, these are the noise contours that were used for the TSS assessment. The CNEL 60 dB noise zone was not assessed because the AICUZ does not have recommendations for that zone.

Table 5.18-2. LUCP Compatibility Criteria for Noise

Land Use Category	Location			
	Remainder of Zone C	*CNEL (dB)*		
		60-65	65-70	>70
Public				
Schools, Libraries, Hospitals, Nursing Homes, Museums	+	-	--	--
Churches, Auditoriums, Concert Halls, Meeting Halls	+	o	-	-
Transportation, Parking, Cemeteries	++	++	+	o
Commercial and Industrial				
Offices, Retail Trade, Hotels and Motels	+	o	o	-
Service Commercial, Wholesale Trade, Warehousing, Light Industrial, Mortuaries	++	+	o	o
General Manufacturing, Utilities, Extractive Industry	++	++	+	+
Agricultural and Recreational				
Cropland	++	++	++	+
Livestock Breeding	+	o	o	-
Parks, Playgrounds, Zoos	++	+	o	-
Golf Courses, Riding Stables, Water Recreation	++	+	o	o
Outdoor Spectator Sports	++	+	o	-
Amphitheaters	o	-	--	--

Notes:

	Land Use Acceptability	***Interpretation / Comments***
++	Clearly Acceptable	The activities associated with the specified land use can be carried out with essentially no interference from the noise exposure.
+	Normally Acceptable	Noise is a factor to be considered in that slight interference with outdoor activities may occur. Conventional construction methods will eliminate most noise intrusions upon indoor activities.

Table 5.18-2. LUCP Compatibility Criteria for Noise (continued)

Notes (continued)

	Land Use Acceptability	*Interpretation / Comments*
o	Marginally Acceptable	The indicated noise exposure will cause moderate interference with outdoor activities and with indoor activities when windows are open. The land use is acceptable on the condition that outdoor activities are minimal and construction features which provide sufficient noise attenuation are used (e.g., installation of air conditioning so that windows can be kept closed). Under other circumstances, the land use should be discouraged.
-	Normally Unacceptable	Noise will create substantial interference with both outdoor and indoor activities. Noise intrusion upon indoor activities can be mitigated by requiring special noise insulation construction. Land uses that have conventionally constructed structures and / or involve outdoor activities that would be disrupted by noise should generally be avoided.
--	Clearly Unacceptable	Unacceptable noise intrusion upon land use activities will occur. Adequate structural noise insulation is not practical under most circumstances. The indicated land use should be avoided unless strong overriding factors prevail, and it should be prohibited if outdoor activities are involved.

Source: Travis AFB Land Use Compatibility Plan

Table 5.18-3. LUCP Compatibility Criteria for Noise

Zone	Locations	Prohibited Uses	Other Conditions
A	Runway Primary Surface and Clear Zone	All structures and assemblages of people	None
B1	Inner Approach / Departure Zone	Children's schools, day care centers, libraries Hospitals, nursing homes Highly noise-sensitive uses (e.g., outdoor theaters)	Minimum NLR of 40 dB in buildings with noise-sensitive uses
B2	Extended Approach / Departure Zone	Children's schools, day care centers, libraries Hospitals, nursing homes Highly noise-sensitive uses (e.g., outdoor theaters)	Minimum NLR of 35 dB in residences (including mobile homes) and buildings with noise-sensitive uses
C	Traffic Pattern	Children's schools, day care centers, libraries Hospitals, nursing homes	Minimum NLR of 20 dB in residences (including mobile homes) and buildings with noise-sensitive uses Deed notice required

Source: Travis AFB Land Use Compatibility Plan

Existing Land Uses

Employment Areas are conditionally compatible, meaning sound attenuation measures or noise level reduction measures are recommended for the various uses. Employment Areas within the 70 dB noise contour require measures to achieve noise level reduction (NLR) of 25. Employment Areas within the 75 dB require measures to achieve NLR of 30. Some of the current existing Employment Areas within the 65 dB noise contour are the Potrero Hill Landfill, Recology Hay Road, and UTC Aerospace Systems. It is undetermined if these uses incorporated noise level reduction into the construction of their buildings.

Relative to incompatible existing land uses, there are 123 acres of residential located in the 75 dB noise contour. These uses are incompatible because it is determined that sound attenuation measures would not be able to attenuate the interior noise level to a 45 dB level. There are also 246 acres of existing residential use within the 70 dB noise contour and 380 acres within the 65 noise contour, which may be compatible with proper sound attenuation measures. Given the rural nature of these areas, residential densities and total units are very low.

Figure 5.18-2a illustrates the existing land use in the noise contours and Figure 5.18-2b provides the compatibility assessment for each type of land use, according to AICUZ recommendations. Table 5-18-4 provides the acreage of each existing land use within the noise contours.

Table 5.18-4. Existing Land Use Acreage within the Noise Contours

Existing Land Use	CNEL 65 dB	CNEL 70 dB	CNEL 75 dB	Total
Agriculture	10,923	7,241	3,472	21,636
Employment Areas	843	534	119	1,495
Forest Land	203	85	16	305
Military	734	255	503	1,493
Rangeland	758	795	290	1,842
Residential	134	123	123	380
Sparsely Vegetated Land	0	0	13	13
Urban Open	66	11	0	77
Water	983	143	20	1,146
Wetlands	2,188	779	76	3,043

Source: Association of Bay Area Government, 2006; Travis AFB AICUZ, 2009; Matrix Design Group, 2016

Zoning

All of the zoning districts are compatible with restrictions under the various noise contours that are recommended to have noise level reduction measures in place before any new development occurs. Uses allowed in areas zoned Exclusive Agriculture are generally compatible, although agriculture involving livestock is not recommend in the 75 dB noise contours. Exclusive Agriculture zoning also permits a primary dwelling and secondary dwelling. Residential use is not recommended in the 75 dB noise contour, is strongly discouraged in the 70 dB noise contour, and discouraged in the 65 dB noise contour.

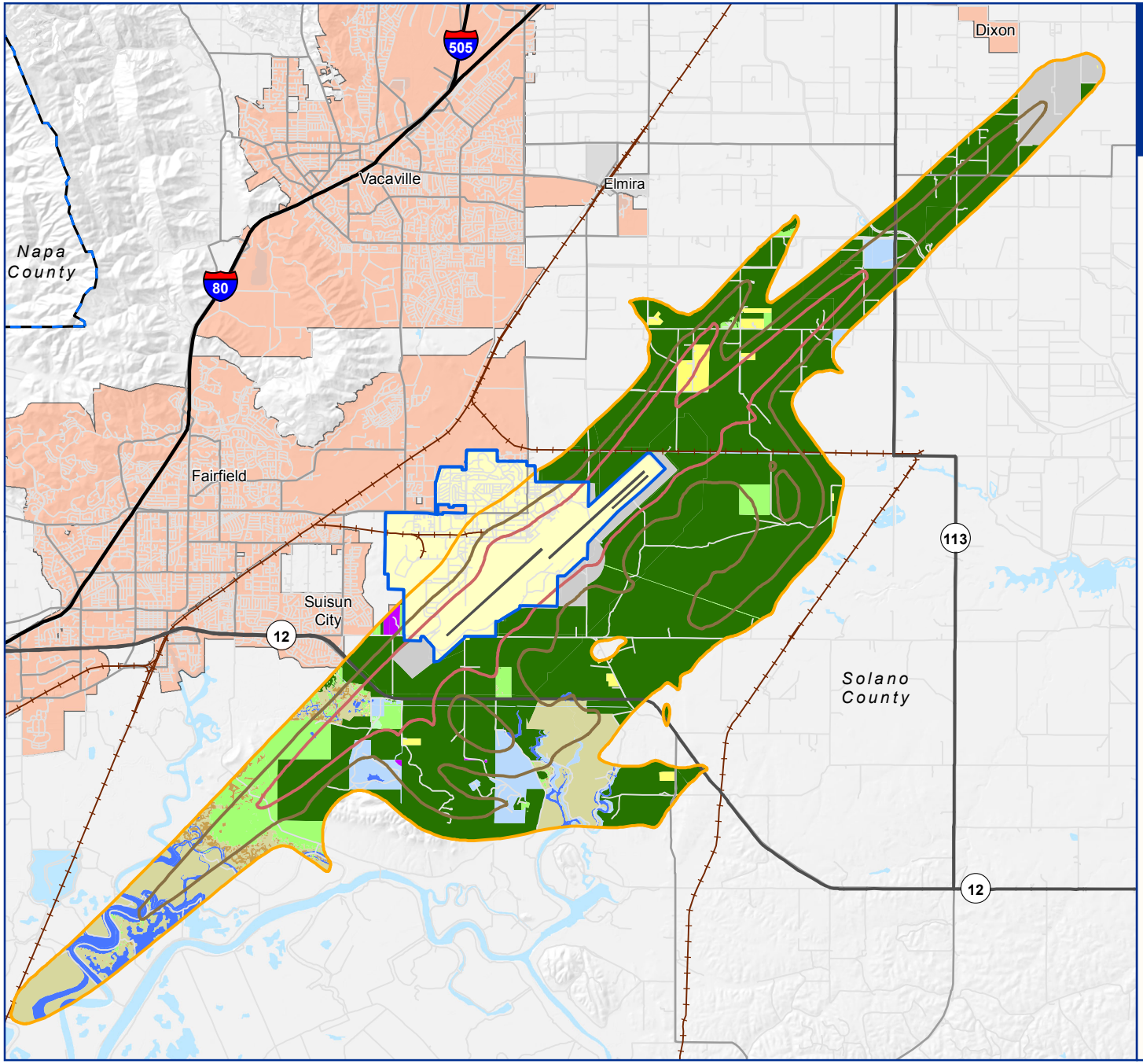

Figure 5.18-2a

Existing Land Use in Noise Zones

Legend

Existing Land Use

- Agriculture
- Employment Areas
- Forest Land
- Military
- Rangeland
- Residential
- Sparsely Vegetated Land
- Urban Open
- Water
- Wetlands

CNEL Noise Contour (dB)

- 65
- 70
- 75

- Travis AFB
- Runway
- Solano County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Source: Solano County, 2015 (Travis AFB Land Use Compatibility Plan). Association of Bay Area Governments, 2006.

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

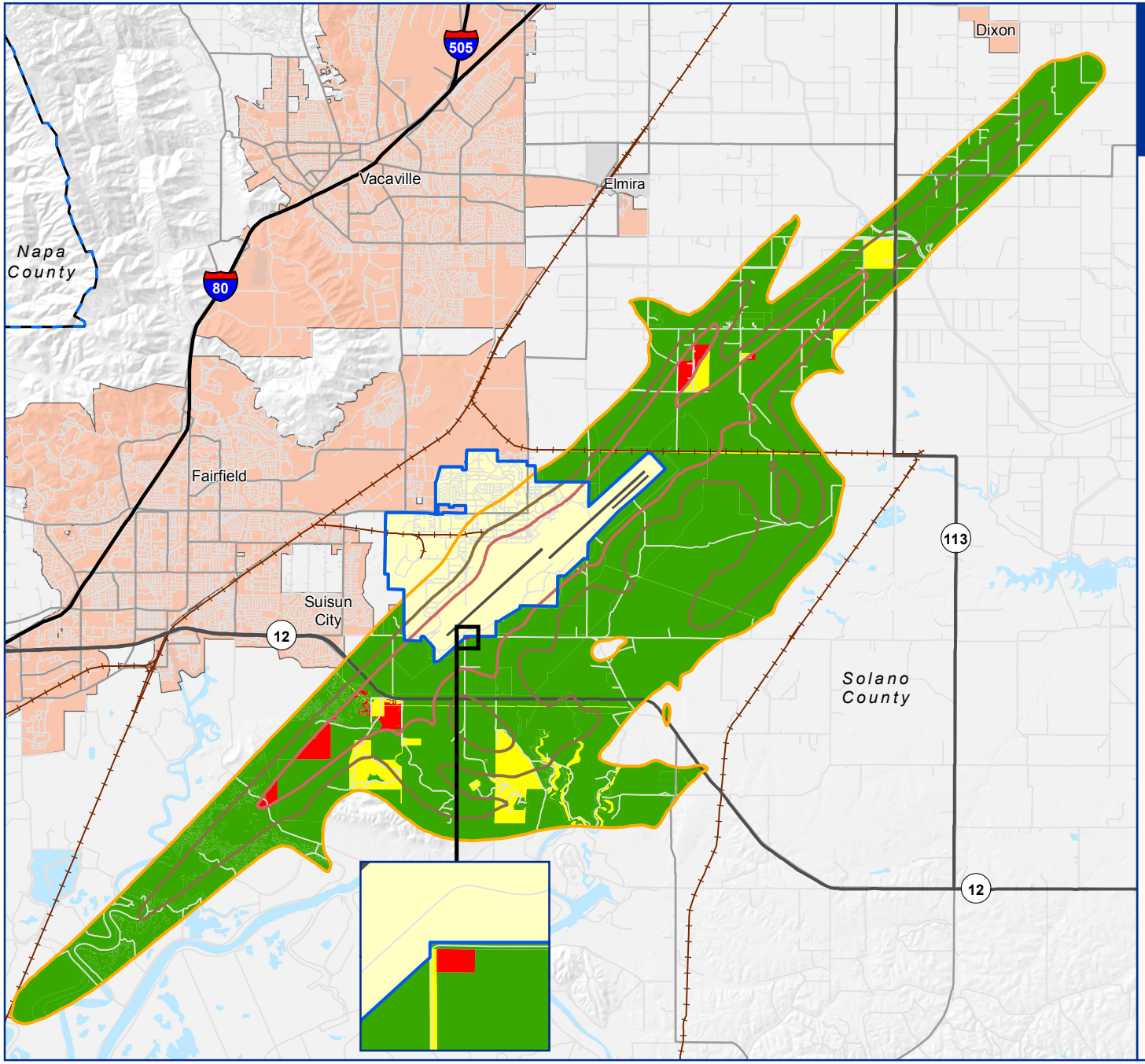

Figure 5.18-2b

Existing Land Use and Noise Compatibility

Legend

Compatibility
- Yes
- Yes with Restrictions
- No

CNEL Noise Contour (dB)
- 65
- 70
- 75

- Travis AFB
- Runway
- Solano County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Source: Matrix Design Group, 2016. Solano County, 2015 (Travis AFB Land Use Compatibility Plan).

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

Marsh Preservation and Suisun Marsh Agriculture zoning districts permit dwelling units and public open space area, which can be incompatible uses within noise contours. Nature exhibits and public assembly are incompatible uses within the 70 dB and 75 dB noise contours. However, agriculture (except livestock) and resource conservation are compatible allowed uses within the zoning districts.

Manufacturing General zoning districts permit dwelling units, which can be incompatible uses within noise contours. The districts also permit general manufacturing uses, which are compatible with the incorporation of recommended sound attenuation measures. It is recommended that manufacturing uses within the 70 dB noise contour utilize measures to achieve noise level reduction (NLR) of 25 be incorporated into public areas, offices, and any noise sensitive areas of the buildings.

Figure 5.18-3a illustrates the zoning in the noise contours and Figure 5.18-3b provides the compatibility assessment for each zoning district, according to AICUZ recommendations. Table 5-18-5 provides the acreage of land within each zoning district within the noise contours. It is important to note that Figure 5.18-3b does not incorporate Section 28.70.10.D of the Solano County Zoning Regulations, which states that land uses within an area of influence must conform to the policies and criteria established in the LUCP. Therefore, all future development proposals in the county within the noise contours would be reviewed for compatibility and must meet the standards of the LUCP. As such, it restricts certain types of uses in the noise contours that are defined to be incompatible in the Travis AFB LUCP.

Table 5.18-5. Zoning District Acreage within the Noise Contours

Zoning District	CNEL 65 dB	CNEL 70 dB	CNEL 75 dB	Total
A-160 (Exclusive Agriculture A-160)	5,507	3,538	1,882	10,928
A-20 (Exclusive Agriculture A-20)	219	86	224	529
A-40 (Exclusive Agriculture A-40)	4	0	0	4
A-80 (Exclusive Agriculture A-80)	4,173	2,636	1,508	8,317
ASM-160 (Suisun Marsh Agriculture ASM-160)	2,690	2,307	797	5,795
MG-1/2 (Manufacturing General MG-1/2)	25	1	0	26
MG-3 (Manufacturing General MG-3)	117	23	0	140
MP (Marsh Preservation MP)	4,024	1,366	222	5,612

Source: Solano County Zoning, 2013; Travis AFB AICUZ, 2009; Matrix Design Group, 2016

Future Land Uses

About 86 percent of the Solano County and Suisun City future land use acreage within the noise contours is dedicated to agricultural use. Agricultural use without residential dwellings and livestock is compatible within all the noise contours. Agricultural uses with dwellings and residential uses must achieve NLR of 25 within the 65 dB noise contour and NLR of 30 within the 70 dB contour. Parks are compatible within the 65 dB noise contour and compatible within the 70 dB noise contour with measure to achieve NLR of 25 incorporated into the construction of structures. Marshes and water bodies are considered compatible within the noise contours.

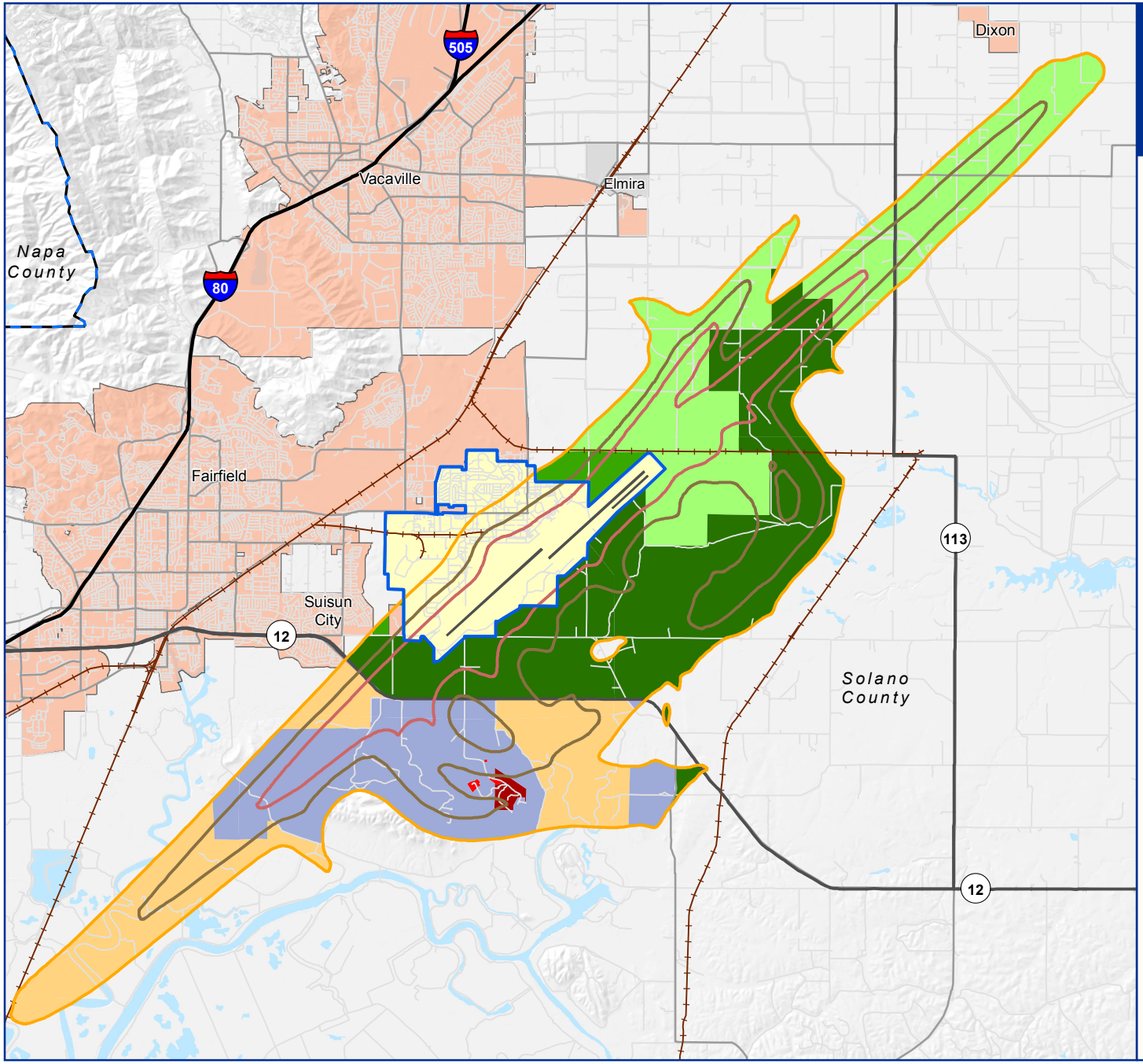

Figure 5.18-3a

Zoning in Noise Zones

Legend

Zoning

- Exclusive Agriculture A-160
- Exclusive Agriculture A-20
- Exclusive Agriculture A-40
- Exclusive Agriculture A-80
- Manufacturing General MG-1/2
- Manufacturing General MG-3
- Marsh Preservation MP
- Suisun Marsh Agriculture ASM-160

CNEL Noise Contour (dB)

- 65
- 70
- 75

- Travis AFB
- Runway
- Solano County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Source: Solano County Zoning, 2013. Solano County, 2015 (Travis AFB Land Use Compatibility Plan).

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

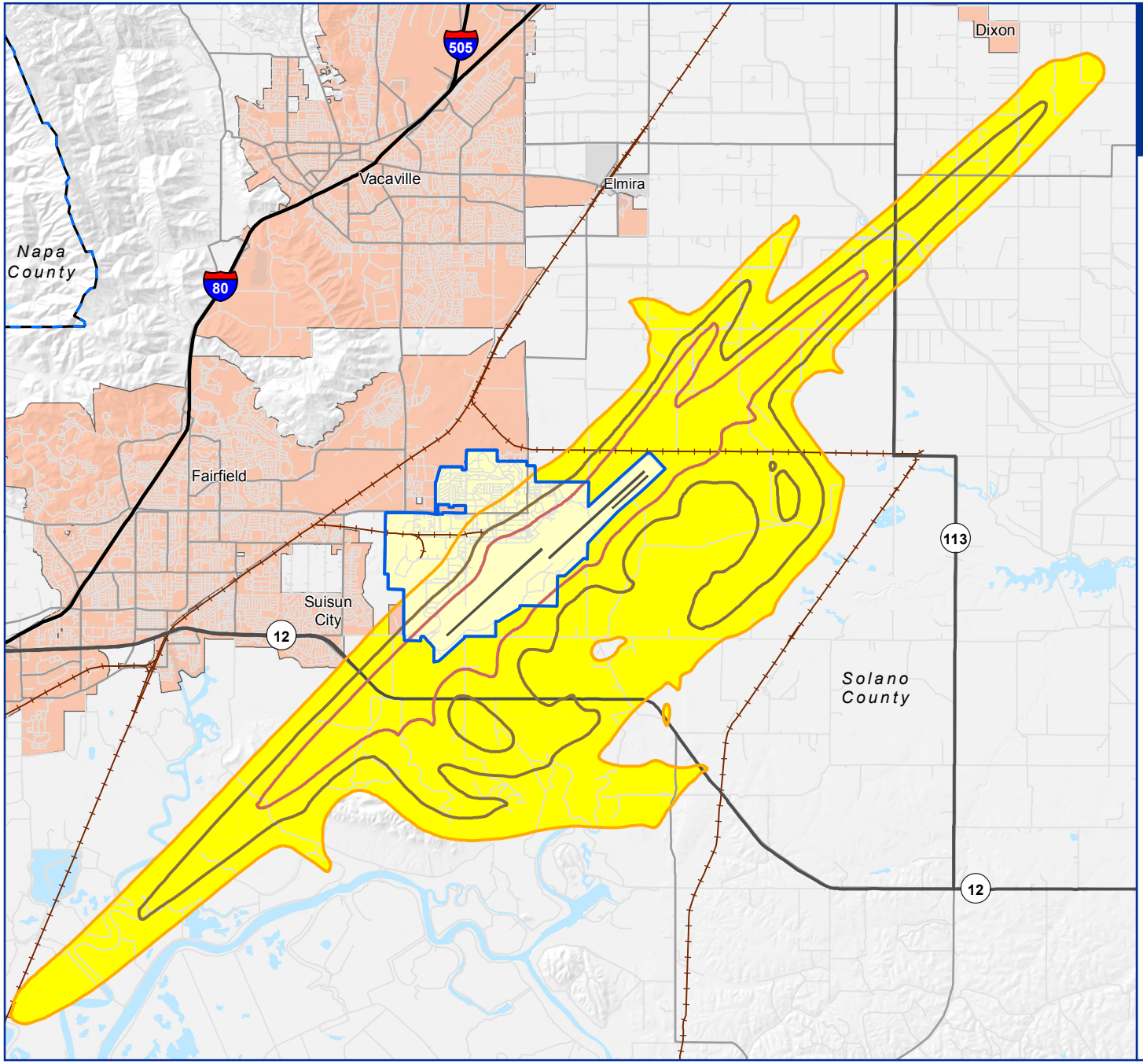

Figure 5.18-3b

Zoning and Noise Compatibility

Legend

Compatibility
- Yes with Restrictions

CNEL Noise Contour (dB)
- 65
- 70
- 75

- Travis AFB
- Runway
- Solano County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Source: Matrix Design Group, 2016. Solano County, 2015 (Travis AFB Land Use Compatibility Plan).

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

The Suisun City Special Planning Area has special guidelines for the areas future development in the Suisun City General Plan. These guidelines include the protection of Travis AFB with development consistent with the LUCP. These guidelines should help ensure that future development within the Special Planning Area will be compatible with Travis AFB.

Figure 5.18-4a illustrates the Solano County future land use categories in the noise contours and Figure 5.18-4b provides the compatibility assessment for each future land use, according to AICUZ recommendations. Figure 5.18-5a illustrates the Suisun City future land use categories in the noise contours and Figure 5.18-5b provides the compatibility assessment for each future land use, according to AICUZ recommendations. Table 5-18-6 provides the acreage of land within each future land use category within the noise contours.

Table 5.18-6. Future Land Use Acreage within the Noise Contours

Future Land Use	CNEL 65 dB	CNEL 70 dB	CNEL 75 dB	Total
Solano County				
Extensive Agriculture	9,468	6,870	3,629	19,967
Intensive Agriculture	3,291	1,656	807	5,754
Marsh	3,537	1,374	192	5,102
Water Bodies	461	57	0	518
Suisun City				
Agriculture	338	610	738	1,687
Community	36	0	0	36
Low Density Residential	<1	0	0	<1
Park	64	7	0	71
Special Planning Area	127	89	95	311

Source: Solano County General Plan, 2006; Suisun City General Plan, 2015; Travis AFB AICUZ, 2009; Matrix Design Group, 2016

Findings

- The LUCP prohibits noise sensitive uses from high noise exposure areas and require different levels of NLR methods to be incorporated into the construction of buildings. The LUCP noise restrictions are either more restrictive or similar to the AICUZ recommendations.
- The LUCP does not contain the detailed land use categories that are included in the AICUZ Study, relying on a more general list of land use categories.
- Based on existing land use, future land use designations, and restrictions contained in the LUCP, few areas with sensitive land uses are exposed to high noise levels.
- There is a need for Travis AFB to increase its communication of when to anticipate unusual noise activity.

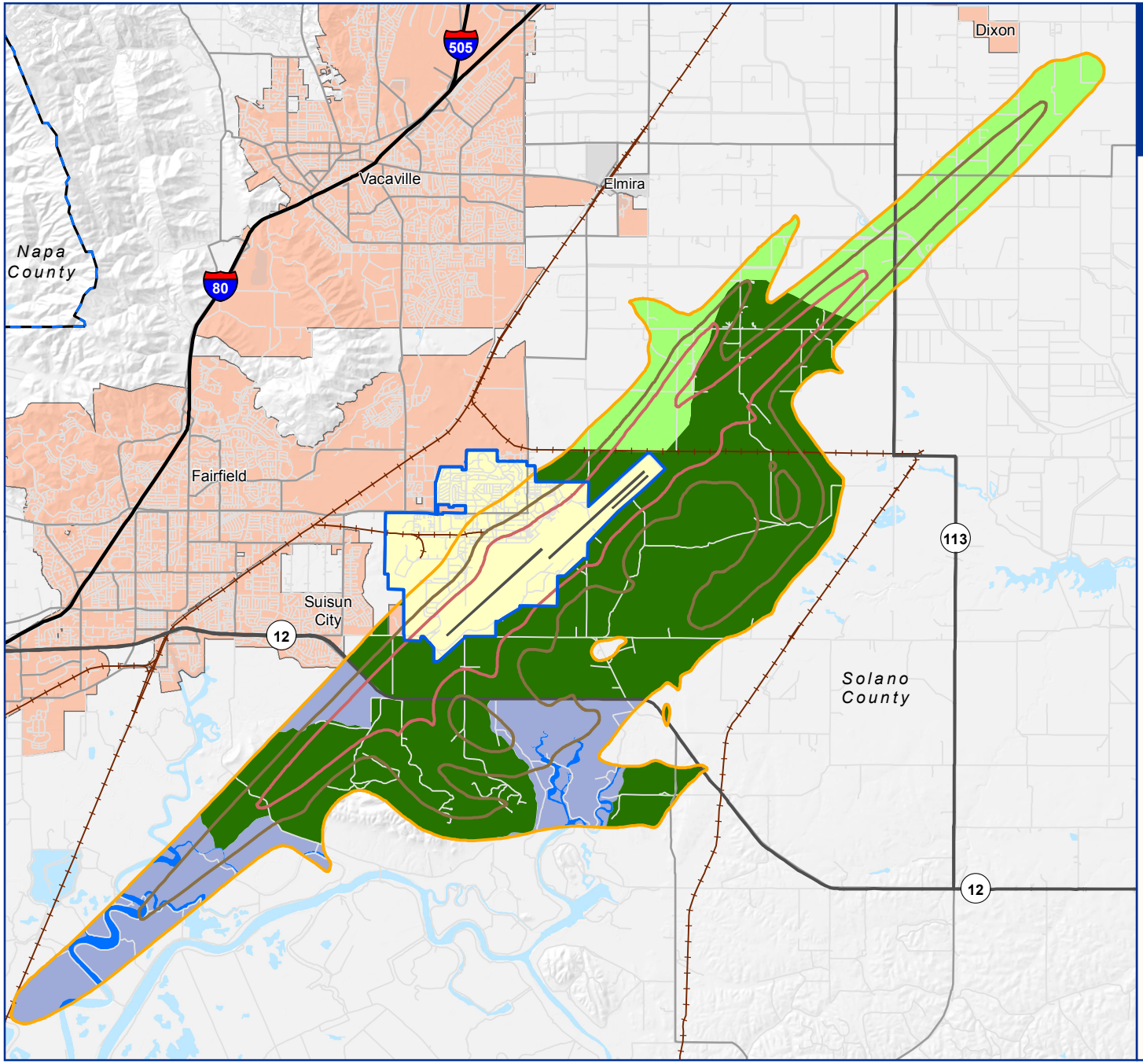

Figure 5.18-4a

Solano County Future Land Use in Noise Zones

Legend

Future Land Use
- Extensive Agriculture
- Intensive Agriculture
- Marsh
- Water Bodies & Courses

CNEL Noise Contour (dB)
- 65
- 70
- 75

- Travis AFB
- Runway
- Solano County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Source: Solano County General Plan, 2006. Solano County, 2015 (Travis AFB Land Use Compatibility Plan).

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

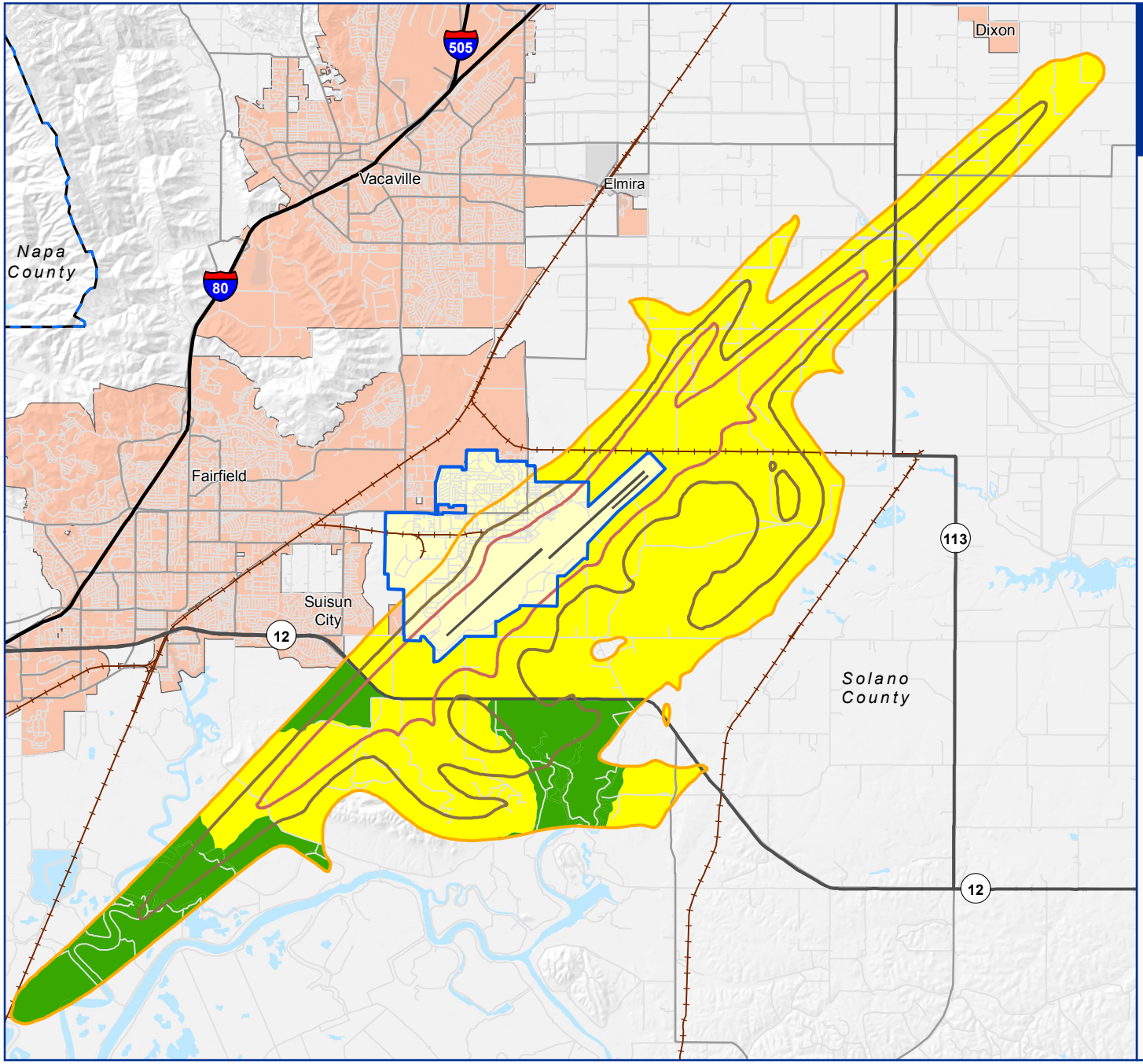

Figure 5.18-4b

Solano County Future Land Use and Noise Compatibility

Legend

Compatibility
- Yes
- Yes with Restrictions

CNEL Noise Contour (dB)
- 65
- 70
- 75

- Travis AFB
- Runway
- Solano County
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Source: Matrix Design Group, 2016. Solano County, 2015 (Travis AFB Land Use Compatibility Plan).

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

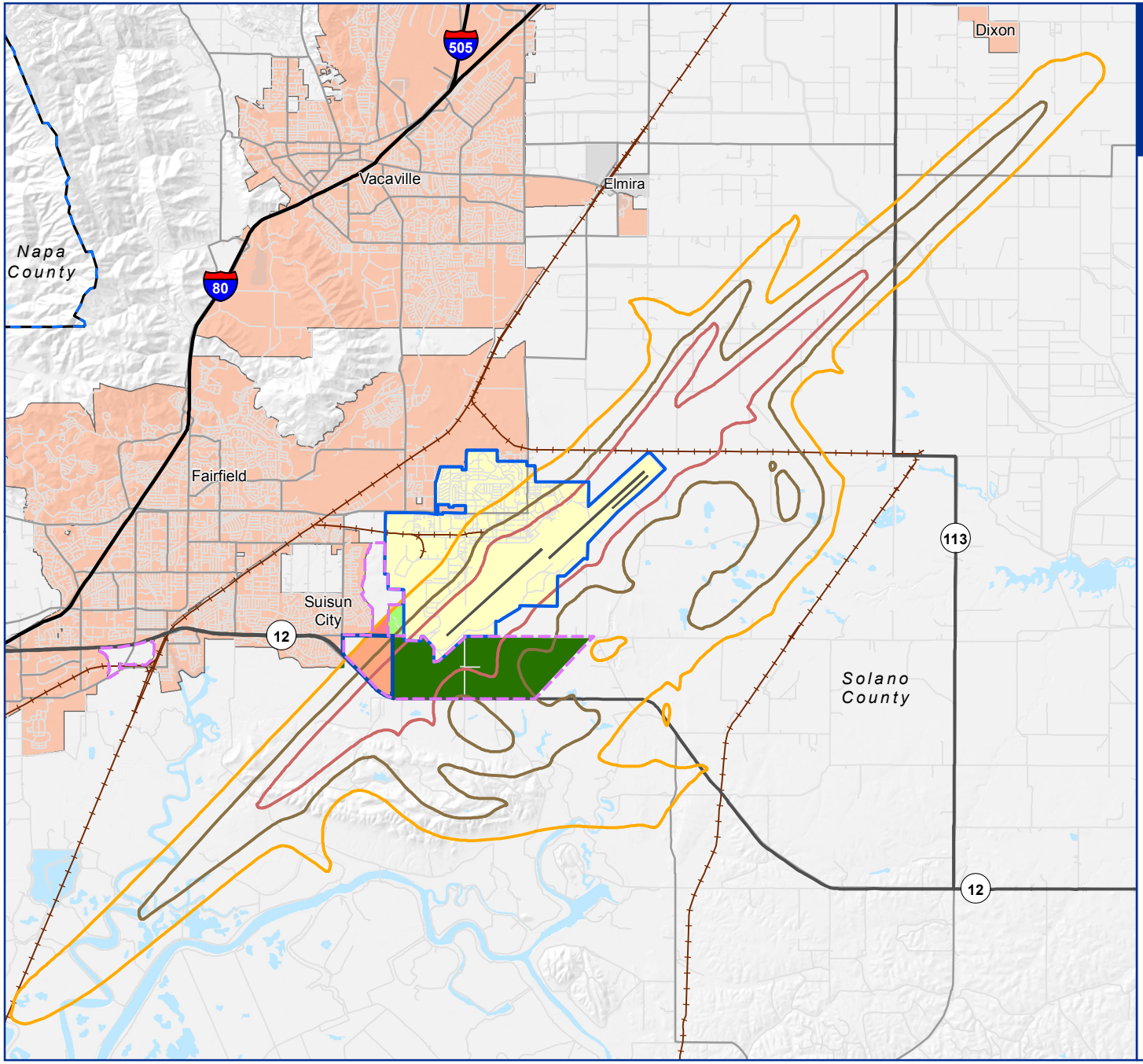

Figure 5.18-5a

Suisun City Future Land Use in Noise Zones

Legend

Future Land Use
- Agriculture & Open Space
- Community
- Low Density Residential
- Park
- Special Planning Area

CNEL Noise Contour (dB)
- 65
- 70
- 75

- Special Planning Area
- Travis AFB
- Runway
- Solano County
- Suisun City Sphere of Influence
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Source: Suisun City Future Land Use, 2015. Solano County, 2015 (Travis AFB Land Use Compatibility Plan).

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

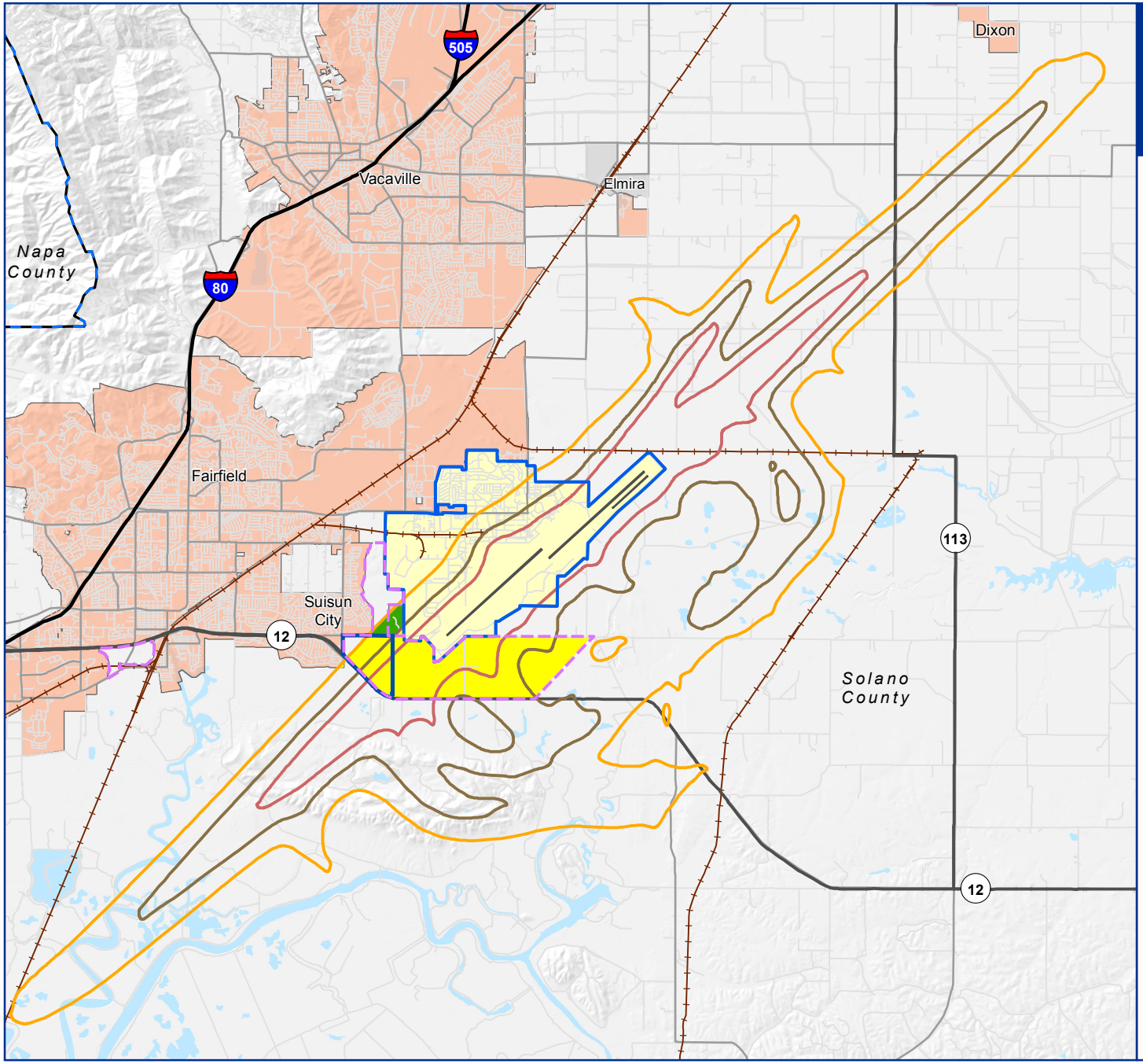

Figure 5.18-5b

Suisun City Future Land Use and Noise Compatibility

Legend

Compatibility
- Yes
- Yes with Restrictions

CNEL Noise Contour (dB)
- 65
- 70
- 75

- Special Planning Area
- Travis AFB
- Runway
- Solano County
- Suisun City Sphere of Influence
- City
- Unincorporated Place
- Interstate
- Highway
- Major Road
- Local Road
- Railroad
- Waterbody

Source: Matrix Design Group, 2016. Solano County, 2015 (Travis AFB Land Use Compatibility Plan).

TRAVIS AFB SUSTAINABILITY STUDY

0 ½ 1 Mile

Matrix DESIGN GROUP

5.19 Public Trespassing (PT)

This factor addresses public trespassing, either purposeful or unintentional, onto a military installation. The potential for trespassing increases when public use areas are near an installation.

There were no Major Issues identified for Public Trespassing in the TSS.

5.20 Roadway Capacity (RC)

Roadway capacity relates to the ability of existing freeways, highways, arterials, and other local roads to provide adequate mobility and access between military installations and their surrounding communities.

As urban development expands into rural areas, roads once used primarily to provide access for agricultural uses and limited local traffic begin to function as urban arterial roadways. These once rural roads often become the main transportation corridors for all types of traffic – from residential automobiles to commercial trucking – and can assist or impede access to military installations.

Key Terms

Level of Service. A common measurement used by traffic engineers to determine the effectiveness of a traffic system is a grading system called Level of Service (LOS) which assigns a letter grade from A to F to roadways and intersections based upon traffic flow and safety characteristics as shown in Table 5.20-1.

Table 5.20-1. Level of Service of Roadway

LOS		Definition
ACCEPTABLE	A	Represents a free-flow operation. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.
	B	Represents reasonably free-flow operation. Ability to maneuver within the traffic stream is slightly restricted.
	C	Represents a traffic flow with speeds near or at free-flow speed of the freeway. There is noticeable restricted ability to maneuver within the stream of traffic.
	D	Speeds begin to decline with increased density. Ability to maneuver within the traffic stream is noticeably limited.
UNACCEPTABLE	E	Operation is at capacity. Vehicles are closely spaced within the traffic stream and there are no useable gaps to maneuver.
	F	A breakdown of vehicle flow is present. This condition exists within the queues forming behind the breakdown points.

Source: http://ccag.ca.gov/wp-content/uploads/2014/07/cmp_2005_Appendix_B.pdf

Roadway Capacity. Roadway capacity refers to the ability of existing freeways, highway, arterials and other local roads to provide adequate mobility and access among military installations and their surrounding communities.

Time Shifting. Time Shifting is moving from one period in time to another period. In this instance, time shifting is utilizing different start times for some eligible personnel.

ISSUE RC-1	**Commercial trucks using North Gate** About once a week, commercial trucks try to enter Travis AFB from the North Gate due to inadequate signage. The trucks must then turn around, causing traffic delays due to limited facilities for such maneuvers.

Compatibility Assessment

All commercial truck traffic is required to enter Travis AFB through the South Gate on Peterson Road. Because commercial traffic requires inspection by security forces, trucks are directed to the South Gate to prevent delays at the other three gates.

Due to inadequate signage on roads leading to the North Gate, about once a week, a commercial truck ends up at the North Gate on North Gate Road. North Gate Road is a very narrow road, only 20 feet wide, which makes it difficult for large commercial trucks to turn around. Once trucks turn onto North Gate Road from Canon Road, heading south, there are no through streets to turn onto before or after reaching the North Gate. Currently, there is only one sign directing commercial traffic, located at the intersection of Canon Road and North Gate Road, near the North Gate. The sign is small and only states that commercial traffic is to use the South Gate, with no direction. Additionally, many commercial drivers rely on GPS, which does not identify the South Gate as the correct entry gate. On Google Maps, when searching for either "Travis AFB South Gate" or "Travis AFB Commercial Gate," the only gates that are identified on the map are the Main Gate and the North Gate.

When commercial truck traffic ends up at the North Gate, delays can be caused, impacting local traffic. These delays are avoided when commercial traffic utilizes the South Gate.

Travis AFB has contacted Google and requested an update to their mapping and direction services to route users to the South Gate, but Google has not updated their system at the time this was written.

One sign directing commercial traffic, located at the intersection of North Gate Road and Canon Road
(Source: Google Maps)

Findings

- Due to lack of adequate signage and inaccurate GPS identification, commercial trucks can create delays when they attempt to enter the North Gate rather than the South Gate.
- Travis AFB has contacted Google to update their mapping services to direct users to the South Gate, but this update has not occurred yet.

ISSUE RC-2	**Roadway capacity at North Gate**
	Road capacity at North Gate is inadequate for safety, especially if there is an accident.

Compatibility Assessment

The local access roads north of Travis AFB, including North Gate Road and Canon Road, cannot always sufficiently handle traffic going to and from the gate. The width of North Gate Road is only 20 feet, compared to standard 24-foot roadways. The road also lacks adequate shoulders. When accidents occur on the road, there is not enough room for cars to safety pull over or room for other cars to safely pass. Additionally, there is no space for large trucks to turn around, as mentioned in Issue RC-1.

The Solano Transportation Authority submitted federal request for funding to improve the roads north of Travis AFB in 2007 and 2009 as a priority project in the county. Plans to improve the roads include widening North Gate Road and Canon Road from 10-foot lanes to the standard 12-foot lanes, along with the addition of 4-foot shoulders. Plans also include replacing a stop sign with a signal at the intersection of Vanden and Canon Roads. The project is expected to cost $7.6 million.

Construction associated with the Fairfield / Vacaville Train Station Specific Plan involved the closure of Peabody Road, between Vanden Road to Huntington Drive, from June 2015 to August 2016. During the closure of Peabody Road, drivers were encouraged to use the North Gate rather than the Main Gate when driving to and from Vacaville and other areas north of Travis AFB. The increased use of the North Gate from the detour created long lines and stacking issues, as North Gate Road is not equipped to handle this level of traffic. Although traffic returned to normal levels after Peabody Road reopened, improvements are still needed.

Another transportation project in the process of being completed, Jepson Parkway, may increase the use of the North Gate. The concept involves the improvement of existing roads, including Leisure Town Road and Vanden Road, to create an alternative local route rather than Interstate 80. Those travelling from north of Travis AFB utilizing Jepson Parkway could increase the use of the North Gate. The North Gate is as an important alternative gate for the Base.

Findings

- Improvements to the roads associated with the North Gate have been planned since 2007.
- North Gate Road and Canon Road cannot always accommodate the amount of traffic travelling to and from Travis AFB. The temporary closure of Peabody Road has highlighted this issue.

ISSUE RC-3	**Main Gate traffic** There are concerns about throughput at the Main Gate impacting traffic off-Base at peak times.

Compatibility Assessment

The Main Gate for Travis AFB is located on Air Base Parkway, which turns into Travis Avenue after it enters the Base. The gate has three inspection lanes and is open at all times. The majority of Base personnel use the Main Gate to access the Base, which can create backups to Parker Road at peak times. If traffic does not move efficiently, which can happen for a variety of reasons, such as times of increased security levels, vehicles entering the installation can stack and impact local traffic using Air Base Parkway.

Traffic congestion has the potential to delay military mission activities, resulting in lost productive hours. In addition, traffic congestion can also affect the surrounding community if vehicle queuing at the gate extends out to Air Base Parkway, delaying civilian traffic.

Through its 2016 Installation Development Plan, Travis AFB has developed recommendations for upgrades and improvements to the Main Gate that would enhance traffic flow onto the Base and reduce congestion in the queuing lanes. At the time this was written, specific funding for the gate has not been acquired, so there is no date for when this enhancement would occur, but it is planned for a six to 10-year timeframe from 2016.

Findings

- Use of the Main Gate has the potential to create backups that can impact traffic off-Base at peak times.
- Travis AFB identified gate enhancements as a project in its 2016 Installation Development Plan to help traffic flow at the Main Gate, but no funding has been acquired yet.

5.21 Safety (SA)

Safety zones are areas in which development should be more restrictive, in terms of use and concentrations of people, due to the higher risks to public safety. Issues to consider include aircraft accident potential zones, weapons firing range safety zones, and explosive safety zones.

Military installations often engage in activities or contain facilities that, due to public safety concerns, require special consideration by local jurisdictions when evaluating compatibility. It is important to regulate land use near military airfields to minimize damage from potential aircraft mishaps and to reduce air navigation hazards. To help mitigate potential issues, the Department of Defense (DOD) has delineated Clear Zones (CZ) and Accident Potential Zones (APZ) near airfield runways. APZs are usually divided into APZ I and APZ II. Each zone was developed based on the statistical review of aircraft mishaps. Studies show that most mishaps occur on or near the runway, predominately along its extended centerline.

Key Terms

Clear Zone (CZ). The CZ is the area that has the highest statistical potential of an aircraft incident (but again, a very low probability). As the name reflects, this area should be kept clear of all structures, including fences. A CZ begins at the physical end of a runway and extends outward, typically covering an area that is 3,000 feet wide by 3,000 feet long. Travis AFB's CZs are different than the typical CZs because the operational end of the runway ends before the physical end of the runway. As a result, the CZs at Travis are larger than normal so that the Base can protect the maximum amount of land based on the physical end of the runway. Travis AFB's CZ on the northwestern end of the runway is 3,000 feet wide by 3,800 feet long and the CZ on the southeastern end of the runway is 3,000 feet wide by 3,997 feet long.

Firebreaks. Firebreaks are either natural features, such as ponds, lakes, streams, and rock barriers, or constructed, such as roads or broad, un-vegetated strips or areas.

ISSUE SA-1	**Fires from off-Base impacting Travis AFB** Fires have started in the grasslands outside Travis AFB and have burned areas on the Base.

Compatibility Assessment

Travis AFB has unimproved lands that are at risk for wildfires. Wildfires are more likely to occur during the summer and fall when grassland vegetation is dry and hot, with windy conditions. A total of 50 wildfires have occurred on the Base since 2008. In August 2015, a three-alarm grass fire broke out on the Base, near the south end of the runway, which spread outside the Base perimeter. The fire burned 125 acres total and was so large that smoke was visible from the Sacramento area. One of the most damaging fires on the Base occurred in August 2008 when a grass fire along Parker Road spread onto the Base. The eight-alarm fire damaged or destroyed about 270 unoccupied homes (part of the former Base family housing complex) that were scheduled to be demolished. More than 215 firefighters from the Base and outside agencies responded to the fire, which burned more than a total of 12 acres of land.

An on-Base grass fire that spread east of Travis AFB in August 2015 (Source: KCRA)

Travis AFB maintains a Wildland Fire Management Plan to reduce the potential for wildfires, to protect and enhance valuable natural resources, and to implement ecosystem management goals and objectives. The overall goal is to reduce the total costs and losses from wildland fire by protecting assets at risk through focused pre-fire management and increasing initial attack success. Fire Emergency Services at Travis AFB has a mutual aid agreement with Solano County, which authorizes Travis AFB to provide support to and request support from Solano County jurisdictions during wildfire incidents on- and off-Base.

Fire control measures include monitoring of controlled burns, maintenance of firebreaks, and implementation of fire protection and prevention inspections. Travis AFB maintains 12- to 15-foot firebreaks around the Base. Prescribed burning has not been conducted on the Base but is considered a useful management tool for wildfire prevention in areas where listed species occur.

For the safety of those on-Base and living nearby, it is important that wildfires are prevented and controlled if they occur. Wildfires must be contained so they do not become a threat to the health and safety of those working and living on or near the Base. The Travis AFB Integrated Natural Resources Management Plan outlines several projects to manage the threat of wildfires, including:

- Produce a wildland fire response protocol for Natural Resource Specialist input into fire suppression activities and rehabilitation funding and projects.
- Produce a fire management GIS database (risk analysis, fuel types, history, fuel breaks and other).
- Develop prescribed burn wildlife habitat priorities and coordinate with Wildland Fire Management.

Source: Travis AFB Integrated Natural Resources Management Plan, http://fox40.com/2015/08/10/grass-fire-burning-near-travis-air-force-base/, http://www.kcra.com/california-wildfires/crews-respond-to-grass-fire-at-travis-air-force-base/34643420, http://www.sfgate.com/bayarea/article/Travis-AFB-fire-destroyed-damaged-270-homes-3199011.php#photo-2338724

Findings

- Wildfires are more likely to occur on and around Travis AFB during the summer and fall when grassland vegetation is dry, and the area is experiencing hot, windy conditions.
- For the safety of those on-Base and living nearby, it is important that wildfires are prevented and controlled. Preventative measures to limit and slow fire progression are important.
- An eight-alarm fire burned 12 acres and destroyed about 270 unoccupied homes on the Base in August 2008.

5.22 Scarce Natural Resources (SNR)

Pressure to gain access to valuable natural resources (such as oil, natural gas, minerals, and water resources) located on military installations, within military training areas, or on public lands historically used for military operations can impact land utilization and military operations.

There were no Major Issues identified for Scarce Natural Resources in the TSS.

5.23 Vertical Obstructions (VO)

Vertical obstructions are created by buildings, trees, structures, or other features that may encroach into the navigable airspace or line of sight radar signal transmission pathways used by the military. These obstructions can be a safety hazard to both the public and military personnel and potentially impact military readiness.

Vertical obstructions can compromise the value of low-level flight training by limiting the areas where such training can occur. These obstructions can include a range of items from man-made, such as telephone poles, utility transmission towers, and radio antennas, to natural, such as tall trees and land features. Vertical obstructions can also interfere with radar transmissions, compromising the integrity of data transmission between the transmitter and receiver. Though most critical near the transmitter, the geographic area impacting the transmissions, or radar viewshed, can be broad depending on the distance between the transmitter and receivers.

Key Terms

Imaginary Surfaces. The term imaginary surface refers to the areas surrounding a heliport or airfield that must be kept clear of objects that might pose a safety threat to aviation activities. A man-made or natural object that projects above an imaginary surface is an obstruction.

Frangible Structures. Construction above the ground surface that will collapse or shatter upon impact.

Vertical Obstructions. Vertical obstructions are objects or structures that exceed a specified height above ground level and extend into airspace. Vertical obstructions may be created by buildings, trees, structures, or other features that are of greater height than, and encroach into, the navigable airspace used for military operations (aircraft approach-departure surfaces, transitional surfaces, as well as military training or flight routes). These can present a safety hazard to both the public and military personnel and potentially impact military readiness.

Technical Background

Vertical obstructions can compromise the value of low-level flight training by limiting the areas where such training can occur. These obstructions can include a range of items from man-made, such as telephone poles and radio antennae, to natural, such as tall trees and land features.

In relation to flight operations from an airport (military or civilian), vertical obstructions are addressed through compliance with Federal Regulation Title 14 Part 77, which establishes standards and notification requirements for objects affecting navigable airspace. Commonly referred to as Part 77 compliance, this regulation provides details to evaluate the potential for a vertical obstruction based on the elevation of the airfield, the height and resulting elevation of the new structure or facility, and the location of the structure or facility in relation to the airfield in question.

To determine when structures or facilities should be evaluated for vertical obstruction, Part 77 states the following requirements for notifying the FAA:

> *§77.9 - Any person/organization who intends to sponsor any of the following construction or alterations must notify the Administrator of the FAA:*
>
> *– Any construction or alteration exceeding 200 feet above ground level.*
>
> *Any construction or alteration:*
>
> *– within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with at least one runway more than 3,200 feet.*
>
> *– within 10,000 feet of a public use or military airport which exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 feet.*
>
> *– within 5,000 feet of a public use heliport which exceeds a 25:1 surface.*

Any highway, railroad, or other traverse way whose prescribed adjusted height would exceed the above noted standards.

When requested by the FAA:

– Any construction or alteration located on a public use airport or heliport regardless of height or location.

Part 77 also identifies the height at which an object may be considered an obstruction at a designated distance:

§77.17- Obstruction standards.

(a) An existing object, including a mobile object, is, and a future object would be an obstruction to air navigation if it is of greater height than any of the following heights or surfaces:

(1) A height of 499 feet above ground level at the site of the object.

(2) A height that is 200 feet above ground level or above the established airport elevation, whichever is higher, within three nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length, and that height increases in the proportion of 100 feet for each additional nautical mile from the airport up to a maximum of 499 feet.

(3) A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, which would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance.

(4) A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the minimum obstacle clearance altitude.

(5) The surface of a takeoff and landing area of an airport or any imaginary surface established under § 77.19, 77.21, or 77.23. However, no part of the takeoff or landing area itself will be considered an obstruction.

(b) Except for traverse ways on or near an airport with an operative ground traffic control service furnished by an airport traffic control tower or by the airport management and coordinated with the air traffic control service, the standards of paragraph (a) of this section apply to traverse ways used or to be used for the passage of mobile objects only after the heights of these traverse ways are increased by:

(1) 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance.

(2) 15 feet for any other public roadway.

(3) 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road.

(4) 23 feet for a railroad.

(5) For a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it.

Apart from the Part 77, the FAA has developed imaginary surfaces around runways to determine how structures and facilities are evaluated as to whether they pose a vertical obstruction relative to the surrounding airspace. The levels of imaginary surfaces build upon one another and are designed to eliminate obstructions to air navigation and operations, either natural or man-made. The dimension or size of an imaginary surface depends on the runway classification. Figure 5.23-1 illustrates all the imaginary surfaces of a runway and the heights and ratios that buildings and structures are evaluated for vertical obstructions.

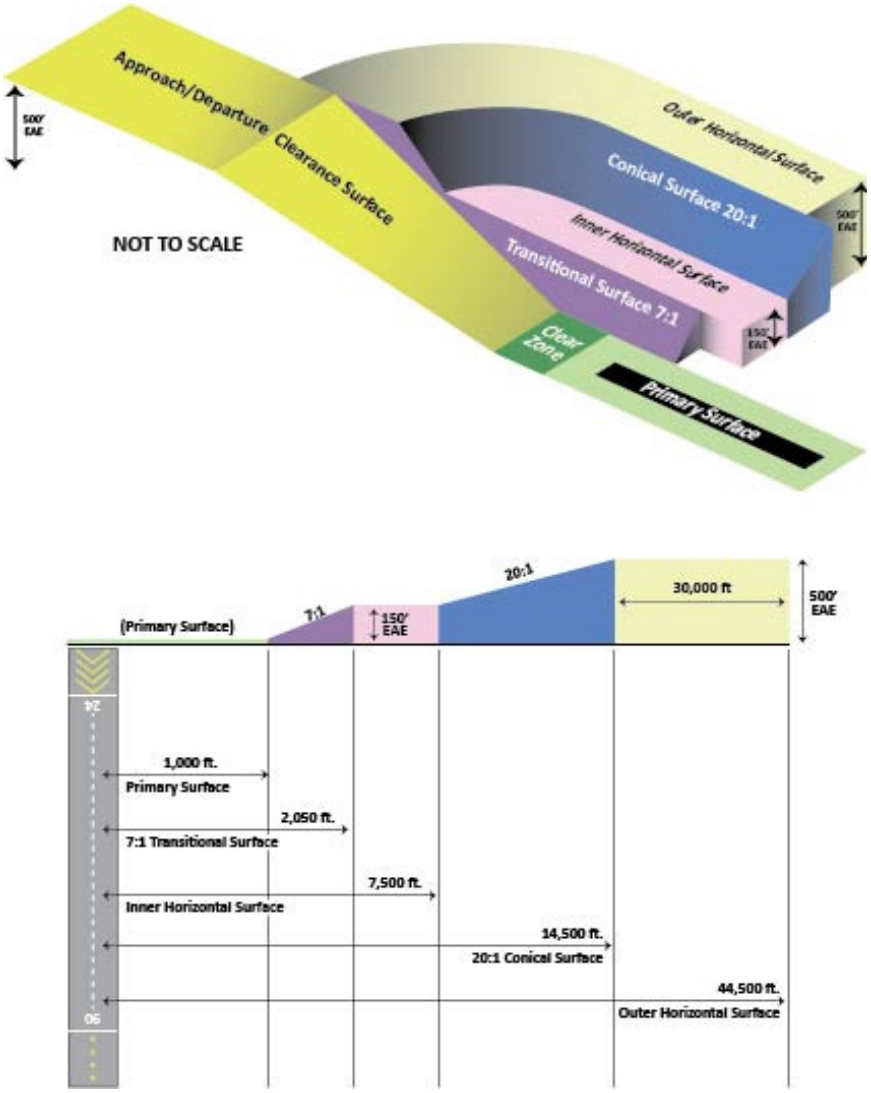

Figure 5.23-1. Example Imaginary Surfaces Cross-Section

As defined in the Travis AFB AICUZ, the following provides a description of each of the imaginary surfaces.

Primary Surface. This surface defines the limits of the obstruction clearance requirements in the immediate vicinity of the landing area. The primary surface comprises surfaces of the runway, runway shoulders, and lateral safety zones and extends 200 feet beyond the runway end. The width of the primary surface for the type of runway at Travis AFB is 2,000 feet, or 1,000 feet on each side of the runway centerline.

Clear Zone Surface. This surface defines the limits of the obstruction clearance requirements in the vicinity contiguous to the end of the primary surface. The length and width (for a single runway) of a Clear Zone surface at Travis AFB is 3,000 feet by 3,000 feet.

Approach-Departure Clearance Surface. This surface is symmetrical about the runway centerline extended, begins as an inclined plane (glide angle) 200 at the end of the primary surface of the centerline elevation of the runway end, and extends for 50,000 feet. The slope of the approach-departure clearance surface is 50:1 along the extended runway (glide angle) centerline until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 feet from the start of the glide angle. The width of this surface at the runway end is 2,000 feet; it flares uniformly, and the width at 50,000 feet is 16,000 feet.

Inner Horizontal Surface. This surface is a plane, oval in shape at a height of 150 feet above the established airfield elevation. It is constructed by scribing an arc with a radius of 7,500 feet above the centerline at the end of the runway and interconnecting these arcs with tangents.

Conical Surface. This is an inclined surface extending outward and upward from the outer periphery of the inner horizontal surface for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation. The slope of the conical surface is 20:1.

Outer Horizontal Surface. This surface is a plane located 500 feet above the established airfield elevation. It extends for a horizontal distance of 30,000 feet from the outer periphery of the conical surface.

Transitional Surfaces. These surfaces connect the primary surfaces, Clear Zone surfaces, and approach-departure clearance surfaces to the outer horizontal surface, conical surface, other horizontal surface, or other transitional surfaces. The slope of the transitional surface is 7:1 outward and upward at right angles to the runway centerline. To determine the elevation for the beginning of the transitional surface slope at any point along the lateral boundary of the primary surface, including the CZ, draw a line from this point to the runway centerline. This line will be at right angles to the runway axis. The elevation at the runway centerline is the elevation for the beginning of the 7:1 slope.

ISSUE VO-1	**Infrangible fence** The adjacent property north of the runway on the east side of Travis AFB has erected an infrangible fence, right up against the Base fence. Fencing at the end of the runway must be frangible in the event a mishap was to occur upon landing or takeoff.

Compatibility Assessment

The DOD Unified Facility Criteria (UFC) 3-260-01, Airfield and Heliport Planning and Design, establishes a Clear Zone Mandatory Frangibility Zone (MFZ) for the Air Force that extends through the land use control area to the end of the clear zone. Items that must be sited there due to their function must be made frangible to the maximum extent possible. A frangible structure must be designed using materials that will either break into segments or shatter without impaling the aircraft skin or becoming an obstacle to the continued movement of the aircraft.

A private property owner constructed an infrangible fence, north of the runway, to keep cattle on the property. The fence was built along an existing frangible fence built and maintained by Travis AFB within the MFZ. The construction of the private infrangible fence next to the frangible fence creates a safety hazard for potential collisions. However, the frangibility requirement only applies to structures and property owned or controlled by the Air Force. The UFC 3-260-01 recommends interaction with property owners whose land falls within the MFZ, encouraging the construction of frangible items.

Findings

- The infrangible fence creates an obstruction with the MFZ at the northeast end of the runway.
- UFC frangibility requirements cannot be enforced on property that is not controlled by the Air Force and Travis AFB can only encourage the construction of frangible objects on private property.

5.24 Vibration (V)

Vibration is an oscillation or motion that alternates in opposite directions and may occur as a result of an impact, explosion, noise, mechanical operation, or other change in the environment. Vibration may be caused by military and / or civilian activities.

There were no Major Issues identified for Vibration in the TSS.

5.25 Water Quality / Quantity (WQQ)

Water quality / quantity concerns include the assurance that adequate water supplies of good quality are available for use by the installation and surrounding communities as the area develops. Water supply for agriculture and industrial use is also considered.

Key Terms

Groundwater. Groundwater is water held underground in the soil or in pores and crevices in rock.

ISSUE WQQ-1	**Travis AFB water supply** Ensure Travis AFB continues to have a secure and reliable water supply, including multiple supply sources.

Compatibility Assessment

The City of Vallejo is the primary water service provider for Travis AFB, supplying about 90 percent of the water for the Base, which is sourced from Lake Berryessa and Barker Slough. The water is supplied through contract between Vallejo and Travis AFB that has been in place for several decades. The other 10 percent of the Base's water comes from five wells on Cypress Lakes Golf Course, north of the Base near Vacaville. These wells draw from the Tehama aquifer, which is limited, due to damage caused by over-drafting in the past. Because of this damage, water drawn from the aquifer is regulated to ensure no further damage occurs. Since California is prone to drought, it is important that Travis AFB has a consistent water supply for the future, which is provided by Vallejo. Vallejo supplies water to Travis AFB that is treated at an on-site facility on the Base. This provides additional security for a quality water supply for the Base; however, during the TSS process, it was mentioned that the Base would like to ensure a redundancy for its water supply in the event of an emergency or disaster. If this is further explored in the future, Travis AFB should work with its existing water service provider to assess capacity to support future redundancies.

The 2011 Travis AFB Water Study recommended that the Base privatize its water system and depend on groundwater from the wells at the golf course. However, the Sustainable Groundwater Management Act was passed in 2014 and Groundwater Sustainability Agencies were formed to help protect groundwater sources. The Act requires medium- and high-priority groundwater basins in California to be managed by local agencies that have formed a Groundwater Sustainability Agency (GSA) by June 30, 2017. Once formed, a GSA must develop and implement a Groundwater Sustainability Plan by January 31, 2022 to guide the sustainable management of its groundwater basin. With these policies in place, groundwater use at the Base may be limited, and is not considered a viable source to provide reliable water to the Base.

Travis AFB Water Treatment Plant

Findings

- The City of Vallejo is the primary water service provider for Travis AFB through a contract with the City that has been in place for several decades.
- Vallejo supplies water to Travis AFB that is treated at an on-site facility on the Base, providing additional security for a quality water supply for the Base.
- Travis AFB is interested in ensuring redundant water supplies in the event of an emergency or disaster. If this is further explored in the future, Travis AFB should work with its existing water service provider to assess capacity to support future redundancies.

TRAVIS AFB
SUSTAINABILITY STUDY

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