100% FINAL

BEALE AIR FORCE BASE, CALIFORNIA

Air Installations Compatible Use Zones (AICUZ) Study

February 2020

U.S. AIR FORCE









Beale Air Force Base, California

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100% Final

February 2020

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 9TH RECONNAISSANCE WING (ACC)
BEALE AIR FORCE BASE, CALIFORNIA

24 January 2020

MEMORANDUM FOR AREA GOVERNMENTS

FROM: 9 RW/CC
5950 C Street
Beale AFB, CA 95903

SUBJECT: Air Installations Compatible Use Zones (AICUZ) Study

1. The 2020 Air Installations Compatible Use Zones (AICUZ) Study for Beale Air Force Base (AFB) is an update of the AICUZ Study dated 2005. The Air Force initiated the update to incorporate changes in aircraft operations including increased KC-135 tanker operations, changes in flight tracks, and changes in noise modeling methodology. It is a re-evaluation of aircraft noise and accident potential related to United States Air Force (Air Force) flying operations. The Air Force provides the AICUZ to aid in the development of local planning mechanisms that will protect the public safety and health, as well as preserve the operational capabilities of Beale AFB.

2. The AICUZ Study contains a description of the affected area around the installation. It outlines the location of runway Clear Zones (CZs), Accident Potential Zones (APZs), and noise contours, and provides recommendations for development that is compatible with military flight operations. It is our recommendation that local governments incorporate these recommendations into community lans, zoning ordinances, subdivision regulations, building codes, and other related documents.

3. This update provides noise contours based upon the Community Noise Equivalent Level (CNEL) metric and utilizes current flight operations. Chapter 4 of the study describes the metric in detail, and Chapter 5 discusses safety. Chapter 6 covers land use compatibility, and Chapter 7 discusses roles of the Air Force and its neighbors in promoting compatible land uses around the installation.

4. We greatly value the positive relationship Beale AFB has experienced with its neighbors over the years. As a partner in the process, we have attempted to minimize noise disturbances through such actions as minimizing night flying, avoiding flights over heavily populated areas, and continuing to participate in implementing the Beale Joint Land Use Study (JLUS) (2008). We appreciate your cooperation in implementing the recommendations and guidelines presented in this AICUZ Study.

CLARK.ANDREW.M.1099761810 Digitally signed by CLARK.ANDREW.M.1099761810 Date: 2020.02.19 15:27:32 -08'00'

ANDREW M. CLARK, Colonel, USAF
Commander

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Abbreviations and Acronyms

319 OG	319th Operations Group
548 ISRG	548th Intelligence, Surveillance, and Reconnaissance Group
7 SWS	7th Space Warning Squadron
9 RW	9th Reconnaissance Wing
940 ARW	940th Air Refueling Wing
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFH	Air Force Handbook
AFI	Air Force Instruction
AFS	Air Force Station
AGL	Above Ground Level
AICUZ	Air Installations Compatible Use Zones
Air Force	United States Air Force
ALUC	Airport Land Use Commission
APZ	Accident Potential Zone
ATC	Air Traffic Control
BASH	Bird/Wildlife Aircraft Strike Hazard
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
CZ	Clear Zone
dB	Decibel
dBA	A-weighted Decibel
DNL	Day-night Average Sound Level
DoD	Department of Defense
DoDI	Department of Defense Instruction
EMI	Electromagnetic Interference
FAA	Federal Aviation Administration
FAR	Floor Area Ratio
FY	Fiscal Year
GC	California Government Code
GCA	Ground Control Approach
GDP	Gross Domestic Product
GIS	Geographic Information System
HAFZ	Hazards to Aircraft Flight Zone
Hz	Hertz
JLUS	Joint Land Use Study
Marine Corps	United States Marine Corps
MIA	Military Influence Area
MSL	Mean Sea Level

Navy	U.S. Department of the Navy
NEXRAD	Next-Generation Radar
NM	Nautical Mile
NVG	Night Vision Goggles
NWS	National Weather Service
PA	Public Affairs
PAVE PAWS	Precision Acquisition Vehicle Entry Phased Array Warning System
PED	Processing, Exploitation, and Dissemination
SACOG	Sacramento Area Council of Governments
SCARWAF	Special Category Army with the Air Force
SEL	Sound Exposure Level
SLUCM	Standard Land Use Coding Manual
SR	State Route
T&G	Touch-and-Go
UAS	Unmanned Aircraft System
VFR	Visual Flight Rules

1.0 Introduction

This document is an update of the Beale Air Force Base (AFB) Air Installations Compatible Use Zones (AICUZ) Study. The update presents and documents changes to the AICUZ since the release of the previous study in 2005. It reaffirms the United States Air Force's (Air Force's) policy of promoting public health, safety, and general welfare in areas surrounding an air installation while seeking development that is compatible with the defense flying mission. This study presents changes in flight operations since the previous study and provides planning noise contours and recommendations for achieving development that is compatible with the defense flying mission.

1.1 AICUZ Program

Military airfields attract development—people who work on the installation want to live nearby, while others want to provide services to installation employees and residents. When incompatible development occurs near an installation or training area, affected parties within the community may seek relief through political channels that could restrict, degrade, or eliminate capabilities necessary to perform the defense mission. In the early 1970s, the Department of Defense (DoD) established the AICUZ Program. The goal of the program is to protect the health, safety, and welfare of those living and working near air installations while sustaining the Air Force's operational mission. The Air Force accomplishes this goal by promoting proactive, collaborative planning for compatible development to sustain mission and community objectives.

The AICUZ Program recommends that noise zones, Clear Zones (CZs), Accident Potential Zones (APZs), and flight clearance requirements associated with military airfield operations be incorporated into local community planning programs in order to maintain the airfield's operational requirements while minimizing the impact to residents in the surrounding community. Cooperation between military airfield planners and community-based counterparts serves to increase public awareness of the importance of air installations and the need to address mission requirements and associated noise and risk factors in the public planning process. As the communities that surround airfields grow and develop, the Air Force has the responsibility to communicate and collaborate with local governments on land use planning, zoning, and similar matters that could affect the installation's operations or missions. Likewise, the Air Force has a responsibility to understand and communicate potential impacts that new and changing missions may have on the local community.

1.2 Scope and Authority

1.2.1 Scope

This AICUZ Study uses projected air operations. The Air Force provides Beale AFB's CZs, APZs, and noise zones associated with the airfield's runways to the local communities, along with recommendations for compatible land use near the installation for incorporation into comprehensive plans, zoning ordinances, subdivision regulations, building codes, and other related documents.

1.2.2 Authority

Authority for the Air Force AICUZ Program lies in two documents:

- Air Force Instruction (AFI) 32-1015 *Integrated Installation Planning*, implements Department of Defense Instruction (DoDI) 4165.57, *Air Installations Compatible Use Zones*, and applies to all Air Force installations with active runways located in the United States and its territories. This instruction provides guidance to installation AICUZ Program Managers.

- Air Force Handbook (AFH) 32-7084, *AICUZ Program Manager's Guide,* provides installation AICUZ Program Managers with specific guidance concerning the organizational tasks and procedures necessary to implement the AICUZ Program. It is written in a "how to" format and aligns with AFPD 32-70, *Environmental Quality*.

1.3 Previous AICUZ Efforts and Related Studies

Previous studies relevant to this AICUZ Study include:

- AICUZ Study for Beale AFB, Volumes I and II (2005);

- Beale Joint Land Use Study (JLUS) (2008); and

- Sacramento Area Council of Governments (SACOG) Beale AFB Land Use Compatibility Plan (2011).

1.4 Changes that Require an AICUZ Study Update

This 2020 Beale AFB AICUZ Study is an update of the 2005 AICUZ Study, providing the installation's current flight tracks, CZs, APZs, and noise zone information and presenting the most accurate representation of the installation's future aircraft activities. As such, the update allows surrounding communities to consider both current and potential activities when making land use decisions.

As the DoD aircraft fleet mix and training requirements change over time, the resulting flight operations change as well. These changes can affect noise contours and necessitate an AICUZ Study update. Additionally, non-operational changes, such as noise modeling methods and a local community's land use, may also require the need for an update. Per AFI 32-1015 and AFH 32-7084, the primary changes since the previous AICUZ Study that necessitate this update include:

- **Changes in air operations.** Recent changes in air operations have included:
  - Returning the KC-135 Stratotanker mission to Beale AFB in 2016. The annual number of KC-135R sorties flown from Beale AFB is expected to increase from 200, as of the end of 2018, to 500 once the unit is fully manned.
  - Eliminating the Marysville Automatic Direction Finder U-2 Dragon Lady procedure. This procedure involved use of a radio tower in Marysville as a navigation aid. The introduction of new technology has made this procedure obsolete, and it is no longer used.
  - Shifting the Beale AFB Aeroclub's flying operations to the Yuba County Airport.
  - There have been numerous other adjustments to flight procedures, as described in recent updates to Beale AFB instructions that cover flying operations, including detailed guidance for runway operations, flight procedures, and traffic patterns.
- **Changes in flight tracks**. RQ-4 Global Hawk unmanned aircraft systems (UAS) flight tracks and profiles have been updated based on current flying guidance.
- **Changes in ground engine run-up locations**. The T-38 Talon parking area has been relocated, resulting in low-power static engine run noise moving from one part of the parking apron to another.
- **Changes in noise modeling software.** The 2020 AICUZ Study used the NOISEMAP topographic effects module, which was not available for the 2005 AICUZ.
- **Changes in DoD and Air Force policy guidance.** The noise analysis has been completed in accordance with DoDI 4165.57 and AFI 32-1015. Additionally, in recent years, DoD policy has changed to prescribe modeling of an average annual day (AAD) (i.e., 1/365th of total annual operations) rather than an average busy day (ABD) (i.e., 260 busy flying days per year for based aircraft).

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2.0 Beale AFB, California

2.1 Location

Beale AFB covers nearly 23,000 acres in Yuba County in northern California (Figure 2-1). The installation is located outside the town of Linda and approximately 10 miles east of the city of Marysville and Yuba City. Beale AFB is comprised of several land holdings, including:

- **Airfield Facilities**: Beale AFB maintains a 340-acre active airfield with a 12,000-foot runway, taxiways, cargo pads, and aircraft parking apron.

- **Point Arena Air Force Station (AFS)**: Point Arena AFS was originally opened in 1951 as a part of the Air Defense Command radar network. In 1979, the installation was converted to function as part of North American Aerospace Defense Command's Joint Surveillance System until closure of the facility in 1998. The site is currently in a caretaker status under Beale AFB. Pending environmental remediation, the installation's intent is to transfer the property with the General Services Administration's direction.

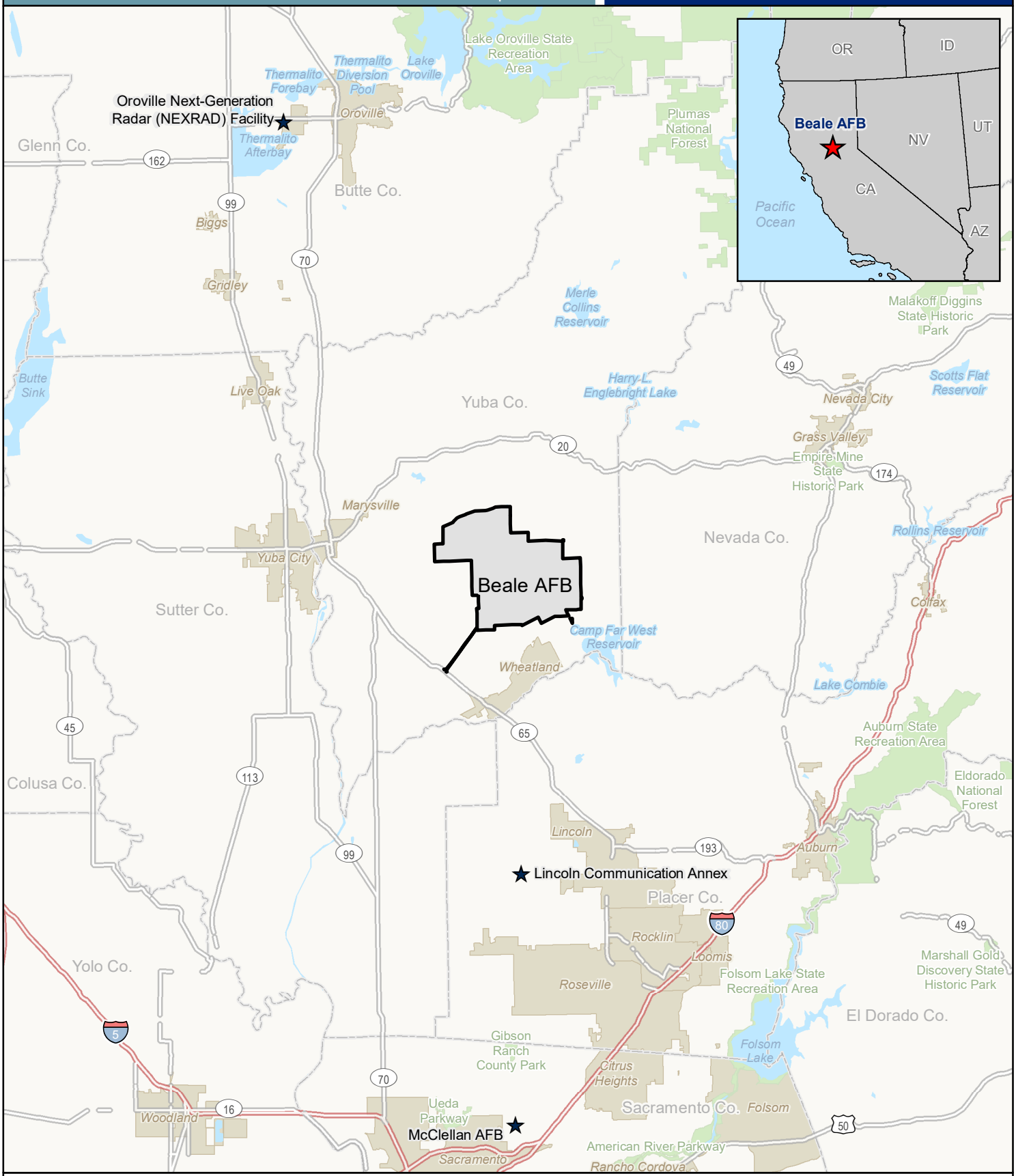
- **Lincoln Receiver Site (Communications Annex)**: Beale AFB manages the Lincoln Receiver Site, located roughly 30 miles south of the installation. The site is part of the High Frequency Global Communications System and serves as a receiving site for communication between aircraft in flight and ground control systems. Lincoln Receiver Site is remotely operated by Andrews AFB, but is owned and maintained by Beale AFB.

- **Oroville Next-Generation Radar (NEXRAD) Facility**: The Oroville NEXRAD Facility is part of the national NEXRAD network, composed of 160 S-band Doppler weather radar systems owned by the National Weather Service (NWS). The facility serves government, private, and commercial entities throughout northern California, Nevada, and Oregon. The NEXRAD Facility infrastructure is owned and maintained by Beale AFB, while the radar equipment is owned by the NWS.

Figure 2-1

Beale Air Force Base
Air Installation Compatible Use Zones

Regional Setting



Legend

- Other Base Location
- Installation Boundary
- County Boundary
- City
- Interstate Highway
- State Highway
- Waterbody
- Park/Recreation Area

0 4 8 Miles

N

Source: AFCEC 2019; CA DOT 2015; ESRI 2017; U.S. Census Bureau 2018.

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2.2 History

Following the Japanese attack on Pearl Harbor on December 7, 1941, local businesspeople, led by the Marysville's Chamber of Commerce, lobbied the federal government to construct a military installation in the area. In 1942, the Army announced it would construct a base near Marysville. Camp Beale, named after Edward Fitzgerald Beale (1822–1893), a 19th century pioneer who graduated from the Naval Academy and served in the California militia, was activated in 1942. The 13th Armored Division, 81st Infantry Division, and 96th Infantry Division all trained at Camp Beale before deploying to the European or Pacific theaters.

In 1947, Camp Beale was placed on the War Department Surplus list. The War Assets Administration assumed custody of Camp Beale, sold most of its buildings, and certified Beale's 86,000 acres to the Farm Credit Administration for resale. However, the newly-formed Air Force put a hold on the post. In April 1948, Camp Beale was transferred to the Air Training Command and renamed Beale Bombing and Gunnery Range. In 1951, the 2275th Air Base Squadron (later Group) was activated at Beale Bombing and Gunnery Range for logistical support.

In 1951, the installation was transferred to the Continental Air Command, and Special Category Army with the Air Force (SCARWAF) engineers began rebuilding its facilities. On November 27, 1951, the installation was renamed Beale AFB via General Order 77. When engineering work at the installation was completed in 1956, the SCARWAF departed, and local communities began a campaign to keep the installation open, led by the Sacramento Valley Military Affairs Committee. The same year, Beale AFB was transferred to the Strategic Air Command, and the 4126th Air Base Squadron was activated, replacing the 2275th Air Base Group. The 4126th Air Base Squadron restored the installation's active status, including constructing the installation's 12,000-foot runway for accommodating the B-52 Stratofortress and KC-135 Stratotanker.

In the 1960s and 1970s, Beale AFB played important roles in the country's defense strategy during the Cold War and in training and deploying bomber and tanker crews during the Vietnam War. In 1976, the Air Force began construction on the Precision Acquisition Vehicle Entry Phased Array Warning System (PAVE PAWS) radar system for missile warning and space surveillance at Beale AFB. The system became operational in 1980.

In 1964, the DoD designated Beale AFB as the home of a new, supersonic reconnaissance aircraft, the SR-71 Blackbird. The 4200th Strategic Reconnaissance Wing was activated on January 1, 1965, and received its first SR-71 Blackbird in January 1966. Immediately following the Vietnam War, aircrews based at Beale AFB set a series of speed and altitude flight records in the SR-71 Blackbird. In 1966, the 9th Strategic Reconnaissance Wing replaced the 4200th. A decade later, the Wing received its first U-2 Dragon Lady. From 1976 until 1990, when budget restrictions forced the retirement of the SR-71 Blackbird,

Beale AFB was home to both the SR-71 Blackbird and U-2 Dragon Lady, two of the world's most unique aircraft. In 2001, Beale AFB again became home to a cutting-edge reconnaissance platform with activation of the 12th Reconnaissance Squadron, the parent organization for the RQ-4 Global Hawk.

Today, in addition to the RQ-4 Global Hawk, Beale AFB is home to the U-2 Dragon Lady, T-38 Talon, and KC-135 Stratotanker. Nearly 7,000 personnel are employed at Beale AFB, which continues its unique mission to deliver combat power and globally integrated intelligence, surveillance, and reconnaissance.

2.3 Mission

The mission of Beale AFB is to train, deploy, and employ Airmen and assets to deliver combat power and globally integrated intelligence, surveillance, and reconnaissance in support of national objectives. This mission is accomplished through a fleet of U-2 Dragon Lady, T-38 Talon, and RQ-4 Global Hawk aircraft operated by the 9th Reconnaissance Wing (9 RW). Beale AFB also supports an air refueling wing, an RQ-4 tenant mission, and various other tenant units. Brief descriptions of the units assigned to Beale AFB and their missions are provided below. Units that do not produce noise that could impact the surrounding community are not included in this AICUZ Study.

2.4 Host and Tenant Organizations

2.4.1 9th Reconnaissance Wing

The 9 RW, Beale AFB's host wing, comprises more than 6,800 military and civilian personnel in four groups on base: 9th Operations Group, 9th Maintenance Group, 9th Mission Support Group, and 9th Medical Group. The 9 RW is responsible for providing national and theater command authorities with timely, reliable, high-quality, high-altitude reconnaissance products. To accomplish this mission, the wing is equipped with the nation's fleet of U-2 Dragon Lady and RQ-4 Global Hawk reconnaissance aircraft and the associated support equipment. The wing also maintains a high state of readiness in its expeditionary combat support forces, which may be deployed to support operations overseas. The 9 RW is assigned to Air Combat Command and is part of the 16th Air Force.

The four groups that comprise the 9 RW are the:

- **9th Operations Group**: Trains, plans, and executes U-2 Dragon Lady missions. Operates T-38 Talons for conducting initial qualification, continuation, and advanced pilot proficiency training. Flies over 139,000 hours/30,000 flights annually, including over 21,500 operational/combat sorties;

- **9th Maintenance Group**: Responsible for providing worldwide maintenance support and fleet health management for the U-2 Dragon Lady, RQ-4 Global Hawk, and T-38 Talon aircraft. It also supports worldwide taskings for operating locations and other Joint Chiefs of Staff requirements;

- **9th Mission Support Group**: Composed of expeditionary combat-support professionals who provide logistical services, communications support, security forces, contracting services, and civil engineering support to the 9 RW and the Beale AFB community; and

- **9th Medical Group**: Supports operational readiness of the 9 RW and the specific needs of the U-2 Dragon Lady high-altitude mission. Provides comprehensive dental, physiological, medical, and environmental support, as well as promotes health education and wellness to the Beale AFB community.

2.4.2 319th Operations Group

The 319th Operations Group (319 OG) is assigned to the 319th Reconnaissance Wing at Grand Forks AFB, North Dakota. The 12th Reconnaissance Squadron of the 319 OG is located at Beale AFB as a tenant unit, where it operates unmanned RQ-4 Global Hawk aircraft. Until June 2019, the 319 OG had been assigned to the 9 RW and was known as the 69th Reconnaissance Group.

2.4.3 940th Air Refueling Wing

The 940th Air Refueling Wing (940 ARW) is assigned to the Air Force Reserve Command and is operationally-gained by the Air Mobility Command. The 940 ARW operates eight KC-135R Stratotankers out of Beale AFB, providing air refueling services to DoD units throughout the western United States. The 940 ARW consists of the 940th Operations Group, 940th Maintenance Group, 940th Mission Support Group, and the 940th Aerospace Medicine Squadron.

2.4.4 548th Intelligence, Surveillance, and Reconnaissance Group

The 548th Intelligence, Surveillance, and Reconnaissance Group's (548 ISRG) presence at Beale AFB consists of four active duty squadrons, two Air Force Reserve squadrons, and two California Air National Guard squadrons. The 9th Intelligence Squadron conducts analysis and processing, exploitation, and dissemination (PED) functions for MQ-9 collection, and it is the Air Force's only unit processing and exploiting U-2 Dragon Lady Optical Bar Camera imagery. The 13th Intelligence Squadron conducts PED operations for U-2 Dragon Lady and RQ -4 Global Hawk signals and imagery intelligence collection.

The 48th Intelligence Squadron provides maintenance and sustainment functions. The 548th Operations Support Squadron is responsible for mission management, operational training, weapons and tactics, fusion operations, plans, and integration across 548 ISRG.

2.4.5 7th Space Warning Squadron

The 7th Space Warning Squadron (7 SWS) operates the PAVE PAWS radar site located on the east side of Beale AFB. The PAVE PAWS are large ground-based phased array radars, and the radar site at Beale AFB is part of a worldwide network of missile warning systems. The 7 SWS uses PAVE PAWS to detect sea-launched ballistic missiles. The unit determines how many missiles were launched and their probable destinations, and reports that information to the U.S. Missile Warning Center.

2.4.6 372d Training Squadron Detachment 21

Detachment 21 of the 372d Training Squadron is subordinate to the 982d Training Group and provides aircraft maintenance training to the 9-RW at Beale AFB. Detachment 21 trains approximately 650 students annually on aircraft maintenance courses, covering in-depth theory of operations, advanced troubleshooting on U-2 Dragon Lady and RQ-4 Global Hawk aircraft systems, the U-2 Dragon Lady and T-38 Talon egress systems, and aerospace ground equipment.

2.5 Airfield Environment

Located on the western side of Beale AFB, the airfield (Figure 2-2) includes aircraft hangars for maintenance and storage, aircraft parking ramps, taxiways, the runway itself, and assorted support facilities. The hangars and support facilities are east of the runway and taxiways, and the main cantonment area of Beale AFB is another 2 miles farther to the east. The runway is constructed of concrete and is 12,001 feet long and 300 feet wide. It is marked at a width of 150 feet, though the full 300-foot width is usable. There are 1,000-foot-long non-load-bearing asphalt overruns at each end, and the runway elevation is 113 feet above mean sea level (MSL).

A runway is typically used in both directions and counted as two separate runways, depending on the direction of the departure. Each direction is labeled as a separate runway and numbered based on its magnetic heading, divided by 10 and rounded to a whole number. Parallel runways have the same heading and are distinguished by the suffix "L" for 'left' and "R" for 'right'.

Figure 2-2

Beale Air Force Base
Air Installation Compatible Use Zones

Airfield Diagram



Legend

- Installation Boundary
- Airfield Runway

0 0.25 0.5 Miles

N

Source: AFCEC 2019; Digital Globe 2018; ESRI 2017; U.S. Census Bureau 2018.

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The runway is referred to as "Runway 15/33" because in one direction it faces a heading of 150° (i.e., to the southeast), and at the opposite end has a heading of 330° (northwest). The runway in use is determined by the direction of the prevailing winds and a variety of other factors. For example, if the prevailing winds are blowing (coming) from the north, then aircraft will take off and land towards the north on Runway 33, and if the prevailing winds are coming from the south then aircraft will take off and land towards the south on Runway 15. In other words, aircraft will almost always take off and land into the wind. At Beale AFB, 77% of operations use Runway 15 and 23% use Runway 33.

2.6 Local Economic Impacts

The military provides direct, indirect, and induced economic benefits to local communities through jobs and wages. Benefits include employment opportunities and increases in local business revenue, property sales, and tax revenue. As of 2018, California ranked second out of all states by total annual defense spending at $49.3 billion, behind Virginia. In fiscal year (FY) 2015, military spending made up approximately 2.1% of the state's gross domestic product (GDP), and over 269,000 active duty, civilian, and Guard or Reserve personnel were employed in the state (National Conference of State Legislatures 2018).

The economic impact of a military installation is based on annual payroll (jobs and salaries), annual expenditures, and the estimated annual dollar value of the jobs created. The military further contributes to the economic development of communities through increased demand for local goods and services and increased household spending by military and civilian employees.

Based on Beale AFB's Economic Impact Statement for FY 2017, the installation, through 9 RW, provides installation support to DoD and federal agencies serving over 11,500 Airmen, civilians, and dependents. The total economic impact of Beale AFB includes all procurement and military and civilian payroll, which totaled $627 million in FY 2017 (Beale AFB 2017) (Table 2-1). Beale AFB's economic impact extends throughout the state of California but is concentrated in the five counties making up the surrounding region, including Butte, Nevada, Placer, Sutter, and Yuba counties.

Tables 2-1 to 2-5 provide summaries of personnel and dependents for Beale AFB, military and civilian payroll, local contract expenditures, the estimated annual value of jobs created indirectly through installation payroll and contract expenditures, and a summary of the installation's total economic impact.

Table 2-1. Total Military Personnel and Dependents by Classification and Housing (Total Persons)

Classification	Total
Active Duty Military	4,423
Air Force Reserve/Air National Guard (ANG)	31
Non-Extended Active Duty ANG/Reserve	1,006
Total Military	**5,460**
Appropriated Fund Civilian	1,080
Non-Appropriated Civilians	225
AAFES/DECA Civilians	114
Private Business	3
Total Civilians	**1,422**
Total Dependents	**4,659**
Total Assigned Personnel and Dependents	**11,541**

Source: Beale AFB 2017

Table 2-2. Military and Civilian Payroll by Category (Millions of Dollars)

Military	Total
Active Duty Military	270.4
Air Force Reserve/ANG	1.8
Non-Extended Active Duty ANG/Reserve	9.8
Individual Mobilization	0.3
Sub-Total	**282.3**
Civilian	
Appropriated Fund Civilians	60.1
Non-Appropriated Civilians	5.7
AAFES/DECA Civilians	2.1
Private Business	0.1
Sub-Total	**68.0**
Total	**350.3**

Source: Beale AFB 2017

Table 2-3. Local Contract Expenditure
(Millions of Dollars)

Expense Category	Amount
Military Construction Program	11.9
Non-Appropriated Fund Construction	36.5
O & M Construction	63.4
Service Contracts	21.7
Commissary (DeCA)	6.3
Base Exchange (AAFES)	0.01
Health Care (TRICARE)	19.0
Education	5.1
TDY (Military & Civilians)	5.6
Other Procurement	13.9
Total Annual Expenditure	**183.5**

Source: Beale AFB 2017
Note: Numbers have been rounded.

Table 2-4. Estimated Annual Value of Jobs Created

Total Number of Jobs Created	1,927
Average Annual Salary	$48,471
Estimated Annual Dollar Value of Jobs Created (Millions of Dollars)	**93.4**

Source: Beale AFB 2017

Table 2-5. Total Economic Impact
(Millions of Dollars)

Expense Category	Amount
Total Payroll	350.3
Contract Expenditures	183.5
Value of Job Creation	93.4
Total Economic Impact	**627.2**

Source: Beale AFB 2017

3.0 Aircraft Operations

Aircraft operations are the primary source of noise associated with a military air installation. The level of noise exposure relates to a number of variables, including the aircraft type, engine power setting, altitude flown, direction of the aircraft, flight track, temperature, relative humidity, frequency, and time of operation (day/night). This chapter discusses the aircraft based at or transient to Beale AFB, the types and number of operations conducted at the airfields, and the runway and flight tracks used to conduct the operations.

3.1 Aircraft Types

3.1.1 Based Aircraft

U-2 Dragon Lady


U-2 Dragon Lady (TU-2S variant)

The U-2 Dragon Lady is a single-seat, single-engine, high-altitude reconnaissance and surveillance aircraft that provides signals, imagery, and electronic intelligence. Long and narrow wings give the U-2 Dragon Lady glider-like characteristics and allow it to quickly lift heavy sensor payloads to altitudes over 70,000 feet, keeping them there for extended periods of time. The U-2 Dragon Lady is powered by a lightweight, fuel efficient General Electric F118-101 engine, which negates the need for air refueling on long duration missions. U-2 Dragon Lady pilots are trained at Beale AFB using two-seat aircraft designated as TU-2S before deploying for operational missions.

RQ-4 Global Hawk


RQ-4 Global Hawk

The RQ-4 Global Hawk is a high-altitude, long-endurance, UAS with sensors that provide intelligence, surveillance, and reconnaissance capabilities. The RQ-4 Global Hawk can reach an altitude of 60,000 feet and has a range of 12,300 nautical miles (NM). It is powered by a Rolls Royce-North American F137-RR-100 turbofan engine.

T-38 Talon

The T-38 Talon is a twin-engine, high-altitude, supersonic jet. At Beale AFB, the T-38 Talons are used to maintain pilot proficiency. They can reach a speed of Mach 1.08, and high-speed maneuvers and aerobatics take place in the special use airspace surrounding Beale AFB. The T-38 Talon is powered by two General Electric J85-GE-5 turbojet engines with afterburners.



T-38 Talon

KC-135 Stratotanker

The KC-135 Stratotanker provides aerial refueling support to Air Force, U.S. Department of the Navy (Navy), U.S. Marine Corps (Marine Corps), and allied nation aircraft. It can carry up to 200,000 pounds of fuel for transfer and is powered by four CFM-56 turbofan engines. The KC-135 Stratotanker has a ceiling of 50,000 feet and is also used for airlift missions. The KC-135 Stratotanker is a variant of the Boeing 707 platform, and the jets were delivered to the Air Force between 1957 and 1965.



KC-135 Stratotanker

3.1.2 Transient Aircraft

C-12 Huron

The C-12 Huron is a medium- to low-altitude, twin-engine, turboprop aircraft. This aircraft is a militarized version of the Hawker Beechcraft Super King Air and Beechcraft 1900. C-12 variants are used by the Air Force, Army, Navy, and Marine Corps. The MC-12W and MC-12S are used for intelligence, surveillance, and reconnaissance, the C-12J is used for passenger transport, and the C-12F performs aeromedical evacuations.



C-12 Huron (MC-12W variant)

C-5M Super Galaxy

The C-5M Super Galaxy is a strategic transport aircraft and is the largest aircraft in the Air Force inventory. Its primary mission is to transport cargo and personnel, and it can operate over intercontinental ranges. Both the nose and aft doors open, allowing ground crews to load and off-load cargo simultaneously from both ends, reducing cargo transfer times. The 60th Air Mobility Wing and 349th Air Mobility Wing operate the C-5M Super Galaxy from nearby Travis AFB.


C-5M Super Galaxy

C-17 Globemaster III

The C-17 Globemaster III is used for airlift and airdrop missions. It is capable of rapid strategic delivery of troops and all types of cargo to main operating bases or directly to forward bases across the world. The design characteristics give it the capability to operate into and out of short runways and austere airfields while carrying large payloads. The C-17 Globemaster III is powered by four Pratt & Whitney F117-PW-100 turbofan engines. The nearest C-17 Globemaster III units operate from Travis AFB.


C-17 Globemaster III

3.2 Maintenance Operations

Maintenance is an integral part of any flying operation and requires a dedicated team of professionals to ensure that units can meet their flying requirements. Two key tasks in maintaining aircraft are low- and high-powered engine maintenance runs.

Aircraft maintainers may conduct engine maintenance runs at power settings ranging from idle to maximum power. Maintainers typically conduct low- to mid-range-powered engine maintenance runs on aircraft parking ramps or just outside of maintenance hangars.

High-powered engine maintenance runs for the U-2 Dragon Lady take place on the aircraft parking apron (see Figure 3-4, presented at the conclusion of Section 3.5), while low- to mid-range-powered engine maintenance runs are completed in shelters with the nose of the U-2 Dragon Lady facing the runway. The T-38 Talon, KC-135 Stratotanker, and RQ-4 Global Hawk complete all engine maintenance runs on parking spots on the apron. Noise

associated with these operations is included in the noise analysis for the Beale AFB noise contours.

While maintenance personnel conduct engine runs primarily during the daytime, they may be conducted at all hours. Each aircraft stationed at Beale AFB has a different proportion of engine runs taking place during daytime, evening, and nighttime hours. For the RQ-4 Global Hawk, more than 95% of engine runs occur between 7:00 a.m. and 7:00 p.m. KC-135 Stratotanker and U-2 Dragon Lady engine runs are also predominately during daytime hours; for both aircraft, 91% of engine runs are conducted between 7:00 a.m. and 7:00 p.m. For T-38 Talons, this figure for daytime hours is 83%, with 16% occurring in the evening (7:00 p.m. to 10:00 p.m.) and less than 1% occurring at night (10:00 p.m. to 7:00 a.m.).

3.3 Flight Operations

Flight activities, including where aircraft fly, how high they fly, how many times they fly over a given area, and the time of day they operate, must be fully evaluated to understand the relationship of flight operations and land use. This chapter discusses typical flight operations for aircraft based at or visiting Beale AFB.

Each time an aircraft crosses over a runway threshold (the beginning or ending of a runway's useable surface) to either takeoff, practice an approach, or land, it is counted as a single flight operation. For example, a departure counts as a single operation as does an arrival. As another example, when an aircraft conducts a pattern (a departure followed by an immediate return) it counts as two operations because the aircraft crosses both the approach and departure ends of the runway during the pattern.

The following list highlights typical operations utilized during normal or increased flight operations. Each flight track utilized is designed to maximize flight operations and, when possible, minimize the effects of noise.

- **Takeoff**: When an aircraft is positioned on the runway, the engine power is set to facilitate movement and eventual flight.

- **Departure**: For the purpose of air traffic sequencing, separation, noise abatement, compliance with avoidance areas, and overall safety of flight, aircraft follow specific ground tracks and altitude restrictions as they depart the airfield's immediate airspace.

- **Straight-In Arrival**: An aircraft performing a straight-in arrival aligns with the runway extended centerline and begins a gradual descent for landing. This type of approach enables an aircraft to maintain a smooth, stable, and steady approach and requires no additional maneuvering.

- **Overhead Break Arrival**: An expeditious arrival using visual flight rules (VFR). The aircraft arrives over the airfield on the runway centerline at a specified point and altitude and then performs a 180-degree "break turn" away from the runway to enter the landing pattern. Once established, the pilot lowers the landing gear and flaps and then performs a second 180-degree descending turn toward the runway centerline to land.

- **Pattern Work**: Pattern work refers to traffic pattern training where the pilot performs takeoffs and landings in quick succession by taking off, flying the pattern, and then landing. A closed pattern consists of two portions, a takeoff/departure and an approach/landing; a complete closed pattern is counted as two operations because the aircraft crosses over a runway threshold twice, once on departure and once on arrival. Traffic pattern training is demanding and utilizes all of the basic flying maneuvers a pilot learns—takeoffs, climbs, turns, climbing turns, descents, descending turns, and straight and level landings.

    - **Low Approach**: A low approach is an approach to a runway that does not result in a landing, but rather a descent towards the runway (usually below 500 feet above ground level [AGL]) followed by a climb-out away from the airfield. Pilots perform low approaches for a number of reasons, including practicing to avoid potential ground obstructions (e.g., vehicles, debris, stray animals).

    - **Touch-and-Go (T&G)**: A T&G landing pattern is a training maneuver that involves landing on a runway and taking off again without coming to a full stop. Usually, the pilot then circles the airfield in a defined pattern, known as a circuit, and repeats the maneuver.

    - **Ground Control Approach (GCA)**: GCA is a radar or "talk down" approach directed from the ground by an air traffic controller (ATC). ATC personnel provide pilots with verbal course and glide slope information, allowing them to make an instrument approach during inclement weather. The GCA generally utilizes a "box-shaped" flight pattern with four 90-degree turns performed at a set altitude and is used to practice a variety of approach procedures at an airfield.

- **Radar Approach**: Radar approaches are instrument approaches performed with active assistance from ATC during poor weather conditions. ATC personnel direct the aircraft toward the runway centerline. Once established on the centerline, pilots use aircraft instruments to maintain runway alignment and adherence to altitude restrictions until the pilot is able to acquire visual sight with the runway environment. Pilots often practice this type of approach to maintain proficiency.

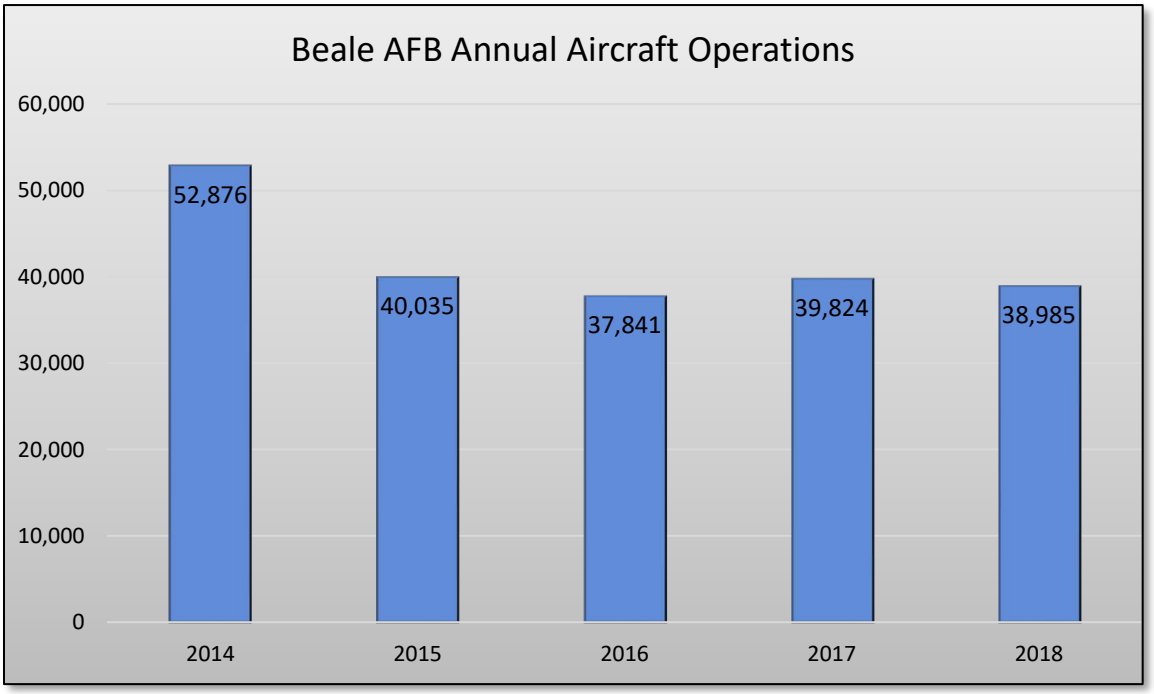
- **Simulated Flame-Out**: This is a visual flight maneuver used to simulate a landing recovery from a complete loss of engine thrust. To execute the maneuver, a pilot must establish the aircraft on a specified flight profile (altitude, airspeed, position over the airfield) that would allow the aircraft to glide safely across the runway threshold in a position to land. If properly executed, the maneuver should not require the use of additional engine power until after the maneuver is complete.

3.4 Annual Aircraft Operations

This AICUZ Study considers operations at Beale AFB, including operations from aircraft permanently based at the installation and transient aircraft. Figure 3-1 provides the number of aircraft operations that have occurred at Beale AFB over a five-year period, including based and transient aircraft. Total annual operations account for each departure and arrival, including those conducted as part of a pattern operation.

Over the five-year period from FY 2014 to FY 2018, annual operations at Beale AFB averaged 41,912, as documented in the Air Traffic Activity Reporting System. This represents a decrease from the 2005 AICUZ Study, which showed 73,365 annual operations. The drop in operations after 2014 can be attributed to the loss of the MC-12 Liberty mission. Two squadrons of MC-12s were stationed at Beale AFB from 2011 through mid-2015. Figure 3-1 presents operations numbers for FYs 2014 through 2018.

Figure 3-1. Summary of Flight Operations for Fiscal Years 2014–2018



Operations at Beale AFB predominantly occur during daytime hours (7:00 a.m. to 7:00 p.m.). Overall, 93% of operations take place during the daytime, 6% take place during the evening (7:00 p.m. to 10:00 p.m.), and 1% occur during the nighttime (10:00 p.m. to 7:00 a.m.). Table 3-1 shows the most current annual flight operations count, subdivided by aircraft type.

Table 3-1. Current Annual Flight Operations

Aircraft	Departures	Arrivals	Closed Pattern Operations[1]	Total Operations
U-2 Dragon Lady	2,070	2,070	26,498	30,638
T-38 Talon	2,326	2,326	2,326	6,978
KC-135 Stratotanker	500	500	3,000	4,000
RQ-4 Global Hawk	204	204	192	600
Transient	130	130	72	332
Grand Total	**5,230**	**5,230**	**32,088**	**42,548**

Note:
[1] Each "closed pattern operation" consists of two total operations: one arrival and one departure.
Source:
U-2 Dragon Lady and T-38 Talon sortie counts per unit records. KC-135 Stratotanker sorties and all closed patterns per unit estimates. Transient sorties per Beale AFB transient log, and transient closed patterns per estimates from air traffic control.

Operations continue to undergo minor alterations in response to evolving mission requirements. For example, the addition of two T-38 aircraft in the summer of 2019 is expected to slightly increase flying operation counts in coming years. Minor changes in operations do not result in substantive changes to noise levels near the installation.

3.5 Runway Utilization and Flight Tracks

3.5.1 Runway Utilization

The frequency with which aircraft utilize a runway involves a variety of factors including, but not limited to:

- Airfield environment (layout, lights, runway length);
- Direction of prevailing winds;
- Location of natural terrain features (rivers, lakes, mountains, and other features);
- Wildlife activity;
- Number of aircraft in the pattern; and/or
- Preference of a runway for the purpose of safety and noise abatement.

Installation Operations, ATC personnel, and the Supervisor of Flying establish the runway in use. Aviation planners adjust the pattern procedures accordingly to maximize air traffic flow efficiency. Table 3-2 lists how frequently each runway at Beale AFB is used.

Table 3-2. Runway Usage and Departure Routing

Runway Direction	Arrival (%)	Departure (%)
Runway 33 (arriving from the south and/or departing to the north)	23	23
Runway 15 (arriving from the north and/or departing to the south)	77	77

3.5.2 Flight Tracks

Each runway has designated flight tracks that provide for the safety, consistency, and control of an airfield. Flight tracks depict where aircraft fly in relation to an airfield. They are designed for departures, arrivals, and for pattern work procedures, and are designated for each runway to facilitate operational safety, noise abatement, air crew consistency, and the efficient flow of air traffic within the tower's controlled airspace. Aircraft flight tracks are not set "highways in the sky." While we show flight tracks as lines on the map, they are actually bands. Aircraft de-confliction, configuration, pilot technique, takeoff weight, and wind all affect the actual path taken on any given flight.

Figures 3-2 and 3-3 present the flight tracks for Beale AFB. Figure 3-4 shows run-up locations on the airfield, which are an additional source of noise. Run-up locations are specific spots where aircraft are parked for maintenance engine runs.

3.6 Noise Abatement

The Air Force recognizes that noise from military operations may cause concern for people living near military installations. For this reason, the Air Force has established a noise program aimed at reducing and controlling the emission of noise and vibrations associated with the use of military aircraft, weapon systems, and munitions while maintaining operational requirements.

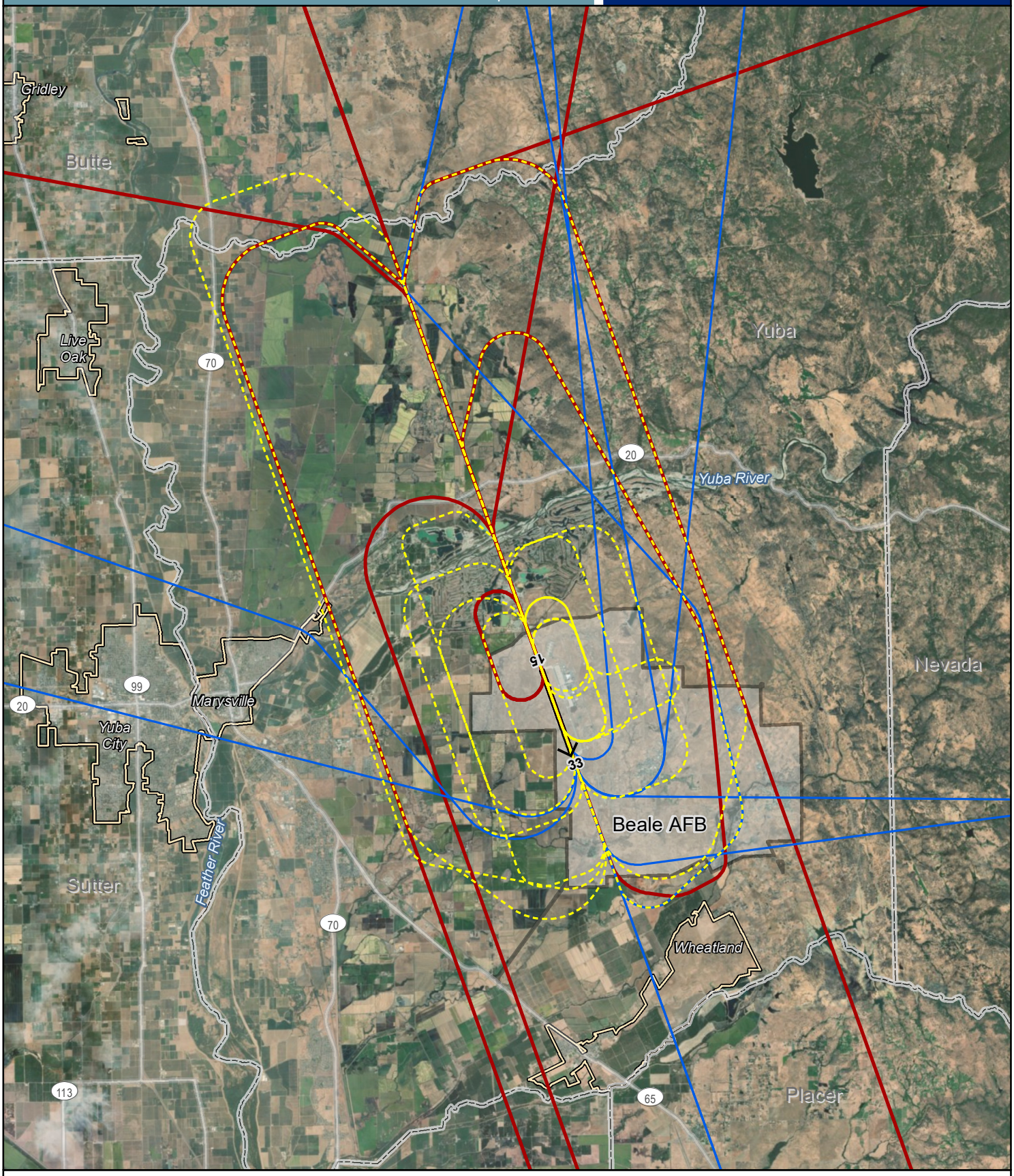
Per Beale AFB Instruction 11-250, Airfield Operations and Base Flying Procedures, "there are no aircraft noise abatement procedures" in effect for units operating from Beale AFB. Interviews with pilots in the 9 RW and 940 ARW confirmed that there are no noise abatement procedures in place.

Installation leadership periodically reviews flight operations and their potential impact on surrounding communities. This requirement facilitates the planning, designation, and establishment of flight tracks over sparsely populated areas and/or waterways as often as practicable to balance operational safety and reduce noise exposure levels in surrounding communities.

Figure 3-2

Beale Air Force Base
Air Installation Compatible Use Zones

Flight Tracks for Runway 15



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- Arrival Flight Track
- Departure Flight Track
- Closed Pattern Flight Track

0 2 4 Miles

N

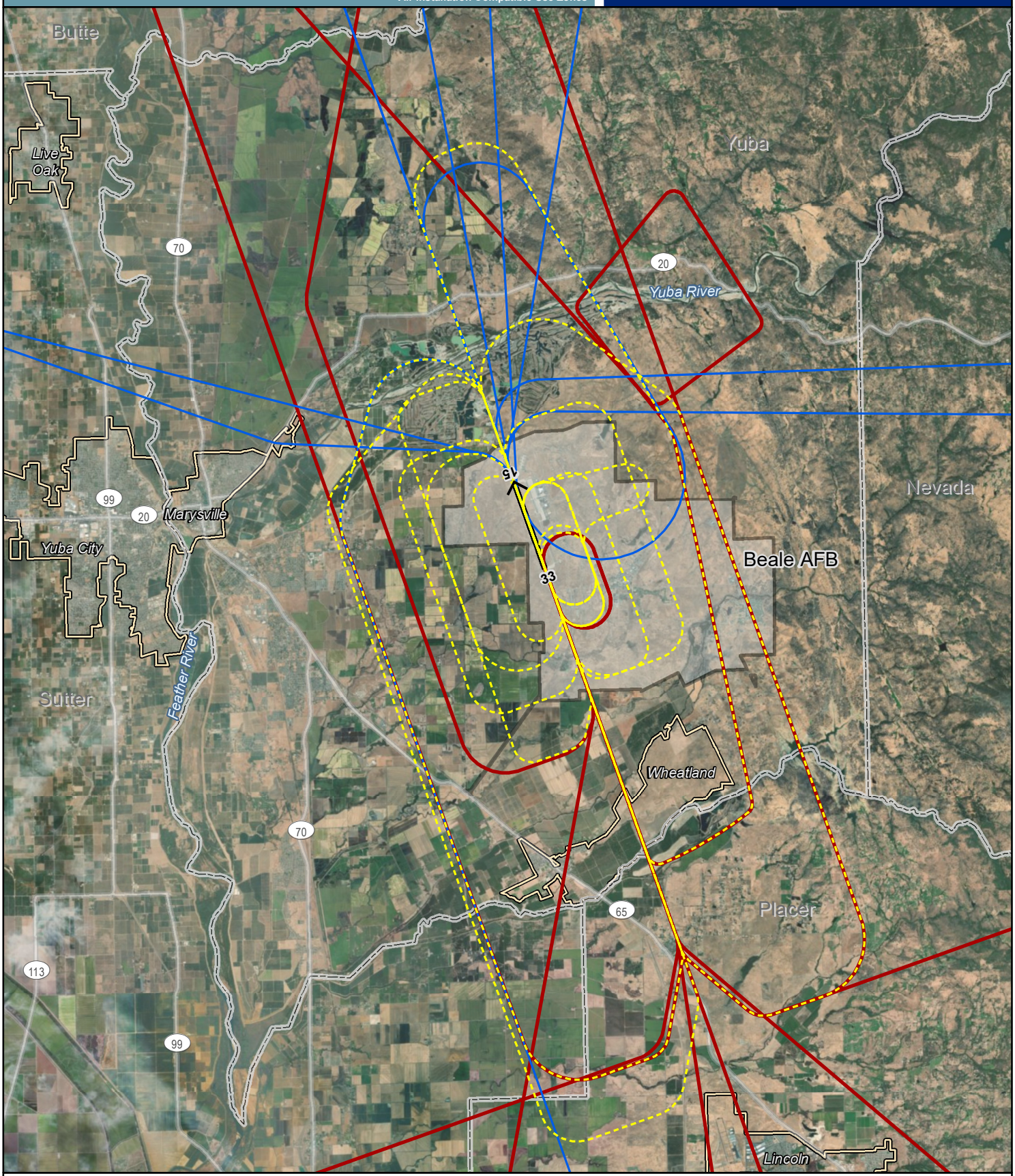
Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; Leidos 2019; U.S. Census Bureau 2018.

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Figure 3-3

Beale Air Force Base
Air Installation Compatible Use Zones

Flight Tracks for Runway 33



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- Arrival Flight Track
- Departure Flight Track
- Closed Pattern Flight Track

0 2 4 Miles

N

Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; Leidos 2019; U.S. Census Bureau 2018.

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Figure 3-4

Beale Air Force Base
Air Installation Compatible Use Zones

Run-up Locations



Legend

- Run-up Location
- Installation Boundary
- Airfield Runway

0 0.25 0.5 Miles

N

Source: AFCEC 2019; Digital Globe 2018; ESRI 2017; Leidos 2019; U.S. Census Bureau 2018.

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3.7 Noise Complaints

At times, military operations may generate noise complaints. The Air Force evaluates all noise complaints to ensure future operations, when possible, do not generate unacceptable noise. Concerned citizens are encouraged to contact the Public Affairs (PA) Office with any noise complaints. You can reach the PA Office at (530) 634-8887.

Beale AFB also posts information on the installation website, including alerts about upcoming aircraft operations that are able to be shared publicly:

- Website (https://www.beale.af.mil/);
- Facebook (https://www.facebook.com/BealeAirForceBase/); and
- Twitter (https://twitter.com/9thrw).

4.0 Aircraft Noise

Terrain features, weather phenomena, man-made structures, and daily life activity contribute to noise exposure.

How an installation manages aircraft noise can play a key role in shaping its relationship with neighboring communities. Ideally, aircraft noise and its management should be key factors in local land use planning. Because noise from aircraft may affect areas around the installation, the Air Force has defined noise zones using the guidance provided in the Integrated Installation Planning Instruction (AFI 32-1015).

While the level of noise produced by aircraft may have a direct effect on communities in proximity to military air installations, other factors also influence the noise impact. An airfield's layout (its buildings, parking ramps, and runways), type of aircraft, natural terrain features, weather phenomena, and daily activities all influence the levels of noise that the community experiences.

4.1 What is Sound/Noise?

Sound becomes noise when it interferes with normal activities.

Sound consists of vibrations in the air. A multitude of sources can generate these vibrations, including roadway traffic, barking dogs, radios—or aircraft operations. We call these vibrations compression waves. Just like a pebble dropped into a pond creates ripples, the compression waves—formed of air molecules pressed together—radiate out, decreasing with distance. If these vibrations reach your eardrum at a certain rate and intensity, you perceive it as sound. When the sound is unwanted, we refer to it as noise. Generally, sound becomes noise to a listener when it interferes with normal activities. Sound has three components: intensity, frequency and duration.

- **Intensity** or loudness relates to sound pressure change. As the vibrations oscillate back and forth, they create a change in pressure on the eardrum. The greater the sound pressure change, the louder it seems.

- **Frequency** determines how we perceive the pitch of the sound. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches. Sound frequency is measured in terms of cycles per second or hertz (Hz). While the range of human hearing goes from 20 to 20,000 Hz, we hear best in the range of 1,000 to 4,000 Hz. For environmental noise, we use A-weighting, which focuses on this range, to best represent human hearing. While we may refer to A-weighted decibels as "dBA", if it is the only weighting being discussed, the "A" is generally dropped.

- **Duration** is the length of time one can detect the sound.

4.2 How Sound is Perceived

The loudest sounds that the human ear can comfortably hear are a trillion times higher in intensity than those of sounds we barely hear. Because such large numbers become awkward to use, we measure noise in decibels (dB), which uses a logarithmic scale.

Figure 4-1 is a chart of A-weighted sound levels from common sources. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB can cause discomfort inside the ear, while sound levels between 130 and 140 dB are felt as pain.

Figure 4-1. Typical A-weighted Sound Levels of Common Sounds

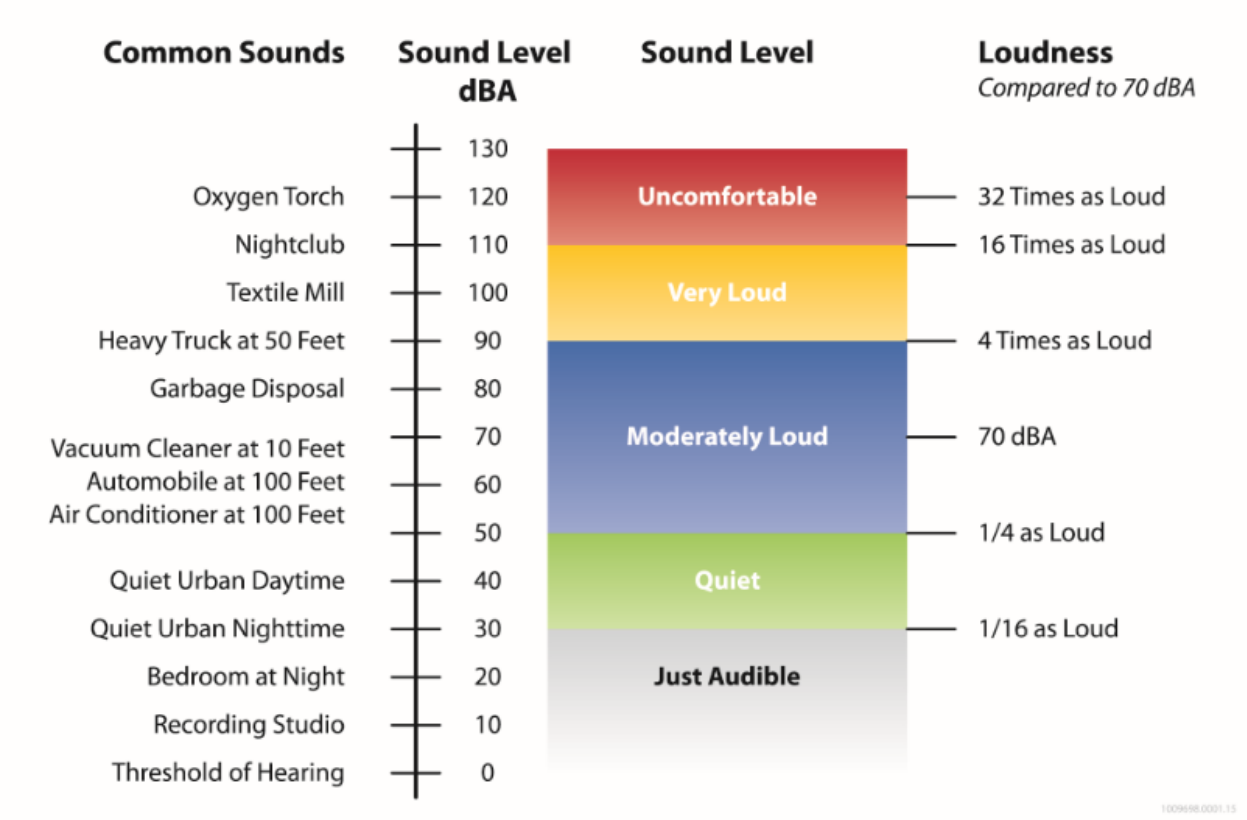


Table 4-1 shows the subjective responses with change in (single-event) sound level. While noise energy doubles or halves with every 3-dB change, we do not perceive all this noise energy. It takes a 10 dB increase or decrease for our ears to perceive a doubling or halving of loudness.

Table 4-1. Subjective Response to Changes in Sound Level

Change in Sound Level	Change in Loudness
20 dB	Striking 4-fold Change
10 dB	Dramatic 2-fold or Half as Loud
5 dB	Quite Noticeable
3 dB	Barely Perceptible
1 dB	No Noticeable Change

4.3 Community Noise Equivalent Level

When people hear an aircraft fly overhead, the question may be asked, "How loud was that?" While we may often find ourselves concerned over the loudness of a sound, there are other dimensions to the sound event that draw our interest. For instance, does one overflight draw the same interest as two separate overflights—or 20? Also, does the 30-second run-up of engines prior to takeoff draw the same interest as a 30-minute maintenance run? Additionally, is an overflight more noticeable at 2:00 p.m. or at 2:00 a.m., when the ambient noise is low and most people are sleeping?

The length and number of events—the total noise energy—combined with the time of day that a noise event takes place play key roles in the perception of noise. To reflect these concerns, the Air Force and the State of California use a metric called the Community Noise Equivalent Level (CNEL).

CNEL, when used as a metric for aircraft noise, represents the accumulation of noise energy from all aircraft noise events in 24-hours. Additionally, for all operations between 10:00 p.m. and 7:00 a.m., CNEL adds a 10-dB adjustment to each event to account for the intrusiveness of nighttime operations. CNEL also adds an adjustment for evening operations, adding an adjustment of 5 dB to each event between the hours of 7:00 p.m. and 10:00 p.m. CNEL represents the noise energy present in a daily period. However, because aircraft operations at military airfields fluctuate from day to day, CNEL is typically based on a year's worth of operations and represents the annual average daily aircraft events.

4.4 Noise Contours

4.4.1 What are Noise Contours?

The Air Force develops noise contours, as needed, to assess the compatibility of aircraft operations with surrounding land uses. Noise contours connect points of equal value, just as contours on topographic maps connect points of equal elevation. This AICUZ Study presents the 2005 and present-day noise contours (the 2020 Beale AFB AICUZ noise contours). The Air Force utilizes NOISEMAP, the DoD standard model for assessing noise

exposure from military aircraft operations at air installations. Noise contours, when overlaid on local land use maps, can help to identify areas of incompatible land use and assist communities in planning for future development around an air installation.

4.4.2 2020 Beale AFB Noise Contours

The 2020 Beale AFB AICUZ noise contours are present-day contours and were developed based on the current operational numbers provided in Table 3-1. As shown on Figure 4-2, the 60 dB CNEL contour extends beyond the northern boundary of the installation approximately 2.2 miles to the northwest, within unincorporated areas of Yuba County. It also extends approximately 0.6 mile beyond the western boundary of the installation south of North Beale Road in unincorporated areas of the county. The 65 dB CNEL contour extends beyond the installation boundary approximately 1.9 miles to the northwest and 0.4 miles to the west, within unincorporated Yuba County. The greater than 75 dB CNEL contours do not extend beyond the installation boundary.

Figure 4-3 shows a comparison of the 2020 Beale AFB AICUZ noise contours and the 2005 AICUZ noise contours. In general, the 2005 AICUZ noise contours extend farther beyond the installation boundary to the northwest and west than the 2020 Beale AFB AICUZ noise contours. As shown on the figure, noise levels have decreased in the 13 years since the previous AICUZ update in 2005. One cause of the reduction in noise levels is the change in DoD policy to prescribe modeling of an AAD (i.e., 1/365th of total annual operations) rather than an average busy day (ABD) (i.e., 260 busy flying days per year for based aircraft). This change, which increases the number of days across which operations are averaged, results in a 1.5 dB decrease in CNEL. Two other important factors in the decrease in noise levels are the loss of the MC-12 Liberty mission in 2015 and a reduction in the number of operations flown by T-38, KC-135R, and RQ-4 aircraft compared to the number of operations in 2005. The general shape of the 2005 noise contours is similar to the shape of the 2020 Beale AFB noise contours, reflecting that flight paths and runway usage patterns have not changed significantly.

Table 4-2 presents the off-installation land acreage and estimated population within the 2020 Beale AFB AICUZ noise contours. The Air Force generates population estimates based on 2017 American Community Survey five-year estimates Census block group-level data, using a geometric proportion method to determine the estimated population within the contour bands. This method assigns population based on the portion of a census block group that falls within the contour. The population across census block groups is assumed to be evenly distributed.

Approximately 1,456 acres and 66 people off the installation would be exposed to a minimum of 60 dB CNEL noise zones, with approximately 97% of this acreage and population located within the 60-64 dB CNEL and 65-69 dB CNEL noise zones. Less than 50 acres and approximately 2 people would be in the 70-74 dB CNEL noise zone.

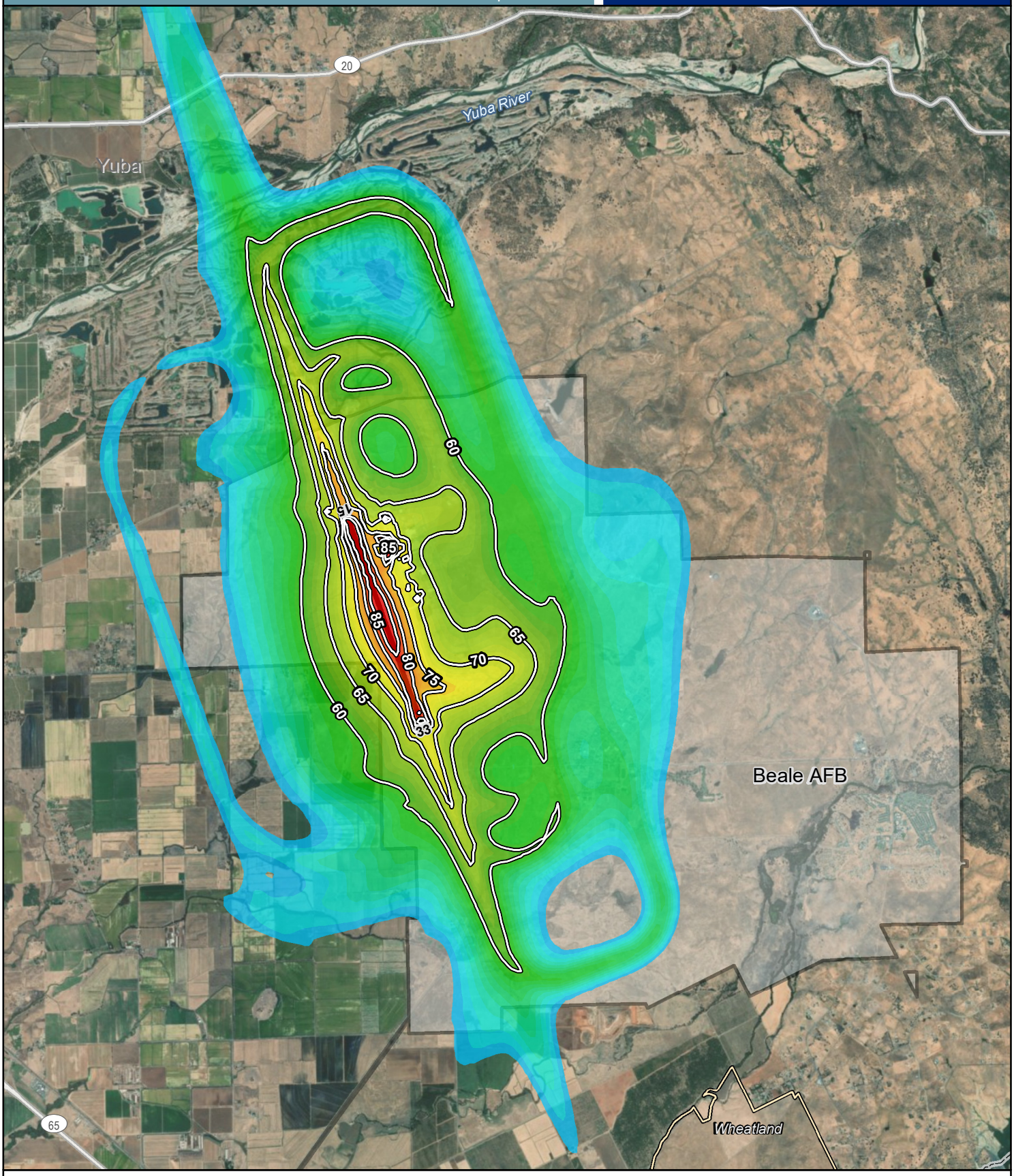
Table 4-2. Off-installation Land Area and Estimated Population within Noise Zones for the 2020 Beale AFB AICUZ Noise Contours

Noise Zone (dB CNEL)	Acres	Estimated Population
60-64	1,129	51
65-69	279	13
70-74	48	2
75-79	0	0
80-84	0	0
85+	0	0
Total (60+)	**1,456**	**66**

Figure 4-2

Beale Air Force Base
Air Installation Compatible Use Zones

2020 Beale AFB Noise Contours with Gradient Shading



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- 2020 Beale AFB Noise Contour
- Noise Zone (dB)
  - 50
  - 85

0 1 2 Miles

N

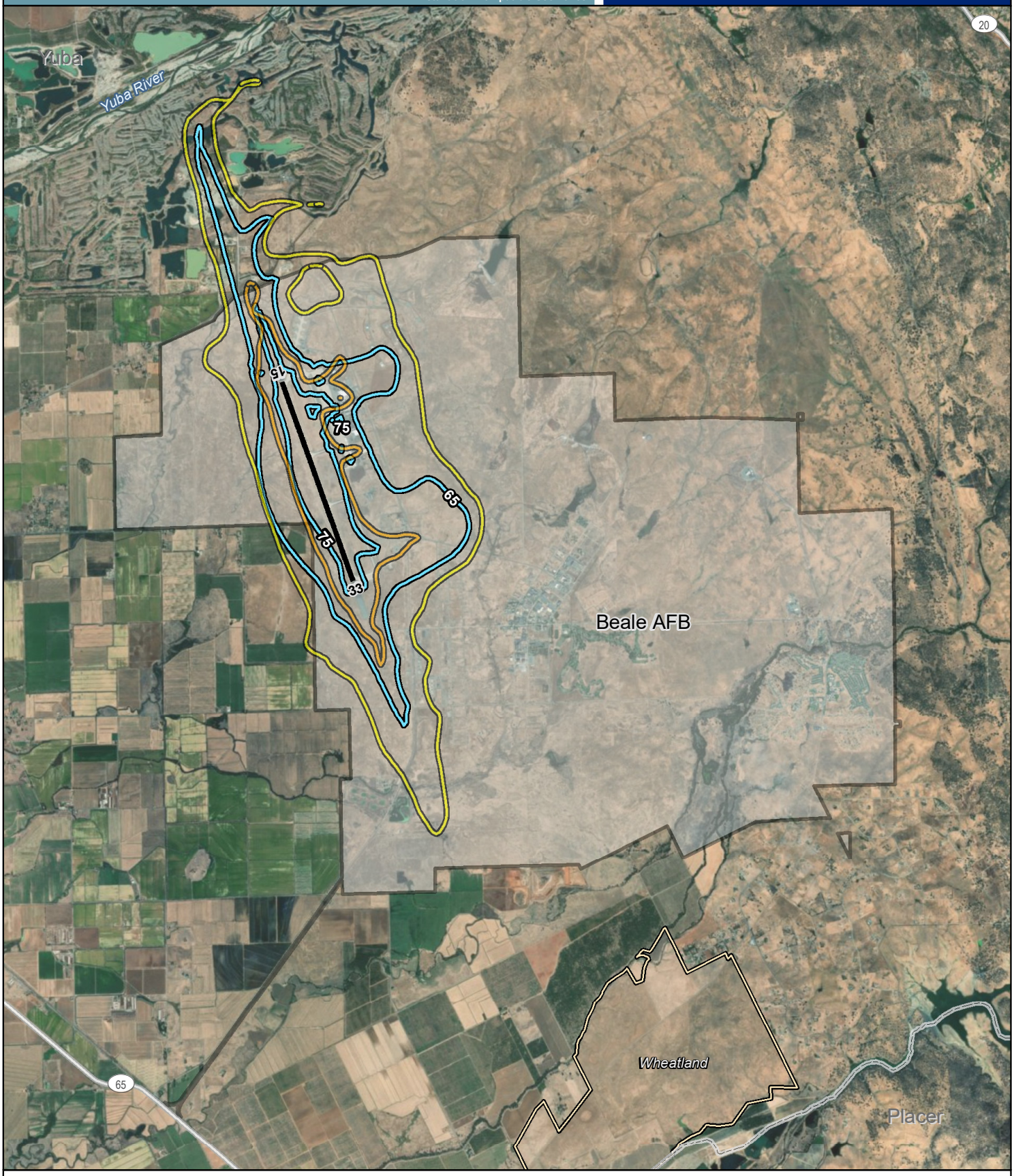
Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; U.S. Census Bureau 2018.

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Figure 4-3

Beale Air Force Base
Air Installation Compatible Use Zones

Comparison of 2020 and 2005 AICUZ Noise Contours



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- 2020 Beale AFB Noise Contour, dB
- 65 dB Noise Contour (2005 AICUZ)
- 75 dB Noise Contour (2005 AICUZ)

0 1 2 Miles

N

Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; U.S. Census Bureau 2018.
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5.0 Community and Aircraft Safety

Community and aircraft safety is paramount to the Air Force, and this safety is a shared responsibility between the Air Force and the surrounding communities, with each playing a vital role in its success. Cooperation between the Air Force and the community results in strategic and effective land use planning and development. As such, the Air Force has established a flight safety program and has designated areas of accident potential around its air installations to assist in preserving the health, safety, and welfare of residents living near its airfield. This AICUZ Study provides the information needed, in part, to reach this shared safety goal.

Identifying safety issues assists the community in developing land uses compatible with airfield operations. As part of the AICUZ Program, the Air Force defines areas of accident potential, imaginary surfaces, and hazards to aircraft flight.

5.1 Clear Zones and Accident Potential Zones

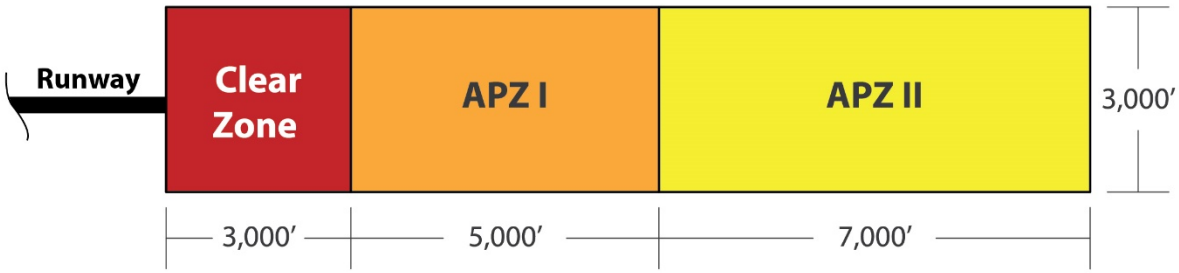
In the 1970s and 1980s, the military conducted studies of historical accident and operations data throughout the military. The studies showed that most aircraft mishaps occur on or near the runway, diminishing in likelihood with distance from the runway. Based on these studies, the DoD identified CZs and APZs as areas where an aircraft accident is most likely to occur if an accident were to take place; however, it should be noted that CZs and APZs are not predictors of accidents. The studies identified three areas that, because of accident potential, planners should consider for density and land use restrictions: the CZ, APZ I, and APZ II. The CZs and APZs are described in the bullets below and are shown on Figure 5-1.

- **Clear Zone**: At the end of all active Air Force runways is an area known as the "Clear Zone." The CZ is an area measuring 3,000 feet long by 3,000 feet wide centered on the end of the runway. A CZ is required for all active runways and should remain undeveloped.

- **APZ I**: Beyond the CZ is APZ I. APZ I is 3,000 feet in width and 5,000 feet in length along the extended runway centerline.

- **APZ II**: APZ II is the rectangular area beyond APZ I. APZ II is 3,000 feet in width by 7,000 feet in length along the extended runway centerline.

Figure 5-1. Runway Clear Zones and Accident Potential Zones



While the APZs extend outward from the ends of the runway along the extended runway centerline, the installation may add a curved APZ when over 80% of the operations follow a curved departure.

Within the CZ, most uses are incompatible with military aircraft operations. For this reason, it is the Air Force's policy, where possible, to acquire real property interests in land within the CZ to ensure incompatible development does not occur. Within APZ I and APZ II, a variety of land uses are compatible; however, higher density uses (e.g., schools, apartments, churches) should be restricted because of the greater safety risk in these areas. Chapter 6 discusses land use and recommendations for addressing incompatibility issues within APZs for each airfield.

Figure 5-2 depicts the CZs and APZs for Runway 15/33 at Beale AFB. The CZs and APZs have not changed from the 2005 AICUZ Study. The CZ on the north side of Beale AFB is entirely contained within the base boundary. The APZs on the north side of the base extend off the base and into the community over a portion of a large mining area. The CZ and APZs on the south side of the base are entirely contained within the base boundary. Table 5-1 tabulates the off-installation land acreage and estimated population within the CZs and APZs. Chapter 6 discusses land use and recommendations for addressing incompatibility issues within CZs and APZs for an airfield.

Table 5-1. Off-installation Land Area and Estimated Population within the Clear Zones and Accident Potential Zones

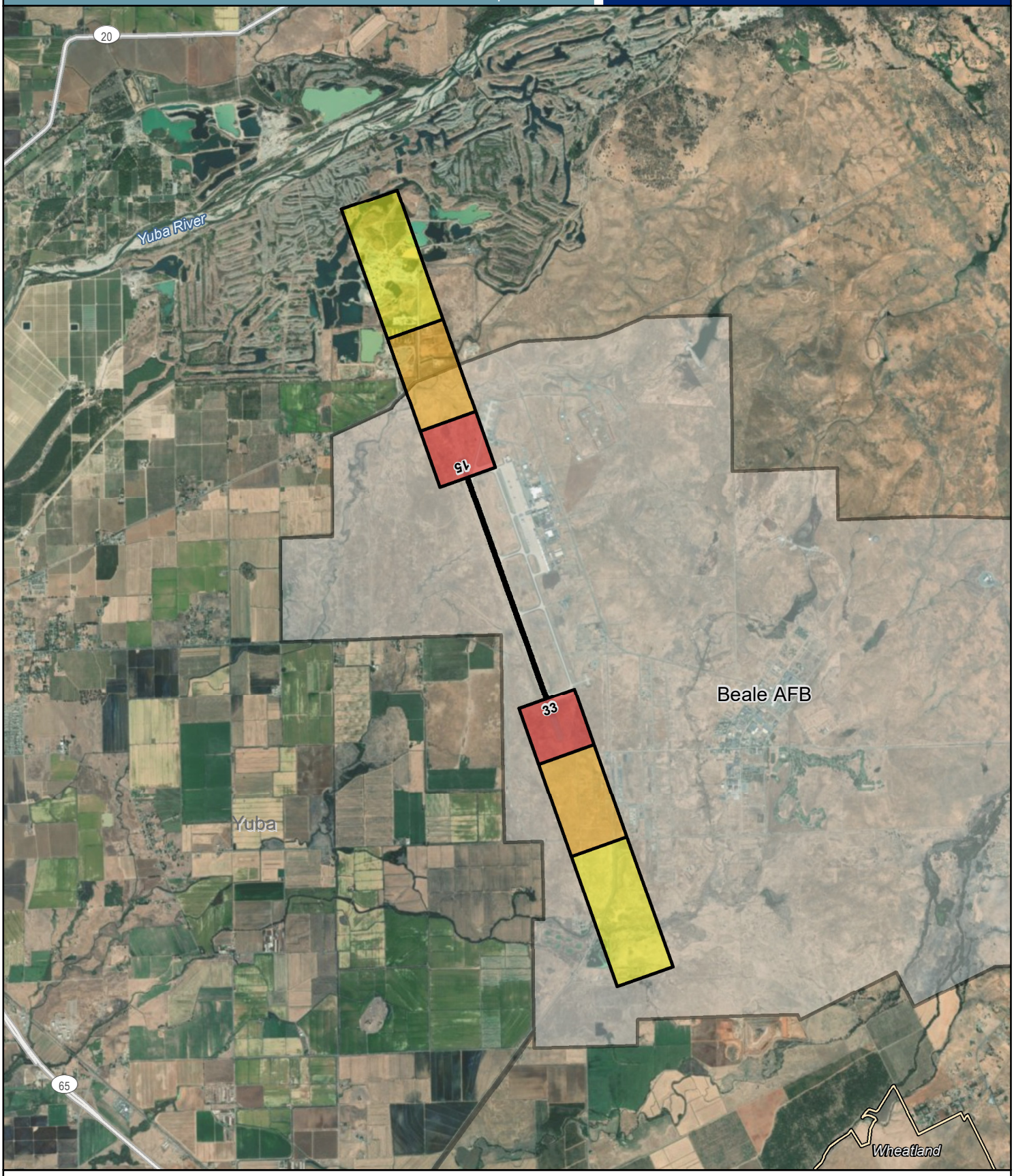
Zone	Acres	Population
CZ	0	0
APZ I	175	7
APZ II	482	18
Total	**657**	**25**

Source: U.S. Census Bureau, n.d.

Figure 5-2

Beale Air Force Base
Air Installation Compatible Use Zones

2020 Clear Zones and Accident Potential Zones



Legend

- Installation Boundary
- Airfield Runway
- City Boundary
- State Highway

2020 Clear Zones and Accident Potential Zones

- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

N

0 0.5 1 Miles

Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017.

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5.2 Imaginary Surfaces

The DoD and Federal Aviation Administration (FAA) identify a complex series of imaginary planes and transition surfaces that together define the airspace needed to remain free of obstructions around an airfield. Obstruction-free imaginary surfaces form a complex bowl around the airfield to ensure safe flight approaches, departures, and pattern operations. Obstructions include natural terrain and man-made features such as buildings, towers, poles, wind turbines, cell towers, and other vertical obstructions to airspace navigation.

There are different imaginary surfaces for fixed-wing runways (depending on type of aircraft supported by the runway) and rotary-wing runways/helipads. An illustration of the imaginary surfaces for typical Class B fixed-wing runways, like the runway at Beale AFB, is depicted on Figure 5-3. Table 5-2 provides brief descriptions for each of these surfaces. Figure 5-4 depicts the actual runway airspace imaginary surfaces specific to Beale AFB's Class B runway. In general, the Air Force does not permit above-ground structures in the primary surface (located on base), and height restrictions apply to transitional surfaces and approach and departure surfaces. Height restrictions are more stringent for areas closer to the runway and flight paths.

Figure 5-3. Imaginary Surfaces and Transition Planes for Class B Fixed-Wing Runways

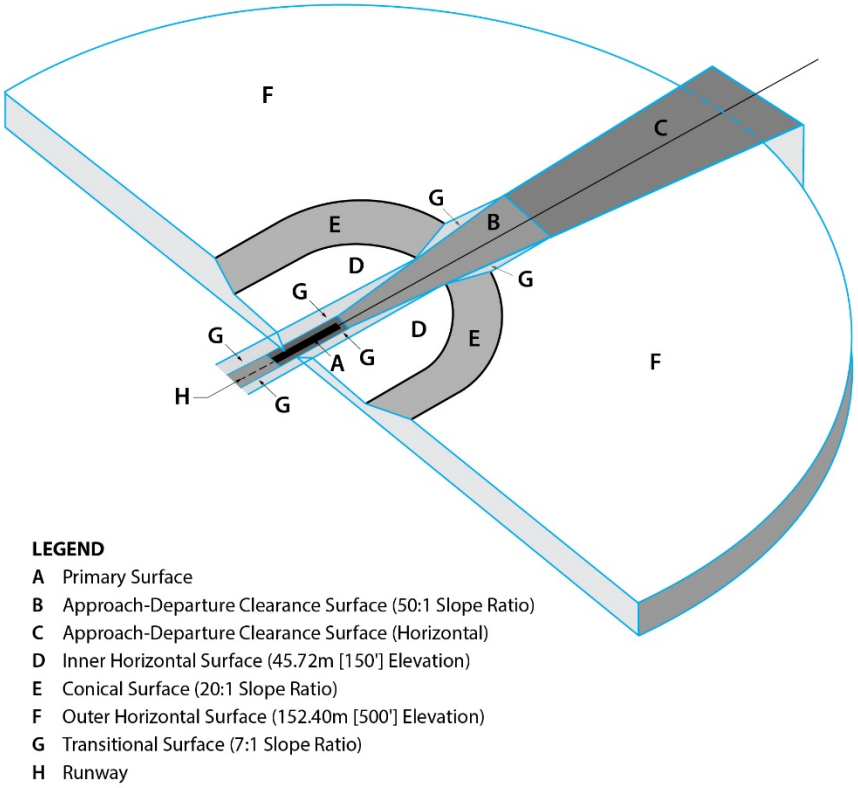


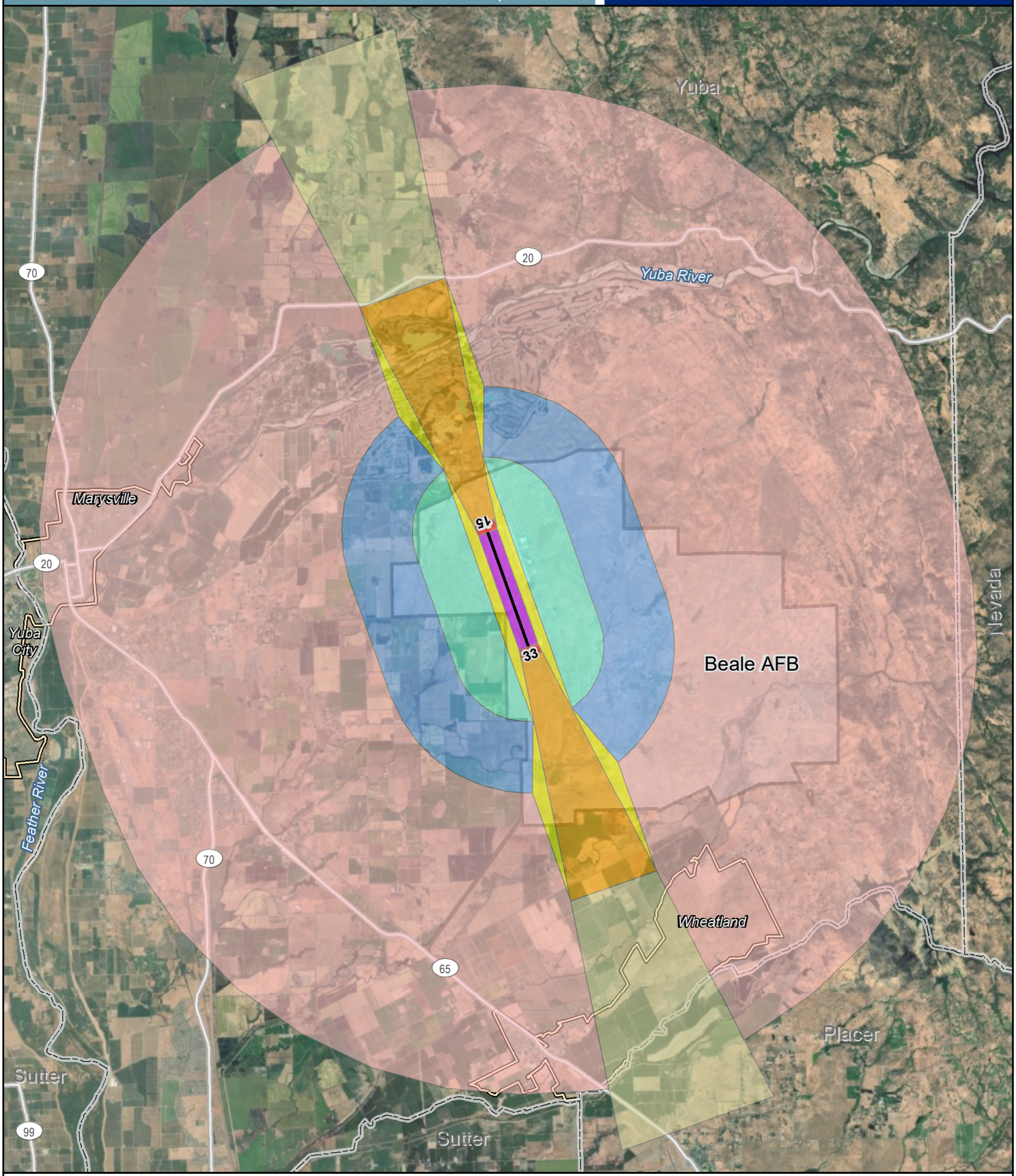
Table 5-2. Descriptions of Imaginary Surfaces for Military Airfields

Primary Surface	An imaginary surface symmetrically centered on the runway, extending 200 feet beyond each runway end that defines the limits of the obstruction clearance requirements in the vicinity of the landing area. The width of the primary surface is 2,000 feet, or 1,000 feet on each side of the runway centerline.
Approach-Departure Clearance Surface	This imaginary surface is symmetrically centered on the extended runway centerline, beginning as an inclined plane (glide angle) at the end of the primary surface (200 feet beyond each end of the runway), and extending for 50,000 feet. The slope of the approach-departure clearance surface is 50:1 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 starting point. The width of this surface at the runway end is 2,000 feet, flaring uniformly to a width of 16,000 feet at the end point.
Inner Horizontal Surface	This imaginary surface is an oval plane at a height of 150 feet above the established airfield elevation. The inner boundary intersects with the approach-departure clearance surface and the transitional surface. The outer boundary is formed by scribing arcs with a radius 7,500 feet from the centerline of each runway end and interconnecting these arcs with tangents.
Conical Surface	This is an inclined imaginary 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. The conical surface connects the inner and outer horizontal surfaces.
Outer Horizontal Surface	This imaginary surface is located 500 feet above the established airfield elevation and extends outward from the outer periphery of the conical surface for a horizontal distance of 30,000 feet.
Transitional Surface	This surface extends outward and upward at right angles to the runway centerline and extended runway centerline at a slope of 7:1. The transitional surface connects the primary and the approach-departure clearance surfaces to the inner horizontal, the conical, and the outer horizontal surfaces.

Figure 5-4

Beale Air Force Base
Air Installation Compatible Use Zones

Runway Airspace Imaginary Surfaces and Transition Planes



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway

Airfield Imaginary Surfaces

- Approach/Departure Clearance Surface (50:1)
- Approach/Departure Clearance Surface (Horizontal)
- Conical Surface (20:1)
- Graded Area
- Inner Horizontal Surface
- Outer Horizontal Surface
- Primary Surface
- Transitional Surface (7:1)

N

0 1 2 Miles

Source: AFCEC 2018, 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; U.S. Census Bureau 2018.

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5.3 Hazards to Aircraft Flight Zone

Certain land uses and activities pose potential hazards to flight. To ensure land uses and activities are examined for compatibility, the Air Force has identified a Hazards to Aircraft Flight Zone (HAFZ). The HAFZ is defined as the area within the imaginary surfaces that are shown on Figure 5-4. Please note that the area and shape of the HAFZ may change with the encroachment issue at hand. For instance, issues related to bird/wildlife aircraft strike hazards may follow natural boundaries, encompass local bodies of water, and extend along flight paths. Unlike noise zones and safety zones, the HAFZ does not have recommended land use compatibility tables. Instead, it is a consultation zone recommending that project applicants and local planning bodies consult with the Air Force to ensure the project is compatible with Air Force operations. These land use and activity compatibility considerations include:

- **Height:** Tall objects can pose significant hazards to flight operations or interfere with navigational equipment, including radar. City/county agencies involved with approvals of permits for construction should require developers to submit calculations showing that projects meet the height restriction criteria of 14 Code of Federal Regulations (CFR) 77.17 for the specific airfield described in the AICUZ Study. City and county agencies may also consider requiring a "Determination of No Hazard" issued by the FAA for any tall objects within this zone.

- **Visual Interference:** Industrial or agricultural sources of smoke, dust, and steam in the airfield vicinity can obstruct a pilot's vision during takeoff, landing, or other periods of low-altitude flight. Close coordination between the installation and landowners can often mitigate these concerns. For example, irrigating before plowing can greatly reduce dust concerns.

- **Light Emissions:** Bright lights, either direct or reflected, in the airfield vicinity can impair a pilot's vision, especially at night. A sudden flash from a bright light causes a spot or "halo" to remain at the center of the visual field for a few seconds or more, rendering a person virtually blind to all other visual input. This is particularly dangerous for pilots at night when the flash can diminish the eye's adaptation to darkness. The eyes partially recover from this adaptation in a matter of minutes, but full adaptation typically requires 40 to 45 minutes. Specific examples of light emissions that can interfere with the safety of nearby aviation operations include:

    - Lasers that emit in the visible spectrum, which can be potentially harmful to a pilot's vision during both day and night.

- The increasing use of energy-efficient LED lighting, which poses potential conflicts in areas where pilots use night vision goggles (NVGs). NVGs can exaggerate the brightness of these lights, interfering with pilot vision.

- The use of red LED lights to mark obstructions, which can produce an unintended safety consequence because red LED lights are not visible on most NVG models, rendering them invisible to NVG users in the area.

- **Bird/Wildlife Aircraft Strike Hazard (BASH)**: Wildlife represents a significant hazard to flight operations. Birds, in particular, are drawn to different habitat types found in the airfield environment, including hedges, grass, brush, forest, water, and even the warm pavement of the runways. Due to the speed of the aircraft, collisions with wildlife can happen with considerable force. Although most bird and animal strikes do not result in crashes, they cause structural and mechanical damage to aircraft as well as loss of flight time.

  Most collisions occur when the aircraft is at an elevation of less than 1,000 feet. To reduce the potential of a BASH, the Air Force recommends that land uses that attract birds not be located near installations with an active air operations mission. These land uses include:

  - Waste disposal operations;

  - Wastewater treatment facilities;

  - Transfer stations;

  - Landfills;

  - Golf courses;

  - Wetlands;

  - Storm water ponds; and

  - Dredge disposal sites.

  Birds and raptors in search of food or rodents will flock to landfills, increasing the probability of BASH occurrences near these facilities. One can also use design modifications to reduce the attractiveness of these types of land uses to birds and other wildlife.

In general, the FAA recommends that these uses be limited within various zones around airfields, including:

- Within 10,000 feet of airfields supporting jet aircraft, such as Beale AFB; and
- Within 5 statute miles of all airports where the attractant could cause hazardous wildlife movement into or across the approach and departure airspace.

More information about the FAA's recommendations for reducing these types of attractants can be found in the FAA's Advisory Circular 150/5200-33B.

In order to support flight safety through necessary wildlife management, the U.S. Department of Agriculture employs a contractor at Beale AFB who conducts wildlife control measures on and in proximity to the base.

- **Radio Frequency/Electromagnetic Interference:** The American National Standards Institute defines electromagnetic interference (EMI) as any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment.

  EMI can be induced intentionally, as in forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, such as high-tension line leakage and industrial machinery. In addition, EMI may be caused by atmospheric phenomena, such as lightning or precipitation static.

  New generations of military aircraft are highly dependent on complex electronic systems for navigation and critical flight and mission-related functions. Consequently, communities should use care when siting any activities that create EMI. Many of these sources are low-level emitters of EMI. However, when combined, they have an additive quality.

  EMI also affects consumer devices, such as cell phones, FM radios, television reception, and garage door openers. In some cases, the source of interference occurs when consumer electronics use frequencies set aside for military use.

- **Unmanned Aircraft Systems:** The use of UAS (i.e., drones) near military airfields poses a serious flight safety hazard due to the potential for a mid-air collision between military aircraft and small- to medium-sized drones. The FAA maintains specific guidance about where drones can be flown. Currently, non-DoD drone operations are not permitted within certain zones surrounding military bases. Drone flight at Beale AFB is prohibited except as specifically authorized by the Installation Commander. Unauthorized drones may be disabled, damaged, destroyed, seized or confiscated. Unauthorized drone

operators may be subject to criminal prosecution, fines, and loss of operator privileges (49 U.S.C. §40103(B)(3) and §46307, 14 CFR 101 and 107, and 10 U.S.C. §130i, where applicable).

For more information on drone use in and around DoD airfields, visit the FAA's website at: www.faa.gov/uas.

6.0 Land Use Compatibility Analysis

CZs, APZs, noise zones, and the HAFZ make up the AICUZ footprint for an air installation. The AICUZ footprint defines the minimum recommended area within which land use controls are needed to enhance the health, safety, and welfare of those living or working near a military airfield and to preserve the flying mission. The AICUZ footprint, combined with the guidance and recommendations set forth in the AICUZ Study, are the fundamental tools necessary for the planning process. The Air Force recommends that local and regional governments adopt the AICUZ noise zones, CZs, APZs, and HAFZ into planning studies, regulations, and processes to best guide compatible development around installations. This AICUZ Study uses the AICUZ noise zones, CZs, and APZs (Figure 6-1) for Beale AFB as the basis for the land use compatibility analysis.

6.1 Land Use Compatibility Guidelines and Classifications

In an effort to establish long-term compatibility for lands within the vicinity of military air installations, the DoD has created land use compatibility recommendations based on the Federal Highway Administration's Standard Land Use Coding Manual (SLUCM). These guidelines are used by DoD personnel for on-installation planning and for engaging with the local community to foster compatible land use development. Table A-1 of Appendix A shows the suggested land use compatibility guidelines within the CZs and APZs. Table A-2 of Appendix A provides land use compatibility recommendations within noise zones.

6.2 Planning Authorities

This section presents information for each governing body that has land use jurisdictions near Beale AFB, including descriptions of existing and future land uses.

6.2.1 California State Planning and Zoning Law

California Government Code (GC) §65300 requires every county and city in the state to adopt a comprehensive, long-term general plan. A general plan provides a vision for and guides future development of the jurisdiction and any land outside the jurisdiction's boundaries which, in the planning agency's judgement, bears relation to its planning. General plans must include seven mandated elements: land use, housing, circulation, noise, safety, open space, and conservation. The land use element is typically the most used and cited element of a general plan and must describe the proposed general distribution, location, and extent of residential, business, industrial, recreational, and other types of land use (GC §65302(a)). GC §65302(a)(2) requires that the land use element must consider the impact of new growth—including designated future land uses covered by the general plan or proposed zoning ordinances—on military readiness activities carried out on military bases, installations, and operating and training areas within or adjacent to the planning area (California Governor's Office of Planning and

Research 2016). Cities and counties must address potential impacts on military readiness activities based on information provided by the military and other sources (GC §65302 (a)(2)(A)).

The housing element of a general plan must be updated every five years (GC §65588). However, there are no state mandates requiring the other elements of a general plan to be updated at specific time intervals (California Governor's Office of Planning and Research 2016).

A local general plan may be implemented through a zoning code or, in some cases, specific plans. State law requires cities and counties to hold public hearings to give the community an opportunity to review proposed general plan updates, specific plans, zoning ordinances, zoning changes, or amendments.

Sections of the California Planning and Zoning Law (GC §65352, §65404, §65940, and §65944) were amended in 2004 to require that local planning agencies refer proposed amendments or substantial changes to a general plan to the appropriate branch of the military when the plan applies to areas within 1,000 feet of a military installation, within special use airspace, or beneath a low-level flight path. The amendments also require project applicants to provide information on projects within 1,000 feet of a military installation, beneath a low-level flight path, or within special use airspace. State and local agencies are required to provide a complete copy of the application to the affected branch of the military, and installations may request to consult with the agency and project applicant to discuss the effects of the proposed project, potential alternatives, and mitigation measures (California Legislative Information, n.d.).

The California State Aeronautics Act (Public Utilities Code §21670 et seq.) requires the creation of airport land use commissions (ALUCs) and preparation of airport land use compatibility plans. The act requires creation of a compatibility plan for each public-use and military airport. ALUCs promote land use compatibility around airports "to protect public health, safety, and welfare by ensuring the orderly expansion of airports and the adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards within areas around public airports to the extent that these areas are not already devoted to incompatible uses" (SACOG 2011). See Section 7.2 for information on the Beale AFB Land Use Compatibility Plan, prepared by the SACOG.

Local governments have a responsibility for implementing airport land use compatibility plans. GC §65302.3 requires that each county and city affected by an airport land use compatibility plan make its general plan and any affected specific plans consistent with the airport land use compatibility plan. Local governments must also submit their affected plans and certain other proposed land use actions, such as amendments to zoning ordinances or building regulations, to the ALUC for review against the compatibility plan (SACOG 2011).

The Governor's Office of Planning and Research has developed a mapping tool for local governments and project developers to use in identifying whether proposed projects are located near military installations, training areas, or special use airspace. This tool, the California Military Land Use Compatibility Analyst (http://cmluca.gis.ca.gov/), is available as a free resource through the Governor's Office of Planning and Research website to help local governments and project developers comply with California planning law (California Governor's Office of Planning and Research 2019).

6.2.2 Yuba County

Community planning and development within the county is managed by Yuba County's Community Development and Services Agency. The mission of the agency is "to improve the overall quality of life for [the county's] residents and fiscal health of [its] businesses by coordinating the orderly growth and development of the county, providing proper implementation of related regulations, and providing operation, maintenance and expansion of Public Works infrastructure to ensure the public health and safety of county residents and businesses" (Yuba County 2019). The County Board of Supervisors adopted the 2030 General Plan in 2011. The 2030 General Plan is implemented through Yuba County's Development Code, which regulates development in unincorporated areas of the county. The Yuba County General Plan includes strategies intended to promote compatible land use in the vicinity of Beale AFB, consistent with AICUZ guidelines.

City of Marysville

The City of Marysville's Community Development and Services Department manages the City's programs related to community planning and zoning, provides guidance for long-term growth, and administers the City's zoning code. The City of Marysville's current General Plan was completed in 1985 and is implemented through the City's long-range planning activities and development regulations (City of Marysville 1985). As of December 2019, the City of Marysville is undergoing an update of the General Plan and is using the 2020 Beale AFB noise contours published in the AICUZ Study.

The Community Development and Services Department provides other services, including design and environmental review, permitting, economic development services, and zoning ordinance information and revisions. The City of Marysville maintains a zoning map showing residential, commercial, industrial, and planned development zoning districts (City of Marysville City Services Department 2007). The City's seven-member Planning and Historic Preservation Commission serves as an advisory board to the Mayor and City Council. The responsibilities of the commission include review of planning applications and requests for zoning changes, among other duties. The Mayor and City Council then consider recommendations from the Planning and Historic Preservation Commission for final approval or rejection.

Yuba City

Yuba City's Development Services Department is responsible for current and long-term planning, administering the zoning code, and redevelopment of the city's downtown. The department maintains the City's current General Plan, which was adopted by the City Council in 2004 and provides a vision for future development of the city to a planning horizon of 2025 (Yuba City 2004). The General Plan is implemented through area-specific plans and master plans, as well as the City's zoning ordinance. The City's zoning map includes residential, commercial, industrial, agricultural, planned development, and other overlay districts. The zoning ordinance specifies which land uses are permitted in each district (Yuba City 2018).

The City's Planning Commission includes seven members appointed by the City Council. The Planning Commission is responsible for ensuring proposed projects are consistent with the General Plan and approving projects or making recommendations on projects to the City Council. The Planning Commission also prepares and makes recommendations to the City Council for adoption or amendment of the General Plan, the zoning ordinance, and other regulations, and any programs or legislation needed to implement the General Plan (Yuba City 2004).

City of Wheatland

The City of Wheatland's Community Development Department implements the City's General Plan, administers the zoning ordinance and other City ordinances, manages development permitting, and provides advice and technical assistance to citizens, the Planning Commission, and City Council. The City's current General Plan was adopted in 2006. The General Plan provides a long-term vision for the city's development through the planning horizon of 2025 and outlines policies, standards, and programs to guide day-to-day planning decisions (City of Wheatland 2006). The General Plan includes policies designed to promote compatible land use in the vicinity of Beale AFB. The City also maintains a zoning map showing residential, commercial, industrial, agricultural, planned development, and other zoning and overlay districts. The City's zoning ordinance specifies which land uses are permitted in each district.

The City of Wheatland's Planning Commission has five members who are appointed by the City Council. The Planning Commission serves as an advisory board to the City Council and Mayor.

6.3 Land Use and Proposed Development

In order to analyze the compatibility of nearby land uses surrounding Beale AFB, the use of each parcel is characterized into categories like those shown below. While the specific categories used by each local government may vary, these generalized categories provide a starting point for each analysis.

- **Business/Retail Commercial:** Commercial and retail business uses. This includes large-scale (big box) stores, malls, strip commercial centers, restaurants, hotels, and highway commercial uses.
- **Conservation/Agriculture/Open Space:** Natural, preserved, agricultural, or undeveloped land areas, but may include some passive recreation features, such as trails and boardwalks. Also includes wetlands, floodplains, forests, and stream buffers.
- **Heavy Industrial:** Heavy manufacturing, seaport, utilities, and other higher-impact industrial uses. Can allow for petroleum storage.
- **Light Industrial:** Low-impact or high-tech manufacturing, distribution, or warehousing uses.
- **Institutional:** Land that the public has access to, including schools, colleges, churches, hospitals, museums, and libraries. Government uses include government offices and fire stations.
- **Low Density Residential:** Rural in character with single-family residential detached housing. It can also include a continuation of agricultural uses, open space, equestrian, civic and recreation, and mixed-uses, where appropriate.
- **Mixed Use:** A blend of residential, commercial, cultural, institutional, or even industrial uses may be proposed.
- **Mobile Home:** Areas developed for single-family mobile homes, mobile home parks, or manufactured housing.
- **Office:** Professional offices that include business offices, usually grouped in office parks or medium-rise office buildings.
- **Parks and Recreation:** Active or passive park space or recreation facilities.
- **Planned Unit Development:** Area of planned development or growth, which can include various mixed uses.

- **Single-family Residential:** Single-family, detached housing ranging from one to four dwelling units per acre.

- **Transportation/Utility:** Utility service distribution and freight handling and movement.

See Section 6.4.1 for further details on how the categories above are generalized for comparison across the Air Force. Appendix A, Land Use Compatibility Tables, provides further description on these land use categories along with notes on general allowable uses within the jurisdictions surrounding Beale AFB.

The land use compatibility analysis performed as part of this AICUZ Study assesses existing and future land uses near Beale AFB to determine compatibility with the installation's mission and operations. Existing land use is assessed to determine current land use activity, while future land use plans and zoning regulations are used to project development and potential growth areas. Existing land use and parcel data provided by local communities were evaluated to ensure an actual account of land use activity, regardless of conformity to zoning classification or the designated planning or permitted use. Additionally, local management plans, policies, ordinances, and zoning regulations were evaluated to determine the type and extent of land use allowed in specific areas.

6.3.1 Existing Land Uses

The Yuba County General Plan characterizes the land use of unincorporated parts of the county as primarily agriculture, with over 75% of all land utilized for agricultural purposes. Yuba County parcel data detail the existing land uses surrounding Beale AFB, which are predominantly Open/Agriculture/Low Density. These areas, primarily located to the north, northwest, and east of the installation, are currently utilized for agriculture purposes and open range land, with small pockets of low density residential development scattered throughout the area. Additionally, the Open/Agriculture/Low Density existing land uses comprise the majority of land within the 2020 Beale AFB noise contours and APZs.

Other existing land uses surrounding Beale AFB include Public/Quasi-Public lands located adjacent to the southern boundary of the installation and Commercial uses southwest of the installation along South Beale Road and State Route (SR-) 65.

Additional small, scattered areas of existing Residential land uses are located within the 2020 Beale AFB noise contours to the north and south of the installation. Existing land uses within the Beale AFB CZs, APZs, and 2020 noise contours are illustrated on Figure 6-2.

6.3.2 Current Zoning

Land surrounding Beale AFB is primarily zoned Open/Agriculture/Low Density, Recreational, and Industrial. Lands currently zoned as Open/Agriculture/Low Density are primarily located west and south of the installation and make up the majority of zoned areas within the 2020 Beale AFB noise contours. It is important to note that lands currently zoned as Open/Agriculture/Low Density within the City of Wheatfield south of the installation are available to be developed and may be rezoned in the future to allow for more intensive land uses, like commercial or residential uses.

While currently undeveloped, lands just north of Beale AFB within the APZs for Runway 33 are zoned for industrial development. To the east and northeast of Beale AFB, the majority of lands are zoned either Open/Agriculture/Low Density or Recreational.

Existing zoning within the Beale AFB CZs, APZs, and 2020 noise contours is illustrated on Figure 6-3.

6.3.3 Future Land Use

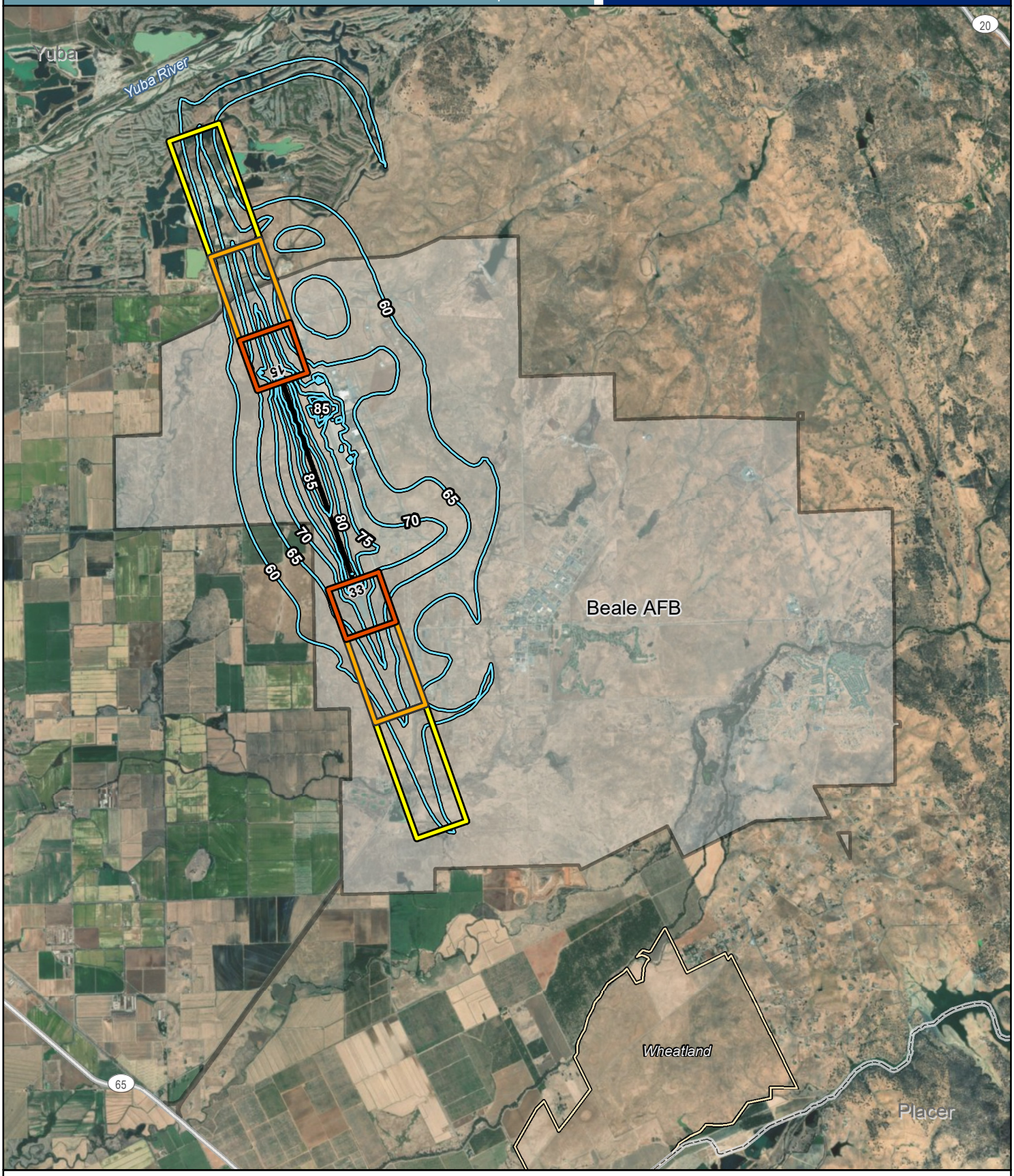
Future land use geographic information system (GIS) data were not available for areas surrounding Beale AFB. In order to provide an analysis, future land uses were examined based on publicly available data. Additionally, by analyzing zoning data in the place of the unavailable future land use data, the analysis includes areas where the potential for future incompatible growth was possible.

The Yuba County General Plan details development trends for the county, highlighting that, historically, large areas along SR-65 and SR-70 have been developed or approved for future development. Additionally, the General Plan states that the foothill and mountain areas of the county are publicly held open space, grazing lands, or otherwise rural and agricultural in nature, and are expected to continue to be used in this manner (Yuba County 2011). In addition to areas of the county where growth is most expected (i.e., along SR-65), the Yuba County General Plan also identifies goals and policies that state the County's intention to promote future land uses that are compatible with Beale AFB operations. Policy CD3.6 states that the County will coordinate with Beale AFB for relevant planning and zoning actions, and that the County will not approve incompatible land uses that encroach on Beale AFB. Likewise, Policy CD3.9 states that the County will discourage uses that increase the potential for interference with Beale AFB operations related to birds and other wildlife (Yuba County 2011). As it is the intent of the County to develop in a manner in which the surrounding land uses remain compatible with Beale AFB operations, it is anticipated that, through the existing, structured plan and development review, land uses will remain largely compatible with the installation's mission and operations.

Figure 6-1

Beale Air Force Base
Air Installation Compatible Use Zones

Composite AICUZ Footprint: 2020 Beale AFB Noise Contours and AICUZ Clear Zones and Accident Potential Zones



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- 2020 Beale AFB Noise Contour
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

N

0 1 2 Miles

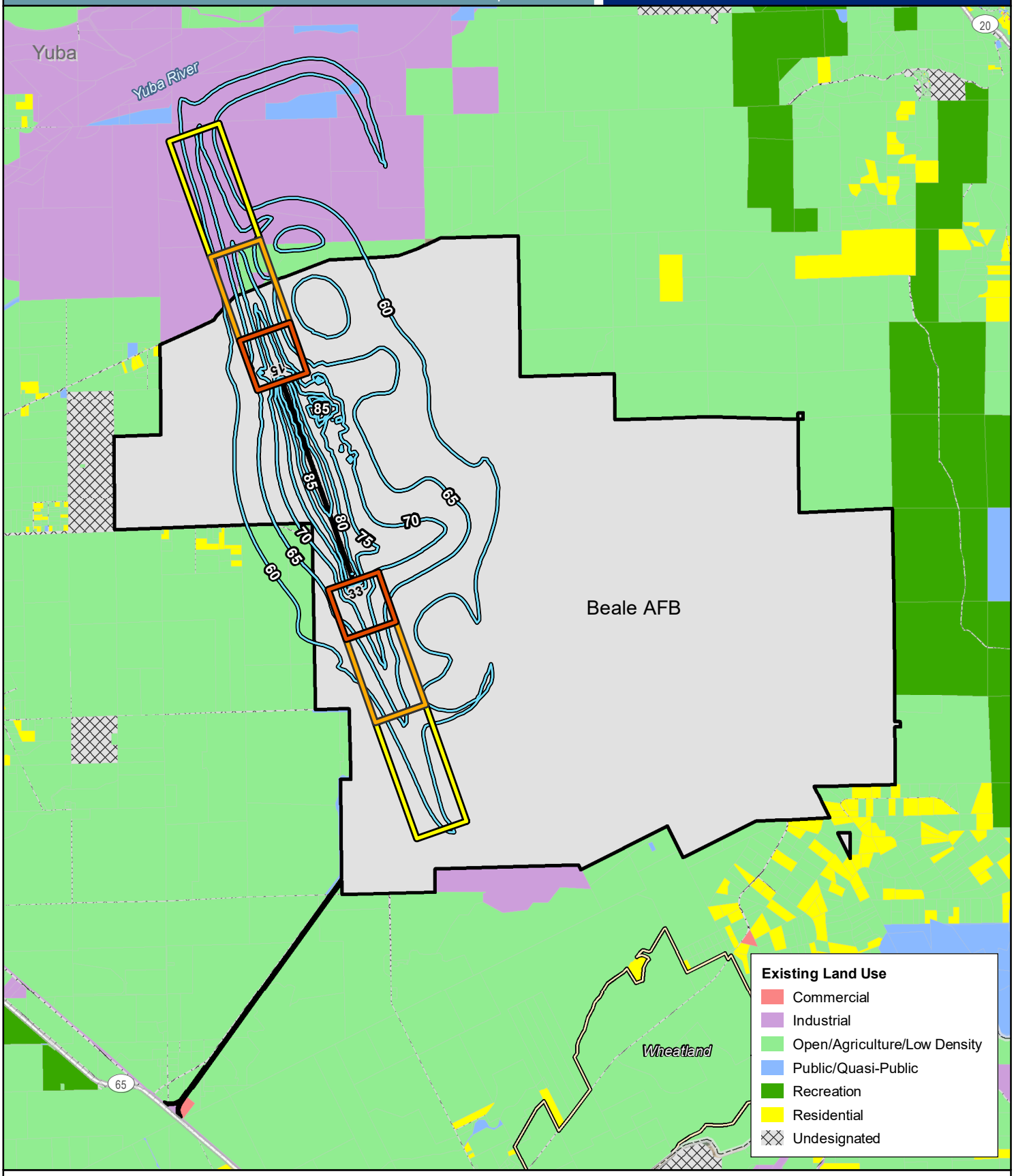
Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; U.S. Census Bureau 2018.

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Figure 6-2

Beale Air Force Base
Air Installation Compatible Use Zones

Existing Land Use and 2020 Beale AFB Noise Contours and AICUZ Clear Zones and Accident Potential Zones



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- 2020 Beale AFB Noise Contour
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 1 2 Miles

N

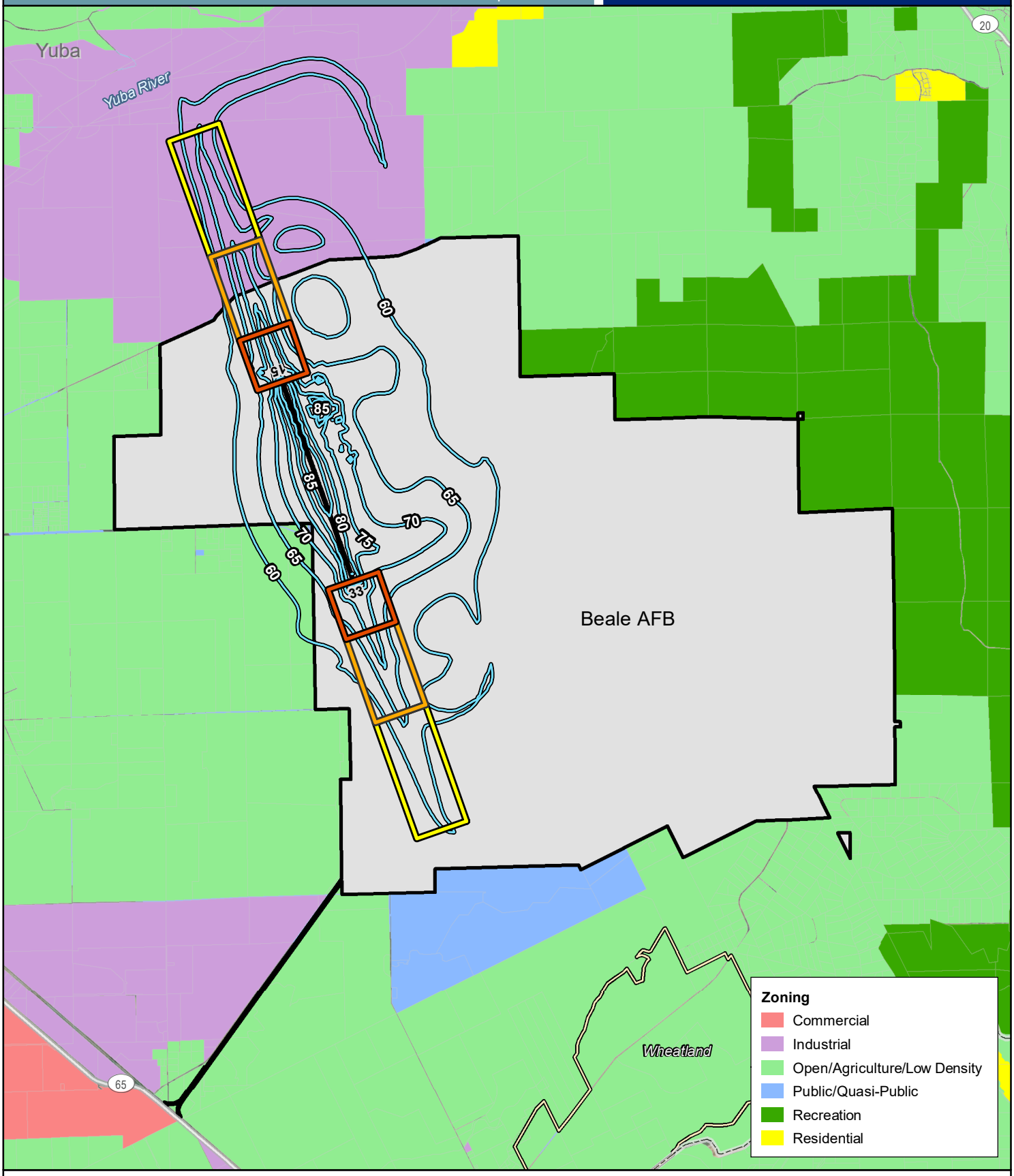
Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; Placer County 2019; U.S. Census Bureau 2018; Yuba County 2019.

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Figure 6-3

Beale Air Force Base
Air Installation Compatible Use Zones

Zoning and 2020 Beale AFB Noise Contours and AICUZ Clear Zones and Accident Potential Zones



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- 2020 Beale Noise Contour
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 1 2 Miles

N

Source: AFCEC 2019; CA DOT 2015; City of Wheatland 2019; Digital Globe 2018; ESRI 2017; Placer County 2019; U.S. Census Bureau 2018; Yuba County 2018.

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6.4 Compatibility Concerns

6.4.1 Land Use Analysis

Land use describes how land is developed and managed and is characterized by the dominant function occurring within an area. To compare land use consistently across jurisdictions, this analysis uses generalized land use classifications illustrating land use compatibility across common land use types. These generalized land use categories are not exact representations of the local community's land use designations, but combine similar land uses (like those introduced in Section 6.3) into one of seven categories:

- **Residential**: All types of residential activity, such as single- and multi-family residences and mobile homes, at a density greater than one dwelling unit per acre.
- **Commercial**: Offices, retail stores, restaurants, and other types of commercial establishments.
- **Industrial**: Manufacturing, warehouses, and other similar uses.
- **Public/Quasi-Public**: Publicly owned lands and land to which the public has access, including military reservations and training grounds, public buildings, schools, churches, cemeteries, and hospitals.
- **Recreational**: Land areas designated for recreational activity, such as parks, wilderness areas and reservations, conservation areas, and areas designated for trails, hikes, camping, etc.
- **Open/Agriculture/Low Density**: Undeveloped land areas, agricultural areas, grazing lands and areas with residential activity at densities less than or equal to one dwelling unit per acre.
- **Undesignated**: Applies to parcels that had no indicated value or were listed as "undesignated" in the original datasets.

For the purpose of this analysis, the DoD AICUZ compatibility guidelines (Tables A-1 and A-2 of Appendix A) have been consolidated into the seven generalized land use classifications. Table 6-1 provides generalized compatibility guidelines. Land use compatibility falls into one of four categories: (1) Compatible; (2) Compatible with Restrictions; (3) Incompatible; and (4) Incompatible with Exceptions. The conditionally compatible land use (i.e., categories 2 and 4) may require incorporation of noise attenuation measures into the design and construction of structures and further evaluation to be considered "compatible," and may require density limitations for land in APZs.

Table 6-1. Generalized Land Use Categories and Noise/Safety Compatibility

Generalized Land Use Category[3]	Noise Zone (dB DNL)						CZ	APZ I	APZ II
	<65	65-69	70-74	75-79	80-84	85+			
Residential	Yes	No[1]	No[1]	No	No	No	No	No	No[1]
Commercial	Yes	Yes	Yes[2]	Yes[2]	No	No	No	Yes[2]	Yes[2]
Industrial	Yes	Yes	Yes	Yes	Yes[2]	No	No	Yes[2]	Yes[2]
Public/Quasi-Public	Yes	Yes[2]	Yes[2]	Yes[2]	No	No	No	No	Yes[2]
Recreation	Yes	Yes[2]	Yes[2]	No	No	No	No	Yes[2]	Yes[2]
Open/Agriculture/Low Density	Yes	Yes[2]	Yes[2]	Yes[2]	Yes[2]	Yes[2]	No	Yes[2]	Yes[2]
Undesignated	Yes	No	No	No	No	No	No	No	No

Notes:
[1] Incompatible with exceptions.
[2] Compatible with restrictions.
[3] This generalized table demonstrates the land compatibility guidelines. Refer to Appendix A for use in determining land use compatibility.

6.4.2 Existing Land Use Compatibility Concerns

Table 6-2 details the existing land use compatibility for off-installation areas within the 2020 Beale AFB noise contours. Table 6-3 details existing land use compatibility for off-installation areas within the CZs and APZs. As evident in Table 6-2 and on Figure 6-5, existing land uses within the 2020 Beale AFB noise contours are compatible with aircraft operations at the installation.

Areas of existing land use incompatibility within Beale AFB's CZs and APZs include 6 acres of public/quasi-public lands within APZ I. These areas consist of two roads (Hammonton Smartville Road and Hammonton Road) located north of Beale AFB within APZ I for Runway 33. These areas are shown on Figure 6-6.

While this analysis focuses on areas where land uses within the noise contours, CZs, and APZs may be incompatible with aircraft operations, it is also important to analyze areas outside of the AICUZ footprint that may pose potential hazards to flight. Certain developments or land uses within the HAFZ (previously discussed in Section 5.3) may also pose compatibility concerns. In particular, a 261-acre landfill run by the company Recology is located approximately 2 miles south of Beale AFB. The landfill is of particular concern as its height may affect instrument approach procedures and birds may be attracted to the landfill, creating the potential for BASH concerns. At the time of this study (2019), Beale AFB has submitted a formal obstruction evaluation request with the FAA (2019-AWP-10874-OE) to determine if the planned landfill height poses a hazard. Base personnel have also entered exploratory discussions with the landfill operators to raise their awareness of potential hazards to flight. A formal response from the FAA to the obstruction evaluation request is expected and will inform future discussions.

6.4.3 Future Land Use Compatibility Concerns

As previously discussed in Section 6.3.3, future land use data are not available for the areas surrounding Beale AFB. In order to provide an adequate analysis, current zoning district data were used to identify potential future compatibility concerns. Table 6-4 details the future land use compatibility for off-installation areas within the 2020 Beale AFB noise contours. Table 6-5 details future land use compatibility for off-installation areas within the CZs and APZs.

As shown in Table 6-4 and on Figure 6-7, future land uses within the 2020 Beale AFB noise contours are compatible with aircraft operations at the installation.

Areas of future land use incompatibility within Beale AFB's CZs and APZs include eight (8) acres of public/quasi-public lands within APZ I. These areas consist of two roads (Hammonton Smartville Road and Hammonton Road) and a parcel of land zoned as a Public Facilities District located north of Beale AFB within APZ I for Runway 33.

Table 6-2. Off-installation Existing Land Use Acreage within AICUZ Noise Zones

Designation	Generalized Land Use Category[3]	Noise Zone (dB CNEL)												
		60-64	Note	65-69	Note	70-74	Note	75-79	Note	80-84	Note	85+	Note	Total
Incompatible	Residential			-	(1)	-	(1)	-		-		-		-
	Commercial									-		-		-
	Industrial											-		-
	Public/Quasi-Public[4]									-		-		-
	Recreation							-		-		-		-
	Open/Agriculture/ Low Density													
	Undesignated			-		-		-		-		-		-
Compatible	Residential	-												-
	Commercial	-		-		-	(2)	-	(2)					-
	Industrial	793		180		7		-		-	(2)			980
	Public/Quasi-Public[4]	20		6	(2)	5	(2)	-	(2)					31
	Recreation	3		1	(2)	1	(2)							5
	Open/Agriculture/Low Density	379		93	(2)	35	(2)	-	(2)	-	(2)	-	(2)	507
	Undesignated	-												-
Subtotals	Incompatible	-		-		-		-		-		-		-
	Compatible	1,195		280		48		-		-		-		1,523
Total		**1,195**		**280**		**48**		**-**		**-**		**-**		**1,523**

Notes:
All contour areas on-installation are excluded from the counts. Public roadways within the greater than 60 dB CNEL noise contours have been included in the Public/Quasi-Public generalized land use category.
[1] Incompatible with exceptions.
[2] Compatible with restrictions.
[3] Refer to Appendix A for details.
[4] Public roadways within the AICUZ noise zones have been included in the Public/Quasi-Public generalized land use category.

Table 6-3. Off-installation Existing Land Use Acreage within Clear Zones/Accident Potential Zones

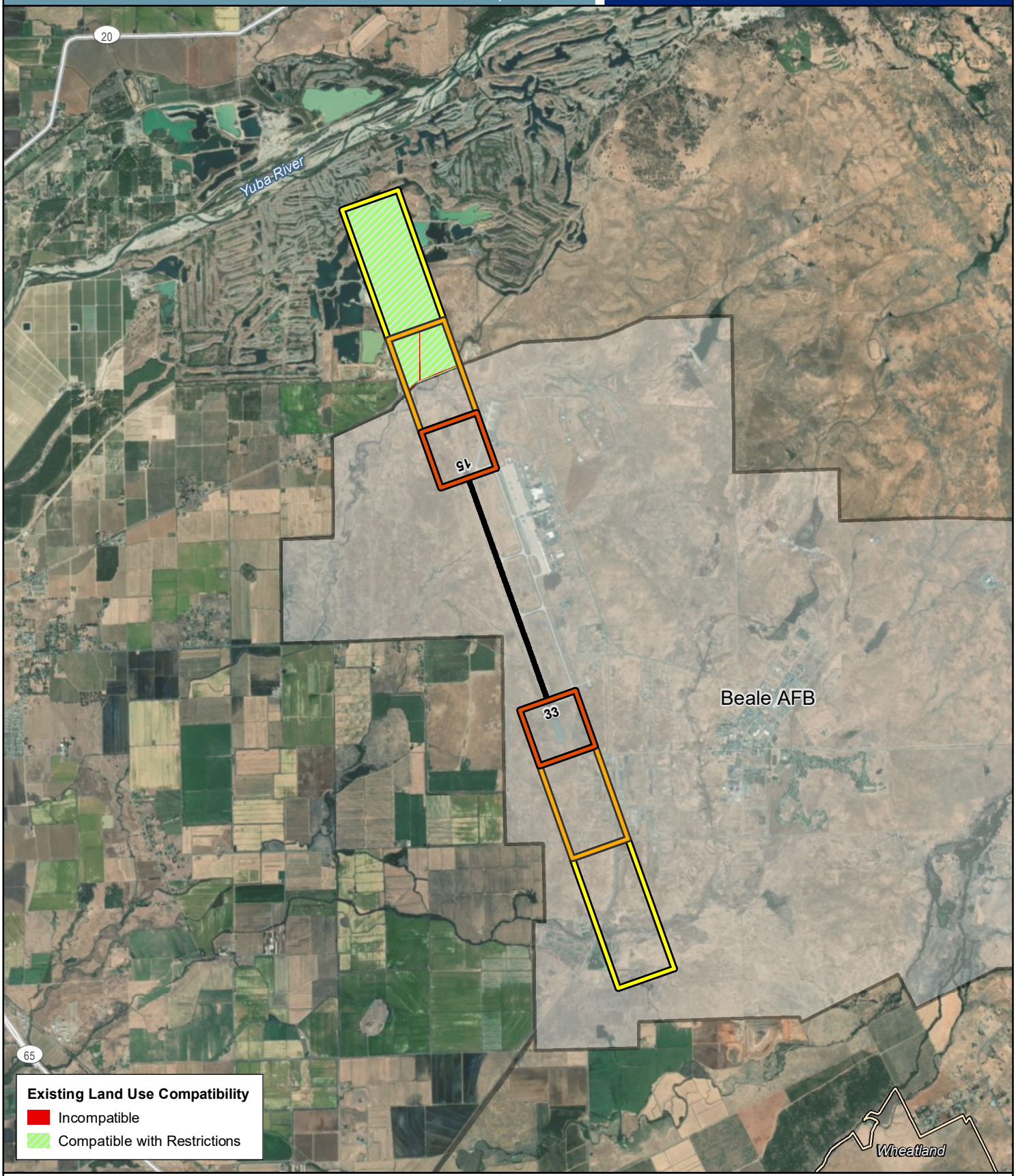
Designation	Generalized Land Use Category[2]	CZ	Note	APZ I	Note	APZ II	Note	Total
Incompatible	Residential	-		-		-		-
	Commercial	-						-
	Industrial	-						-
	Public/Quasi-Public[4]	-		6				6[3]
	Recreation	-						-
	Open/Agriculture/Low Density	-						-
	Undesignated	-		-		-		-
Compatible	Residential							
	Commercial			-	(1)		(1)	-
	Industrial			89	(1)	481	(1)	570
	Public/Quasi-Public[4]					<1	(1)	<1
	Recreation			2	(1)		(1)	2
	Open/Agriculture/Low Density			78	(1)	<1	(1)	78
	Undesignated							
Subtotals	Incompatible	-		6		-		6
	Compatible	-		169		482		651
Total		**-**		**175**		**482**		**657**

Notes:
All contour areas on-installation are excluded from the counts.
[1] Compatible with restrictions.
[2] Refer to Appendix A for details.
[3] Total incompatible existing land use is 6 acres in Table 6-3 but is 8 acres for incompatible future land use as detailed in Table 6-5 due to differences between the existing land use and designated zoning for a 2-acre parcel adjacent to the installation boundary. See Section 6.4.3 for additional discussion.
[4] Public roadways within the AICUZ clear zones and APZs have been included in the Public/Quasi-Public generalized land use category.

Figure 6-4

Beale Air Force Base
Air Installation Compatible Use Zones

Incompatible Existing Land Use within 2020 AICUZ Clear Zones and Accident Potential Zones



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

Note: Public roadways within the AICUZ footprint have been included in the Public/Quasi-Public generalized land use category.

0 1 2 Miles

N

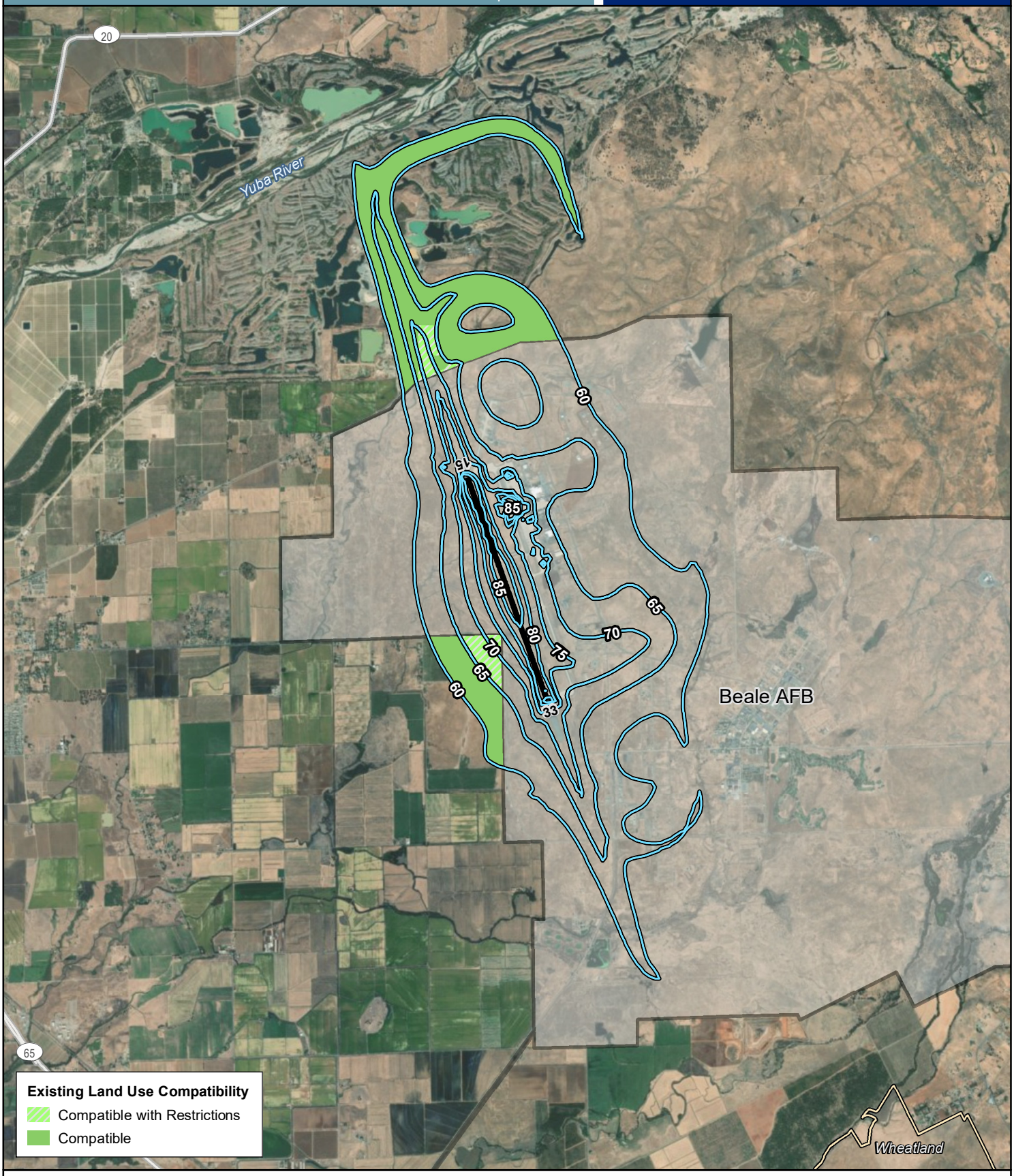
Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; U.S. Census Bureau 2018; Yuba County 2019.

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Figure 6-5

Beale Air Force Base
Air Installation Compatible Use Zones

Incompatible Existing Land Use within 2020 Beale AFB Noise Contours



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- 2020 Beale AFB Noise Contour

Note: Public roadways within the AICUZ footprint have been included in the Public/Quasi-Public generalized land use category.

0 1 2 Miles

N

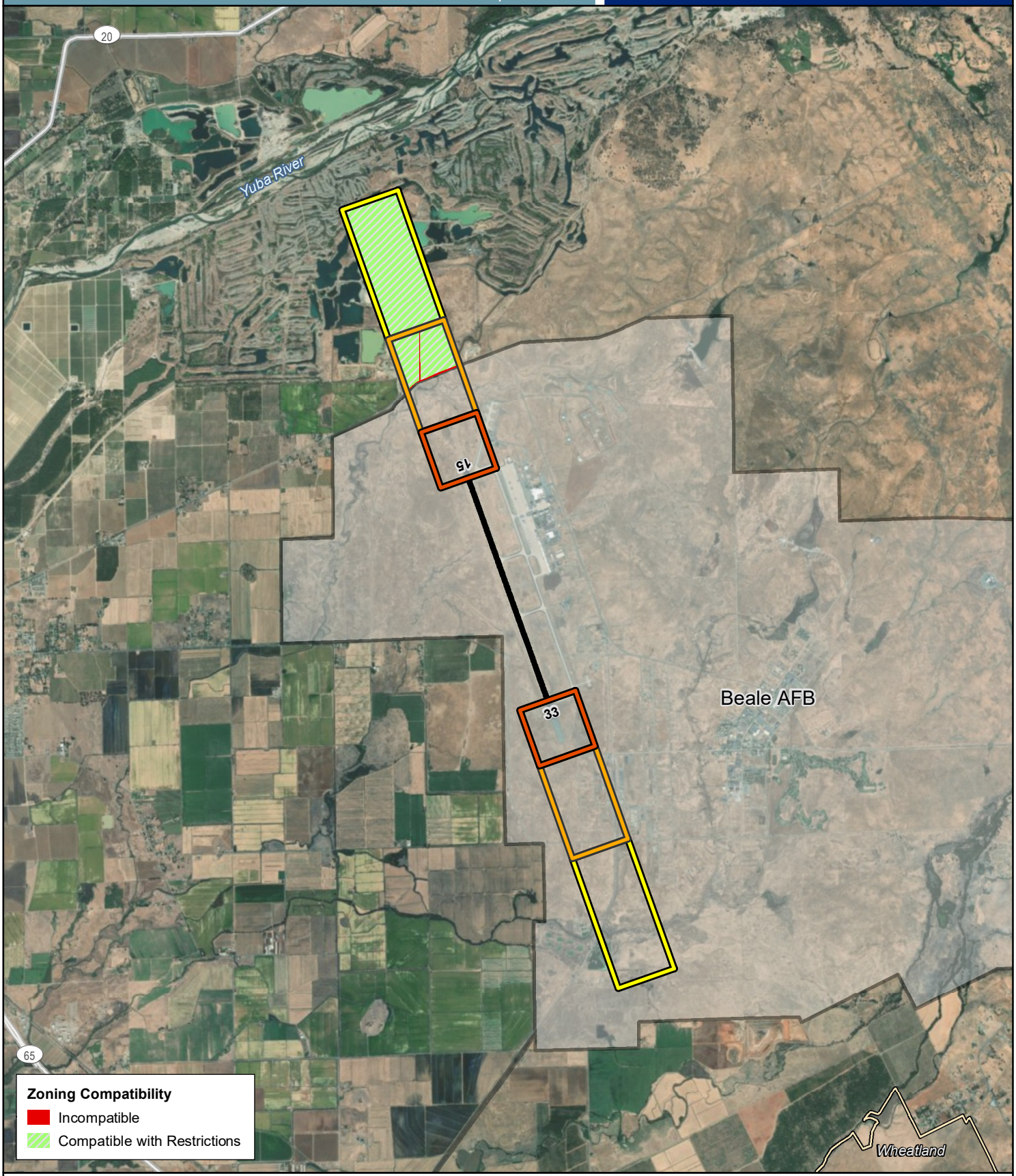
Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; U.S. Census Bureau 2018; Yuba County 2019.

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Figure 6-6

Beale Air Force Base
Air Installation Compatible Use Zones

Incompatible Zoning within 2020 AICUZ Clear Zones and Accident Potential Zones



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

Note: Public roadways within the AICUZ footprint have been included in the Public/Quasi-Public generalized land use category.

0 1 2 Miles

N

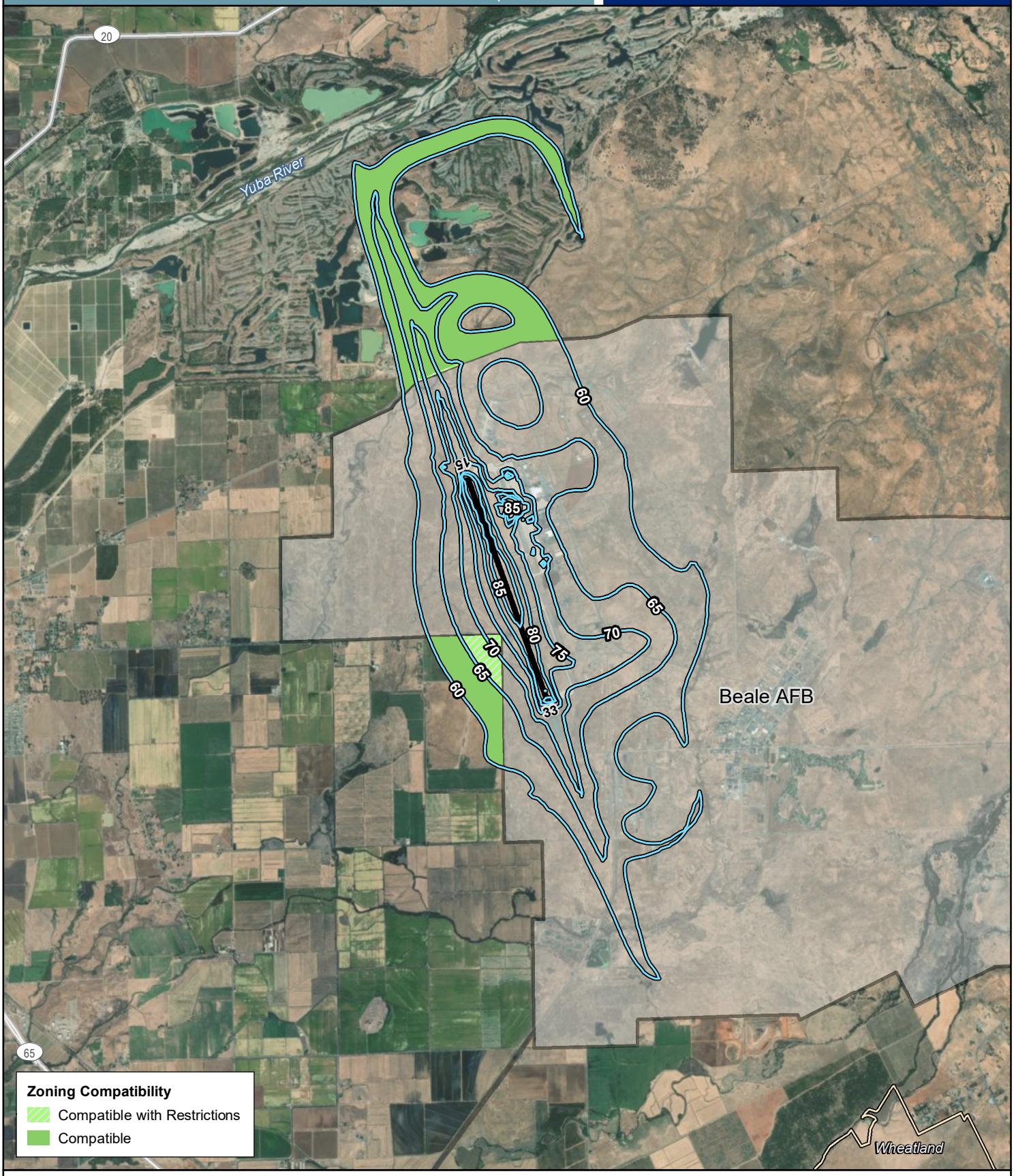
Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; U.S. Census Bureau 2018; Yuba County 2018.

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Figure 6-7

Beale Air Force Base
Air Installation Compatible Use Zones

Incompatible Zoning within 2020 Beale AFB Noise Contours



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- 2020 Beale AFB Noise Contour

Note: Public roadways within the AICUZ footprint have been included in the Public/Quasi-Public generalized land use category.

0 1 2 Miles

N

Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; U.S. Census Bureau 2018; Yuba County 2018.

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Table 6-4. Off-installation Future Land Use Acreage within AICUZ Noise Zones

Designation	Generalized Land Use Category[3]	Noise Zone (dB CNEL)												
		60-64	Note	65-69	Note	70-74	Note	75-79	Note	80-84	Note	85+	Note	Total
Incompatible	Residential			-	(1)	-	(1)	-		-		-		-
	Commercial									-		-		-
	Industrial											-		-
	Public/Quasi-Public[4]									-		-		-
	Recreation							-		-		-		-
	Open/Agriculture/ Low Density													
	Undesignated			-		-		-		-		-		-
Compatible	Residential	-												-
	Commercial	-		-		-	(2)	-	(2)					-
	Industrial	964		209		32		-		-	(2)			1,205
	Public/Quasi-Public[4]	13		7	(2)	8	(2)	-	(2)					28
	Recreation	-		-	(2)	-	(2)							-
	Open/Agriculture/Low Density	218		64	(2)	8	(2)	-	(2)	-	(2)	-	(2)	290
	Undesignated	-												-
Subtotals	Incompatible	-		-		-		-		-		-		-
	Compatible	1,195		280		48		-		-		-		1,523
Total		**1,195**		**280**		**48**		**-**		**-**		**-**		**1,523**

Notes:
All contour areas on-installation are excluded from the counts. Future land use data shown in this table are based upon local zoning designations within the greater than 60 dB CNEL noise contours. Public roadways within the greater than 60 dB CNEL noise contours have been included in the Public/Quasi-Public generalized land use category.
[1] Incompatible with exceptions.
[2] Compatible with restrictions.
[3] Refer to Appendix A for details.
[4] Public roadways within the AICUZ noise zones have been included in the Public/Quasi-Public generalized land use category.

Table 6-5. Off-installation Future Land Use Acreage within Clear Zones/Accident Potential Zones

Designation	Generalized Land Use Category[2]	CZ	Note	APZ I	Note	APZ II	Note	Total
Incompatible	Residential	-		-		-		-
	Commercial	-						-
	Industrial	-						-
	Public/Quasi-Public[4]	-		8				8[3]
	Recreation	-						-
	Open/Agriculture/Low Density	-						-
	Undesignated	-		-		-		-
Compatible	Residential							
	Commercial			-	(1)	-	(1)	-
	Industrial			167	(1)	482	(1)	649
	Public/Quasi-Public[4]					<1	(1)	<1
	Recreation			-	(1)	-	(1)	-
	Open/Agriculture/Low Density			-	(1)	-	(1)	-
	Undesignated							
Subtotals	Incompatible	-		8		-		8
	Compatible	-		167		482		649
Total		**-**		**175**		**482**		**657**

Notes:
All contour areas on-installation are excluded from the counts. Future land use data shown in this table are based upon local zoning designations within the Clear Zones and Accident Potential Zones. Public roadways within the Accident Potential Zones have been included in the Public/Quasi-Public generalized land use category.

[1] Compatible with restrictions.

[2] Refer to Appendix A for details.

[3] Total incompatible existing land use is 6 acres in Table 6-3 but is 8 acres for incompatible future land use as detailed in Table 6-5 due to differences between the existing land use and designated zoning for a 2-acre parcel adjacent to the installation boundary. See Section 6.4.3 for additional discussion.

[4] Public roadways within the AICUZ clear zones and APZs have been included in the Public/Quasi-Public generalized land use category.

6.5 Hypothetical Mission Contours

AICUZ studies often provide future year planning noise contours. Long-range planning by local land use authorities involves strategies that influence present and future uses of land. Due to the long-range nature of this planning, the Air Force provides planning contours (i.e., noise contours based on reasonable projections of future missions and operations). AICUZ studies using planning contours provide a description of the long-term (5- to 10-year) aircraft noise environment for projected aircraft operations that is more consistent with the planning horizon used by state, tribal, regional, and local planning bodies.

The Air Force develops planning contours based on the best available, realistic, long-range projections of unclassified estimates of future mission requirements. These include reasonable projections of future operations based on trends in operational tempo, retirement of legacy aircraft, new aircraft entering the inventory, and other factors.

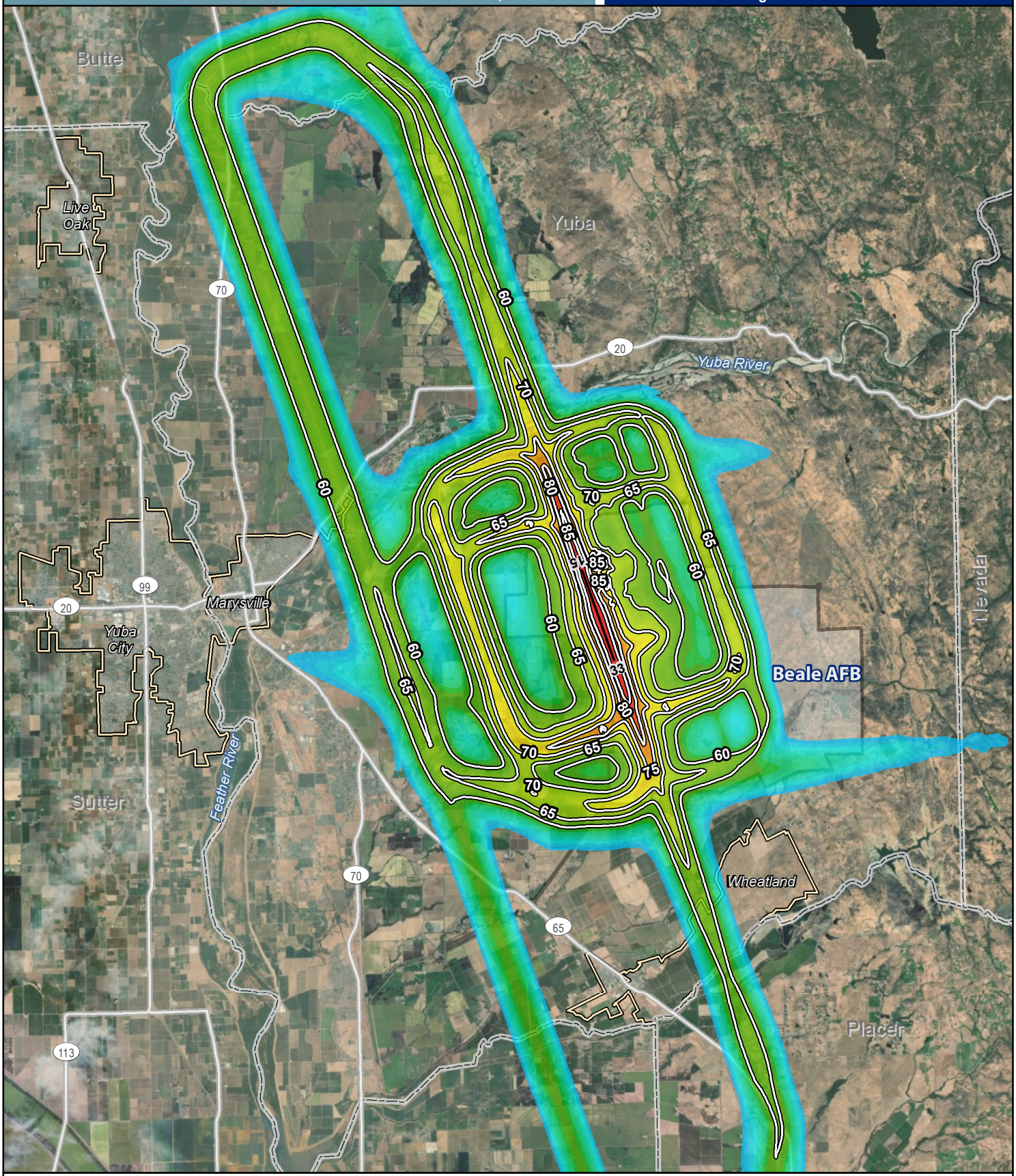
This AICUZ Study includes a set of hypothetical noise contours that reflect hypothetical aircraft operations at full mission capacity at Beale AFB. Given that the present-day contours for Beale AFB represent a snapshot in time, future development adjacent to the present-day 65 dB CNEL noise contour could limit Beale AFB's ability to accommodate potential mission changes. The hypothetical full mission capacity scenario allows room for mission growth. The Beale AFB hypothetical noise contours are shown on Figure 6-8.

These long-range projections are not commitments of future operations. Inclusion of planning contours in the AICUZ Study does not eliminate the need to conduct appropriate environmental analysis if an assumption used in the development of the planning contours becomes a proposed Air Force action.

Figure 6-8

Beale Air Force Base
Air Installation Compatible Use Zones

Beale AFB Hypothetical Mission Noise Contours with Gradient Shading



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- State Highway
- Hypothetical Mission Noise Contour

Noise Zone (dB)
50
85

0 1 2 Miles

N

Source: AFCEC 2019; CA DOT 2015; Digital Globe 2018; ESRI 2017; U.S. Census Bureau 2018.

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7.0 Implementation

Implementation of the AICUZ Study must be a joint effort between Beale AFB and the surrounding communities. This AICUZ Study provides the best source of information to ensure land use planning decisions made by the local municipalities are compatible with a future installation presence. This chapter discusses the roles of partners and stakeholders in the collaborative planning.

7.1 Air Force Role

The goal of the Air Force AICUZ Program is to minimize noise and safety concerns for the surrounding communities and to advise these communities about potential impacts from installation operations on the safety, welfare, and quality of life of their citizens.

Beale AFB's AICUZ responsibilities encompass the areas of flight safety, noise abatement, and participation in the land use planning process.

Air Force policy and guidance requires that installation leadership periodically review existing practices for flight operations and evaluate these factors in relationship to populated areas and other local situations.

Beale AFB will:

- Ensure that, wherever possible, air operations planners route flights over sparsely populated areas to reduce the exposure of lives and property to a potential accident.

- Periodically review existing traffic patterns, instrument approaches, weather conditions, and operating practices and evaluate these factors in relationship to populated areas and other local conditions. The purpose of this review is to limit, reduce, and control the impact of noise from flying operations on surrounding communities.

- Consider the establishment of a community forum between the installation and surrounding stakeholders to discuss land use and other issues of concern; the installation would hold these meetings on a quarterly basis.

- Schedule land use planning meetings to provide a forum for agencies to meet and discuss future development and to address issues that may surface because of new proposals.

- Provide copies of the AICUZ Study to local, county, tribal, and regional planning departments and zoning administrators to aid in the planning process and provide copies of the AICUZ Study to appropriate state and federal agencies.

- Work directly with local governments and other agencies to control bird and wildlife attractants in the vicinity of the installation.

- Work with the JLUS Coordinating Committee to refine data that would assist local governments in compatibility planning.

Preparation and presentation of this Beale AFB AICUZ Study is one phase in continuing Air Force participation in the local planning process. The Air Force recognizes that, as the local community updates its land use plans, Beale AFB must be ready to provide additional input, as needed.

7.2 State/Regional Roles

As noted in Section 6.2.1, development in California is guided by California GC §65300, which requires every county and city in the state to adopt a comprehensive, long-term general plan. California GC §65302(a)(2) requires that the land use element must consider the impact of new growth—including designated future land uses covered by the general plan or proposed zoning ordinances—on military readiness activities carried out on military bases, installations, and operating and training areas within or adjacent to the planning area (California Governor's Office of Planning and Research 2016). Periodic reviews and updates to the land use element of a local general plan provide an opportunity to revise AICUZ-specific information based on the updated information provided in this AICUZ Study. The guidance provided in the land use element to avoid or minimize potential impacts on Beale AFB operations should be implemented through targeted zoning or other land use controls to prevent future incompatible development.

In addition to State planning legislation, there are military-related organizations and councils, including the Governor's Military Council and California Defense Communities Alliance, which help to promote community development that is compatible with Beale AFB's mission.

Two regional plans, the Beale AFB Land Use Compatibility Plan prepared by the SACOG ALUC and the Beale JLUS (2008), are intended to promote compatible land use in the vicinity of Beale AFB. The ALUC's compatibility plan establishes compatibility policies that are consistent with the guidance provided by the 2005 Beale AFB AICUZ Study. Local governments affected by the compatibility plan must make their general plans and any specific plans consistent with these compatibility policies.

The Beale JLUS introduced recommendations to promote compatible land use around the installation. Local recommendations are included in Section 7.3. The following are state and regional recommendations from the JLUS:

- SACOG should update the airport land use compatibility plan to reflect the data provided in the current Beale AFB AICUZ Study. The airport land use

compatibility plan should be updated, as necessary, to reflect changes in air operations or missions at Beale AFB.

- Regional and state agencies should refer development applications to Beale AFB for review and comment.

- The JLUS Coordinating Committee, Beale AFB, and the Governor's Office of Planning and Research should create a clearinghouse of planning information regarding compatibility planning through collaboration with the California Resources Agency.

- The JLUS Coordinating Committee should develop a general memorandum of understanding to implement the JLUS process.

- State regulatory agencies should develop specific memorandums of understanding to implement JLUS recommendations.

7.3 Local Government Role

The role of the local government is to enact planning, zoning, and development principles and practices that are compatible with the installation and protect the installation's mission. The residents of the surrounding community have a long history of working with personnel from Beale AFB. Adoption of the following recommendations during the revision of relevant land use plans or zoning regulations will strengthen this relationship, increase the health and safety of the public, and protect the integrity of the installation's flying mission:

- Local government planners consider AICUZ policies and guidelines when developing or revising general plans and use AICUZ overlay maps and Air Force Land Use Compatibility Guidelines (see Appendix A) to evaluate existing and future land use proposals. For example, Yuba County and the City of Wheatland have adopted policies in their general plans designed to promote compatible land use in the vicinity of Beale AFB consistent with AICUZ guidelines and the recommendations of the JLUS.

- Ensure that new development applications or "changed use of property" are submitted to Beale AFB to afford the opportunity to assess those applications for potential impacts on defense missions. The Beale AFB PA Office can provide a land use planning point of contact. Yuba County has adopted Action HS4.2 in its 2011 General Plan stating that the County will involve Beale AFB representatives in development project review and conditions. Local governments also must comply with the California Planning and Zoning Law (GC §65352, §65404, §65940, and §65944), which requires agencies to provide information to the military on certain types of land use actions within 1,000

feet of a military installation, beneath a low-level flight path, or within special use airspace (see Section 6.2.1).

- Adopt or modify zoning ordinances to reflect the compatible land uses outlined in the AICUZ Study, including the creation of military airport overlay zones. Yuba County has created the Airport Environs Overlay District, in part, to identify the range of uses compatible with airport accident hazard and noise exposure zones and prohibit development of incompatible uses.

- Local government and county planners establish procedures to consult on land use matters within overlapping extra-territorial jurisdictions near Beale AFB, known in California as "spheres of influence."

- Local governments review their capital improvement plan, infrastructure investments, and development policies to ensure they do not encourage incompatible land use patterns near Beale AFB, with particular emphasis on utility extension and transportation planning. Yuba County has adopted Action CD14.2 in its 2011 General Plan stating that the County will consult with Beale AFB regarding efficient infrastructure planning in the SR-65 corridor.

- Local governments implement height and obstruction ordinances that reflect current Air Force and 14 CFR 77 requirements, presented in this study as HAFZs. Yuba County has established the Airport Environs Overlay District under its Development Code, in part, to comply with 14 CFR 77 requirements and prevent the creation of hazards to air navigation. Similarly, the City of Wheatland has adopted a policy (Policy 9.E.2 in the City of Wheatland's 2006 General Plan) to ensure that development within Beale AFB's approach and departure zones complies with FAA regulations on objects affecting navigable airspace.

- Fair disclosure ordinances be enacted to require disclosure to the public for those AICUZ items that directly relate to aircraft operations at Beale AFB.

- Where allowed, local governments require real estate disclosure for individuals purchasing or leasing property within noise zones or CZs/APZs.

- Enact or modify building/residential codes to ensure that any new construction near Beale AFB has the recommended noise level reduction measures incorporated into the design and construction of structures. Yuba County's Airport Environs Overlay District ordinance requires new development exposed to CNEL above 60 dB to comply with noise reduction standards.

- Government planning bodies monitor proposals for tall structures, such as wind turbines and communication towers, to ensure that new construction does not pose a hazard to navigable airspace around Beale AFB. Where appropriate, coordinate with the FAA on the height of structures.

- Local government land use plans and ordinances reflect AICUZ recommendations for development in CZs/APZs and noise zones.

- Local governments consult with Beale AFB on planning and zoning actions that have the potential to affect installation operations.

- Invite Air Force leadership to be advisory members on boards, commissions, and regional councils addressing long-range development and other planning policies.

- Encourage the development of a working group of city, county, and Beale AFB representatives to discuss land use concerns and major development proposals that could affect aircraft operations.

The following are local government recommendations from the JLUS for local governments:

- Local governments should create four (4) Military Influence Area (MIA) zones that should be used by local jurisdictions to identify areas where specific compatibility issues are more likely to occur and create a broader framework for making sound planning decisions around military airfields.

- Local governments should establish and promote voluntary acquisition programs that will transfer acquired properties to a land trust or acquire conservation easements limiting future uses of the land.

- Local governments should develop Transfer of Development Rights programs to transfer development rights in the most critical MIA zones to other appropriate development areas in the same jurisdiction.

- Local governments should implement the recommendations contained in the 2005 Beale AFB AICUZ Study.

- Local governments should develop or update avigation easement programs.

- Local governments should require sound attenuation for occupied buildings, with the level of sound protection required based on noise exposure and the type of land use.

- Local governments should incorporate land use compatibility planning concepts into Capital Improvement Plans for infrastructure extensions and improvements (California Governor's Office of Planning and Research 2008).

7.4 Community Role

Neighboring residents and installation personnel have a long-established history of working together for the mutual benefit of the Beale AFB mission and local community. Adoption of the following recommendations will strengthen this relationship, protect the health and ensure the safety of the public, and help protect the integrity of the installation's flying mission:

- **Real Estate Professionals and Brokers:**
    - Know where noise zones and CZs/APZs encumber land near the air installation and invite installation representatives to brokers' meetings to discuss the AICUZ Program with real estate professionals.
    - Disclose noise impacts to all prospective buyers of properties within areas greater than 65 dB DNL or within the CZs/APZs.
    - Require the Multiple Listing Service to disclose noise zones and CZs/APZs for all listings.
- **Developers:**
    - Know where the noise zones and CZs/APZs encumber land near the air installation. Consult with Beale AFB on proposed developments within the AICUZ footprint.
    - Participate in local discussions regarding existing zoning ordinances and subdivision regulations to support the compatible land uses outlined in this AICUZ Study through implementation of a zoning overlay district based on noise contours and CZs/APZs.
- **Local Citizens:**
    - Participate in local forums with the installation to learn more about the installation's missions.
    - Become informed about the AICUZ Program and learn about the program's goals, objectives, and value in protecting the public's health, safety, and welfare.

- When considering property purchases, ask local real estate professionals, city planners, and installation representatives about noise and accident potential.

While the installation and community are separated by a fence, it is recognized that Air Force activities and operations may affect the community. Likewise, community activities and development decisions can affect the Air Force's ability to complete its local hometown mission. The local military and community goals can be mutually achieved through a combination of collaborative planning and partnerships, open communication, and close relationships. The AICUZ Study can provide a foundation on which related communication can be based to ensure that the community and its hometown military installation can continue to coexist for many years.

Questions about the AICUZ Program may be directed to the installation PA Office at (530) 634-8887 or 9rw.pa@us.af.mil.

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Appendix A. Land Use Compatibility Tables

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
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

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
27	Printing, publishing, and allied industries	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
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

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
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
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 & .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 of 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 of 0.24 in APZ II
55	Retail trade – automotive, marine craft, aircraft, and accessories	N	Y	Y	Maximum FAR of 0.14 in APZ I & 0.28 in APZ II
56	Retail trade – apparel and accessories	N	N	Y	Maximum FAR of 0.28 in APZ II
57	Retail trade – furniture, home, furnishings and equipment	N	N	Y	Maximum FAR of 0.28 in APZ II
58	Retail trade – eating and drinking establishments	N	N	N	
59	Other retail trade	N	N	Y	Maximum FAR of 0.16 in APZ II

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
60	**Services[10]**				
61	Finance, insurance and real estate services	N	N	Y	Maximum FAR of 0.22 in APZ II
62	Personal services	N	N	Y	Office uses only. Maximum FAR of 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 of 0.22 in APZ II
63.7	Warehousing and storage services[12]	N	Y	Y	Maximum FAR of 1.0 in APZ I; 2.0 in APZ II
64	Repair Services	N	Y	Y	Maximum FAR of 0.11 APZ I; 0.22 in APZ II
65	Professional services	N	N	Y	Maximum FAR of 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 of 0.11 APZ I; 0.22 in APZ II
67	Government Services	N	N	Y	Maximum FAR of 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 of 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	

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
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 of 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 of 0.11 in APZ I; 0.22 in APZ II
79	Other cultural, entertainment and recreation	N	Y[11]	Y[11]	Maximum FAR of 0.11 in APZ I; 0.22 in APZ II
80	**Resource production and extraction**				
81	Agriculture (except live-stock)	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 of 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 of 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 of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
85	Mining activities[18]	N	Y[18]	Y[18]	Maximum FAR of 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 of 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]	

NOTES:

1. A "Yes" or a "No" 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 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 maximum assemblies of 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% 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 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. Chapels, houses of worship, and other land uses of public gatherings are incompatible 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.

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.

Table A-2. Recommended Land Use Compatibility for Noise Zones

LAND USE			SUGGESTED LAND USE COMPATIBILITY			
SLUCM NO.	LAND USE NAME	DNL or CNEL 65-69	DNL or CNEL 70-74	DNL or CNEL 75-79	DNL or CNEL 80-84	DNL or CNEL 85+
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	Apartment: 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
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

Table A-2. Recommended Land Use Compatibility for Noise Zones

LAND USE		SUGGESTED LAND USE COMPATIBILITY				
SLUCM NO.	LAND USE NAME	DNL or CNEL 65-69	DNL or CNEL 70-74	DNL or CNEL 75-79	DNL or CNEL 80-84	DNL or CNEL 85+
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
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

Table A-2. Recommended Land Use Compatibility for Noise Zones

LAND USE			SUGGESTED LAND USE COMPATIBILITY			
SLUCM NO.	LAND USE NAME	DNL or CNEL 65-69	DNL or CNEL 70-74	DNL or CNEL 75-79	DNL or CNEL 80-84	DNL or CNEL 85+
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
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 live- stock)	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

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.

CNEL – Community Noise Equivalent Level (normally within a very small decibel difference of DNL).

Ldn – Mathematical symbol for DNL.

NOTES:

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, non-conforming land uses.
    b. Where the community determines that these uses must be allowed, measures to achieve outdoor to indoor noise level reduction (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 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 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 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.
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.
9. Residential buildings require an NLR of 30.
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.

Table A-3. Recommended Land Use Compatibility for Small Arms Noise

LAND USE		SUGGESTED LAND USE COMPATIBILITY	
SLUCM NO.	LAND USE NAME	Noise Zone II 87–104 dB Peak	Noise Zone III >104 dB Peak
10	**Residential**		
11	Household units	N[1]	N
11.11	Single units: detached	N[1]	N
11.12	Single units: semidetached	N[1]	N
11.13	Single units: attached row	N[1]	N
11.21	Two units: side-by-side	N[1]	N
11.22	Two units: one above the other	N[1]	N
11.31	Apartments: walk-up	N[1]	N
11.32	Apartment: elevator	N[1]	N
12	Group quarters	N[1]	N
13	Residential hotels	N[1]	N
14	Mobile home parks or courts	N[1]	N
15	Transient lodgings	25	N
16	Other residential	N[1]	N
20	**Manufacturing**		
21	Food and kindred products; manufacturing	Y[2]	Y[3]
22	Textile mill products; manufacturing	Y[2]	Y[3]
23	Apparel and other finished products; products made from fabrics, leather, and similar materials; manufacturing	Y[2]	Y[3]
24	Lumber and wood products (except furniture); manufacturing	Y[2]	Y[3]
25	Furniture and fixtures; manufacturing	Y[2]	Y[3]
26	Paper and allied products; manufacturing	Y[2]	Y[3]
27	Printing, publishing, and allied industries	Y[2]	Y[3]
28	Chemicals and allied products; manufacturing	Y[2]	Y[3]
29	Petroleum refining and related industries	Y[2]	Y[3]
30	**Manufacturing (continued)**		
31	Rubber and misc. plastic products; manufacturing	Y[2]	Y[3]
32	Stone, clay and glass products; manufacturing	Y[2]	Y[3]
33	Primary metal products; manufacturing	Y[2]	Y[3]
34	Fabricated metal products; manufacturing	Y[2]	Y[3]
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	25	35
39	Miscellaneous manufacturing	Y[2]	Y[3]
40	**Transportation, communication, and utilities**		
41	Railroad, rapid rail transit, and street railway transportation	Y[2]	Y[3]
42	Motor vehicle transportation	Y[2]	Y[3]
43	Aircraft transportation	Y[2]	Y[3]
44	Marine craft transportation	Y[2]	Y[3]
45	Highway and street right-of-way	Y[2]	Y[3]
46	Automobile parking	Y[2]	Y[3]
47	Communication	25	35

Table A-3. Recommended Land Use Compatibility for Small Arms Noise

LAND USE		SUGGESTED LAND USE COMPATIBILITY	
SLUCM NO.	LAND USE NAME	Noise Zone II 87–104 dB Peak	Noise Zone III >104 dB Peak
48	Utilities	Y[2]	Y
49	Other transportation, communication and utilities	25	35
50	**Trade**		
51	Wholesale trade	Y[2]	Y[3]
52	Retail trade – building materials, hardware and farm equipment	25	35
53	Retail trade – including shopping centers, discount clubs, home improvement stores, electronics superstores, etc.	25	35
54	Retail trade – food	25	35
55	Retail trade – automotive, marine craft, aircraft and accessories	25	35
56	Retail trade – apparel and accessories	25	35
57	Retail trade – furniture, home, furnishings and equipment	25	35
58	Retail trade – eating and drinking establishments	25	35
59	Other retail trade	25	35
60	**Services**		
61	Finance, insurance and real estate services	25	35
62	Personal services	25	35
62.4	Cemeteries	Y[2]	Y[3]
63	Business services	25	35
63.7	Warehousing and storage	Y[2]	Y[3]
64	Repair services	Y[2]	Y[3]
65	Professional services	25	N
65.1	Hospitals, other medical facilities	N	N
65.16	Nursing homes	N	N
66	Contract construction services	25	35
67	Government services	25	35
68	Educational services	35	N
68.1	Child care services, child development centers, and nurseries	35	N
69	Miscellaneous Services	35	N
69.1	Religious activities (including places of worship)	35	N
70	**Cultural, entertainment, and recreational**		
71	Cultural activities	35	N
71.2	Nature exhibits	N	N
72	Public assembly	N	N
72.1	Auditoriums, concert halls	35	N
72.11	Outdoor music shells, amphitheaters	N	N
72.2	Outdoor sports arenas, spectator sports	N	N
73	Amusements	Y	N
74	Recreational activities (including golf courses, riding stables, water recreation)	N	N

Table A-3. Recommended Land Use Compatibility for Small Arms Noise

LAND USE		SUGGESTED LAND USE COMPATIBILITY	
SLUCM NO.	LAND USE NAME	Noise Zone II 87–104 dB Peak	Noise Zone III >104 dB Peak
75	Resorts and group camps	N	N
76	Parks	N	N
79	Other cultural, entertainment and recreation	N	N
80	**Resource production and extraction**		
81	Agriculture (except livestock)	Y[4]	Y[5]
81.5	Livestock farming	Y[4]	N
81.7	Animal breeding	Y[4]	N
82	Agriculture related activities	Y[4]	Y[5]
83	Forestry activities	Y[4]	Y[5]
84	Fishing activities	Y	Y
85	Mining activities	Y	Y
89	Other resource production or extraction	Y	Y

KEY:

SLUCM – Standard Land Use Coding Manual, U.S. Department of Transportation.

dBP – unweighted Peak decibel level.

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.

NOTES:

1. General

   a. Although local requirements for on- or off-base housing may require noise-sensitive land uses within Noise Zone II, such land use is generally not recommended. 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, non-conforming land uses.

   b. Where the community determines that these uses must be allowed, measures to achieve outdoor to indoor NLR of at least 30 decibels (dB) in Noise Zone II should be incorporated into building codes and be considered in individual approvals.

c. Normal permanent construction can be expected to provide an NLR of 20 dB, thus the reduction requirements are often stated as 10 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors, and closed windows year round.

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 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 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. Residential buildings require an NLR of 30.

5. Residential buildings are not permitted.

Appendix B. Key Terms

Community Noise Equivalent Level (CNEL) – CNEL is a composite noise metric accounting for the sound energy of all noise events in a 24-hour period. In order to account for increased human sensitivity to noise in the evening and at night, a 5 dB adjustment is applied to events that occur between 7 p.m. and 10 p.m. and a 10 dB adjustment is applied to events occurring during the acoustical nighttime period (10 p.m. through 7 a.m.).

Day-Night Average Sound Level (DNL) – DNL is a composite noise metric accounting for the sound energy of all noise events in a 24-hour period. In order to account for increased human sensitivity to noise at night, DNL includes a 10 dB adjustment to events occurring during the acoustical nighttime period (10 p.m. through 7 a.m.). See section 4.3 for additional information.

Decibel (dB) – Decibel is the unit used to measure the intensity of a sound.

Flight Profiles – Flight profiles consist of aircraft conditions (e.g., altitude, speed, power setting) defined at various locations along each assigned flight track.

Flight Track – The flight track locations represent the various types of arrivals, departures, and closed patterns accomplished at air installations. The location for each track is representative for the specific track and may vary due to air traffic control, weather, and other reasons (e.g., one pilot may fly the on one side of the depicted track, while another pilot may fly slightly to the other side of the track).

Operation – An aircraft operation is defined as one takeoff or one landing. A complete closed pattern or circuit is counted as two operations because it has a takeoff component and a landing component. A sortie is a single military aircraft flight from the initial takeoff through the termination landing. The minimum number of aircraft operations for one sortie is two operations, one takeoff (departure) and one landing (approach).

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