100% FINAL

JOINT BASE LANGLEY-EUSTIS, VIRGINIA

Air Installations Compatible Use Zones (AICUZ) Study

June 2020

U.S. AIR FORCE

DEPARTMENT OF THE AIR FORCE

AIR COMBAT COMMAND

MEMORANDUM FOR AREA GOVERNMENTS

FROM: Joint Base Langley-Eustis
Hampton, VA 23665

SUBJECT: Air Installations Compatible Use Zones (AICUZ) Study

1. The 2020 AICUZ Study for Joint Base Langley-Eustis (JBLE) is an update of the Langley Air Force Base (AFB) 2007 AICUZ Study and includes JBLE-Eustis. Langley AFB and the United States Army's Fort Eustis were merged on October 1, 2010, to form Joint Base Langley-Eustis (JBLE), in accordance with the 2005 Base Realignment and Closure Commission recommendation. The Air Force initiated the update to include changes to the AICUZ since the release of the previous studies in 2007. It is a reevaluation of military operational noise and safety zones. 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 JBLE.

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. The AICUZ Study also provides JBLE's surface danger zones and noise zones associated with the JBLE-Eustis small arms ranges. It is our recommendation that local governments incorporate these recommendations into community plans, zoning ordinances, subdivision regulations, building codes, and other related documents.

3. This update provides noise contours based upon the Day-Night Average Sound Level (DNL) metric and utilizes a planning noise contour. Long-range planning by local land use authorities involves strategies to influence present and future uses of land. Due to the long-range nature of planning, the Air Force provides planning contours—noise contours based on reasonable projections of future missions and operations. AICUZ studies using planning contours provide a description of the long-term aircraft noise environment for projected aircraft operations that is more consistent with the planning horizon used by state, tribal, regional, and local planning bodies.

4. We greatly value the positive relationship JBLE 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 and avoiding flights over heavily populated areas. We solicit your cooperation in implementing the recommendations and guidelines presented in this AICUZ Study update.

[Commander's Signature Block]
Commander

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Abbreviations and Acronyms

ACC	Air Combat Command
AFB	Air Force Base
AFI	Air Force Instruction
AFPD	Air Force Policy Directive
AICUZ	Air Installations Compatible Use Zones
Air Force	United States Air Force
APZ	Accident Potential Zone
ATC	Air Traffic Control
BASH	Bird/Wildlife Aircraft Strike Hazard
CATM	Combat Arms Training and Maintenance
CDNL	C-weighted Day-night Average Noise Level
CFR	Code of Federal Regulations
CZ	Clear Zone
dB	Decibel
DNL	Day-Night Average Sound Level
DoD	Department of Defense
EMI	Electromagnetic Interference
FAA	Federal Aviation Administration
FAR	Floor Area Ratio
GCA	Ground Control Approach
HAFZ	Hazards to Aircraft Flight Zone
HRPDC	Hampton Roads Planning District Commission
Hz	Hertz
IONMP	Installation Operational Noise Management Plan
JBLE	Joint Base Langley-Eustis
JLUS	Joint Land Use Study
LaRC	Langley Research Center
LFA	Langley Flight Approach
Lpk	Peak Sound Pressure Level
MSL	Mean Sea Level
NASA	National Aeronautics and Space Administration
NLR	Noise Level Reduction
NVGs	Night Vision Goggles
PA	Public Affairs
RPA	Remotely Piloted Aircraft
SLUCM	Standard Land Use Coding Manual
UAS	Unmanned Aircraft System
U.S.C.	United States Code
USDA	United States Department of Agriculture
VFR	Visual Flight Rules

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1.0 Introduction

The 2020 Air Installations Compatible Use Zones (AICUZ) Study for Joint Base Langley-Eustis (JBLE) is an update of the Langley Air Force Base (AFB) 2007 AICUZ Study and includes JBLE-Eustis. Langley AFB and the United States Army's Fort Eustis were merged on October 1, 2010, to form JBLE, in accordance with the 2005 Base Realignment and Closure Commission recommendation. The update presents and documents changes to the AICUZ since the release of the previous studies in 2007. It reaffirms the United States 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 for JBLE-Langley and current noise contours for JBLE-Eustis, as well as 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 military'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 for JBLE-Langley and latest available air and small arms operations for JBLE-Eustis. The Air Force provides JBLE's CZs, APZs, noise zones, and Hazards to Aircraft Flight Zones associated with the JBLE-Langley and the JBLE-Eustis airfield runways and helipads 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. The Air Force also provides JBLE's surface danger zones and noise zones associated with the JBLE-Eustis small arms ranges.

1.2.2 Authority

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

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

- Air Force Handbook 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 Air Force Policy Directive (AFPD) 32-70, *Environmental Quality*.

1.3 Previous AICUZ Efforts and Related Studies

Previous studies relevant to this AICUZ Study include:

- Langley AFB AICUZ Study, 2007

- United States Army Transportation Center Fort Eustis and Fort Story Installation Operational Noise Management Plan (IONMP), 2007

- Hampton-Langley Joint Land Use Study (JLUS), 2010

- Virginia Regional JLUS Implementation Strategy, 2017

- Hampton-Langley JLUS Resilience Addendum, 2018

- Fort Eustis JLUS, 2018

1.4 Changes that Require an AICUZ Study Update

This 2020 JBLE AICUZ Study updates the 2007 Langley AFB AICUZ Study and includes JBLE-Eustis. The 2020 JBLE AICUZ provides flight tracks, CZs, APZs, noise zones, surface danger zones, the latest available aircraft and small arms activities, and a projection of future aircraft operations occurring at JBLE. As such, the AICUZ Program 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. The primary changes since the previous AICUZ Study that necessitate this update include:

- Joint basing of Langley AFB and Fort Eustis in 2010 as a result of the Base Realignment and Closure recommendations.
- Update of Air Force Instruction (AFI) 32-7063 to include ground ranges and subsequent integration into AFI 32-1015.
- Update of Air Force Handbook (AFH) 32-7084 to include ground ranges.
- Use of planning noise contours at JBLE-Langley.
- Inclusion of JBLE-Eustis.
- Operational changes (i.e., introduction of additional aircraft, flight track changes, noise contour changes, and mission changes).

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2.0 JBLE, Virginia

2.1 Location

JBLE is located in the Hampton Roads region of southeastern Virginia (Figure 2-1). JBLE is comprised of several land holdings, including the following:

- **JBLE-Langley**: JBLE-Langley occupies 3,167 acres and is located within the City of Hampton, which is bordered by York County and Poquoson to the north and the City of Newport News to the west.
- **JBLE-Eustis**: JBLE-Eustis occupies 7,933 acres and is located approximately 17 miles northwest of JBLE-Langley within the City of Newport News, which is bordered by the James River to the west, James City County to the northwest, and York County to the north and east.
- **National Aeronautics and Space Administration (NASA) Langley Research Center (LaRC):** Adjacent to the eastern boundary of JBLE-Langley, NASA LaRC occupies 764 acres.
- **Landings at Langley:** The Landings at Langley is military housing associated with JBLE and is located in York County between JBLE-Langley and JBLE-Eustis.

JBLE-Langley Main Gate (top left), JBLE-Eustis Main Gate (top right), NASA LaRC Entrance (bottom left), Landings at Langley Jamestown Village Section (bottom right)

2.2 History

JBLE-Langley, formerly Langley AFB, was established in 1917 as the General Headquarters Air Force and contains the oldest active Air Force airfield, Langley Field. Langley Field was originally purchased in 1916 for the Army Air Forces to build an airfield for aeronautical research, experiments, flight tests, and use by the National Advisory Committee for Aeronautics (known today as NASA). JBLE-Eustis, formerly Fort Eustis, received permanent military installation status in 1923 after serving as Camp Abraham Eustis, a training center for Coast Artillery Corps units and Army Balloonists' School, during World War I. Fort Eustis contains Felker Army Airfield, which opened in 1954 as Felker Heliport, the first military heliport in the world.

In 2010, Langley AFB and Fort Eustis were consolidated under the responsibility of the Air Force and the 633d Air Base Wing, becoming JBLE in accordance with the 2005 Base Realignment and Closure Commission recommendation. The intent of this joint base merger was to promote and foster a more cohesive operational partnership between the Air Force and Army, while preserving capabilities and unique Service identities. Today, JBLE is home to more than 18,000 Air Force and Army personnel accomplishing a variety of missions, including transportation, fighter operations, and training.

Langley Field circa 1922 (left), Felker Heliport circa 1954 (right)

2.3 Mission

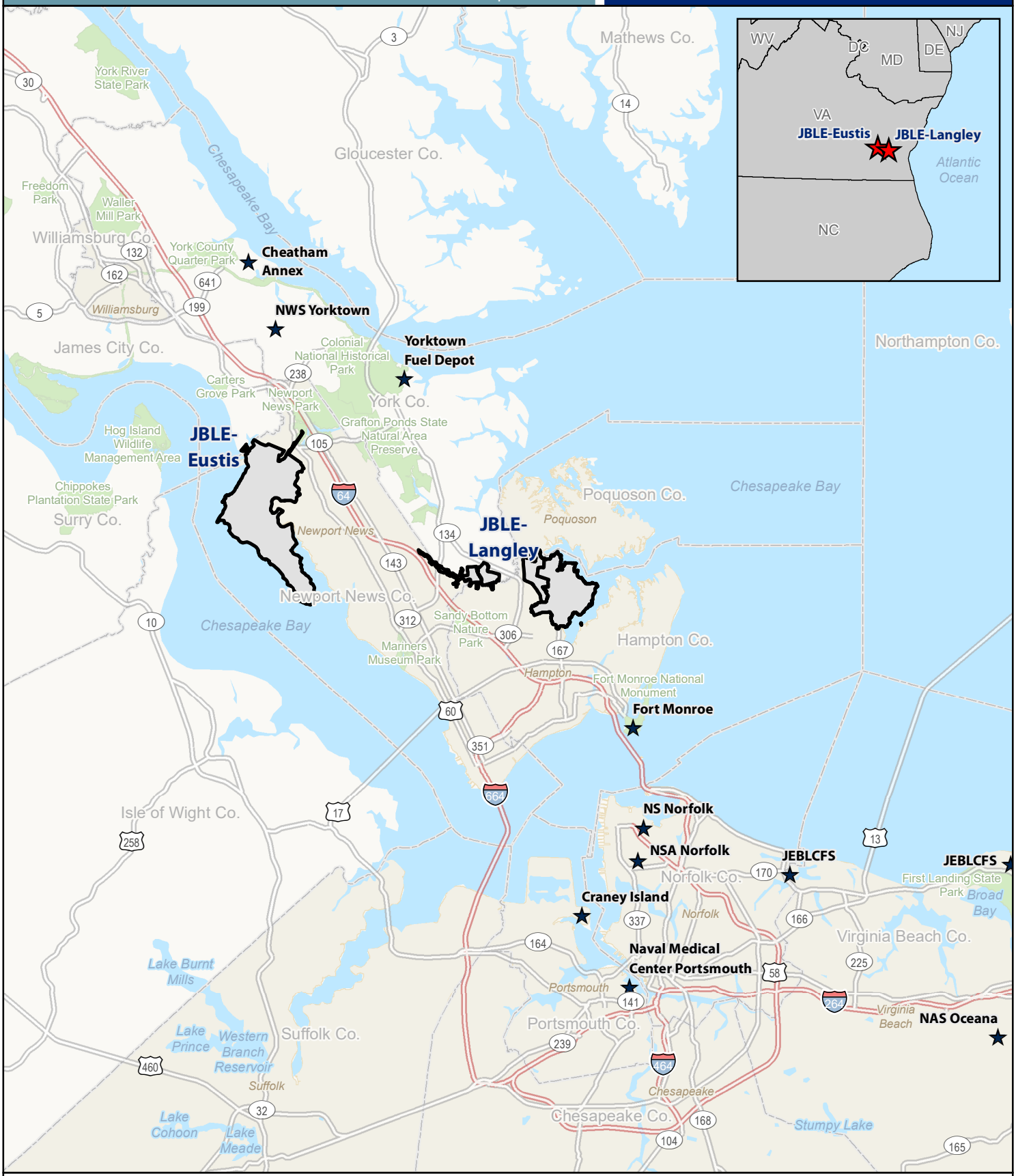
The host unit of JBLE is the 633d Air Base Wing, an Air Force-led mission support wing that serves both Air Force and Army units. The 633d Air Base Wing provides mission-ready expeditionary airmen to combatant commanders in support of joint operations worldwide. The primary mission performed at JBLE-Langley is the mission of the 1st Fighter Wing. JBLE-Eustis is a Training and Doctrine Command installation that provides training related to operations that require transportation modes, including rail, marine, and amphibious movements. This AICUZ Study focuses on the flying and small arms missions at JBLE.

Figure 2-1

Joint Base Langley-Eustis

Air Installation Compatible Use Zones

Regional Setting



Legend

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

0 5 10 Miles

N

Source: AFCEC 2018, 2019; DoD 2017; ESRI 2016; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

2.4 Host and Tenant Organizations

JBLE Host Organization	
	**633d Air Base Wing** The 633d Air Base Wing is the host organization for JBLE. The wing is an Air Force-led mission support wing that serves both Air Force and Army units and provides mission-ready expeditionary airmen to combatant commanders in support of joint and combined operations worldwide. The wing also provides installation support to more than 20,000 military and civilian personnel, including Headquarters Air Combat Command, three operational wings at JBLE, and Air Force and Army tenants.
Tenant Organizations (JBLE-Langley)	
	**1st Fighter Wing** The F-22 Raptor is assigned to JBLE-Langley as part of the 1st Fighter Wing and is the Air Force's fifth-generation fighter aircraft. The F-22 Raptor performs air-to-air and air-to-ground missions as a critical component of the Global Strike Task.
	**192d Wing, Virginia Air National Guard** The 192d Wing, Virginia Air National Guard provides a fully trained organization of volunteer airmen. The wing's federal mission is to maintain the highest degree of combat readiness as an effective combat unit to the United States Air Force upon mobilization. The wing's state mission is to remain ready to answer any call to duty by the governor to aid, protect, and defend the state and its citizens.
	**363d Intelligence, Surveillance and Reconnaissance Wing** The 363d Intelligence, Surveillance and Reconnaissance Wing provides expertise to Air Force Special Operations Command and strengthens analytical and targeting capabilities of the rest of the Air Force.
	**480th Intelligence, Surveillance, and Reconnaissance Wing** The 480th Intelligence, Surveillance, and Reconnaissance Wing is the Air Force leader in globally networked intelligence, surveillance, and reconnaissance operations, from humanitarian assistance to major theater conflict.

National Aeronautics and Space Administration Langley Research Center

The NASA LaRC works to make revolutionary improvements to aviation, expand understanding of Earth's atmosphere, and develop technology for space exploration. The center is composed of nearly 200 facilities on 764 acres and employs about 3,400 civil servants and contractors. NASA LaRC also utilizes the runways at JBLE-Langley.

Tenant Organizations (JBLE-Eustis)

United States Army Training and Doctrine Command

United States Army Training and Doctrine Command designs, recruits, trains, and educates the Army, driving constant improvement and change to ensure the total Army can deter, fight, and win on any battlefield.

7th Transportation Brigade (Expeditionary)

The 7th Transportation Brigade (Expeditionary) provides mission command of assigned and attached port, terminal, and watercraft units in support of unified land operations.

128th Aviation Brigade

The 128th Aviation Brigade generates disciplined, physically fit, technically proficient aviation maintenance soldiers and leaders, contributing to the combat readiness of the Army and other services.

93rd Signal Brigade

The 93rd Signal Brigade commands, controls, and defends the eastern region of the LandWarNet, a single, secure, standards-based, versatile infrastructure in the continental United States. The brigade also supports operating and generating forces engaged in full-spectrum operations by enhancing battle command through the transparent delivery of LandWarNet capabilities.

Other Tenant Flying Organizations

JBLE-Eustis's other tenant flying organizations include the Aviation Technologies Organization, the DoD's Aviation Applied Technologies Directorate, and the 159th Aviation Bravo Company. Aviation Technologies Organization and Aviation Applied Technologies Directorate are research and test development organization. The 159th Aviation Bravo Company is an Army Reserve CH-47 Chinook unit.

2.5 Airfield Environment

2.5.1 JBLE-Langley

The JBLE-Langley airfield is located in the center of the installation. The runway, Runway 08/26, is 10,002 feet long by 150 feet wide and oriented along an east-west axis (Figure 2-2). The 1st Fighter Wing operates from two aprons on the south side of the runway. NASA LaRC and the Civil Air Patrol operate from an apron on the north side. There are also several helipads on the north side of the runway. Air traffic control (ATC) is provided by the Air Force via a control tower on the airfield. The Federal Aviation Administration (FAA) also provides ATC via a terminal radar approach control facility in Norfolk.

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'.

2.5.2 JBLE-Eustis

The JBLE-Eustis airfield, Felker Army Airfield, is located in the southwestern portion of the installation. The runway, Runway 14/32, is 3,020 feet long by 75 feet wide and oriented along a northwest-southeast axis (Figure 2-3). A helipad is located less than a half mile northeast of the runway. The maintenance facilities, aprons, taxiways, and helipad primarily support tenant aviation organizations. The Air Force provides ATC via a control tower on the airfield.

2.6 Small Arms Range Environment

JBLE-Eustis also has six active small arms ranges that occupy approximately 75 acres in the southern portion of the installation (Figure 2-4). Small arms ranges are used for marksmanship training activities. In addition to the small arms ranges listed below, combat arms training and maintenance (CATM) operations also occur at JBLE-Langley at the CATM range. Occasionally CATM operations are heard off-base.

The small arms ranges at JBLE-Eustis include:

- **Range 1:** Pistol Qualification and Shotgun Familiarization
- **Range 2:** 25-meter Zero Range, M16 Qualification, M248 10m Familiarization
- **Range 3:** Automated Record Fire Range (M16 Qualification)
- **Range 4:** Special Reaction Team Sniper Range, M60 Machine Gun, 9-millimeter Qualification

- **Range 5:** Combat Pistol Qualification Course, Aviation Applied Technology Directorate Ballistics lab

- **Range 6:** M203 Range

Figure 2-2

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

JBLE-Langley Airfield Diagram

Legend

- Installation Boundary
- Hush House
- County Boundary
- City Boundary

0 0.25 0.5 Miles

N

Source: AFCEC 2018, 2019; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 2-3

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

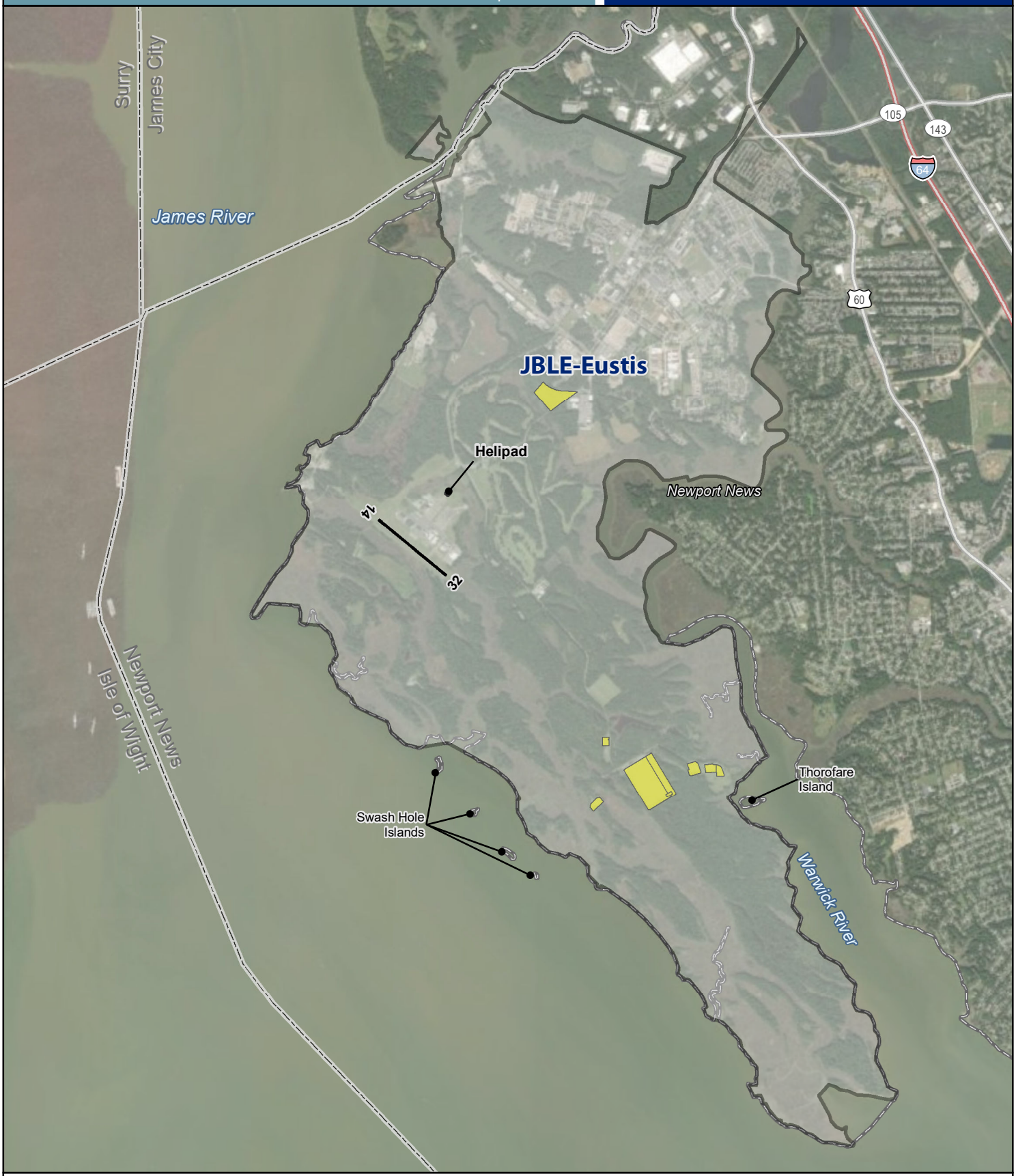
JBLE-Eustis Airfield Diagram

Source: AFCEC 2018; Digital Globe 2017.

Figure 2-4

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

JBLE-Eustis Small Arms Range Locations



Legend

- Airfield Runway
- Installation Boundary
- Small Arms Range
- Interstate Highway
- State/U.S. Highway

0 0.5 1 Miles

N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

2.7 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. In 2018, JBLE's local economic impact was $2.9 billion (Air Force 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.

JBLE directly employs 20,497 military and civilian personnel, and has 7,162 military dependents. JBLE's spending generated approximately $170 million in local expenditures, including construction, services, materials, equipment, supplies, and United States Army Corps of Engineers projects. JBLE is also responsible for an estimated 34,486 indirect jobs with an annual dollar value of approximately $636 million (Air Force 2018).

Tables 2-1 and 2-2 provide summaries of personnel for JBLE, the economic impact of the installation, military and civilian payroll, and construction, contracts, and expenditures for materials, equipment, and supplies.

Table 2-1. Personnel and Payroll

	Direct		Indirect	
Military	**Jobs**	**Payroll ($K)**	**Jobs**	**Payroll ($K)**
Active Duty	13,437	$160,584	5,153	$611,210
Air National Guard	1,233	$30,995	266	$31,491
Subtotal	*14,670*	*$632,579*	*5,419*	*$642,700*
Civilian	**Jobs**	**Payroll ($K)**	**Jobs**	**Payroll ($K)**
General Wage Schedule	4,668	$493,627	4,229	$510,525
Federal Wage Board	97	$12,067	103	$12,260
Other Civilians	284	$35,330	303	$35,896
Appropriated Fund NAF-Activity	161	$7,090	61	$7,203
Appropriated Fund AAFES	409	$8,489	73	$8,625
Appropriated Fund DeCA	208	$9,693	83	$9,848
Subtotal	*5,827*	*$566,296*	*4,852*	*$575,356*
Other	**Jobs**	**Payroll ($K)**	**Jobs**	**Payroll ($K)**
Dependents	7,162	-	-	-
Retirees	729,398	-	-	-
Subtotal	*736,560*	-	-	-
Total	**757,057**	**$1,198,875**	**10,271**	**$1,218,057**

Source: Air Force 2018.

Table 2-2. Expenditures

Expenditure	($K)	
	Direct	Indirect
Non-Appropriated Funds	$277	$207
O&M Construction	$66,449	$49,684
Utilities	$23,949	$11,321
Educational Services	$137	$128
Other Services	$139,549	$126,097
Other Local Expenditures	$6,079	$5,020
Retail Portion of Non-Local Goods & Services	$8,961	$7,131
Local Travel Spending	$25,880	$18,747
Total	**$271,281**	**$218,334**

Source: Air Force 2018.

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 JBLE, the types and number of operations conducted at the airfields, and the runways and flight tracks used to conduct the operations.

3.1 Aircraft Types

There are two primary types of aircraft operating at JBLE: fixed-wing (airplanes and jets) and rotary-wing (helicopters). These aircraft are permanently based at JBLE and are the most common aircraft conducting flight operations at the installation. Aircraft that are not permanently assigned to the installation, but conduct operations from the installation on an occasional basis, are referred to as "transient" aircraft. Brief descriptions of assigned aircraft and the most common transient aircraft at JBLE are provided below. Additional transient aircraft types from other services and air forces around the world occasionally use both airfields.

Based Aircraft (JBLE-Langley)

F-22 Raptor

The F-22 Raptor is a part of the 1st Fighter Wing and is the Air Force's first fifth-generation fighter aircraft. The F-22 Raptor performs air-to-air and air-to-ground missions as a critical component of the Global Strike Task.

T-38A/B Talon

The T-38A/B Talon is a twin-engine, high-altitude, supersonic jet trainer used in a variety of roles because of its design, economy of operations, ease of maintenance, high performance, and exceptional safety record.

Beechcraft UC-12B Huron (NASA 528)

The Beechcraft UC-12B Huron (NASA 528) provides an efficient and effective operational platform for science payloads that require unique integration, dedicated flight profiles, coordinated flights with other platforms, or flight patterns in congested airspace. This aircraft is associated with NASA LaRC's Airborne Science Program.

Cessna 206H Stationair (NASA 504)

The Cessna 206H Stationair (NASA 504) is a small single-engine general aviation aircraft that provides a low-cost research platform for advanced pilot displays. This aircraft is associated with NASA LaRC's Airborne Science Program.

Cirrus Design SR22

The Cirrus Design SR22 is a single-engine production general aviation aircraft. This aircraft is associated with NASA LaRC's Airborne Science Program.

HU-25C Guardian Falcon

The HU-25C Guardian Falcon is a modified twin-engine business jet that provides remote sensing instruments and satellite support. This jet is associated with NASA LaRC's Airborne Science Program.

Transient Aircraft (JBLE-Langley)

C-12 Huron

The C-12 Huron is a military version of an executive passenger and transport aircraft based on the Beech Model 200 Super King Air. The C-12 is a twin turboprop aircraft used for cargo and passenger airlift. The aircraft can carry 19 passengers or up to 3,500 pounds of cargo.

DC-10

The DC-10 is a three-engine, wide-body passenger jet. The aircraft has two turbofan engines mounted underwing and a third at the base of the vertical stabilizer.

F-16 Fighting Falcon

The F-16 Fighting Falcon is a multi-role, highly maneuverable, fighter aircraft that temporarily visits JBLE-Langley or uses JBLE-Langley as an emergency divert field. The F-16 is used in air to air combat and air to surface attack by the United States and allied nations.

F-35 Lightning II

The F-35 is a fifth-generation fighter, which provides next-generation stealth, enhanced situational awareness, and reduced vulnerability for the United States and allied nations.

C-23 Sherpa

The Short C-23 Sherpa is a small military transport aircraft designed to operate from unpaved runways and make short takeoffs and landings.

C-130 Hercules

The Lockheed Martin C-130 Hercules is the Air Force's principal tactical cargo and personnel transport aircraft to conduct its airlift mission. The aircraft is capable of operating from rough dirt strips and is the prime transport for airdropping troops and equipment into hostile areas.

C-17 Globemaster III

The Boeing C-17 Globemaster III military airlift aircraft is a high-wing, four-engine, T-tailed military transport vehicle capable of carrying payloads up to 169,000 pounds. Since it entered service in January 1995, 218 aircraft have been delivered to the Air Force. The C-17 is capable of rapid strategic delivery of troops and all types of cargo to main operating bases or directly to forward bases in the deployment area.

F-15 Eagle

The F-15 Eagle is a twin-engine, all-weather, extremely maneuverable, tactical fighter that is the backbone for the Air Force's air superiority and homeland defense missions. Its two engines provide 58,000 pounds of thrust, which enable the F-15 to exceed speeds of Mach 2.5.

F/A-18 Super Hornet

The McDonnell Douglas F/A-18 Super Hornet is highly capable across the full mission spectrum: air superiority, fighter escort, reconnaissance, aerial refueling, close air support, air defense suppression and day/night precision strike. Compared to the original F/A-18 A through D models, the Super Hornet (E/F) has longer range, an aerial refueling capability, increased survivability/lethality, and improved carrier suitability.

Based Aircraft (JBLE-Eustis)

AH-64 Apache

The AH-64 Apache is a twin-engine, four-bladed, multi-mission attack helicopter designed as a highly stable aerial weapons-delivery platform.

CH-47 Chinook

The CH-47 Chinook, the largest aircraft assigned to JBLE-Eustis, is a heavy-lift cargo rotary-wing aircraft supporting combat and non-combat operations.

UH-60 Blackhawk

The UH-60 Blackhawk is a four-bladed, twin-engine, medium-lift utility helicopter. The UH-60 is capable of carrying 11 personnel or up to 2,600 pounds of cargo internally or 9,000 pounds of cargo externally via sling.

Transient Aircraft (JBLE-Eustis)

Sikorsky CH-53E

Transient aircraft at JBLE-Eustis are primarily rotary-wing Navy aircraft, as well as transient Marine Corps, Air Force, and Coast Guard aircraft. The Sikorsky CH-53E Super Stallion, for example, is a heavy-lift helicopter flown by both the Navy and Marine Corps.

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, or engine checks conducted as part of aircraft maintenance (commonly called engine “run-ups”).

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 are typically conducted in test cells (for out-of-frame engine testing) and in acoustical enclosures, commonly referred to as “hush houses” (i.e., buildings specifically designed to muffle engine noise during in-frame testing). Noise associated with these operations is included in the noise analysis for the JBLE noise contours.

Aircraft maintenance and static engine runs at JBLE-Langley occur in hush houses, test cells, and aircraft parking areas. There are two hush houses located on the north side of the runway. JBLE-Langley is a 24-hour airport and, though the hush houses do not have quiet hours, they primarily operate during the day and, only when necessary, in the evening until 11:00 p.m. If operations will occur after 11:00 p.m., the community will be notified. Due to the configurations of some aircraft, such as the T-38, some maintenance engine run-ups may also occur outside of the hush houses. At JBLE-Eustis, maintenance engine run-ups are conducted in a hangar between the hours of 7:00 a.m. and 10:00 p.m. Depending on mission necessity, maintenance engine runs could occur during nighttime hours.

Hush House performing an engine run at JBLE (left), An F-22 Raptor parked in a hangar on the flight line at JBLE (right)

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 at JBLE.

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.

This AICUZ Study considers JBLE flight operations generated by assigned and transient aircraft, including, but not limited to, the aircraft types described in Section 3.1. At JBLE-Eustis, Felker Airfield ATC documents aircraft movements which, in addition to the types of operations described below, include any aircraft activity that requires ATC's permission, including when an aircraft is passing through JBLE-Eustis' airspace. Operations in other special use areas (e.g., slope training areas, sling load training areas, and confined areas) are also considered an aircraft movement.

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) 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**: A touch-and-go 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 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

Figure 3-1 provides the number of aircraft operations that have occurred at JBLE-Langley over a 10-year period, including based and transient aircraft. Total annual operations account for arrivals, departures, and closed pattern operations. Figure 3-2 provides the number of assigned and transient aircraft operations that have occurred at JBLE-Eustis over a 9-year period.

At JBLE-Langley, current year operations have slightly decreased compared to the operations presented in the 2007 AICUZ Study. Operations over the past five years have been split as approximately 83% taking place during the daytime (defined as taking place from 7:00 a.m. to 10:00 p.m.) and approximately 17% occurring during the nighttime (defined as taking place from 10:00 p.m. to 7:00 a.m.). At JBLE-Eustis, though aircraft operations have changed over time, the overall noise environment has remained relatively consistent since the 2007 IONMP.

Figure 3-1. Summary of Flight Operations at JBLE-Langley for Calendar Years 2007 – 2018

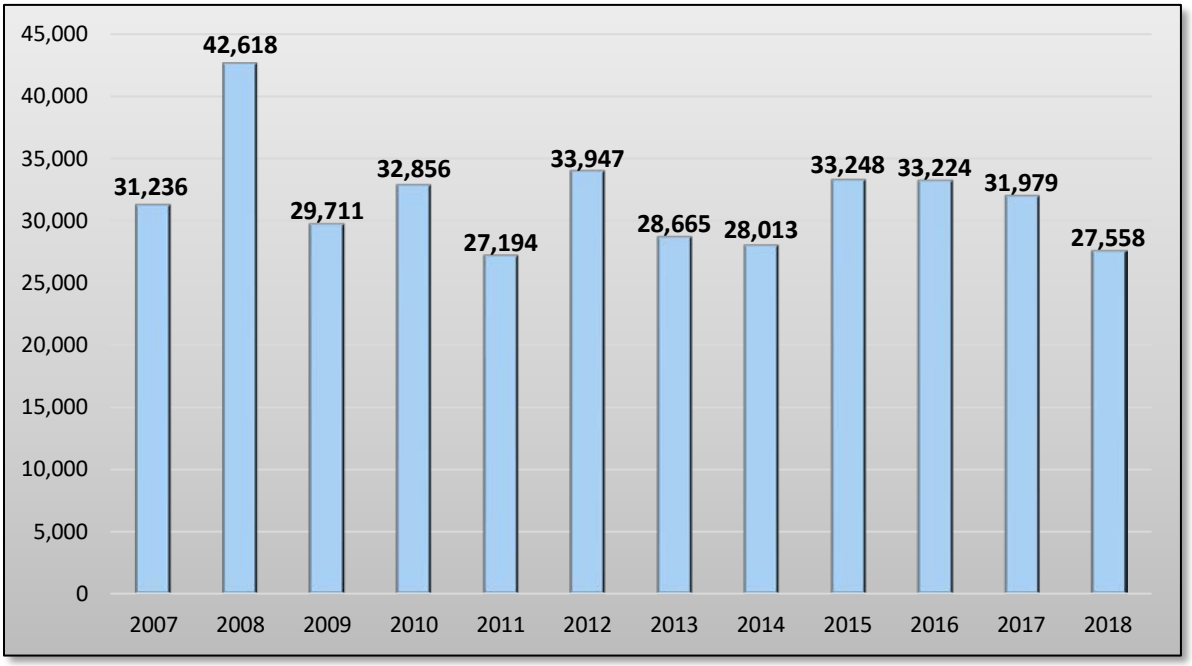


Figure 3-2. Summary of Aircraft Operations at JBLE-Eustis for Calendar Years 2008 – 2017

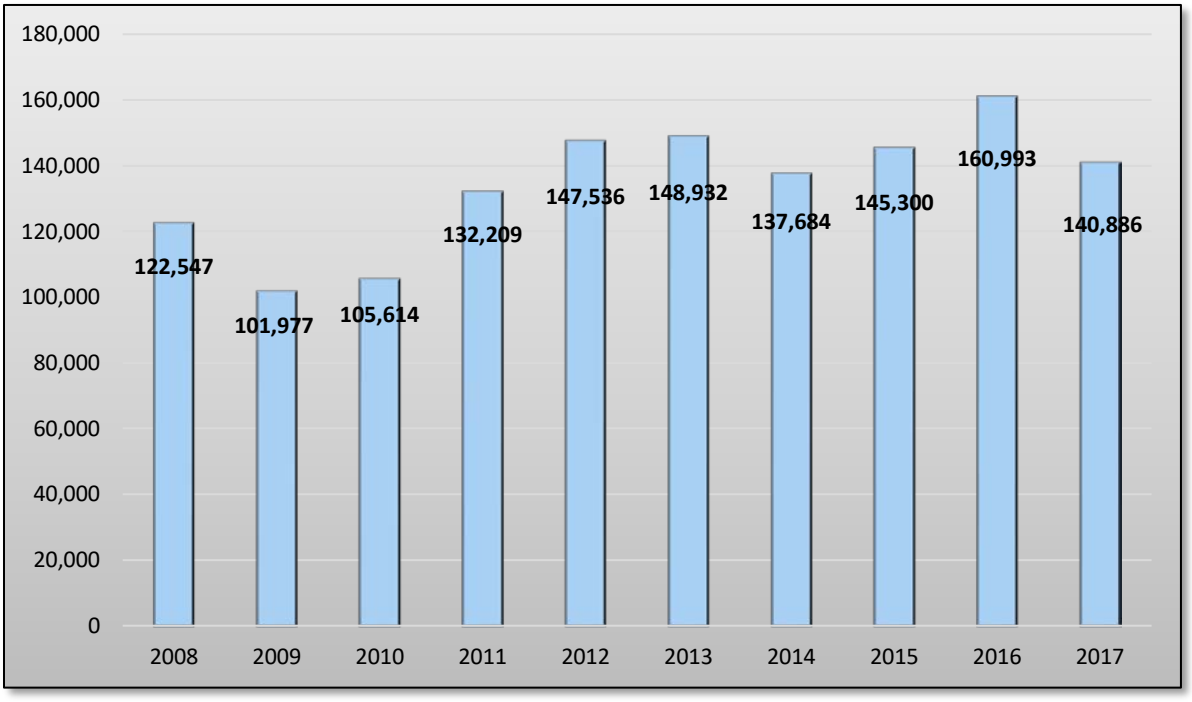


Table 3-1. Calendar Year 2018 [Current] Air Traffic Control Activity Report at JBLE-Langley

	Total
Military	17,490
General Aviation	1,012
Air Carrier/Taxi	4
RPA	99
HELO	8,953
Grand Total	**27,558**

Table 3-2. Calendar Years 2008 – 2017 Annual Aircraft Operations at JBLE-Eustis

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
UH-60	98,037	81,581	84,491	105,767	118,028	119,145	110,127	116,220	128,715	83,400
CH-53	4,289	3,570	3,696	4,627	5,163	5,212	4,818	5,084	5,633	8,500
V-22	0	0	0	0	0	0	100	150	150	1,050
FW	857	713	739	925	1,032	1,042	963	1,016	1,126	950
All Others	19,364	16,113	16,688	20,890	23,313	23,533	21,676	22,830	25,369	46,986
Grand Total	**122,547**	**101,977**	**105,614**	**132,209**	**147,536**	**148,932**	**137,684**	**145,300**	**160,993**	**140,886**

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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
- 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.

F-22 Raptors from the 1st Fighter Wing and 192d Wing participate in a total force exercise at JBLE in February 2019.

Table 3-3 lists how frequently each runway at JBLE-Langley is used. Assigned and transient aircraft utilize Runway 08 for 60 percent of flight operations, and Runway 26 for 40 percent of flight operations. Runway 08 is the preferred runway due to prevailing winds, noise abatement, and other operational considerations. Helicopter departures and arrivals occur on helipads in the northern portion of the airfield and account for 11 percent of aircraft operations at JBLE-Langley.

Table 3-4 lists how frequently each runway at JBLE-Eustis is used. At JBLE-Eustis, aircraft utilize Runway 32 for 60 percent of aircraft operations, and Runway 14 for 40 percent of aircraft operations. Helicopter departures and arrivals frequently occur on the helipad in the northern portion of the airfield.

Table 3-3. Runway Usage and Departure Routing at JBLE-Langley

Runway Direction	Arrival (percent)	Departure (percent)
Runway 08 (East)	60	60
Runway 26 (West)	40	40

Table 3-4. Runway Usage and Departure Routing at JBLE-Eustis

Runway Direction	Arrival (percent)	Departure (percent)
Runway 14 (Southeast)	40	40
Runway 32 (Northwest)	60	60

3.5.2 Flight Tracks

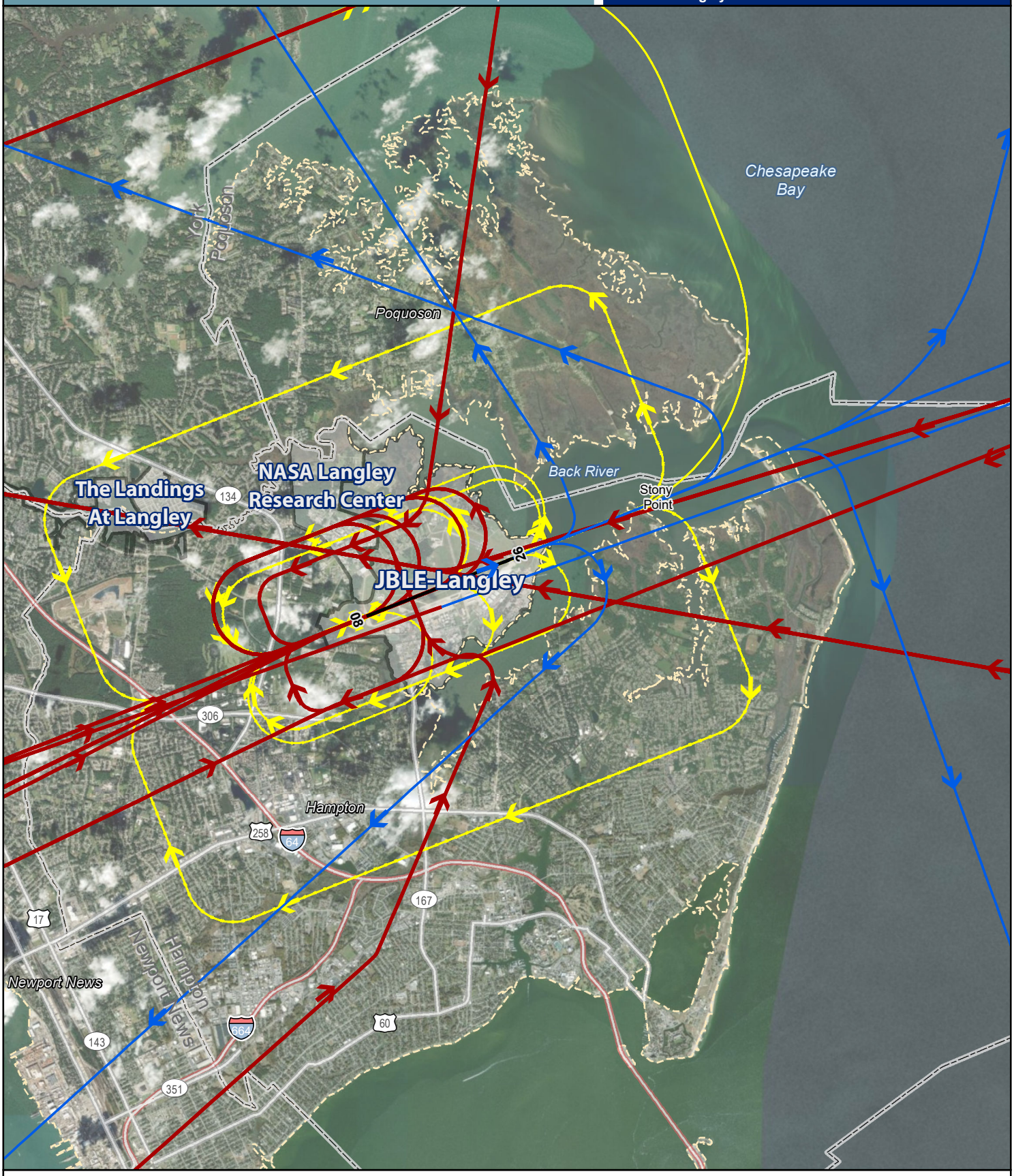
Each runway has designated flight tracks that provide for the safety, consistency, and control of an airfield. Flight tracks depict where aircraft fly in relation to an airfield. They are designed for departures, arrivals, and for pattern work procedures, and are designated for each runway to facilitate 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 3-3, 3-4, and 3-5 present the flight tracks and run-up locations for JBLE-Langley. Figures 3-6 and 3-7 present the flight tracks and run-up locations for JBLE-Eustis.

Figure 3-3

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Flight Tracks for Runway 08 at JBLE-Langley



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- Interstate Highway
- State/U.S. Highway
- Arrival Flight Track
- Closed Pattern Flight Track
- Departure Flight Track

0 0.5 1 Miles

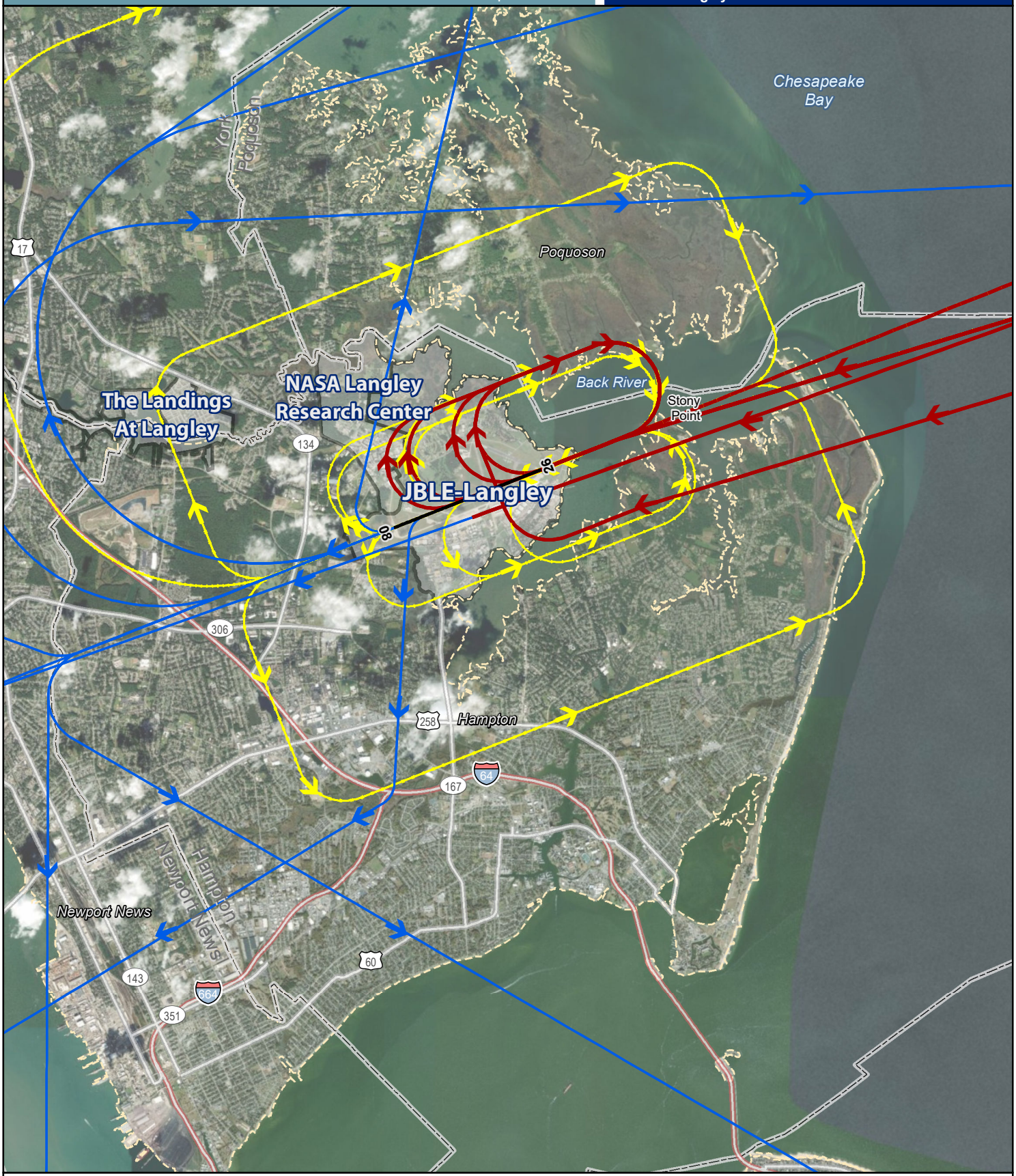
N

Source: AFCEC 2018, 2019; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 3-4

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Flight Tracks for Runway 26
at JBLE-Langley



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- Interstate Highway
- State/U.S. Highway
- Arrival Flight Track
- Closed Pattern Flight Track
- Departure Flight Track

N

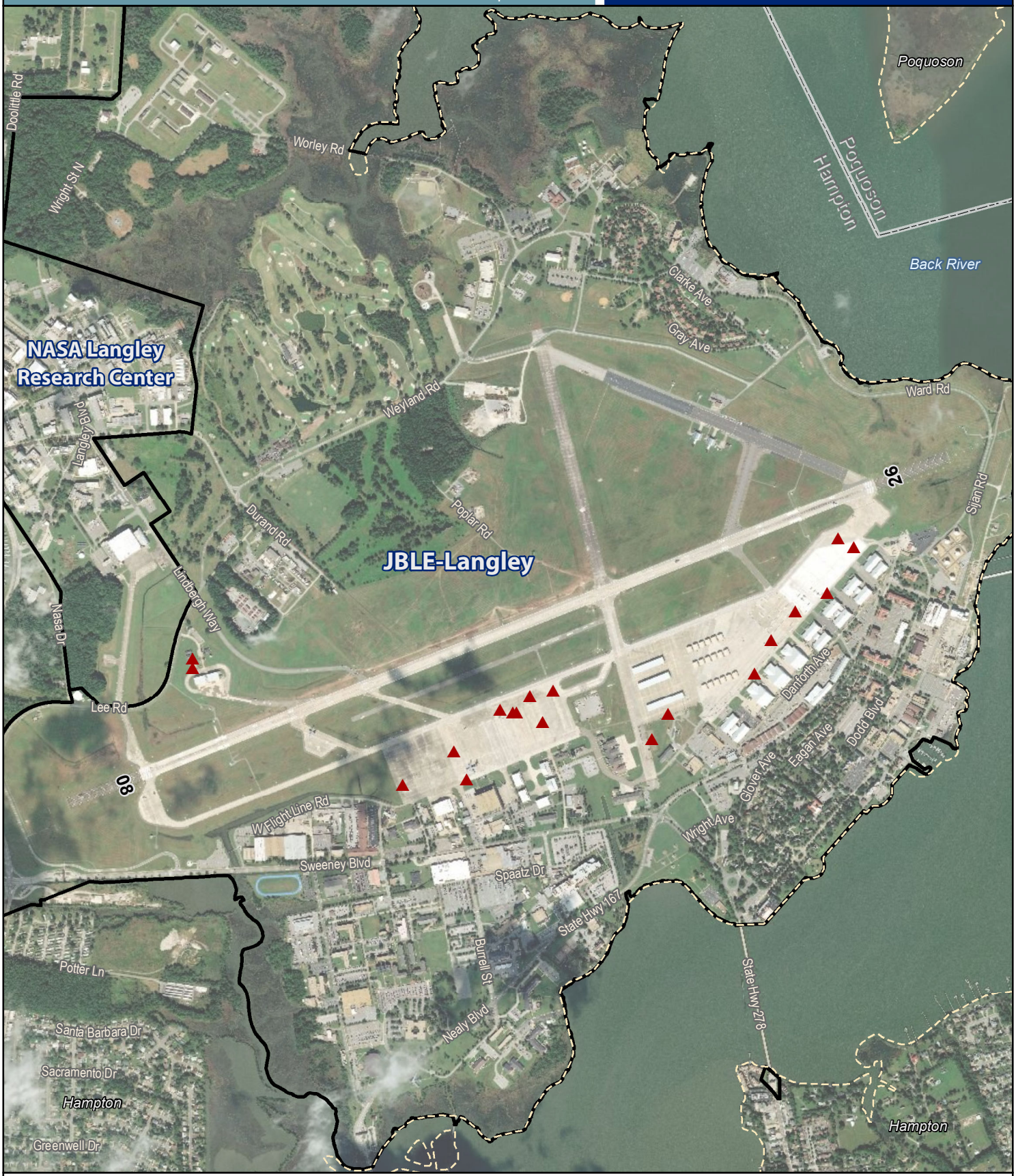
0 0.5 1 Miles

Source: AFCEC 2018, 2019; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 3-5

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Run Up Locations at JBLE-Langley



Legend

- Run Up Location
- Installation Boundary
- County Boundary
- City Boundary

0 0.25 0.5 Miles

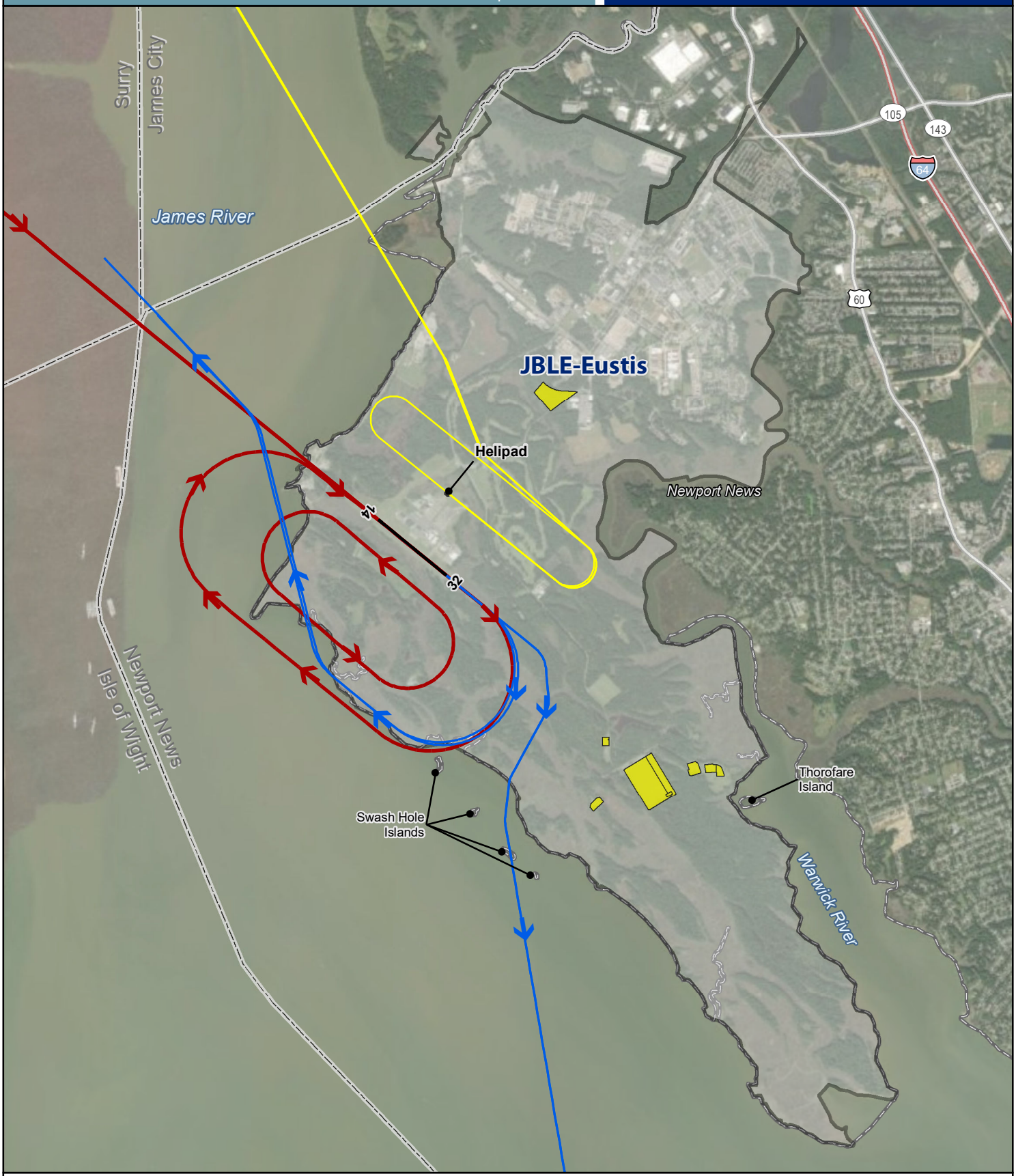
N

Source: AFCEC 2018, 2019; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 3-6

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Flight Tracks for Runways at JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Small Arms Range
- Interstate Highway
- State/U.S. Highway
- Arrival Flight Track
- Closed Pattern Flight Track
- Departure Flight Track

0 0.5 1 Miles

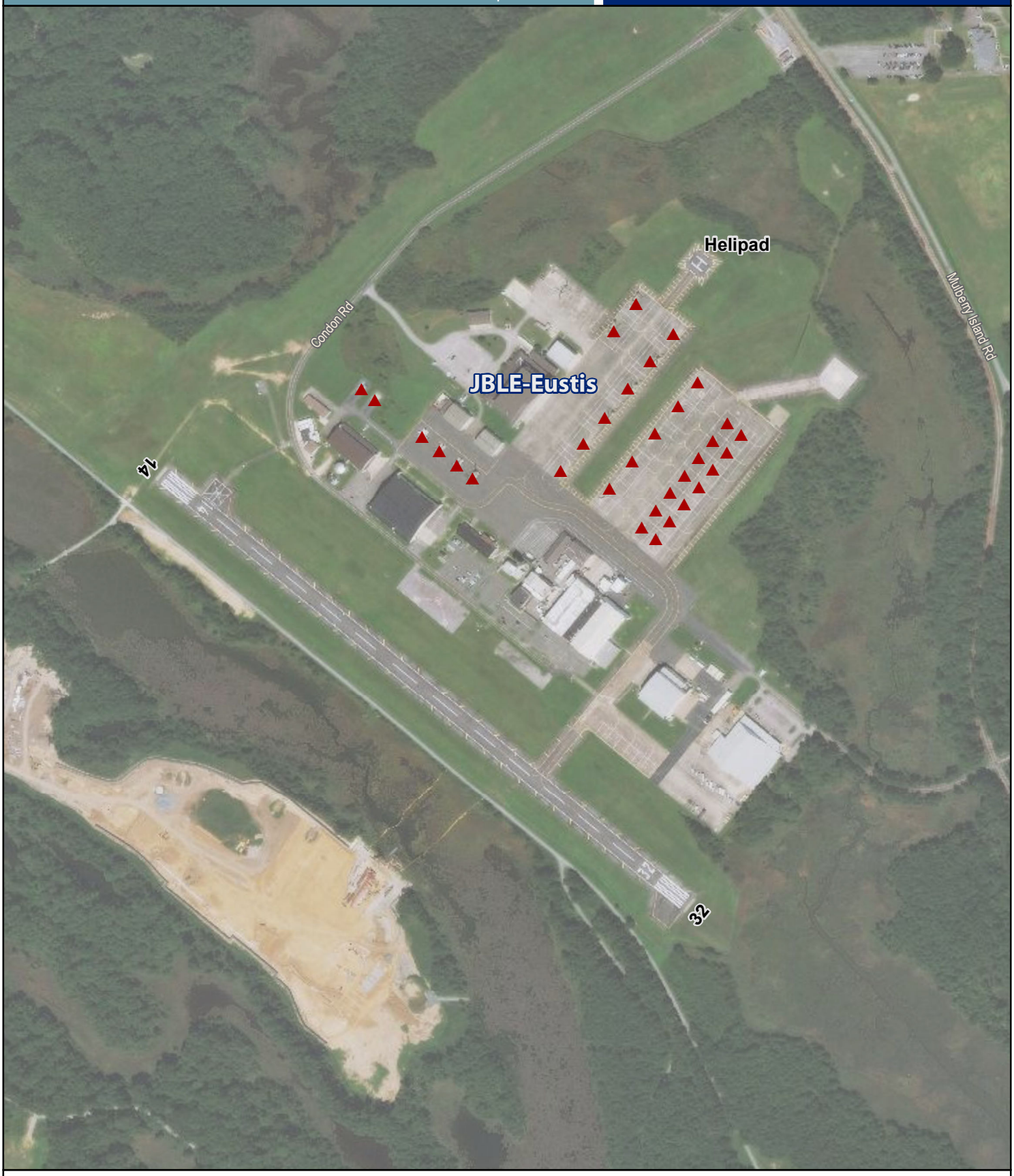
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 3-7

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Run Up Locations at JBLE-Eustis



Legend

▲ Run Up Location

0 500 1,000 Feet

N

Source: AFCEC 2018; Digital Globe 2017.

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. The result is the implementation of various strategies, techniques and procedures, documented under the JBLE Noise Abatement Program, that are aimed at protecting persons and structures from the effects of noise and vibrations.

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.

Noise Abatement Procedures (JBLE-Langley)
• The vast majority of flights (85-95 percent) are routed east over the ocean.
• Closed pattern traffic is generally kept to the north side of the runway to avoid overflying residential areas to the south (both on-base and off-base).
• Aircraft avoid flying over base housing areas.
• Quiet hours begin at 11:00 p.m. and end at 7:00 a.m. Monday through Friday. On weekends and holidays, quiet hours begin at 11:00 p.m. and end at 8:00 a.m. Operations during quiet hours require prior approval. For instances such as these, the base public affairs (PA) office communicates scheduling changes to the community. Departures during quiet hours are made from Runway 08 to the maximum extent possible as it is the designated calm wind runway.
• Supersonic operations are restricted until at least 15 nautical miles from the coastline and above 10,000 feet elevation.
• For operations during established quiet hours, NASA shall coordinate a quiet hour waiver request.
Noise Abatement Procedures (JBLE-Eustis)

- Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:
    - For all areas, an altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.
    - Over any congested area of a city, town, or settlement, or over any open-air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.
    - Over non-congested areas, an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.
- Helicopters may be operated at less than the minimums prescribed for congested and non-congested areas if the operation is conducted without hazard to persons or property on the surface. In addition, each person operating a helicopter shall comply with any routes or altitudes specifically prescribed for helicopters by the FAA.

- JBLE-Eustis practices the Army's fly neighborly or "fly friendly" program, which designates no-fly areas to be avoided whenever possible. The following fly friendly areas are included in the Local Flying Rules:
    - Fort Eustis Main Post, Third Port, the ammunition supply point and all small arms ranges
    - Norfolk Complex, which includes Buckroe Beach, Hampton Roads, and Virginia Beach
    - Jamestown and Hog Island
    - Camp Peary Airstrip
    - Naval Weapons Station
    - Williamsburg City, Busch Gardens, and Water Country USA
    - Williamsburg-Jamestown Airport (unless mission essential)
    - North Carolina Outer Banks

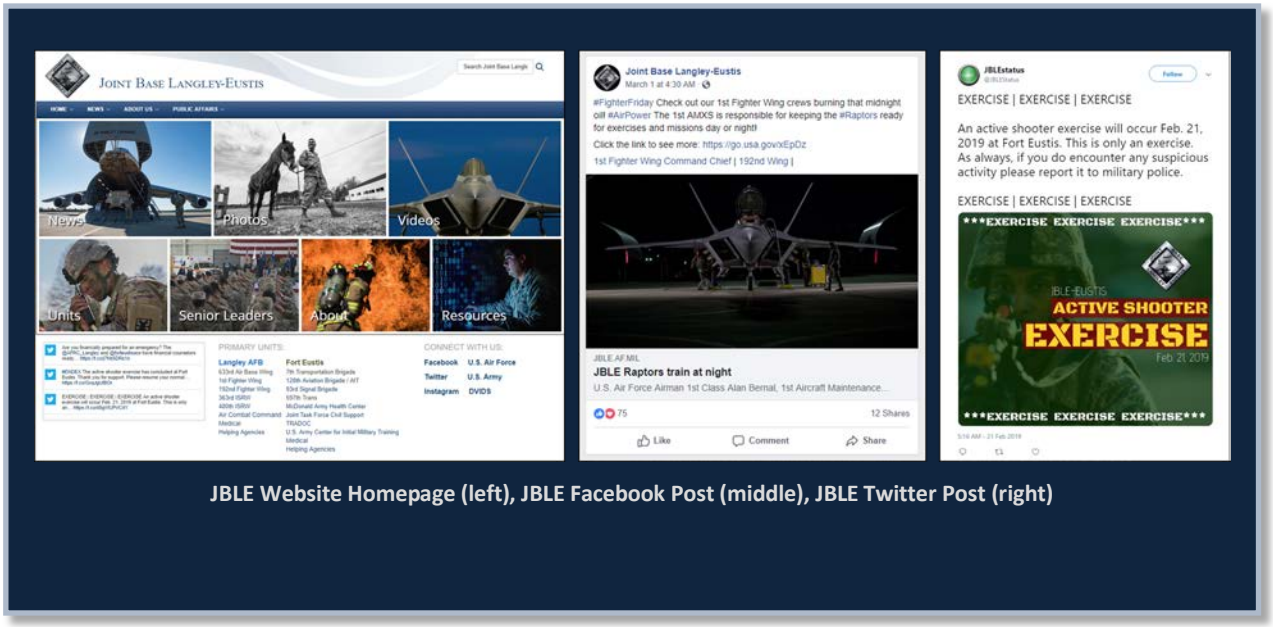
- Flight altitudes are also managed via the following standards:
  - Flights below 1,000 feet mean sea level (MSL) should be avoided
  - Flights over the Peninsula and Williamsburg are to be made at or above 1,500 feet MSL
  - Flights over the west bank of the James River are to be made at or above 2,000 MSL
- Flights may not occur over the neighborhood east of JBLE-Eustis, unless the aircraft is transitioning between JBLE-Eustis and Newport News/Williamsburg International Airport.

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 633d Air Base Wing Public Affairs (PA) Office with any noise complaints. You can reach the PA Office at (757) 764-5701**.**

JBLE also posts information, including alerts about upcoming aircraft operations that are able to be shared publicly, on the installation website and social media pages.

- Website: https://www.jble.af.mil/
- Facebook: https://www.facebook.com/JointBaseLangleyEustis
- Twitter: https://twitter.com/JBLEStatus



JBLE Website Homepage (left), JBLE Facebook Post (middle), JBLE Twitter Post (right)

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4.0 Military Operational 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 AICUZ Instruction (AFH 32-7084, "AICUZ Program Manager's Guide").

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.

In addition to aircraft noise, other major noise sources, such as small arms ranges, may contribute to noise levels at military bases. While the level of noise produced by small arms may have a direct effect on communities in proximity to a military installation, other factors also influence the noise impact (i.e., direction of the noise, sound propagation based on weather conditions, and the effectiveness of noise mitigation and safety structures, such as berms).

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

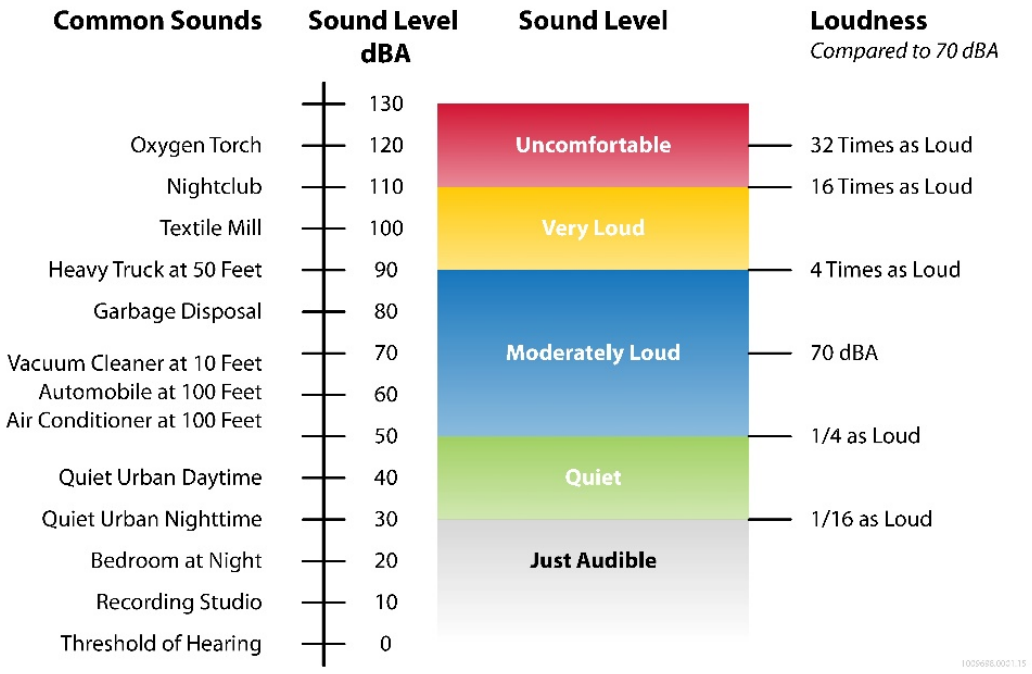


Table 4-1 shows the subjective responses with change in (single-event) sound level. While noise energy doubles or halves with every 3-dB change, we do not perceive all this noise

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 increase or Half as Loud
5 dB	Quite Noticeable
3 dB	Barely Perceptible
1 dB	No Noticeable Change

4.3 The Day-Night Average Sound 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 our perception of noise. To reflect these concerns, the Air Force uses a metric called the "Day-night Average Sound Level" (DNL). DNL was created by the United States Environmental Protection Agency and is used throughout the United States.

DNL, when used as a metric for aircraft noise, represents the accumulation of noise energy from all aircraft noise events in a 24-hour period. Additionally, for all operations between 10:00 p.m. and 7:00 a.m., DNL adds a 10-dB penalty to each event to account for the intrusiveness of nighttime operations. As is implied in its name, the DNL represents the noise energy present in a daily period. However, because aircraft operations at military airfields fluctuate from day to day, the Air Force typically bases DNL on a year's worth of operations and represents the annual average daily aircraft events.

DNL is not a level heard at any given time, but represents long-term exposure. Scientific studies have found good correlation between the percentages of groups of people highly annoyed by sounds and the level of average noise exposure measured in DNL.

The C-weighted Day-night Average Noise Level (CDNL) is the metric used to describe the noise environment for ground training ranges involving the live fire of large caliber

munitions and detonation of explosives. Contours developed using the Blast Noise Model (BNOISE), are averaged over 250 days for joint bases with ground activities.

4.4 Peak Sound Pressure Level

The Air Force uses a metric called the unweighted "Peak Sound Pressure Level" (Lpk) to measure the noise environment for small arms ranges (i.e., .50 caliber and below). Blast noise from each shot and weather conditions at the time of the shot can vary; therefore, Lpk can be weighted to account for those variations. When Lpk has been weighted, the metric used is "PK15(met)," where "15" refers to exceeding Lpk 15 percent of the time and "met" refers to the meteorological conditions.

A peak level less than 87 dB PK15 represents an area with minimal noise exposure. Individuals can hear noise, and may adapt to noise levels over time. A peak level between 87 and 104 dB PK15 represents an area of moderate noise exposure. A peak level greater than 104 dB PK15 represents the most severely impacted areas. Very loud and impulsive sounds, such as those generated from small arms activities, can also cause secondary effects (e.g., shaking of a structure or rattling of windows). These secondary effects may also lead to noise complaints from residents in the local community.

Because the noise generated by a small arms range is impulsive and intermittent, this noise may be perceived as being more disruptive than aircraft noise, which can be somewhat anticipated. The 2018 Fort Eustis JLUS identified this concern, describing the noise zones associated with the small arms range as areas where "incompatibilities may have a significant impact on the community and/or the mission of Fort Eustis" (City of Newport News 2018).

4.5 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 historical and future year planning noise contours for JBLE-Langley and present-day noise contours for JBLE-Eustis. 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 compatible and economically beneficial development around an air installation.

The Air Force utilizes the Small Arms Range Noise Assessment Model for assessing noise exposure from military small arms at installations. If there are multiple weapon types fired at one or multiple firing points, the peak contours reflect the loudest level that occurs at each receiver location because the loudest weapon, not the number of annual operations conducted at the range, determines the noise zones. For small arms ranges, the Air Force

plots two noise zones for use when analyzing land use compatibility: 87 to 104 dB PK15 and >104 dB PK15. The Air Force plots CDNL noise contours of 57, 62, and 70 dB for large caliber weapons and explosives operations. Non-munitions noise sources, such as aircraft and ground vehicles, are not covered in the range noise analysis.

4.5.1 Planning Contours

This AICUZ Study provides 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—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 on the best available, realistic, long-range projections of unclassified estimates of future mission requirements. This includes reasonable projections of future operations based on trends in operational tempo, retirement of legacy aircraft, new aircraft entering the inventory, and other factors.

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.

Assumptions included in the development of JBLE-Langley's planning contours include the following:

- The potential beddown of a new Adversary Air mission.
- Increase of F-22s in the 1st Fighter Wing. A portion of F-22 Raptors from the 43rd Fighter Squadron, previously located at Tyndall Air Force Base in Florida, have been permanently relocated to JBLE-Langley.

Table 4-2 presents the projected (2021) operations for the JBLE-Langley planning contours.

The JBLE-Eustis AICUZ noise contours are the same as the 2007 IONMP noise contours and represent the latest available noise contours for aircraft operations and small arms operations. Table 4-3 presents the projected operations for the JBLE-Eustis planning contours.

Table 4-2. Projected Annual Aircraft Flight Operations for 2020 JBLE AICUZ Noise Contours (Planning Contours for Calendar Year 2021) for JBLE-Langley

Aircraft	Departures			Arrivals			Closed Pattern Operations[1]			Totals		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
F-22	10,391	59	10,450	10,328	122	10,450	7,765	0	7,765	28,484	181	28,665
T-38A/B	9,368	0	9,368	9,368	0	9,368	10,148	0	10,148	28,884	0	28,884
Civilian	770	6	776	770	6	776	0	0	0	1,540	12	1,552
Transient	629	30	659	629	30	659	0	0	0	1,259	60	1,319
ADAIR	4,097	0	4,097	4,097	0	4,097	1,107	0	1,107	9,300	0	9,300
Grand Total	**25,255**	**95**	**25,350**	**25,192**	**158**	**25,350**	**19,020**	**0**	**19,020**	**69,467**	**253**	**69,720**

Note:
[1] Each "closed pattern operation" consists of two total operations: one arrival and one departure.

Table 4-3. Projected Annual Aircraft Flight Operations for 2020 JBLE AICUZ Noise Contours for JBLE-Eustis

Aircraft	Departures	Arrivals	Closed Pattern Operations[1]	Totals
UH-60	7,264	7,264	101,692	116,220
CH-53	318	318	4,448	5,084
Other	1,427	1,427	19,976	22,830
FW	508	508	0	1,016
V-22	60	60	30	150
Grand Total	**9,577**	**9,577**	**126,146**	**145,300**

4.5.2 JBLE-Langley Noise Contours

The 2020 JBLE AFB AICUZ noise contours for JBLE-Langley are based on planning contours for the year 2021, the year in which planned aircraft transitions at JBLE are expected to be complete (Figure 4-2). The noise contours extend off of the installation, primarily to the east and west, following the flight paths for approaches and departures to the main runway at JBLE-Langley.

To the east, the noise contours extend into the Back River, City of Poquoson, and City of Hampton:

- The 65 dB DNL contour extends approximately 4.5 miles primarily over Back River and just into Chesapeake Bay. The 65 dB DNL contour also extends over land south of the City of Poquoson and in the northern areas of the City of Hampton.
- The 70 dB DNL contour extends approximately 2.5 miles primarily over Back River along with some areas over land.
- The 75 dB DNL contour extends approximately 1.5 miles and is nearly entirely over Back River.
- The 80 dB DNL contour extends approximately 1 mile over Back River.
- The 85+ dB DNL contour extends less than .5 miles off base over Back River.

To the west, the noise contours extend into the City of Hampton:

- The 65 dB DNL contour extends approximately 3 miles over the City of Hampton, crossing over Interstate 64.
- The 70 dB DNL contour extends approximately 2 miles over the City of Hampton.
- The 75 dB DNL contour extends approximately 1 mile over the City of Hampton.
- The 80 dB DNL contour extends approximately 0.75 miles over the City of Hampton.
- The 85+ dB DNL contour extends approximately 0.25 miles off base, just over the City of Hampton.

To the north, the 65, 70, and 75 dB DNL contours extend into the City of Poquoson and the 65 dB DNL contour slightly overlaps with York County. To the south, the 65, 70, and 75 dB DNL contours extend into the City of Hampton.

Figure 4-3 shows a comparison of the 2020 and the 2007 AICUZ noise contours. In general, the 2020 JBLE AICUZ noise contours for JBLE-Langley do not extend as far to the east and west as the 2007 AICUZ noise contours. The 75 dB DNL contour for 2020 generally includes the same extent as the 2007 75 dB DNL contour. The 2020 65 dB DNL contour is smaller than the 2007 contour, and does not extend as far to the east and west.

Table 4-4 presents the off-installation land acreage and estimated population within the planning contours. The Air Force generates population estimates on 2017 census block-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 that falls within the contour. The population across census blocks is assumed to be evenly distributed. Population estimates were checked using aerial imagery for areas within the 85+ dB DNL noise zone. Based on the lack of residences within this area, no people are estimated to reside in the 85+ dB DNL noise zone. The acres and number of people within JBLE-Langley's AICUZ noise contours decrease as the loudness of the noise zones increase. For example, approximately 3,000 acres and 7,000 people would be in the 65-69 dB DNL noise zone, but approximately 129 acres and 175 people would be in the 80-84 dB DNL noise zone.

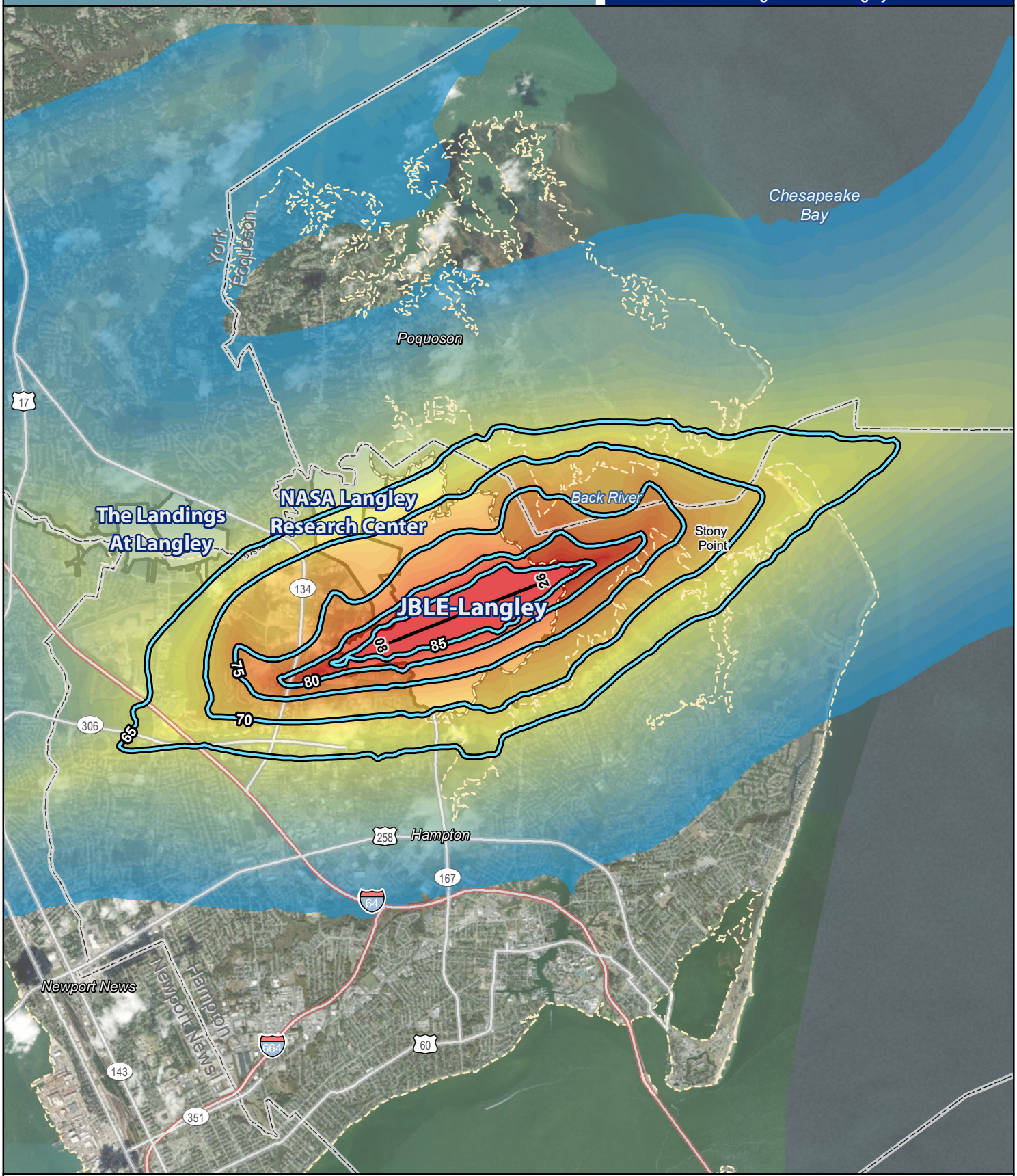
Table 4-4. Off-installation Land Area and Estimated Population within Noise Zones for the 2020 JBLE AICUZ Noise Contours for JBLE-Langley

Noise Zone (dB DNL)	Acres	Estimated Population
65-69	3,327.17	7,290
70-74	2,055.42	4,908
75-79	714.04	1,083
80-84	128.59	175
85+	3.43	0
Total (65+)	**6,228.65**	**13,460**

Figure 4-2

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

2020 JBLE AICUZ Noise Contours
with Gradient Shading for JBLE-Langley



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Noise Contour (dB DNL) (2020 AICUZ)

Noise Gradient (dB DNL)
50
85

0 0.5 1 Miles

N

Source: AFCEC 2018, 2019; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 4-3

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Comparison of 2020 and 2007 AICUZ Noise Contours for JBLE-Langley

Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Noise Contour (dB DNL) (2020 AICUZ)
- 65 dB DNL (2007 AICUZ)
- 75 dB DNL (2007 AICUZ)

0 1 2 Miles

N

Source: AFCEC 2018, 2019; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

4.5.3 Noise Contours at JBLE-Eustis

The 2020 JBLE AICUZ noise contours for JBLE-Eustis are the same as the 2007 IONMP noise contours and represent the latest available noise contours for aircraft operations and small arms operations (Figures 4-4A and 4-4B). The noise contours associated with the runway and helipad consist of a 60–65 dB DNL noise zone and 65–75 dB DNL noise zone. Both noise zones extend less than one mile beyond the installation boundary to the west, over the James River. The only land area encompassed by the noise zones is the northern-most island of the Swash Hole islands in the James River. This island is not populated and falls within the 60-65 dB DNL noise zone.

The peak noise contours associated with the small arms ranges consist of a >104 dB PK15 noise zone and an 87–104 dB PK15 noise zone. The >104 dB PK15 noise zone is completely within the installation boundary. The 87–104 dB PK15 noise zone extends slightly off of the installation over the Warwick River to the east and the James River to the west. This noise zone encompasses Thorofare Island, a privately owned, vacant island in the Warwick River and the southern-most island, which is unpopulated, of the Swash Hole islands in the James River. Otherwise, the portions of the noise zone that extend off of the installation do not encompass any land areas.

Table 4-5 presents the off-installation land acreage within the noise contours. Minimal acreages (just over 5 acres total) are within the JBLE-Eustis noise zones. There are no housing units within the noise zones, and the population within the 65+ dB DNL noise contours is estimated at zero. Therefore, population estimates are not shown in Table 4-5.

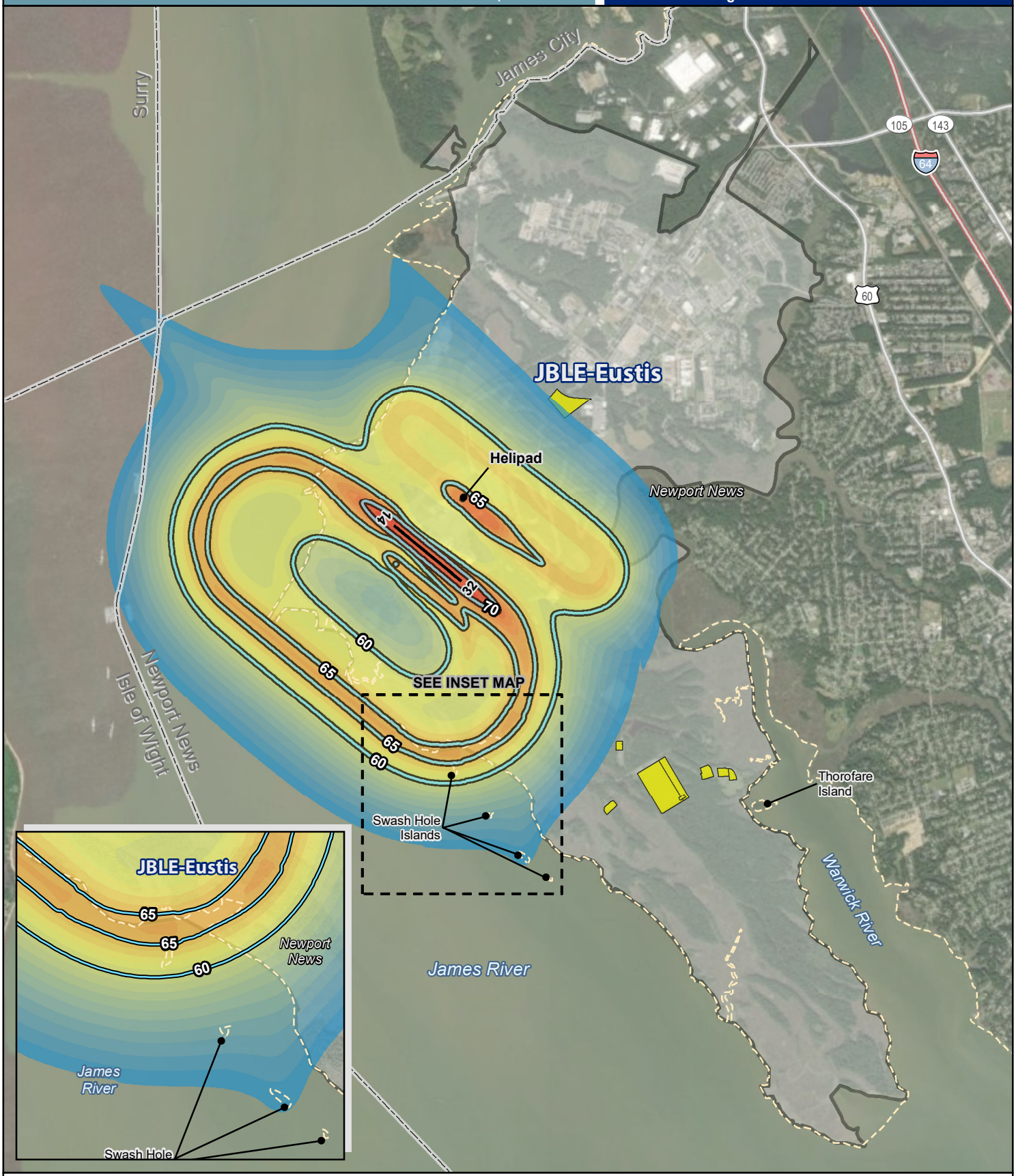
Table 4-5. Off-installation Land Area within Noise Zones for the 2020 JBLE AICUZ Noise Contours for JBLE-Eustis

Noise Zone (dB DNL)	Acres
60-65	0.90
65-75	0.23
Subtotal	1.13
Noise Zone (dB PK15)	
87–104	4.58
104+	0.00
Subtotal	4.58
Total	**5.71**

Figure 4-4A

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

2020 JBLE AICUZ Air Operations Noise Contours with Gradient Shading for JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Small Arms Range
- Interstate Highway
- State/U.S. Highway
- Aircraft Noise Contour (dB DNL)

Noise Gradient (dB DNL)
50
70

0 0.5 1 Miles

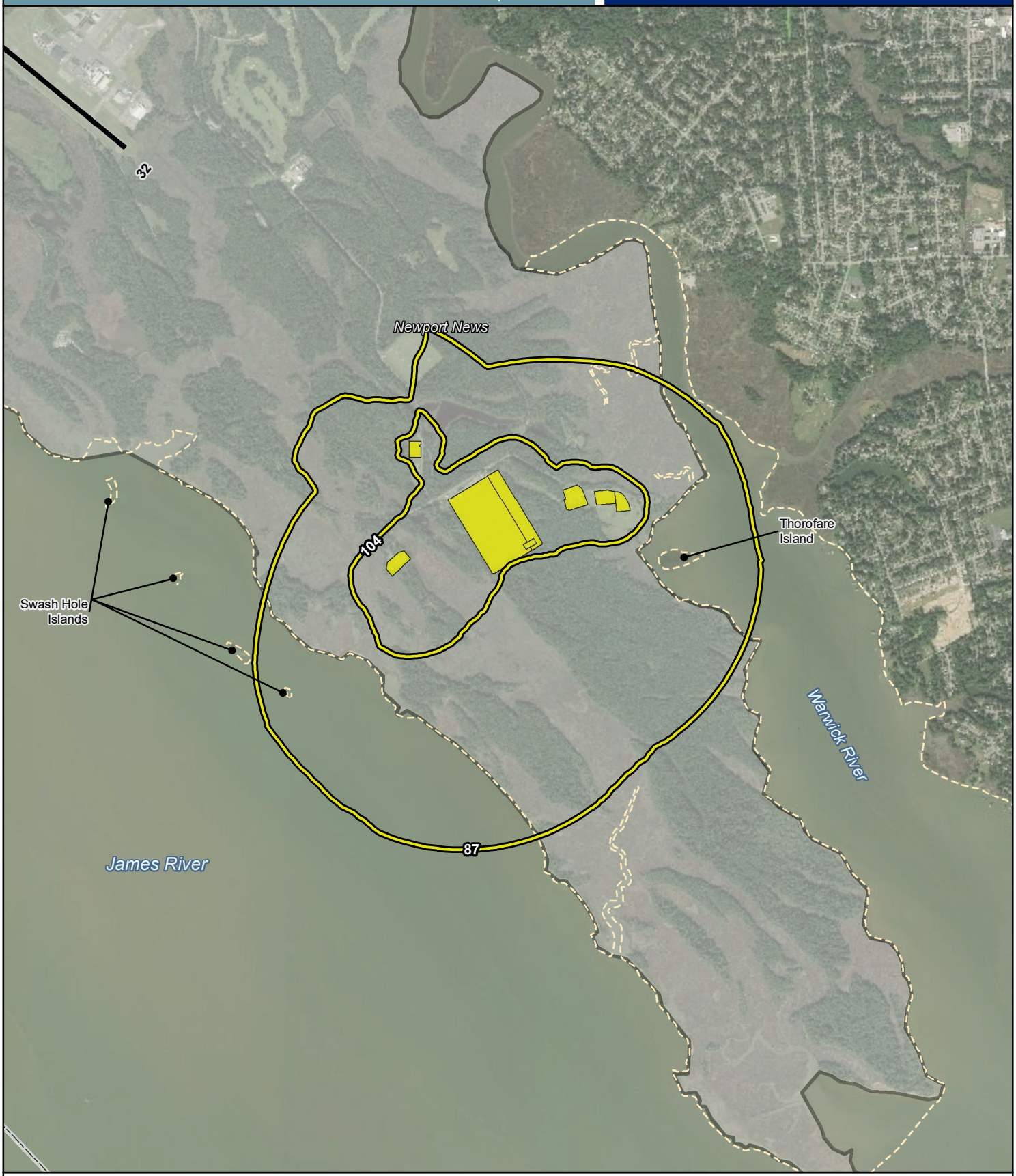
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 4-4B

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

2020 JBLE AICUZ Small Arms Operations
Noise Contours for JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Small Arms Range
- Peak Noise Zone (dB PK15)

0 0.5 1 Miles

N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 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. While the chances of an accident are remote, mishaps do occur and proper land use planning can reduce risk to people on the ground. 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. Additionally, the DoD uses two classes of fixed-wing runways (Class A and Class B) to define APZs. Class A runways are primarily used by light aircraft and do not have the potential for intensive use by heavy or high-performance aircraft. Class B runways are all other fixed-wing runways.

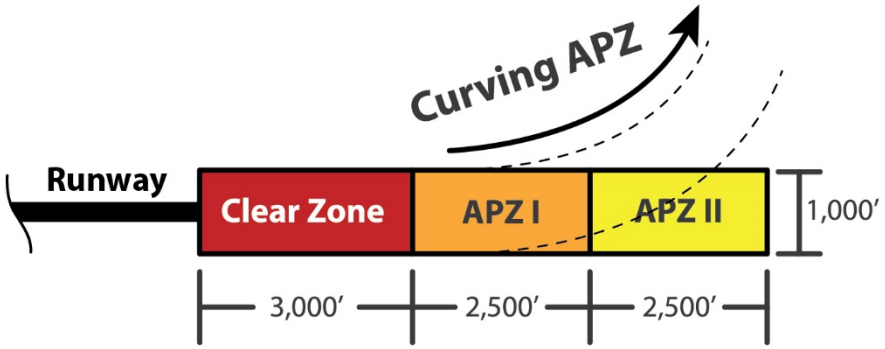
The CZs and APZs for Class A runways are described in the bullets below and shown on Figure 5-1.

- **Clear Zone**: At the end of all active Air Force Class A runways is an area known as the “Clear Zone.” The CZ is an area 3,000 feet square 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 1,000 feet in width and 2,500 feet in length along the extended runway centerline.

- **APZ II**: APZ II is the area beyond APZ I. APZ II is 1,000 feet in width and 2,500 feet in length along the extended runway centerline.

Figure 5-1. Runway Clear Zones and Accident Potential Zones for Class A Runways



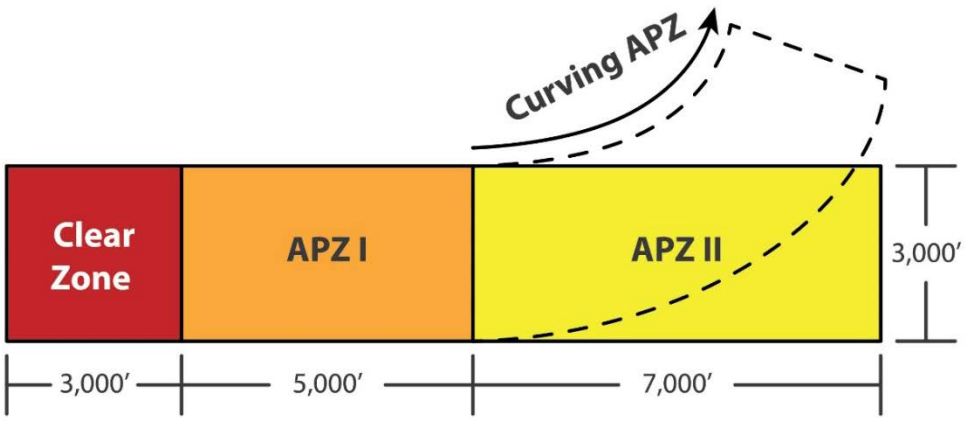
The CZs and APZs for Class B runways are described in the bullets below and shown on Figure 5-2.

- **CZ**: At the end of all active Air Force Class B runways is an area known as the "Clear Zone." The CZ is an area 3,000 feet square 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 5-2. Runway Clear Zones and Accident Potential Zones for Class B Runways



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-percent 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.

5.1.1 Clear Zones and Accident Potential Zones at JBLE-Langley

Figure 5-3 depicts the CZs and APZs, which have not changed since the 2007 AICUZ study, for Runway 08/26 at JBLE-Langley. The CZs and APZs extend beyond the installation boundary to the east and west.

To the east of the runway (Runway 08), the CZs and APZs extend as follows:

- The portion of the CZ that is not within the installation boundary is over water.
- APZ I and APZ II are completely off of the installation and primarily over the Back River.
- The portions of APZ I and APZ II that extend over land are over Stony Point, a peninsula in the Back River. A marina exists on the peninsula partially within APZ II; no other developments exist within the APZs.

To the west of the runway (Runway 26), the CZs and APZs extend as follows:

- The portions of the CZ that are not within the installation boundary are over land in the City of Hampton, including a commercial self-storage facility, to the north and the edge of a mobile home park to the south.

- APZ I and APZ II are completely off of the installation over developed land areas in the City of Hampton. APZ II extends over commercial areas, including a large shopping center and movie theater complex, and a community college.

Table 5-1 tabulates the off-installation land acreage and estimated population living 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 Living Within the Clear Zones and Accident Potential Zones for JBLE-Langley

Zone	Acres	Population
CZ	48.81	104
APZ I	374.99	488
APZ II	528.78	656
Total	**952.58**	**1,248**

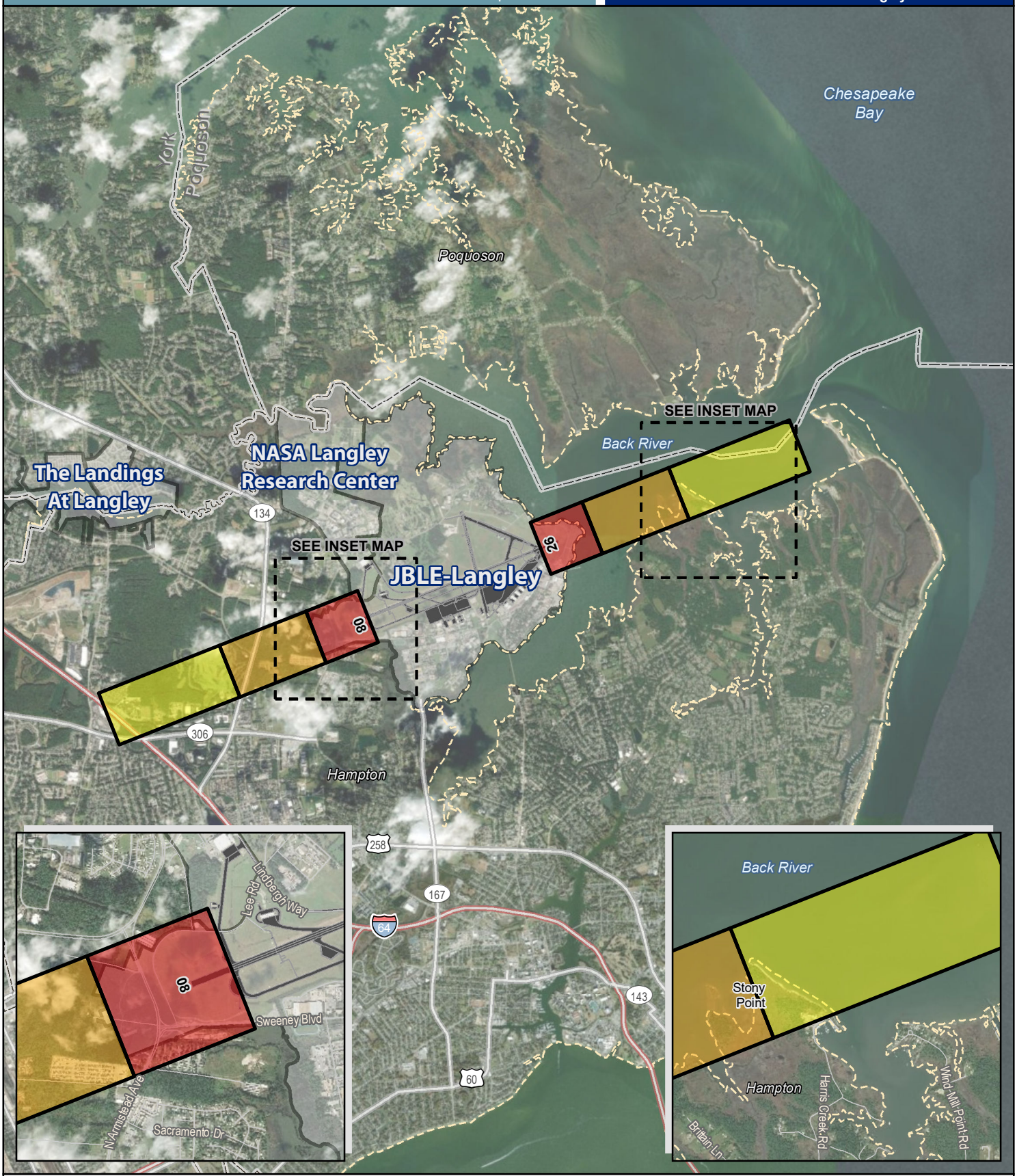
5.1.2 Clear Zones and Accident Potential Zones at JBLE-Eustis

Figure 5-4 depicts the CZs and APZs for Runway 14/32 and the helipad at JBLE-Eustis. The CZs and APZs extend to the northwest and southeast and are primarily within the installation boundary, with the exception of the runway's APZ I and APZ II to the northwest (Runway 32). These APZs are completely off of the installation, over the James River, and do not impact population or land acreage.

Figure 5-3

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

2020 JBLE AICUZ Clear Zones and
Accident Potential Zones for JBLE-Langley



Legend

- Airfield Surface Area
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

N

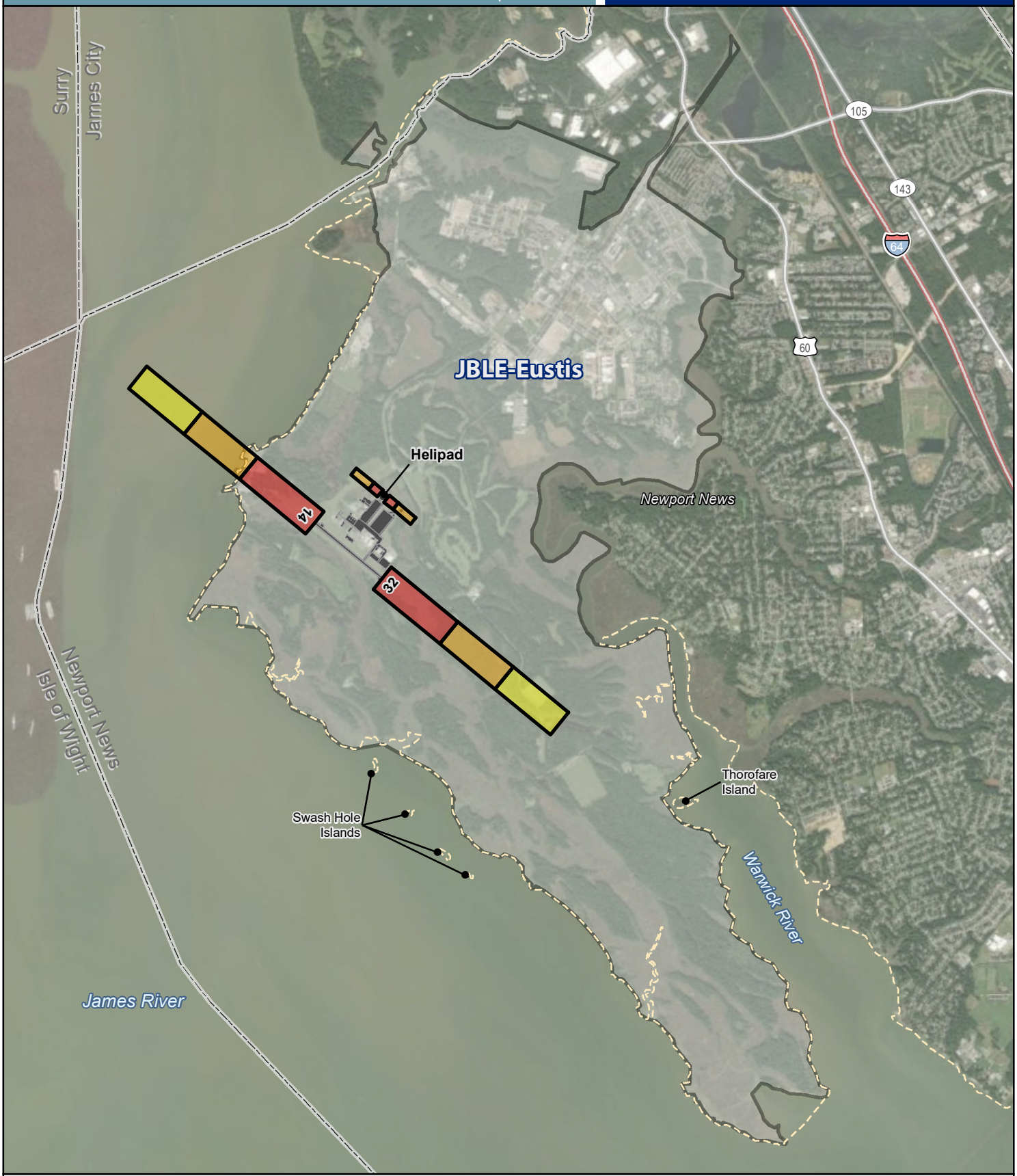
0 0.5 1 Miles

Source: AFCEC 2018, 2019; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 5-4

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

2020 JBLE AICUZ Clear Zones and Accident Potential Zones for JBLE-Eustis



Legend

- Airfield Surface Area
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 0.5 1 Miles

N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

5.2 Imaginary Surfaces

The DoD and 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. 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.

There are different imaginary surfaces for fixed-wing runways (depending on type of aircraft supported by the runway) and rotary-wing runways/helipads. The following subsections provide a description of the imaginary surfaces surrounding the runways of JBLE-Langley and JBLE-Eustis.

5.2.1 Imaginary Surfaces at JBLE-Langley

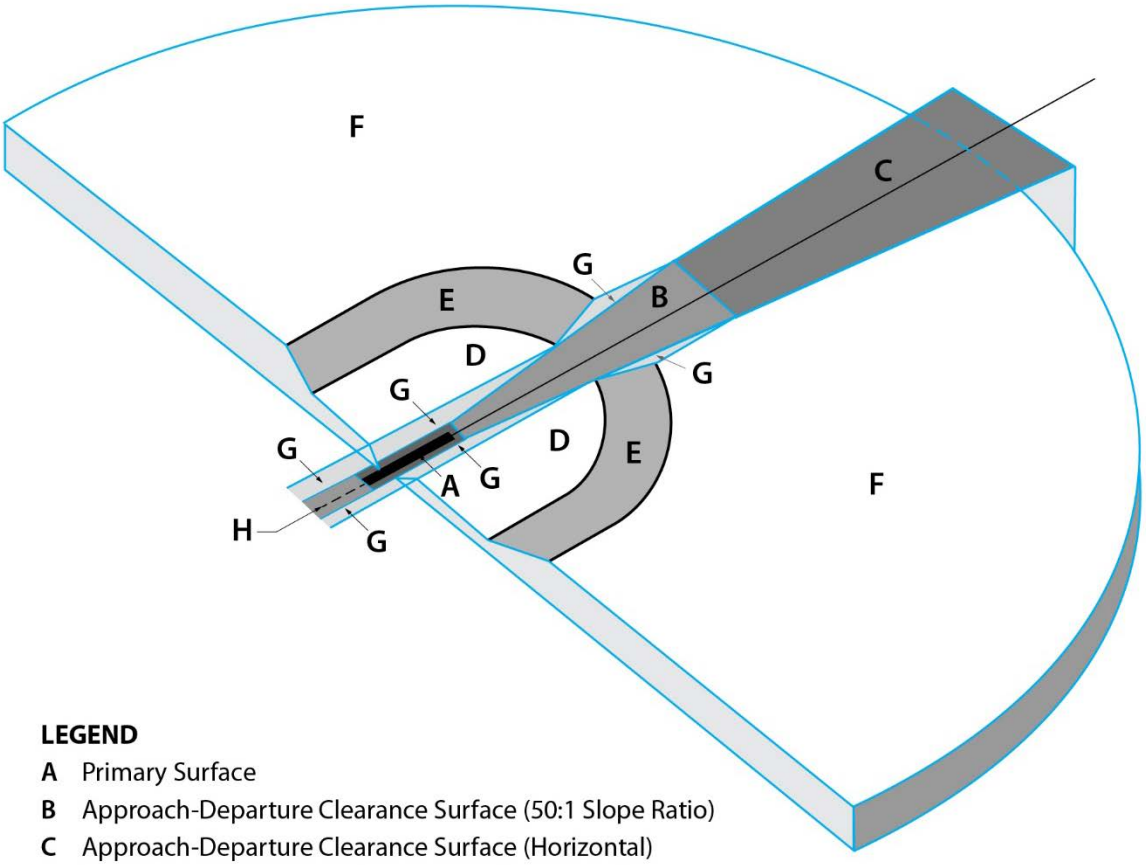
JBLE-Langley uses a Class B runway for fixed-wing aircraft operations. An illustration of the imaginary surfaces for a typical Class B fixed-wing runway is depicted in Figure 5-5. Table 5-3 provides brief descriptions for each of these surfaces. Figure 5-7 depicts the actual imaginary surfaces specific to JBLE-Langley's main runway, in context with the local community.

5.2.2 Imaginary Surfaces at JBLE-Eustis

JBLE-Eustis has a Class A runway used for fixed-wing aircraft operations and a helipad used for rotary-wing (helicopter) operations under VFR. An illustration of the imaginary surfaces for a typical Class A fixed-wing runway is depicted on Figure 5-8. Table 5-4 provides brief descriptions for each of these surfaces. Figure 5-9 depicts the actual imaginary surfaces specific to JBLE-Eustis's Class A runway, in context with the local community. Figure 5-10 shows runway Airspace Imaginary Surfaces for Helipad at JBLE-Eustis.

Helipad airspace imaginary surfaces are areas in the space around helipads. The surfaces are designed to define the areas that must remain obstacle-free for safe aircraft operation. Figure 5-6 contains definitions of the helipad airspace imaginary surfaces for Air Force VFR helipads (DoD 2008).

Figure 5-5. Runway Airspace Imaginary Surfaces for Class B Fixed-Wing Runways



LEGEND

A Primary Surface
B Approach-Departure Clearance Surface (50:1 Slope Ratio)
C Approach-Departure Clearance Surface (Horizontal)
D Inner Horizontal Surface (45.72m [150'] Elevation)
E Conical Surface (20:1 Slope Ratio)
F Outer Horizontal Surface (152.40m [500'] Elevation)
G Transitional Surface (7:1 Slope Ratio)
H Runway

Figure 5-6. Runway Airspace Imaginary Surfaces for VFR Helipads

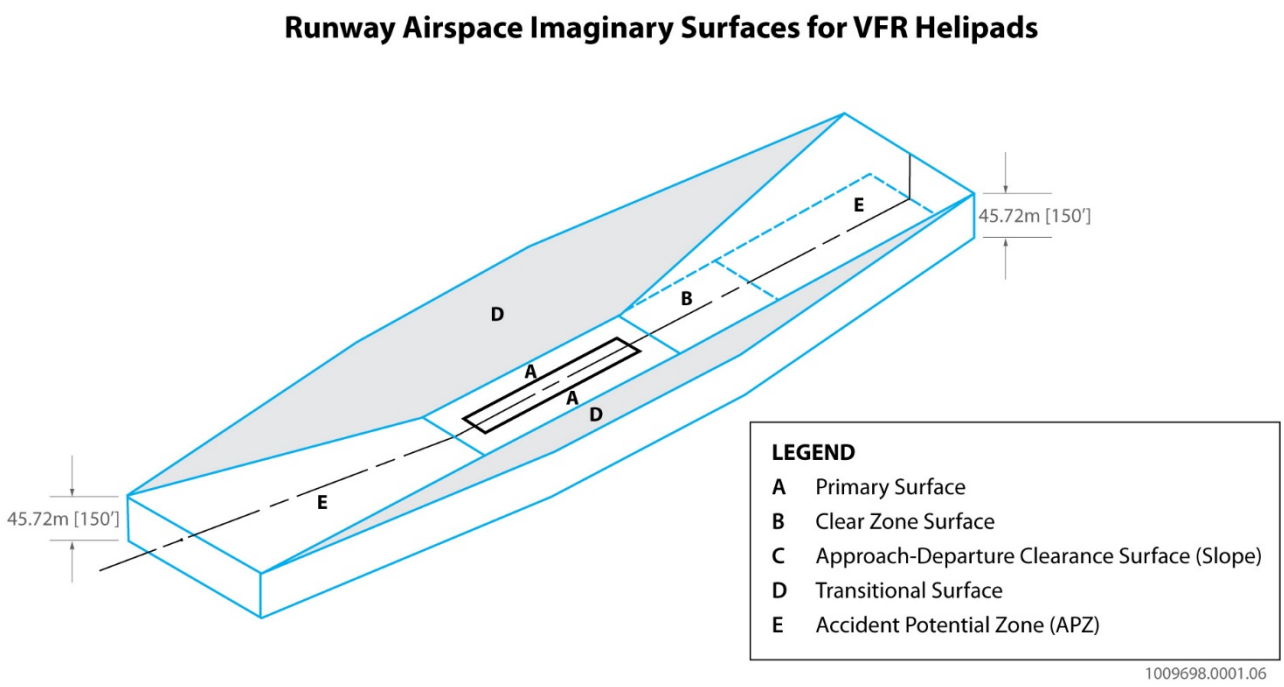


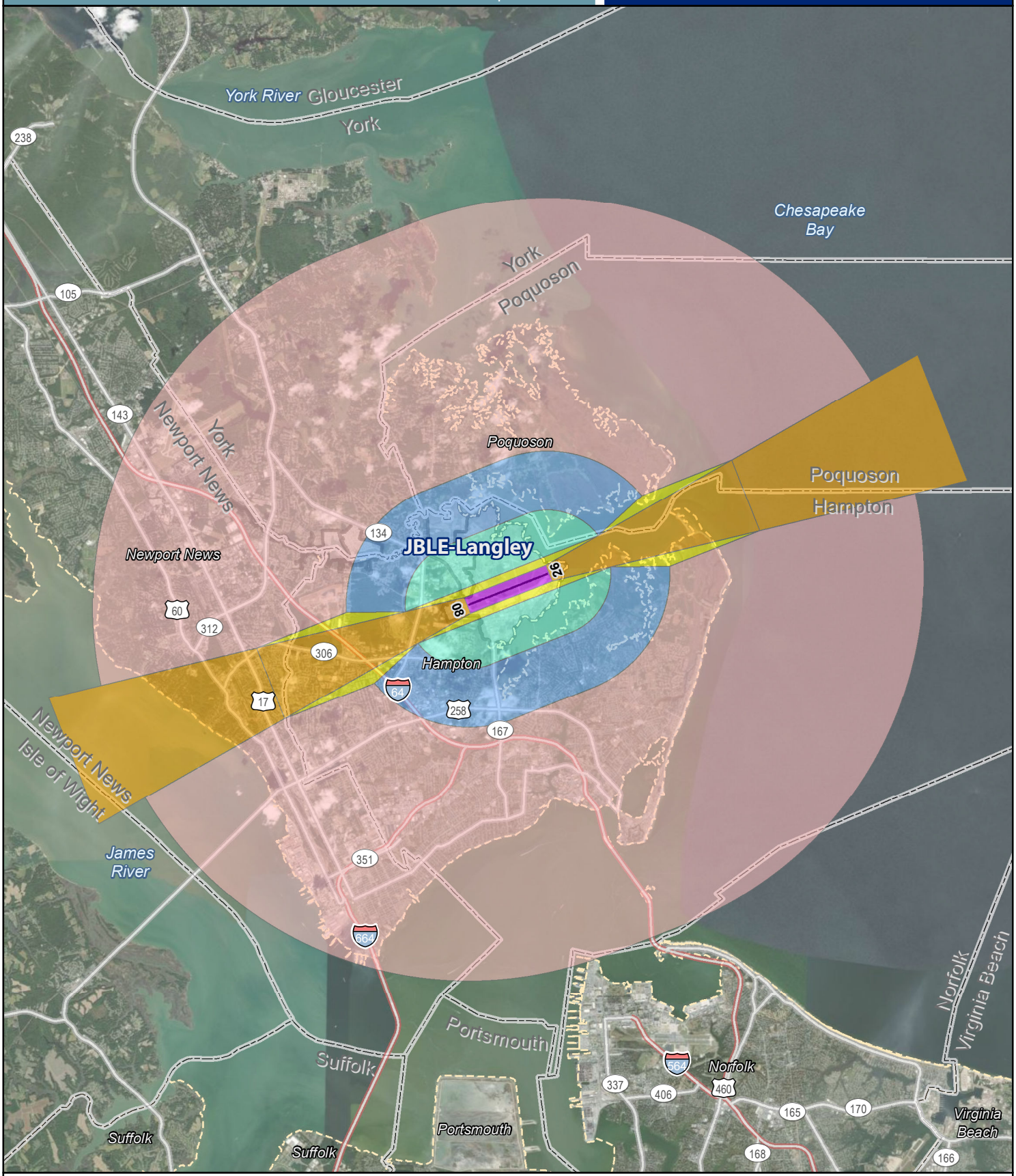
Table 5-3. Descriptions of Runway Airspace Imaginary Surfaces for Military Airfields, Class B Runways

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 5-7

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Runway Airspace Imaginary Surfaces for JBLE-Langley



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway

Airfield Imaginary Surfaces

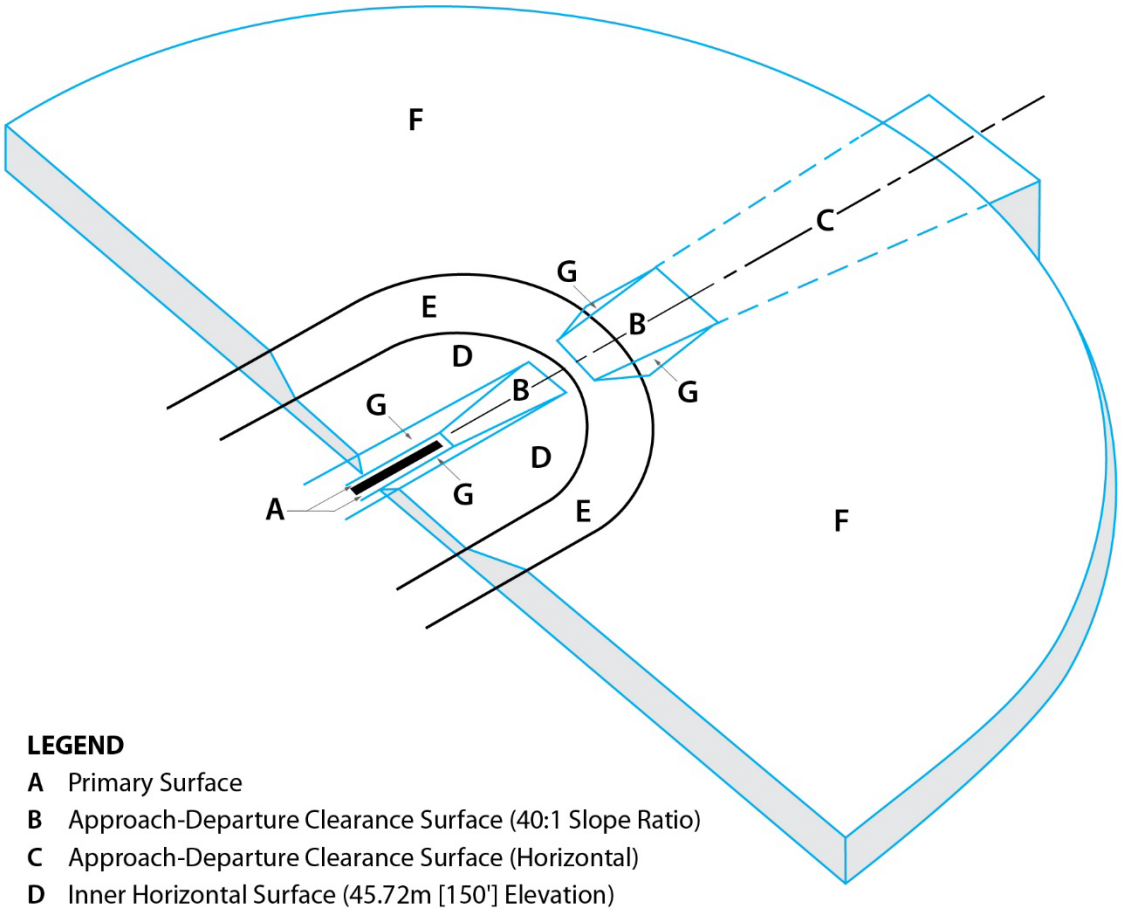
- Approach/Departure Clearance Surface
- Conical Surface
- Inner Horizontal Surface
- Outer Horizontal Surface
- Primary Surface
- Transitional Surface

0 1 2 Miles

N

Source: AFCEC 2018, 2019; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 5-8. Runway Airspace Imaginary Surfaces for Class A Fixed-Wing Runways



LEGEND

A Primary Surface
B Approach-Departure Clearance Surface (40:1 Slope Ratio)
C Approach-Departure Clearance Surface (Horizontal)
D Inner Horizontal Surface (45.72m [150'] Elevation)
E Conical Surface (20:1 Slope Ratio)
F Outer Horizontal Surface (152.40m [500'] Elevation)
G Transitional Surface (7:1 Slope Ratio)

Table 5-4. Descriptions of Runway Airspace Imaginary Surfaces for Military Airfields, Class A Runways

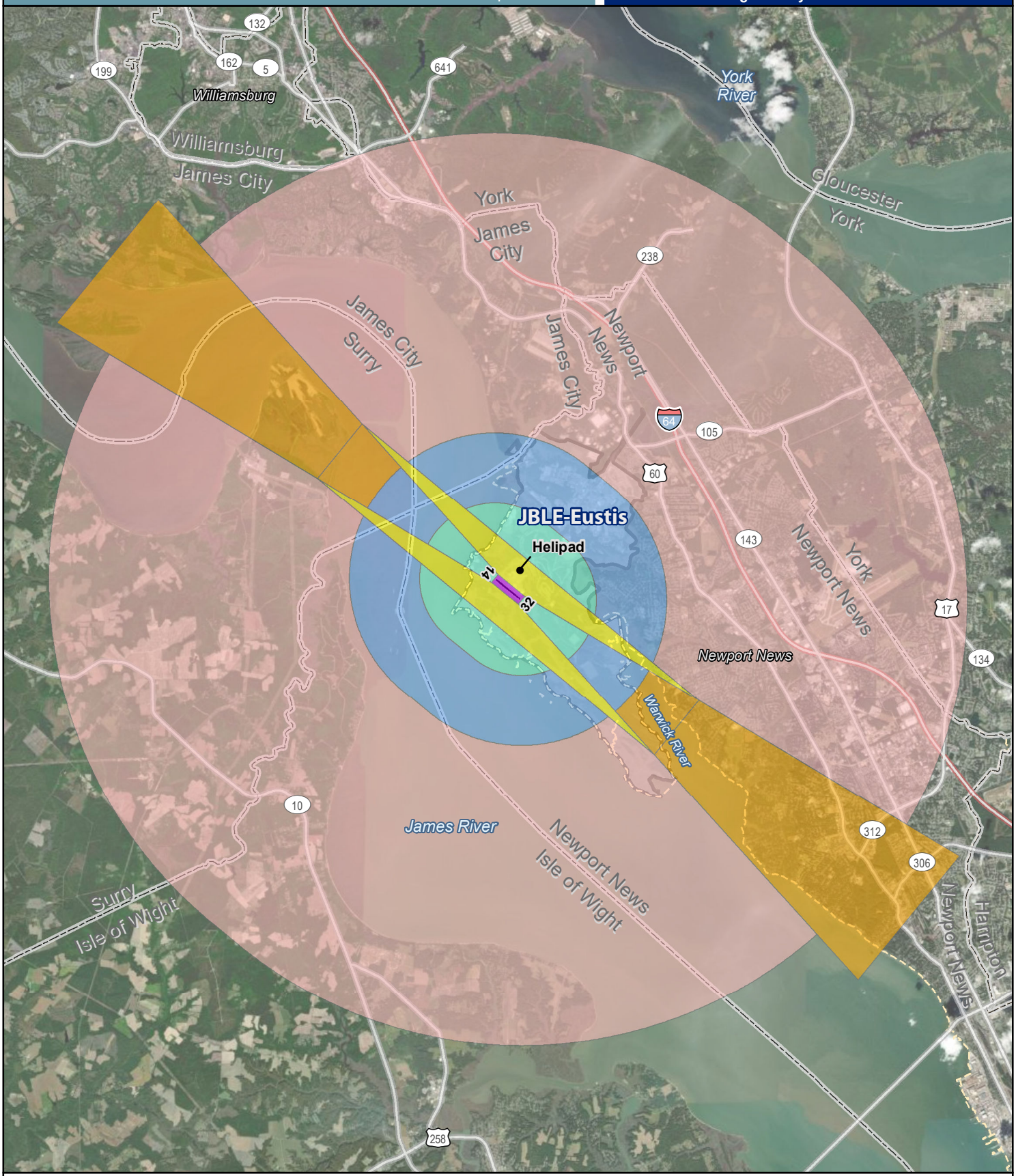
Primary Surface	An imaginary surface symmetrically centered on the runway, extending 200 feet beyond each runway end that defines the limits of the obstruction clearance requirements in the vicinity of the landing area. The width of the primary surface is 1,000 feet, or 500 feet on each side of the runway 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 40:1 until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 40,000 feet from the starting point. The width of this surface at the runway end is 1,000 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 5-9

Joint Base Langley-Eustis Air Force Base

Air Installation Compatible Use Zones

Runway Airspace Imaginary Surfaces for Class A Fixed-Wing Runway at JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway

Airfield Imaginary Surfaces

- Approach/Departure Clearance Surface
- Conical Surface
- Inner Horizontal Surface
- Outer Horizontal Surface
- Primary Surface
- Transitional Surface

0 1 2 Miles

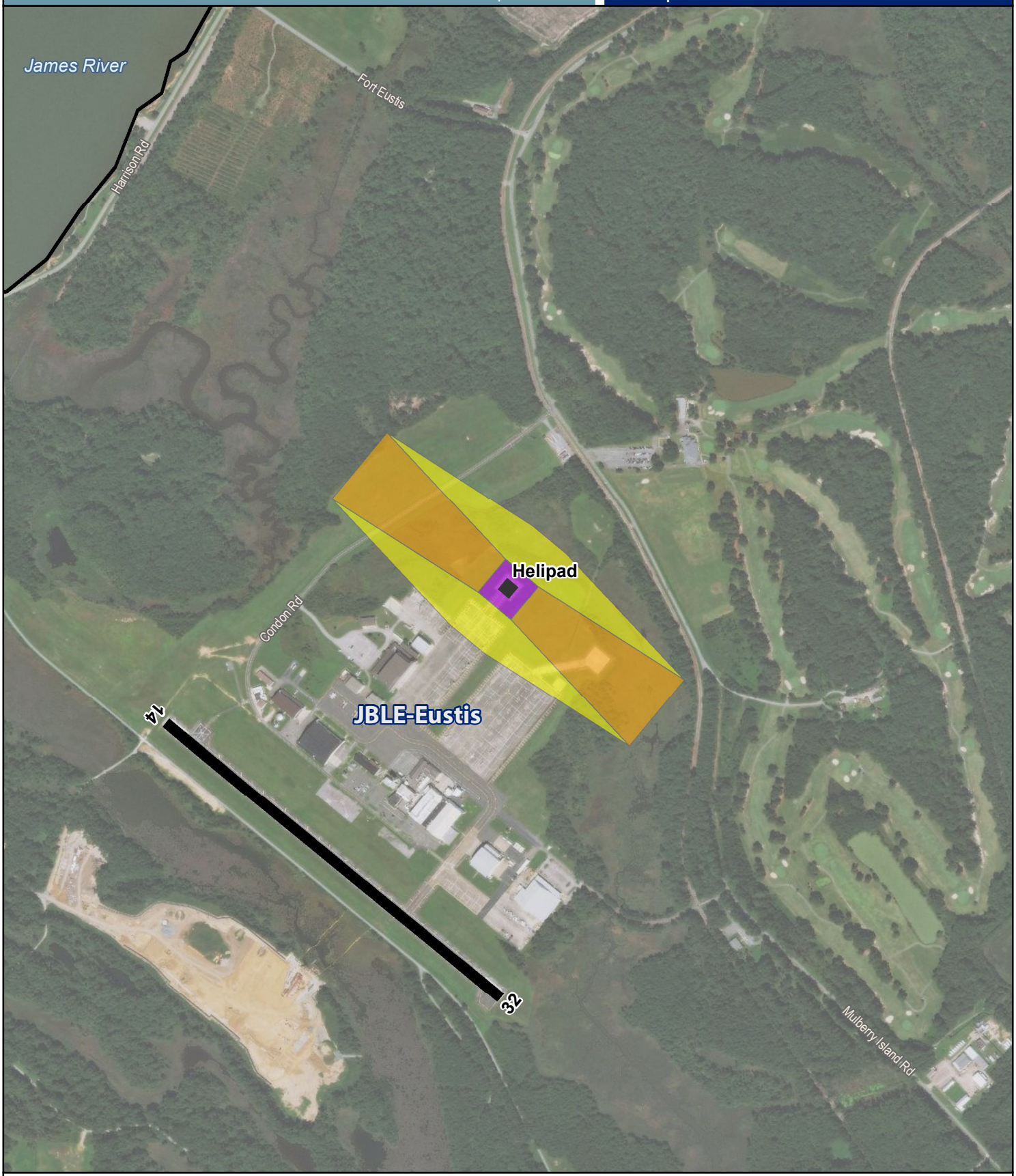
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 5-10

Joint Base Langley-Eustis Air Force Base
Air Installation Compatible Use Zones

Airspace Imaginary Surfaces for Helipad at JBLE-Eustis



Legend

- Installation Boundary
- Airfield Runway
- Helipad

Helipad Imaginary Surfaces

- Approach/Departure Clearance Surface
- Primary Surface
- Transitional Surface

0 500 1,000 Feet

N

Source: AFCEC 2018; Digital Globe 2017.

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 Figures 5-5, 5-7, and 5-8. 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 Navy has an active nighttime training mission at JBLE-Eustis and lighting in the vicinity may degrade the ability of pilots to train and affect the efficiency of exercises.

- 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
  - 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, FAA recommends limiting these uses within various zones around airfields, including:

- Within 10,000 feet of airfields supporting jet aircraft such as JBLE-Langley.

- 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 FAA's recommendations for reducing these types of attractants are provided in FAA's Advisory Circular 150/5200-33B.

In order to support flight safety through necessary wildlife management, the United States Department of Agriculture (USDA) employs a contractor at the base who conducts wildlife control measures on and in proximity to the base. In addition, there is a similar USDA position at Bethel Landfill located west of the base and a half mile outside of the western APZ II. Due to heightened bird activity at the landfill, and its location near JBLE-Langley's flight paths, the importance of these positions is key to flight safety within the HAFZ at JBLE-Langley.

- **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.

- **Drones (Remotely Piloted Aircraft [RPA]/Unmanned Aircraft System [UAS]):** The use of drones (RPA/UAS) 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, civilian drone operations are not permitted within certain zones surrounding military bases. Drone flights at

JBLE are 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 United States Code [U.S.C.] §40103(8)(3) and §46307, 14 CFR 101 and 107, and 10 U.S.C. §130i, where applicable).

No drones are in use at JBLE-Langley. NASA-LaRC utilizes RPA/UAS on a limited basis but they are expressly prohibited from entering JBLE-Langley grounds per an existing agreement. The RPA/UAS utilized by NASA-LaRC may operate under slightly different rules than publicly owned drones, such as those in use by local recreational groups, private citizens, and commercial entities.

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

5.4 Surface Danger Zones

A surface danger zone depicts the space necessary for containment of projectiles, fragments, and debris from the firing of a ground weapons system or demolition activity. Surface danger zones represent a mathematically predicted, three-dimensional area of ground and airspace that projectiles or fragments could travel through and impact the earth, either by direct fire or ricochet from ground-based, live-fire operations. Surface danger zone designs are based on the worst-case scenario for how a given munition type could travel; they are designed to make the probability of a hazardous fragment escaping from range boundaries unlikely and to minimize the danger to the public, range personnel, facilities/equipment, and property.

Surface danger zone sizes and shapes are dependent on the characteristics of the weapon system, ammunition, training requirements, geographical location, and environmental conditions. Figure 5-11 depicts notional parameters of a basic cone surface danger zone and its components. Component descriptions include the following:

- The "distance X" of a surface danger zone is the maximum distance a projectile travels when fired from a weapon system.
- The "dispersion area" is the area directly outside the gun target line that accounts for human error, weapon error, or propellant malfunction.
- The "ricochet area" is located outside the dispersion area and contains any projectiles after they make contact with the target.
- The "buffer zone" is the secondary danger area that laterally parallels the ricochet area and contains fragments, debris, and components from frangible

or explosive projectiles and warheads functioning on the outside edge of the ricochet area.

Figure 5-12 depicts the surface danger zones for the JBLE-Eustis small arms ranges. The surface danger zones are primarily within the installation boundary. The portions of the surface danger zones that extend beyond the installation boundary are over the James River to the west and the Warwick River to the east. There is one privately owned, uninhabited island, Thorofare Island, in the Warwick River that is within the surface danger zones.

Figure 5-11. Typical Surface Danger Zone

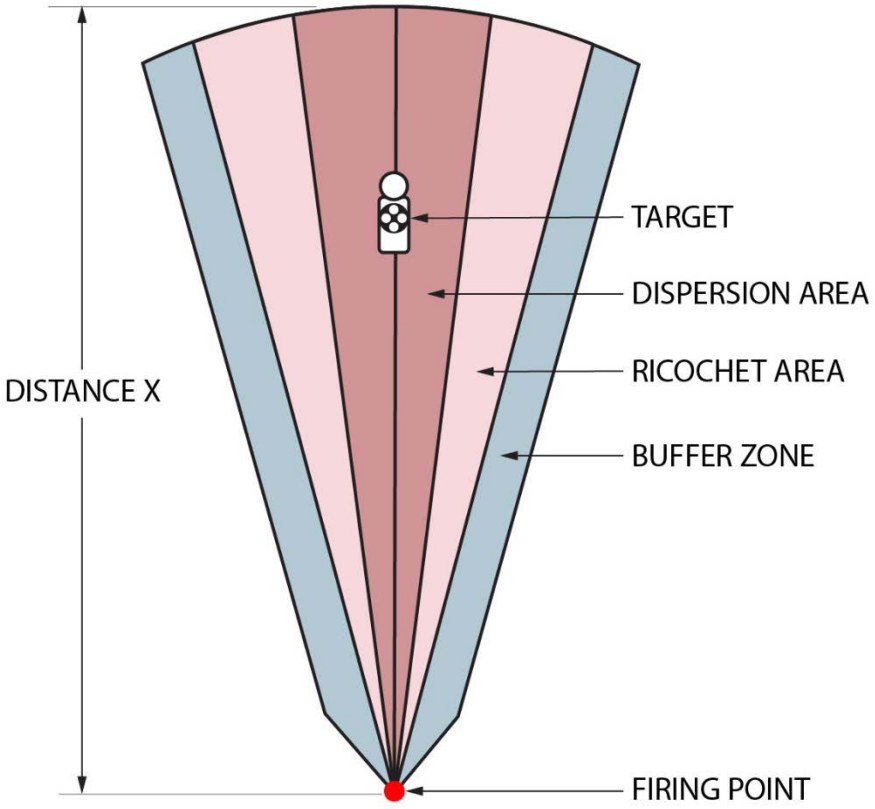
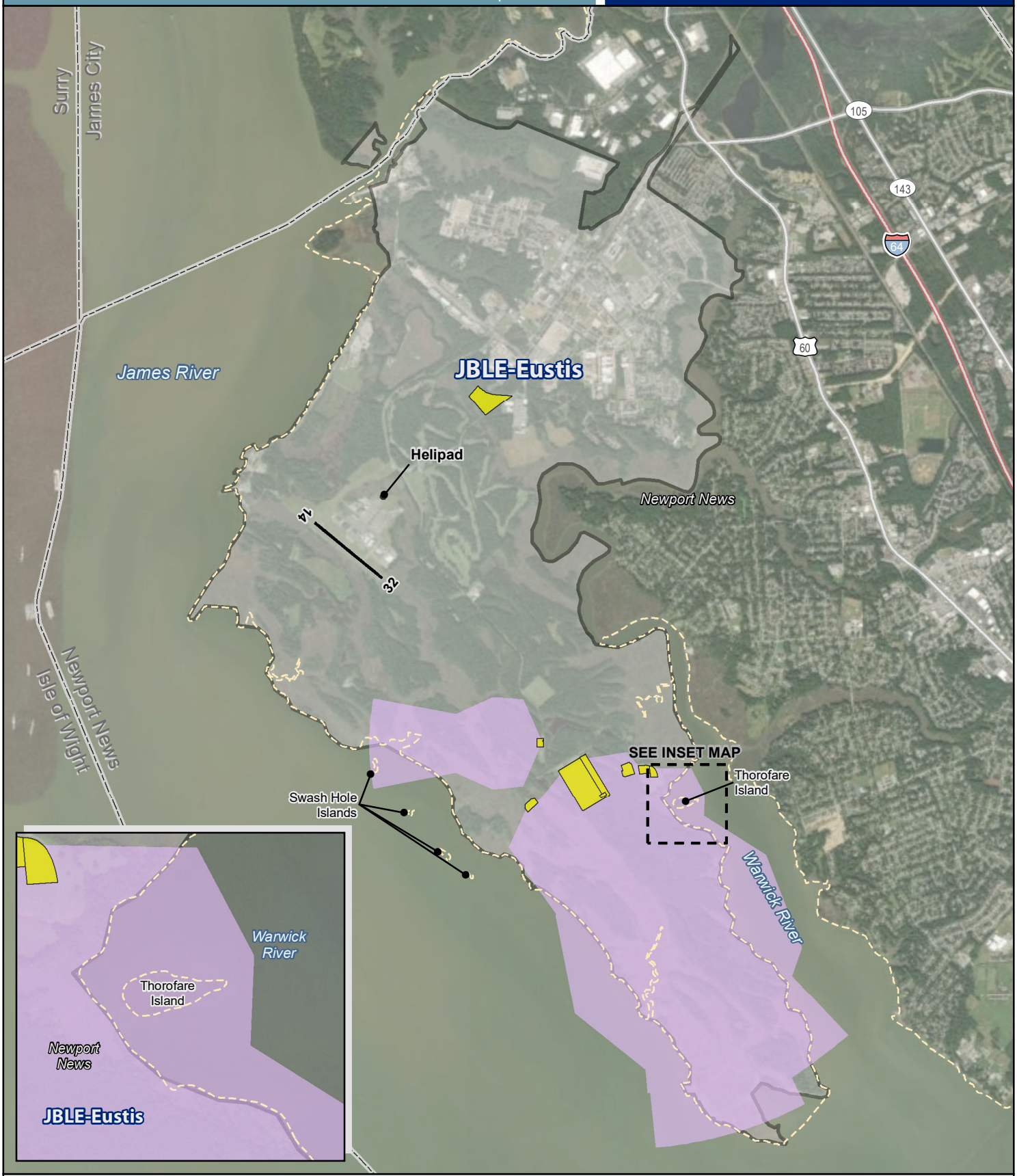


Figure 5-12

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Surface Danger Zones for JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Small Arms Range
- Surface Danger Zone
- Interstate Highway
- State/U.S. Highway

0 0.5 1 Miles

N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

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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, APZs, and surface danger zones (Figure 6-2) for JBLE 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. Table A-3 of Appendix A provides land use compatibility recommendations for small arms noise.

6.2 Planning Authorities

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

6.2.1 Virginia State Planning

Virginia State Code §15.2-2223 requires that all governing bodies develop and adopt a comprehensive plan for the physical development of the areas within its jurisdiction. The State requires that the comprehensive plans be developed with the purpose of guiding and accomplishing a coordinated, adjusted, and harmonious development of the territory. The development shall promote the health, safety, morals, order, convenience, prosperity, and general welfare of the inhabitants, including the elderly and persons with disabilities. Comprehensive plans must also include plans for transportation, long-range recommendations for general development, housing, and strategies for infrastructure.

Virginia State Code §15.2-2280 allows for any locality to classify the territory under its jurisdiction and regulate, restrict, permit, prohibit and determine the use of the land (i.e., zoning). The state code dictates that the governing body of the county shall have

jurisdiction for zoning matters within unincorporated areas of the county, and the governing body of a municipality shall have jurisdiction within those incorporated areas. Additionally, Virginia State Code §15.2-2294 details zoning regulations regarding airport safety zones. Every locality in which an airport, including government or military facilities, is located shall provide for the regulation of height of structures and natural growth with the purpose of protecting the safety of air navigation.

6.2.2 Hampton Roads Planning District Commission

The Hampton Roads Planning District Commission (HRPDC) is a regional organization that represents 17 local governments in Hampton Roads and provides planning assistance on local and regional issues. In Virginia, planning district commissions are voluntary associations created pursuant to the Virginia Area Development Act and the Code of Virginia Chapter 42 "Regional Cooperation Act."

Locally, the HRPDC was formed in 1990 when the Southeastern Virginia Planning District Commission merged with the Peninsula Planning District Commission. The commission coordinated a 2005 JLUS on behalf of and in cooperation with the cities of Chesapeake, Norfolk, and Virginia Beach, Virginia, and the Navy for land use surrounding Naval Air Station Oceana, Chambers Field, and Naval Auxiliary Landing Field Fentress (HRPDC 2017a, 2017b).

The commission also manages the region's land use classification system, which was created to provide a regional standard in interpreting land uses across local governments in the Hampton Roads region and to develop regional existing and future land use maps. At the regional level, there are nine major land use categories with additional land use subcategories denoting development intensity. These regional categories are connected to each local community's land uses, as defined in the local community's comprehensive plan. While the regional classification system provides an overview of land use for Hampton Roads, specific land use and zoning is determined at the local level (HRPDC 2011).

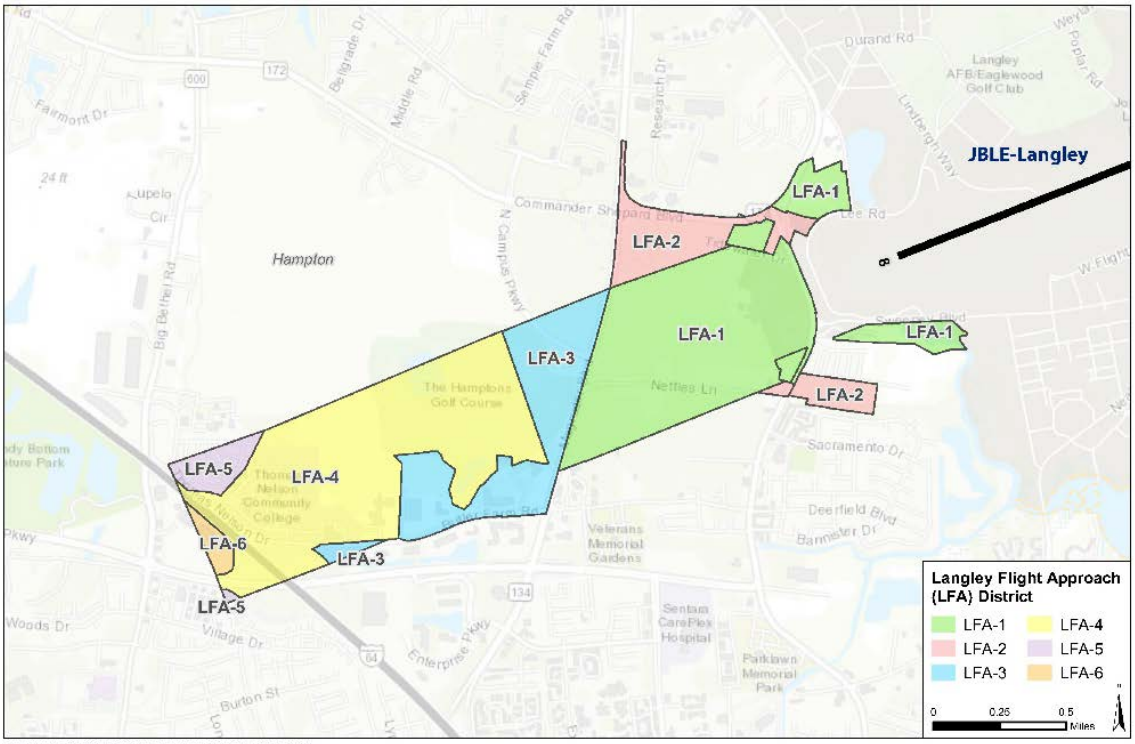
6.2.3 City of Hampton

Planning and zoning oversight for the City of Hampton is administered by the City's Planning & Zoning Administration Division (City of Hampton n.d.). The City's Community Plan is the official policy guide for decisions about physical development and establishes a physical framework for future growth. The plan identifies a close partnership with JBLE-Langley, and the City has helped to implement their AICUZ program in areas of the city that are close to the base to ensure that proper zoning and compatible land use regulations are met.

The City's zoning ordinance is the primary tool for carrying out the policies and recommendations in the Community Plan (City of Hampton 2006). The ordinance includes

six Langley Flight Approach (LFA) Districts, which regulate land use for properties under the approach flight path of JBLE-Langley. LFA-1 and LFA-2 only allow uses that are not disrupted by or disrupting to installation operations in the area nearest to the centerline of the runway and at the end of the runway. LFA-3, LFA-4, LFA-5, and LFA-6 limit the intensity of development (i.e., the concentration of people living and working in the area) beneath the flight approach to prevent negative impacts on aircraft operations (City of Hampton 2017). Figure 6-1 illustrates the LFA districts.

Figure 6-1. City of Hampton Langley Flight Approach (LFA) Districts



Source: AFCEC 2018; City of Hampton 2018; ESRI 2019.
© Ecology and Environment, Inc. 2019

6.2.4 City of Newport News

The City of Newport News Planning Department assists the Planning Commission and City Council with comprehensive planning, permit applications, and zoning (Newport News n.d.). The Newport News Comprehensive Plan provides a 20-year framework for future investment and development in the city and is implemented primarily through the City's zoning ordinance (Newport News 2018b). The Comprehensive Plan acknowledges JBLE's positive impact on the local economy (Newport News 2018a).

6.2.5 City of Poquoson

The City of Poquoson Community Development Department handles long-range planning and decisions about land use and development (City of Poquoson n.d.). The City of Poquoson Comprehensive Plan guides decisions on land use and development for the physical development of the city through the year of 2038. The plan recognizes JBLE as a major employer and also discusses the compatibility analysis in the Langley AFB 2007 AICUZ study, noting that, at the time of the 2007 AICUZ study, none of Poquoson's land was located within a designated APZ. The City's zoning ordinance defines the type of development allowed on parcels, but does not recognize the AICUZ noise zones in any of the categories established to regulate land use and development (City of Poquoson 2003, 2018).

6.2.6 James City County

The County's Planning Division provides planning and zoning oversight for James City County (James City County n.d.). The James City County Comprehensive Plan guides growth and development through 2035. The County's zoning ordinance defines the types of development allowed on parcels and outlines design and development guidelines for use (James City County 1997, 2015).

6.2.7 York County

York County's Planning Division is responsible for comprehensive planning and reviewing land use and development proposals (York County n.d.[a]). The County's Comprehensive Plan is a long-range plan and policy document for the physical development of the county through 2035. The plan recognizes the 2007 JBLE-Langley AICUZ study as a useful tool for assessing zoning classifications near the noise contours (York County 2013). The Comprehensive Plan is implemented by the County's zoning and subdivision ordinances, which act as the basic rule book for land development (York County n.d.[b], 1996, 2013). Though the zoning ordinance does not formally recognize the AICUZ noise zones, it does include an airport safety management overlay district, within which the height of structures and objects of natural growth in the vicinity of airports are restricted. Specifically, these provisions apply to all areas of the county lying within or underneath an imaginary surface or surfaces surrounding any civil or military airport, including JBLE-Langley (York County 1996).

6.3 Land Use and Proposed Development

In 2011, the Hampton Roads Transportation Planning Organization worked with localities in Hampton Roads to develop the Existing and Future Regional Land Use Map for Hampton Roads (HRTPO 2011). The regional land use classification system includes nine major land use categories (Table 6-1), which were used to interpret and merge the land use categories used by localities in Hampton Roads, including the planning authorities

described in Section 6.2. In order to analyze the compatibility of nearby land uses surrounding JBLE, the use of each parcel is characterized according to the categories used in the regional land use classification system. The land use compatibility analysis performed as part of this AICUZ study identifies existing and future land uses near JBLE to determine compatibility conditions. Existing land use is assessed to determine current land use activity, while future land use plans are used to project development and potential growth areas.

Table 6-1. Hampton Roads Regional Land Use Classification System

Activity	Classification	Code	Description
Residential	Rural Residential	RR	Residential uses with <1 dwelling units per acre
	Low Density Residential	RLD	Residential uses with 1-4 dwelling units per acre
	Medium Density Residential	RMD	Residential uses with 4-12 dwelling units per acre
	High Density Residential	RHD	Residential uses with >12 dwelling units per acre
Commercial	Neighborhood Commercial	CN	Limited-scale shopping, business, or trade activity
	Community Commercial	CC	Interneighborhood shopping, business, or trade activity
	Regional Commercial	CR	Regional shopping, business, or trade activity
Industrial	Light Industrial	IL	Light industrial uses (Research & Development, warehousing, service, etc.)
	Heavy Industrial	IH	Heavy industrial uses with possible adverse environmental impacts (manufacturing, etc.)
	Port/Aviation Industrial	IPA	Port, general, and commercial aviation-related industrial operations
Mixed Use	Mixed Use Commercial / Residential	MCR	Commercial/residential mixed-use activity
Military	Military	MM	Military-related facilities
Institutional	Utilities	IU	Utility facilities
	Public/Semi-Public	IP	Government, educational, religious, social, or healthcare facilities
	Transportation Network	IT	Transportation facilities
Agriculture	Agriculture	AA	Agricultural operations
Vacant	Vacant	V	Vacant developable lands

Table 6-1. Hampton Roads Regional Land Use Classification System

Activity	Classification	Code	Description
Parks, Open Space, & Greenways	Parks and Recreation	NP	Open space and recreational uses
	Resource Conservation	NC	Conservation lands
	Historic/Cultural	NH	Historic preservation/cultural uses

Source: HRTPO 2011.

6.3.1 Existing Land Uses

A coastal metropolitan area in Virginia, Hampton Roads is largely developed. Within Hampton Roads, JBLE is located on the Virginia Peninsula, which is characterized by significant, dense areas of development including residential, commercial, industrial, institutional, and other uses.

The composite AICUZ footprint for JBLE-Langley (i.e., noise zones, CZs, APZs, and surface danger zones) encompasses land areas in the City of Hampton, City of Poquoson, and York County. Land use north of JBLE-Langley, in the City of Poquoson, is characterized by residential neighborhoods and parks, open space, and greenways land uses, with scattered commercial and institutional uses and vacant parcels. To the south of the installation in the City of Hampton, land use is a mixture of residential, commercial, and institutional uses with pockets of parks, open space, and greenways uses. East of JBLE-Langley in the City of Hampton, areas of residential and vacant land uses exist with some pockets of commercial and institutional land use. Land immediately to the west of the installation and the NASA-LaRC in the City of Hampton is developed with a mix of land uses, including residential, commercial, industrial, institutional, and vacant land. To the northwest of the installation and the NASA-LaRC in York County, land use is characterized primarily by a mix of residential and parks, open space, and greenways uses, with some vacant parcels. Figure 6-3 illustrates existing land use within the AICUZ footprint for JBLE-Langley.

The composite AICUZ footprint for JBLE at JBLE-Eustis (i.e., noise zones, CZs, APZs, and surface danger zones) is either within the installation boundary or over water or land designated as military land (see Figures 6-6A and 6-6B). North of the installation, but outside of the AICUZ footprint in James City County, land use is predominantly industrial, with areas of military land. To the east of JBLE-Eustis, across the Warwick River in the City of Newport News, land use is predominantly residential, with some commercial; institutional; and parks, open space, and greenways land uses throughout. There are few vacant parcels in the city. Figures 6-7A and 6-7B illustrate existing land use near the AICUZ footprint for JBLE-Eustis.

6.3.2 Current Zoning

The areas of Hampton Roads adjacent to and near JBLE-Langley and within and near the AICUZ footprint are primarily zoned residential. JBLE-Langley, for example, is surrounded to the north and south by areas that are zoned residential, with some pockets of commercial; industrial; institutional; mixed use; and parks, open space, and greenways zoning throughout. A larger area directly west of the installation is zoned for commercial development, and large areas west and northwest of the installation are zoned for mixed use. Figure 6-4 illustrates current zoning within and near the AICUZ footprint for JBLE-Langley. Land directly east of JBLE-Eustis is also primarily zoned residential, with some pockets of parks, open space, and greenways zoning and commercial zoning along U.S. Route 60 (Warwick Boulevard). Land directly north of JBLE-Eustis is primarily zoned industrial. Figures 6-8A and 6-8B illustrate current zoning near the AICUZ footprint for JBLE-Eustis.

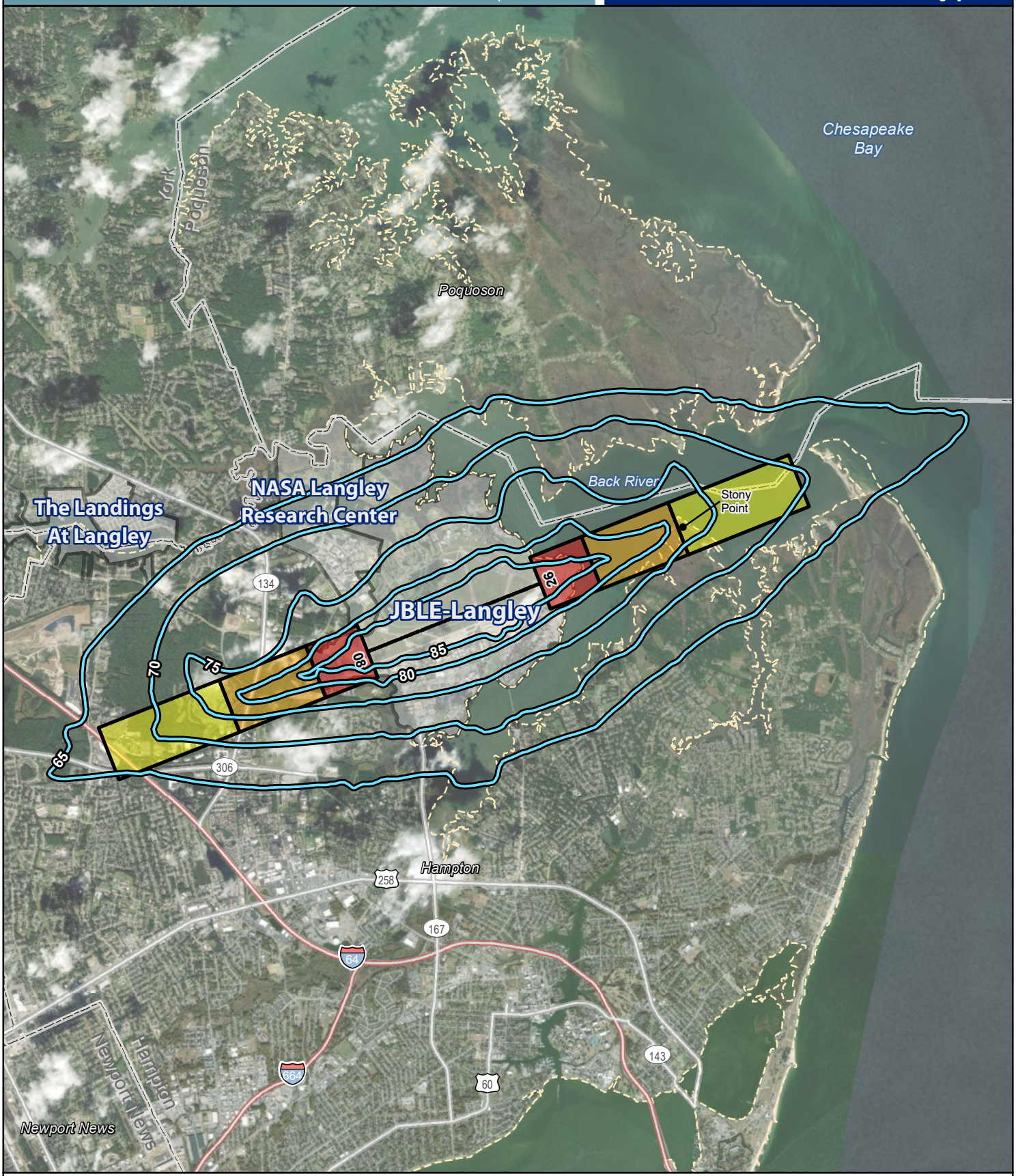
6.3.3 Future Land Use

Future land use data provided by the HRPDC indicates the region is expected to be further developed with residential and industrial land uses. For example, currently vacant parcels to the north, south, east, and west of JBLE-Langley are expected to be developed with residential land uses. Figure 6-5 illustrates projected future land use within the AICUZ footprint for JBLE-Langley. North of the installation, future land uses are anticipated to remain industrial. East of JBLE-Eustis, land uses are anticipated to remain similar to current land uses with additional commercial development along Highway 60. Figures 6-9A and 6-9B illustrate future land use within and near the AICUZ footprint for JBLE-Eustis.

Figure 6-2

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Composite AICUZ Footprint: 2020 JBLE AICUZ Noise Planning Contours and Accident Potential Zones for JBLE-Langley



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Noise Contour (dB DNL) (2020 AICUZ)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 0.5 1 Miles

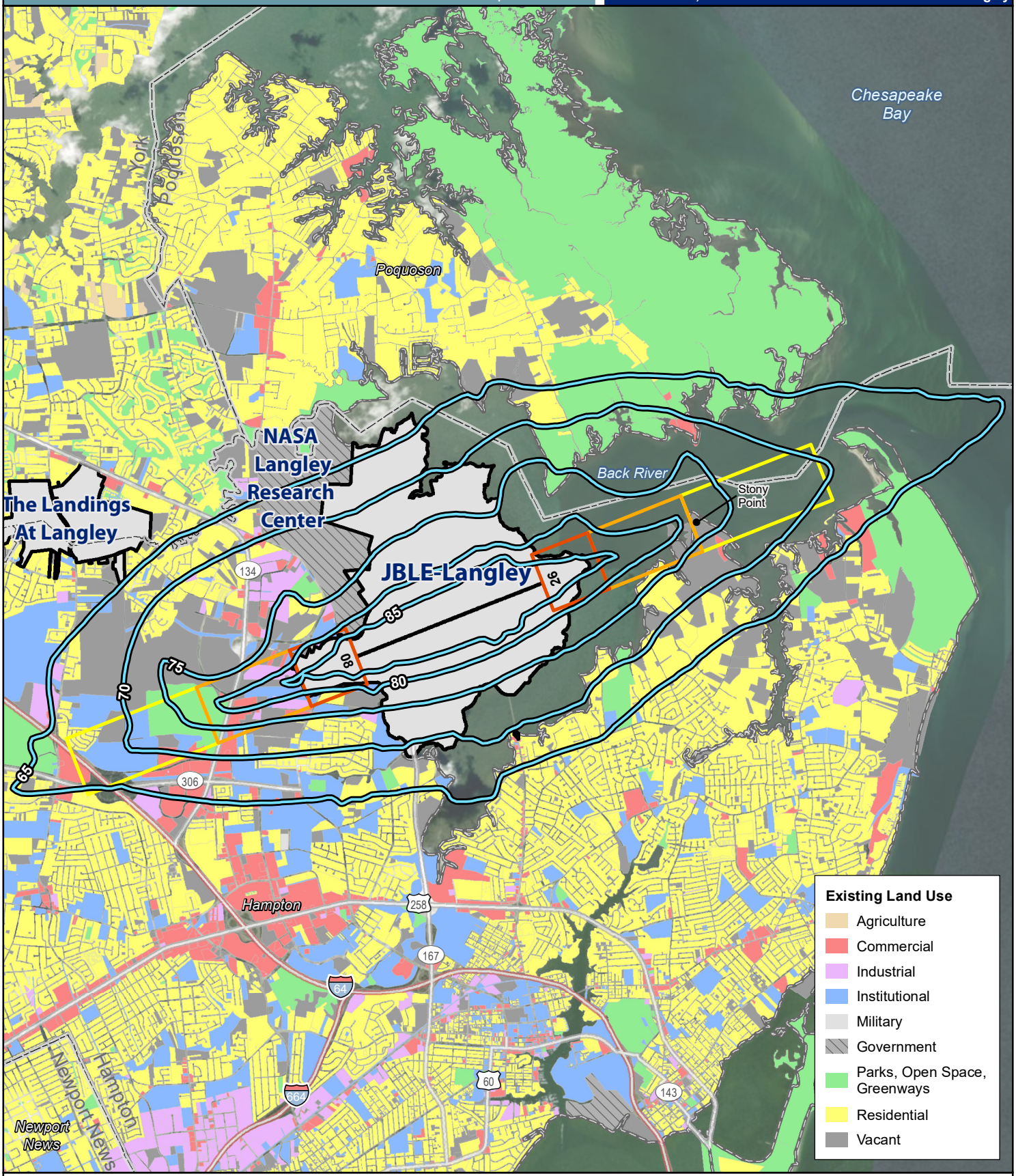
N

Source: AFCEC 2018, 2019; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-3

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Existing Land Use and 2020 JBLE AICUZ Noise Contours, Clear Zones, and Accident Potential Zones for JBLE-Langley



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Noise Contour (dB DNL) (2020 AICUZ)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 0.5 1 Miles

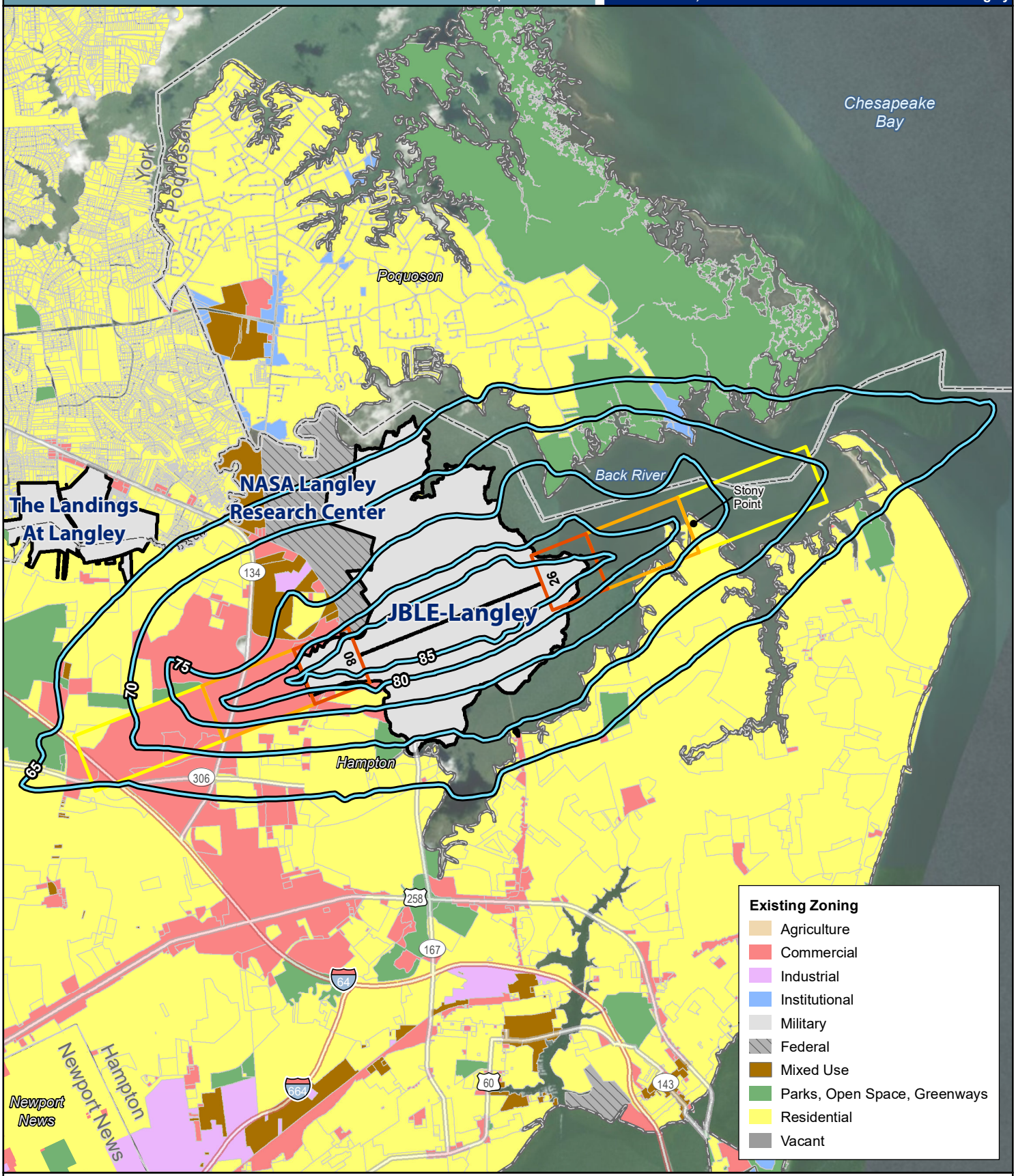
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-4

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Existing Zoning and 2020 JBLE AICUZ Noise Contours, Clear Zones, and Accident Potential Zones for JBLE-Langley



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Noise Contour (dB DNL) (2020 AICUZ)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 0.5 1 Miles

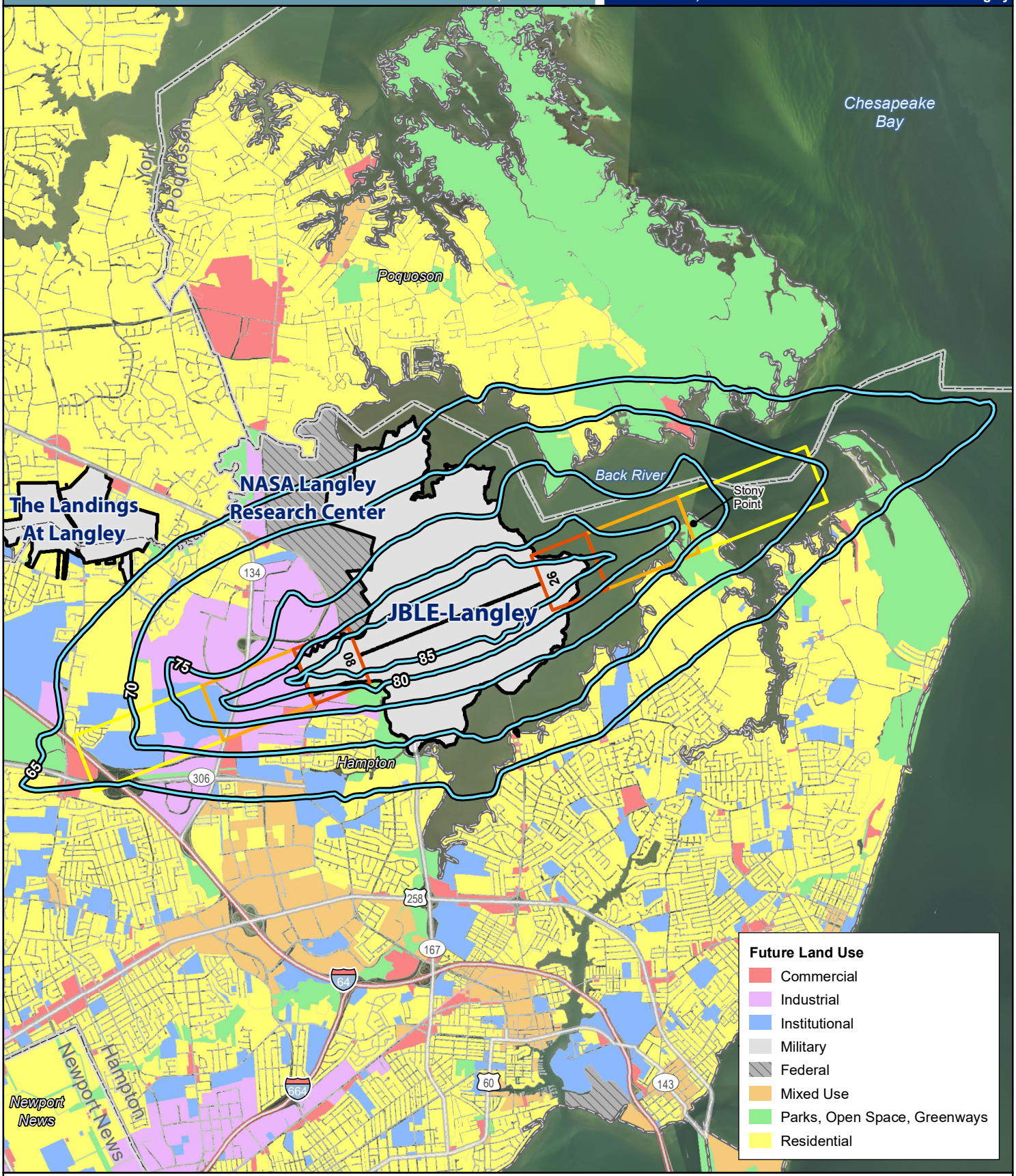
N

Source: AFCEC 2018, 2019; City of Hampton 2018; City of Newport News 2018; City of Poquoson 2018; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018; York County 2018.

Figure 6-5

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Future Land Use and 2020 JBLE AICUZ Noise Contours, Clear Zones, and Accident Potential Zones for JBLE-Langley



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Noise Contour (dB DNL) (2020 AICUZ)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 0.5 1 Miles

N

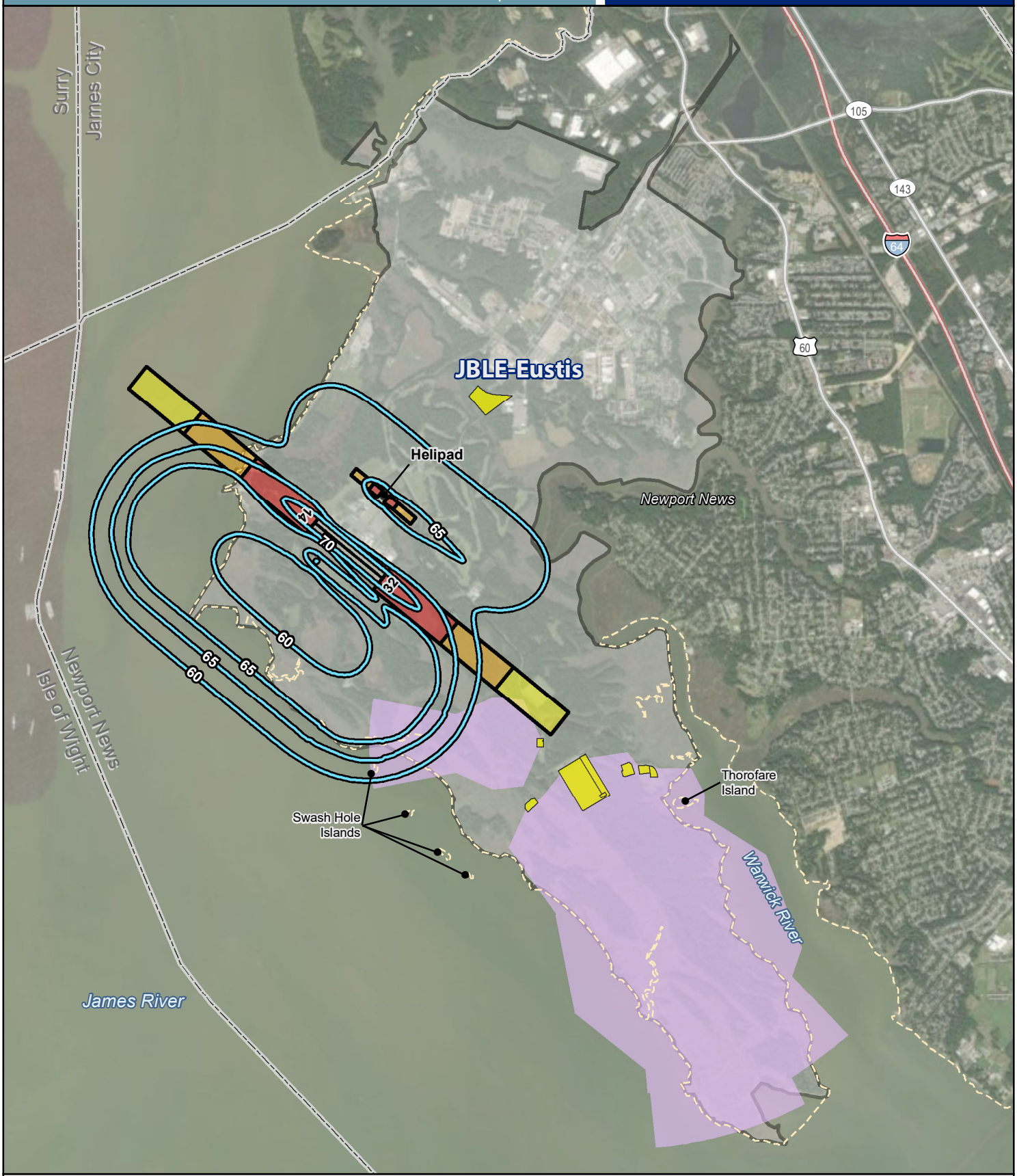
Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-6A

Joint Base Langley-Eustis

Air Installation Compatible Use Zones

Composite AICUZ Footprint: 2020 JBLE AICUZ Aircraft Operations Noise Contours, Accident Potential Zones, and Surface Danger Zones for JBLE-Eustis



Legend

- Airfield Runway
- Installation Boundary
- City Boundary
- County Boundary
- Interstate Highway
- State/U.S. Highway
- Aircraft Noise Contour (dB DNL)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II
- Small Arms Range
- Surface Danger Zone

0 0.5 1 Miles

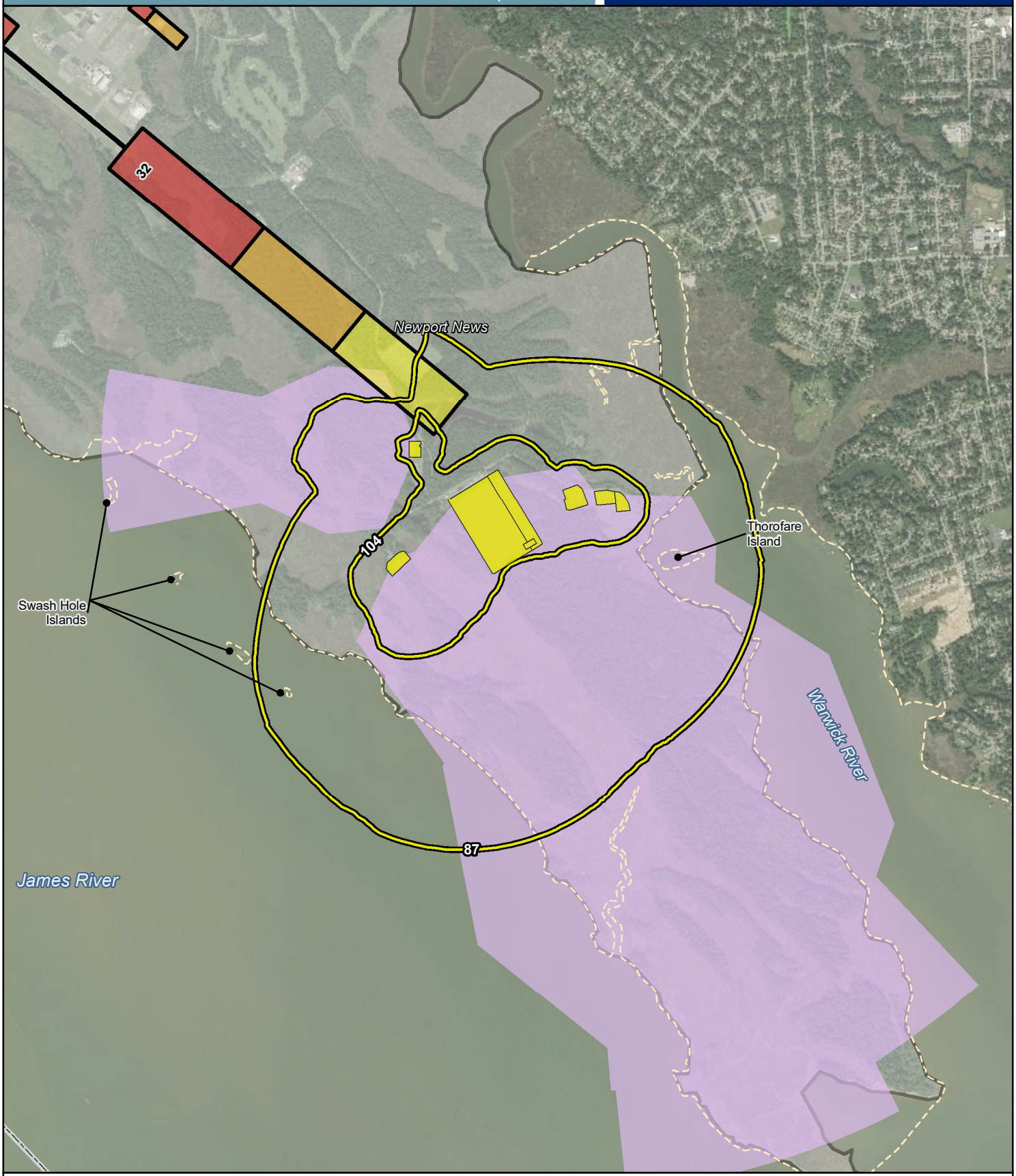
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-6B

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Composite AICUZ Footprint: 2020 JBLE AICUZ Small Arms Operations Noise Contours for JBLE-Eustis



Legend

- Airfield Runway
- Installation Boundary
- City Boundary
- County Boundary
- Peak Noise Zone (dB PK15)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II
- Small Arms Range
- Surface Danger Zone

0 0.5 1 Miles

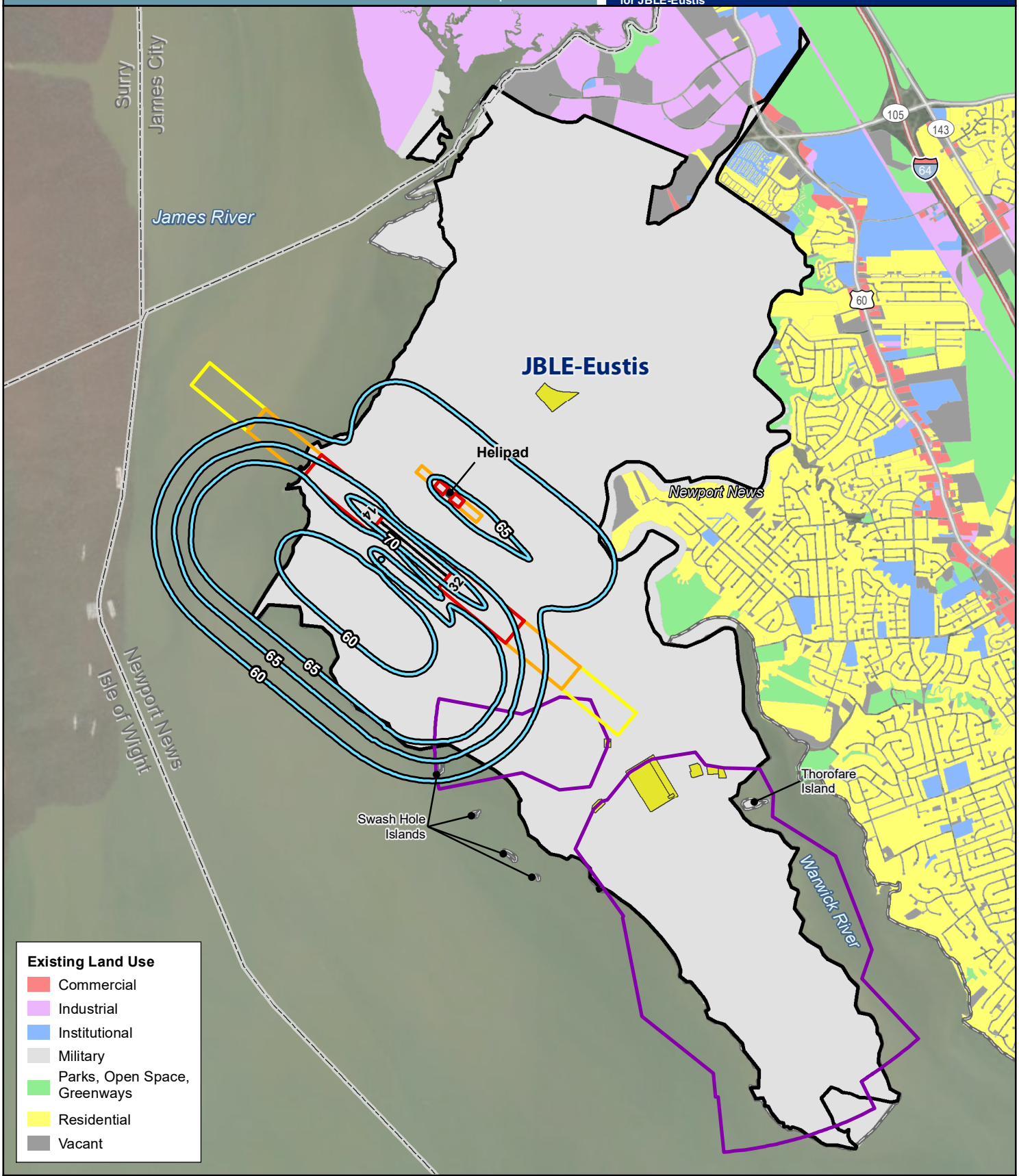
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-7A

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Existing Land Use and 2020 JBLE AICUZ Air Operations Noise Contours, Clear Zones, Accident Potential Zones, and Surface Danger Zones for JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Aircraft Noise Contour (dB DNL)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II
- Small Arms Range
- Surface Danger Zone

0 0.5 1 Miles

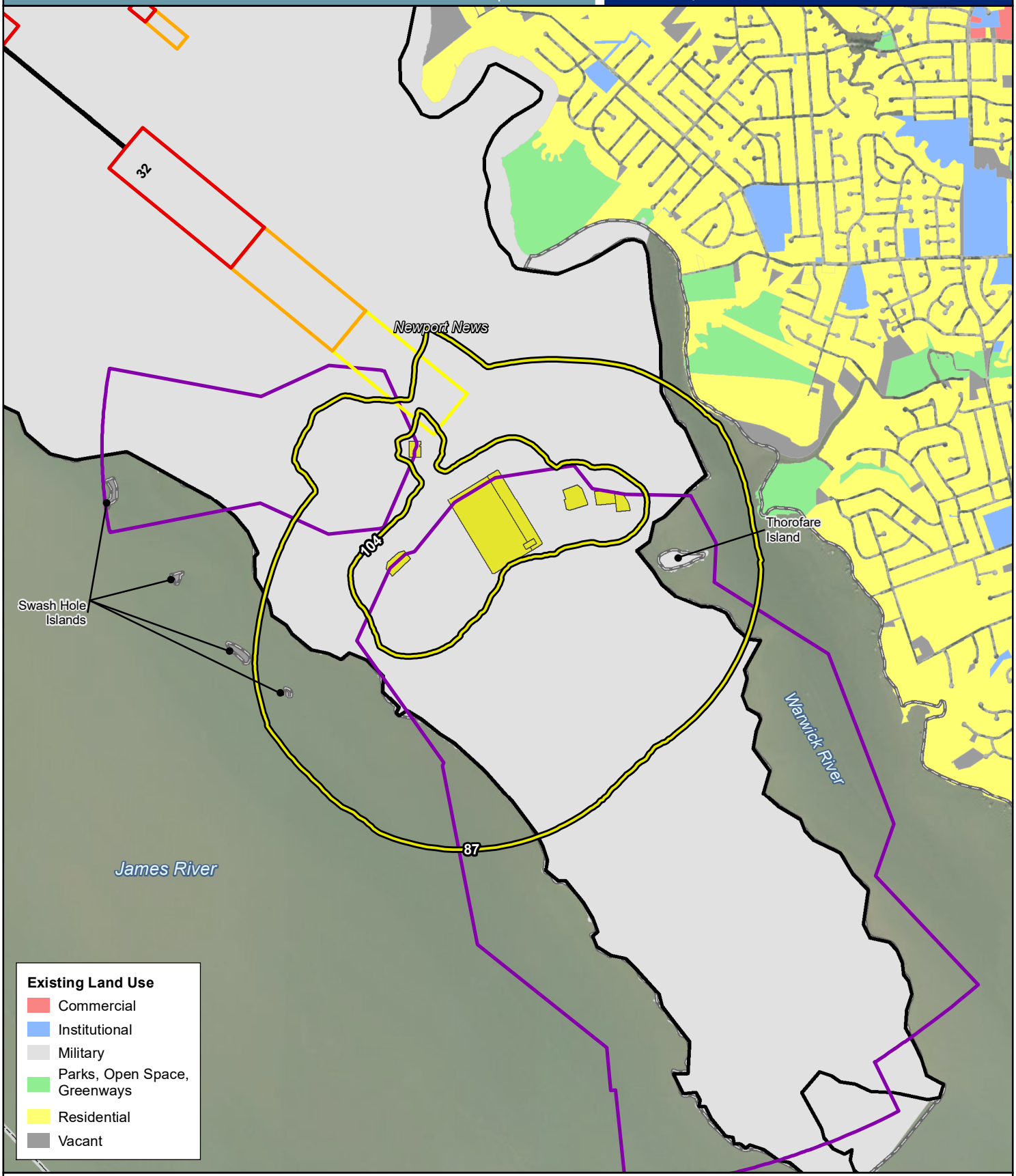
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-7B

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Existing Land Use and 2020 JBLE AICUZ Small Arms Operations Noise Contours for JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Peak Noise Zone (dB PK15)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II
- Small Arms Range
- Surface Danger Zone

0 0.5 1 Miles

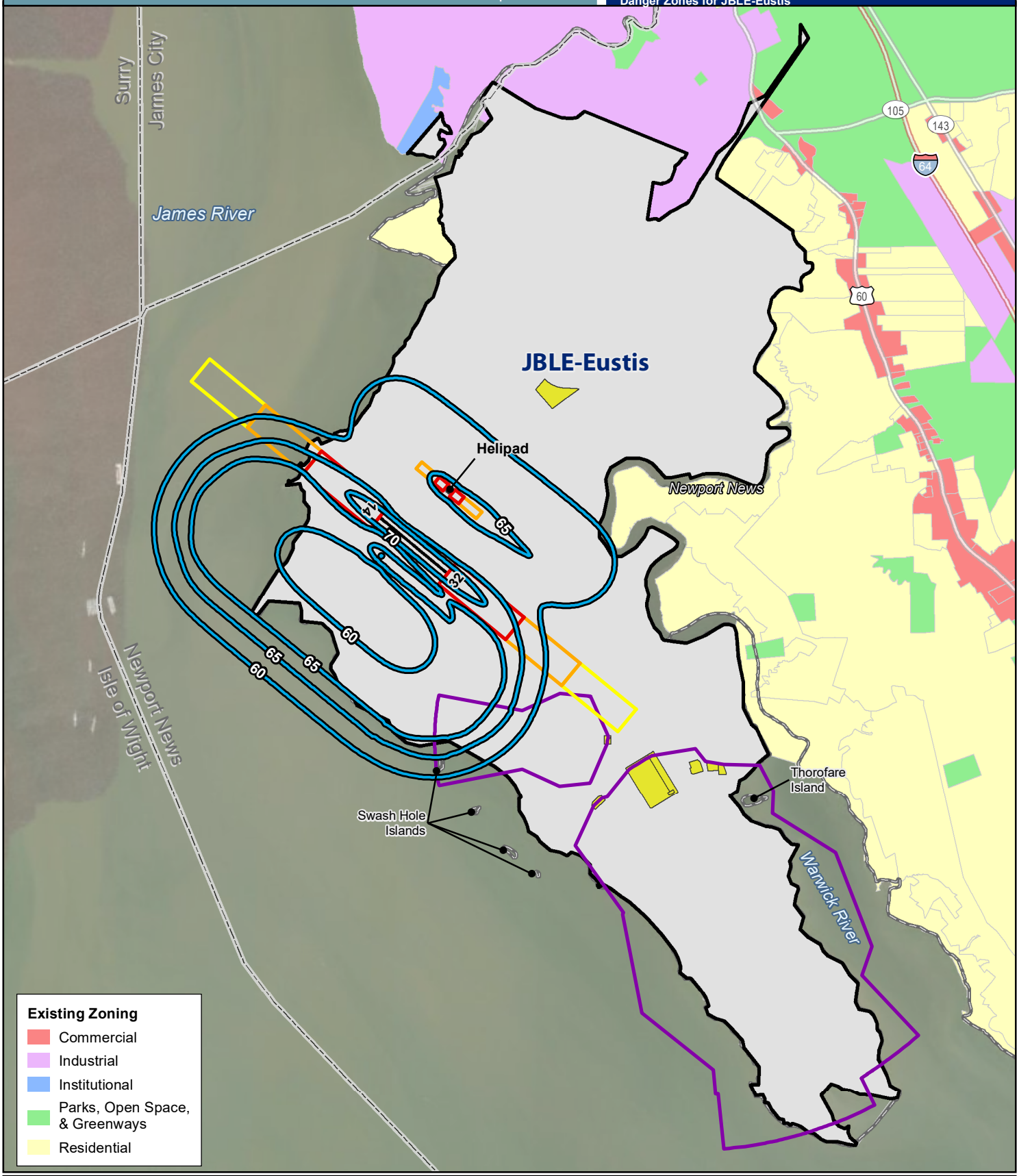
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-8A

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Existing Zoning and 2020 JBLE AICUZ Air Operations Noise Contours, Clear Zones, Accident Potential Zones, and Surface Danger Zones for JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Aircraft Noise Contour (dB DNL)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II
- Small Arms Range
- Surface Danger Zone

0 0.5 1 Miles

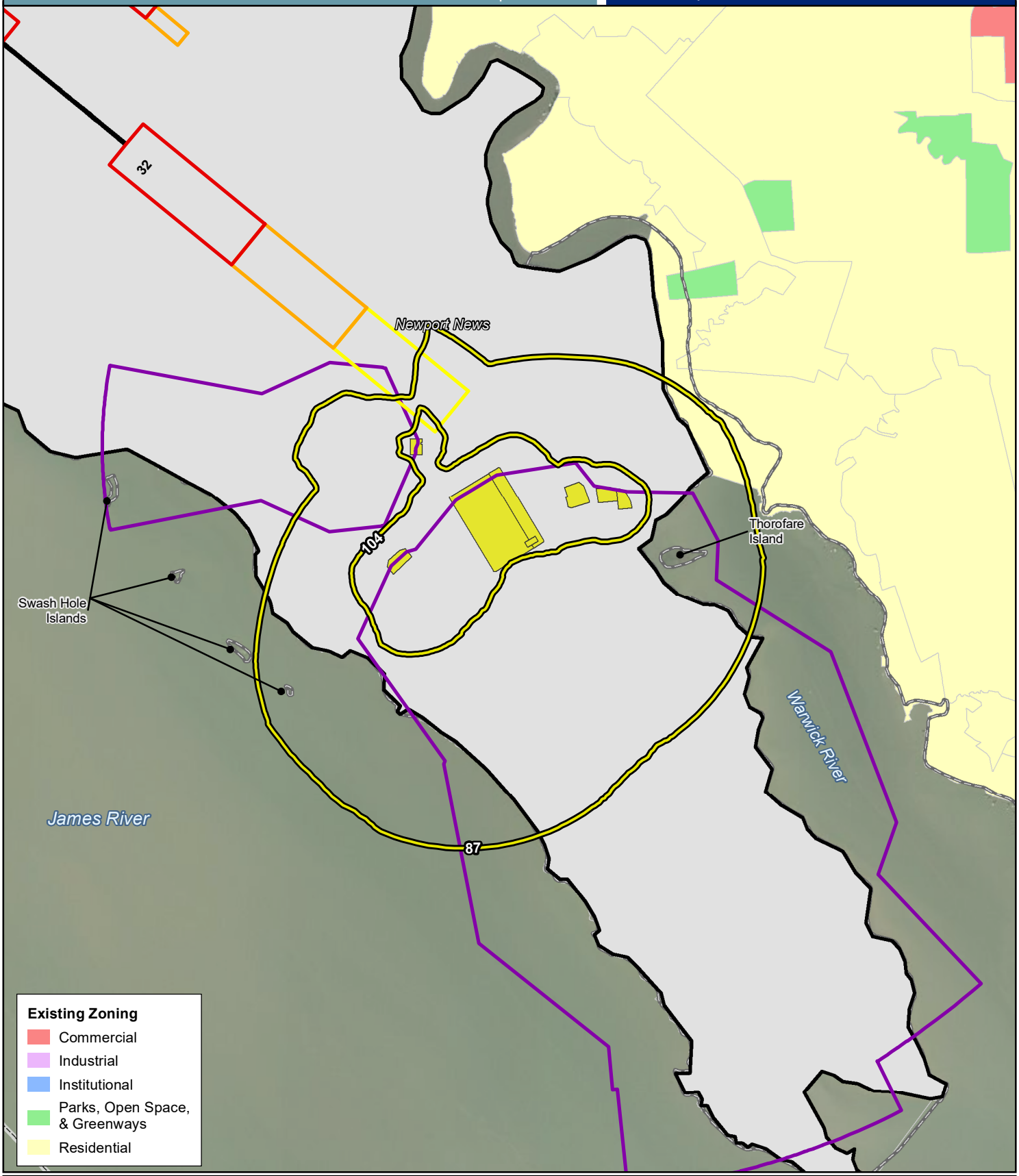
N

Source: AFCEC 2018; City of Newport News 2018; Digital Globe 2017; FHWA 2017; James City County 2018; U.S. Census Bureau 2018; VGIN 2018; York County 2018.

Figure 6-8B

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Existing Zoning and 2020 JBLE AICUZ Small Arms Operations Noise Contours for JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Peak Noise Zone (dB PK15)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II
- Small Arms Range
- Surface Danger Zone

0 0.5 1 Miles

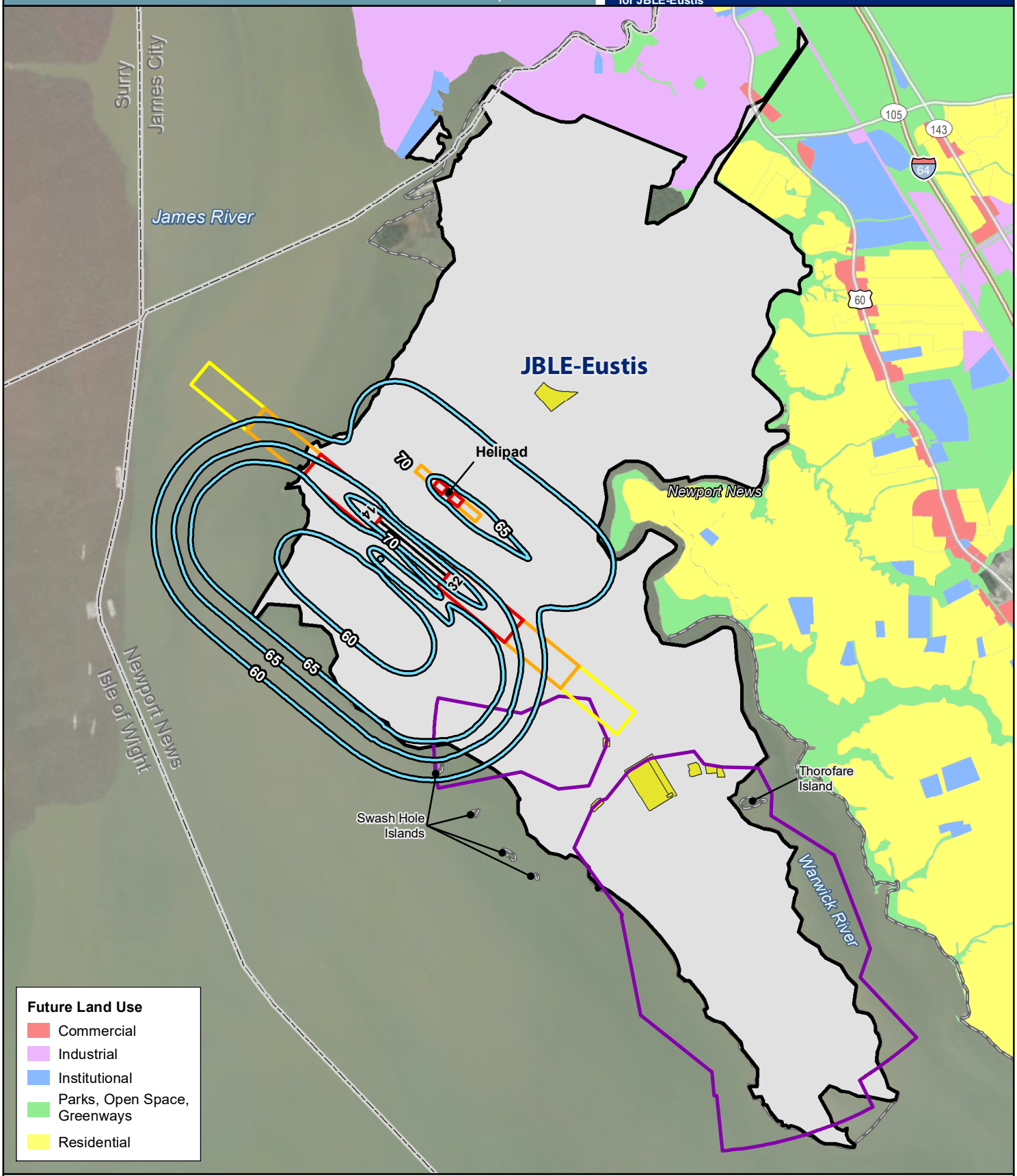
N

Source: AFCEC 2018; City of Newport News 2018; Digital Globe 2017; FHWA 2017; James City County 2018; U.S. Census Bureau 2018; VGIN 2018; York County 2018.

Figure 6-9A

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Future Land Use and 2020 JBLE AICUZ Air Operations Noise Contours, Clear Zones, Accident Potential Zones, and Surface Danger Zones for JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II
- Small Arms Range
- Surface Danger Zone

0 0.5 1 Miles

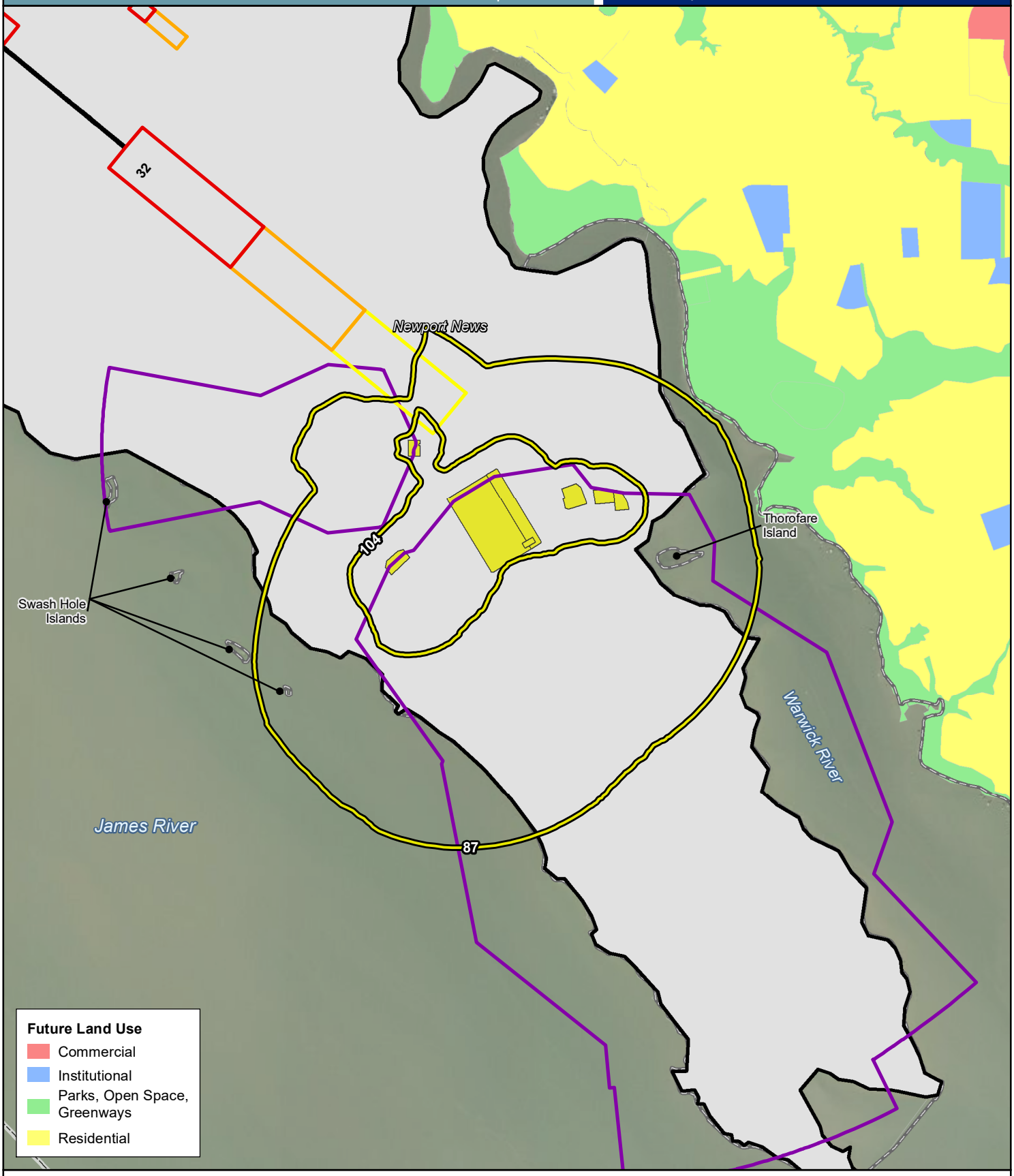
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-9B

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Future Land Use and 2020 JBLE AICUZ Small Arms Operations Noise Contours for JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Peak Noise Zone (dB PK15)
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II
- Small Arms Range
- Surface Danger Zone

0 0.5 1 Miles

N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

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 the Hampton Roads regional land use classification system described in Section 6.3. For the purpose of this analysis, the DoD AICUZ compatibility guidelines (Tables A-1, A-2, and A-3 of Appendix A) have been consolidated into the regional land use classifications. Table 6-2 provides generalized compatibility guidelines for aircraft noise and safety. Table 6-3 provides generalized compatibility guidelines for small arms range noise. 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 6-2. Generalized Land Use Categories for Aircraft 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, including Mixed Use 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, including Mixed Use Industrial	Yes	Yes	Yes	Yes	Yes[2]	No	No	Yes[2]	Yes[2]
Institutional	Yes	Yes[2]	Yes[2]	Yes[2]	No	No	No	No	Yes[2]
Agriculture	Yes	Yes[2]	Yes[2]	Yes[2]	Yes[2]	Yes[2]	No	Yes[2]	Yes[2]
Vacant	Yes	Yes[2]	Yes[2]	Yes[2]	Yes[2]	Yes[2]	No	Yes[2]	Yes[2]
Parks, Open Space, & Greenways	Yes	Yes[2]	Yes[2]	No	No	No	No	Yes[2]	Yes[2]

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.

Table 6-3. Generalized Land Use Compatibility for Small Arms Noise

Generalized Land Use Category[3]	Noise Zone (dB PK)		
	<87	87-104	>104
Residential, including Mixed Use Residential	Yes	No[1]	No
Commercial	Yes	Yes[2]	Yes[2]
Industrial, including Mixed Use Industrial	Yes	Yes[2]	Yes[2]
Institutional	Yes	Yes[2]	Yes[2]
Agriculture	Yes	Yes[2]	Yes[2]
Vacant	Yes	Yes[2]	Yes[2]
Parks, Open Space, & Greenways	Yes	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 at JBLE-Langley

JBLE-Langley's noise contours, as well as APZs, extend into the City of Hampton, City of Poquoson, and York County. Portions of the 65db DNL noise contour also extend over the Plum Tree Island National Wildlife Refuge and the Grandview Natural Preserve. Table 6-4 details the acreage of existing land use compatibility for off-installation areas within the 2020 JBLE-Langley noise contours. Figure 6-10 illustrates the existing land use compatibility for the 2020 JBLE-Langley noise contours.

Incompatible land uses are located in various areas surrounding the installation within the 2020 JBLE-Langley noise contours. In addition to a small parcel of industrial land within noise contours greater than 85 dB DNL (less than an acre), there are several other areas of incompatible land uses within the 80 – 84 dB DNL noise contours including 58 acres of institutional lands and 15 acres of commercial land uses. Additional areas of existing land use incompatibility include 78 acres of residential land within the 75 – 79 dB DNL noise contours as well as 140 acres of parks, open space, and greenways within the 75 – 79 dB DNL noise contours. A total of 1,526 acres of existing residential uses are located with the 65 – 69 dB DNL and 70 – 74 dB DNL noise contours; these uses are incompatible with exceptions. The majority of these incompatible existing land uses are west of the installation. The only areas of incompatibility east of the installation are small areas of residential and parks, open space, and greenways land uses along the Back River.

Table 6-5 details the acreages of compatible and incompatible existing land uses for off-installation areas within the CZs and APZs, and Figure 6-11 illustrates these areas. In total there are 45 acres of incompatible land uses within the JBLE-Langley CZs, 63 acres within APZ I, and 22 acres within APZ II (incompatible with exceptions). Areas of incompatibility within the CZs include 26 acres of institutional lands, 11 acres of residential areas, 4 acres of industrial, 3 acres of vacant lands, 1 acre of military lands, and less than an acre of commercial land.

Table 6-4. Off-Installation Existing Land Use Acreage within AICUZ Noise Zones at JBLE-Langley

Designation	Generalized Land Use Category[3]	Noise Zone (dB DNL)										
		65-69	Note	70-74	Note	75-79	Note	80-84	Note	85+	Note	Total
Incompatible	Residential	1,082	(1)	444	(1)	78	-	<1	-	-	-	1,604
	Mixed Use	-	-	-	-	-	-	-	-	-	-	-
	Commercial							15	-	-	-	15
	Industrial									<1	-	<1
	Institutional							58	-	-	-	58
	Agriculture											
	Vacant											
	Parks, Open Space, & Greenways					140	-	4	-	-	-	144
	Military											
Compatible	Residential											
	Mixed Use											
	Commercial	232	-	124	(2)	41	(2)					397
	Industrial	40	-	119	-	74	-	17	(2)			250
	Institutional	445	(2)	187	(2)	74	(2)					706
	Agriculture	-	-	-	-	-	-	-	-	-	-	-
	Vacant	661	(2)	701	(2)	273	(2)	32	(2)	3	(2)	1,670
	Parks, Open Space, & Greenways	613	(2)	380	(2)							993
	Military	<1	-	1	-	1	-	1	-	<1	-	4
Subtotals	Incompatible	1,082		444		218		78		<1		1,822
	Compatible	1,991		1,512		463		50		3		4,020
TOTAL		**3.073**		**1,956**		**681**		**128**		**4**		**5,842**

Notes:
All contour areas on-installation are excluded from the counts.
[1] Incompatible with exceptions.
[2] Compatible with restrictions.
[3] Refer to Appendix A for details.

Table 6-5. Off-installation Existing Land Use Acreage within Clear Zones/Accident Potential Zones at JBLE-Langley

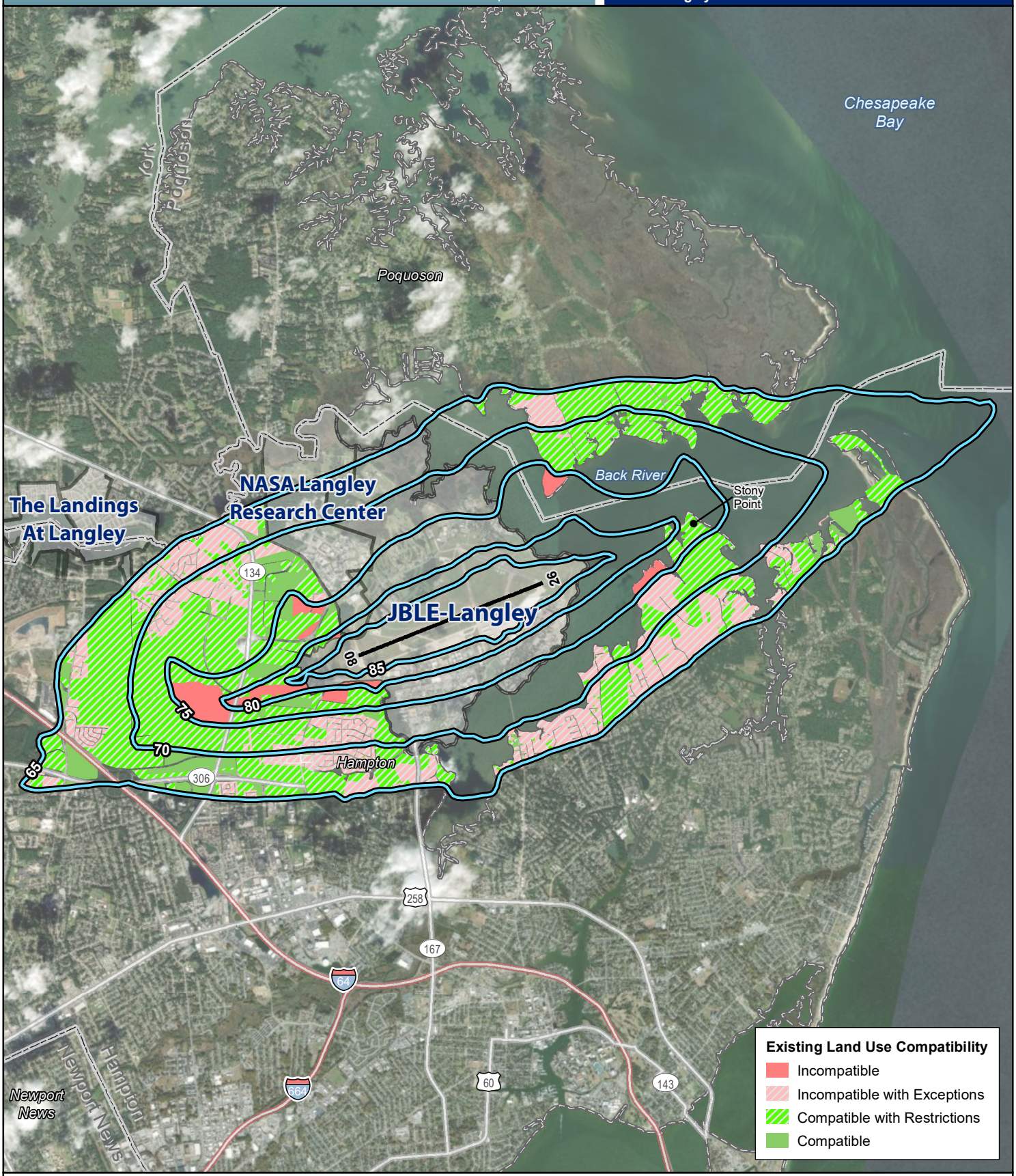
Designation	Generalized Land Use Category[2]	CZ	Note	APZ I	Note	APZ II	Note	Total
Incompatible	Residential	11	-	8	-	22	(1)	41
	Mixed Use	-	-	-	-	-	-	-
	Commercial	<1	-					<1
	Industrial	4	-					4
	Institutional	26	-	55	-			81
	Agriculture	-	-					-
	Vacant	3	-					3
	Parks, Open Space, & Greenways	-	-					-
	Military	1	-					1
Compatible	Residential							
	Mixed Use	-	-	-	-	-	-	-
	Commercial			47	(2)	40	(2)	87
	Industrial			61	(2)	<1	(2)	61
	Institutional					176	(2)	176
	Agriculture			-	-	-	-	-
	Vacant			151	(2)	83	(2)	234
	Parks, Open Space, & Greenways			49	(2)	141	(2)	190
	Military			<1	-	-	-	<1
Subtotals	Incompatible	45		63		22		130
	Compatible			308		440		748
TOTAL		**45**		**371**		**462**		**878**

Notes:
All contour areas on-installation are excluded from the counts.
[1] Incompatible with exceptions.
[2] Compatible with restrictions.
[3] Refer to Appendix A for details.

Figure 6-10

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Incompatible Existing Land Use for Noise at JBLE-Langley



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Noise Contour (dB DNL) (2020 AICUZ)

0 0.5 1 Miles

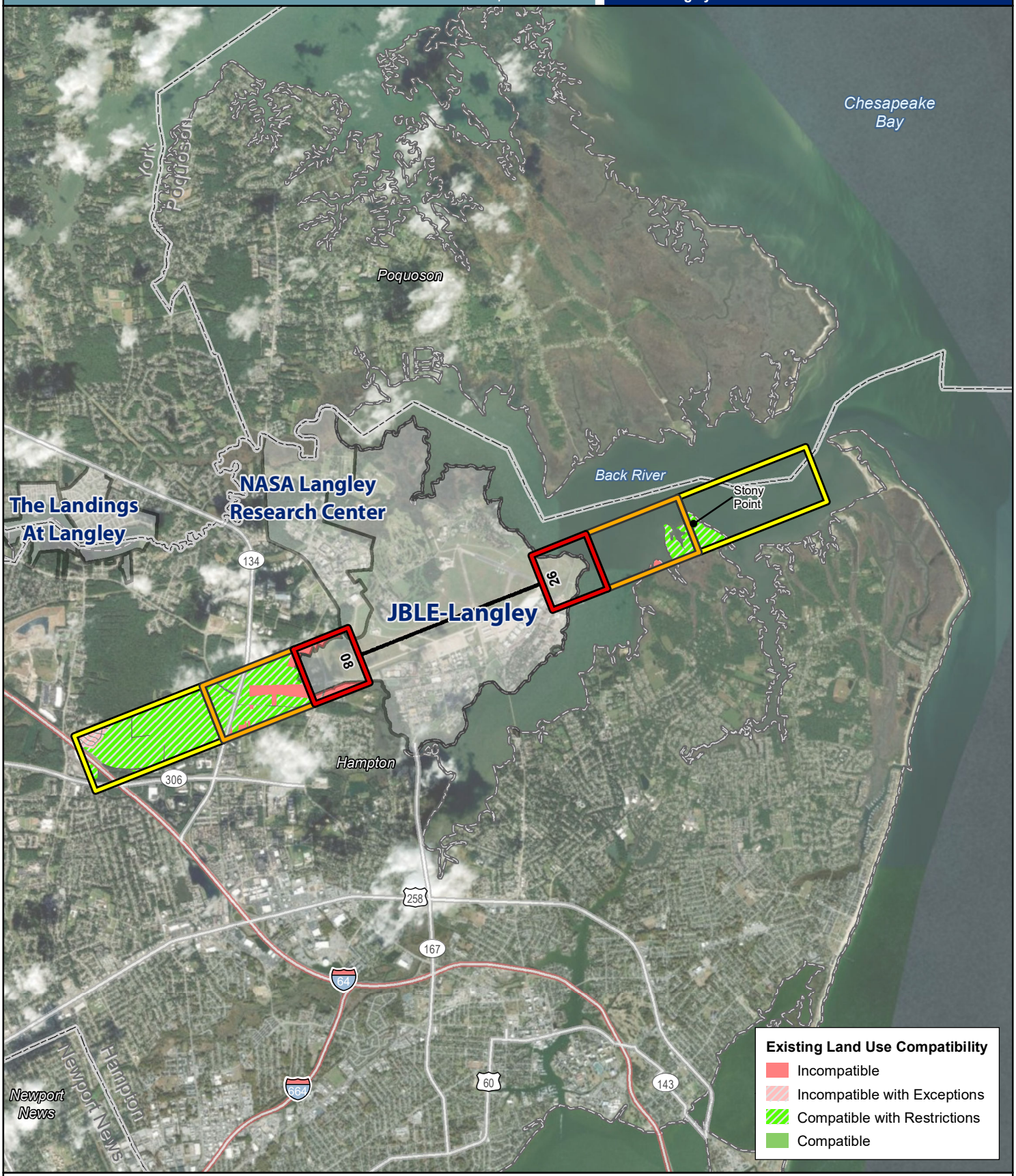
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-11

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Incompatible Existing Land Use for Safety at JBLE-Langley



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 0.5 1 Miles

N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

6.4.3 Future Land Use Compatibility Concerns at JBLE-Langley

Incompatible future land use designations are located in various areas surrounding the installation within the 2020 JBLE-Langley noise contours. In the 85 and above dB DNL noise contour there are 3 acres of incompatible industrial future land uses. Other significant areas of incompatible future land uses include 21 acres of incompatible parks, open space, and greenways uses and 4 acres of institutional uses within the 80 – 84 dB DNL noise contours. Future land use compatibility analysis also details 118 acres of parks, open space, and greenways within the 75 – 79 dB DNL contours. A total of 2,481 acres of future residential uses would be located within the 65 – 69 dB DNL and 70 – 74 dB DNL noise contours; these uses would be incompatible with exceptions. The majority of these areas of incompatible parks, open space, and greenways uses are east of JBLE-Langley and along the Back River. Future residential areas that would be incompatible with exceptions are generally located southeast of the installation across the Back River, and west of the installation near The Landings at Langley. Table 6-6 details the future land use compatibility for off-installation areas within the 2020 JBLE-Langley noise contours. Figure 6-12 illustrates the future land use compatibility for the 2020 JBLE-Langley noise contours.

Table 6-7 details future land use compatibility for off-installation areas within the CZs and APZs, and Figure 6-13 illustrates these areas of future land use compatibility. In total there are 44 acres of incompatible future land uses within the CZs. Thirty-two acres are classified as future industrial development and are located in the CZ for Runway 26; and 10 additional acres are classified as parks, open space, and greenways. Other areas of future land use incompatibility include 49 acres of institutional lands and 6 acres of residential areas, both within APZ I. The 49 acres of institutional lands are within APZ I of Runway 26, and the 6 acres of residential are within APZ I of Runway 08, adjacent to the Back River.

Table 6-6. Off-Installation Future Land Use Acreage within AICUZ Noise Zones at JBLE-Langley

Designation	Generalized Land Use Category[3]	Noise Zone (dB DNL)										
		65-69	Note	70-74	Note	75-79	Note	80-84	Note	85+	Note	Total
Incompatible	Residential	1,769	(1)	712	(1)	27	-	-	-	-	-	2,508
	Mixed Use			-	-	-	-	-	-	-	-	-
	Commercial							-	-	-	-	-
	Industrial									3	-	3
	Institutional							4	-	-	-	4
	Agriculture											
	Vacant											
	Parks, Open Space, & Greenways					118	-	21	-			139
	Military											
Compatible	Residential											
	Mixed Use	57	(2)									57
	Commercial	106	(2)	60	(2)	17	(2)					183
	Industrial	170	-	720	-	405	-	101	(2)			1,396
	Institutional	409	(2)	191	(2)	113	(2)					713
	Agriculture	-	-	-	-	-	-	-	-	-	-	-
	Vacant	-	-	-	-	-	-	-	-	-	-	-
	Parks, Open Space, & Greenways	561	-	273	(2)							834
	Military	<1	-	1	-	1	-	1	-	<1	-	4
Subtotals	Incompatible	1,769		712		145		25		3		2,654
	Compatible	1,303		1,245		536		102		<1		3,187
TOTAL		**3,072**		**1,957**		**681**		**127**		**4**		**5,840**

Notes:
All contour areas on-installation are excluded from the counts.
[1] Incompatible with exceptions.
[2] Compatible with restrictions.
[3] Refer to Appendix A for details.

Table 6-7. Off-installation Future Land Use Acreage within Clear Zones/Accident Potential Zones at JBLE-Langley

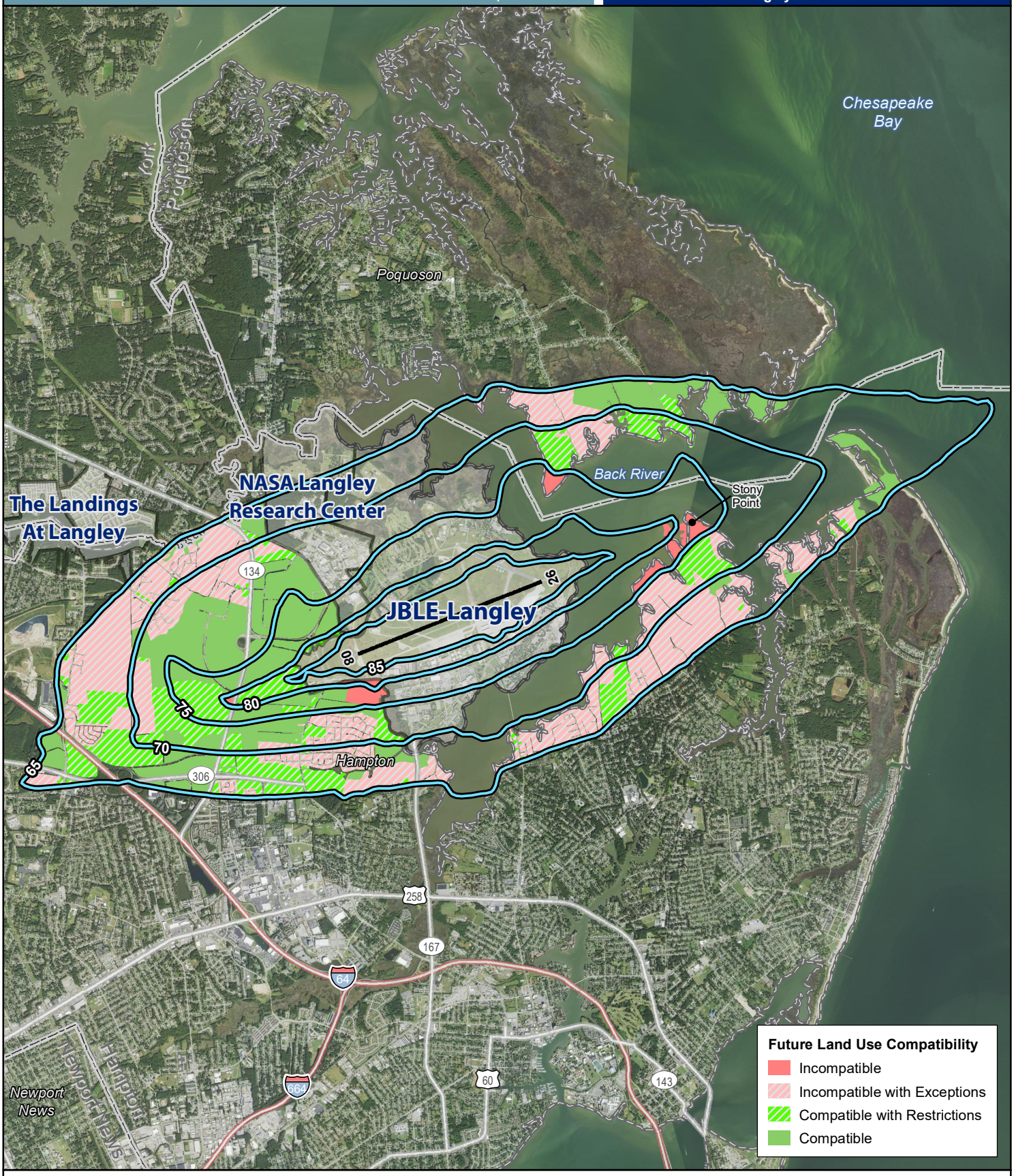
Designation	Generalized Land Use Category[2]	CZ	Note	APZ I	Note	APZ II	Note	Total
Incompatible	Residential	-	-	6	-	86	(1)	92
	Mixed Use	-	-	-	-	-	-	-
	Commercial	1	-					1
	Industrial	32	-					32
	Institutional	-	-	49	-			49
	Agriculture	-	-					
	Vacant	-	-					
	Parks, Open Space, & Greenways	10	-					10
	Military	1	-					1
Compatible	Residential							
	Mixed Use							
	Commercial			8	(2)	11	(2)	19
	Industrial			264	(2)	51	(2)	315
	Institutional					282	(2)	282
	Agriculture			-	-	-	-	-
	Vacant			-	-	-	-	-
	Parks, Open Space, & Greenways			44	(2)	32	(2)	76
	Military			<1	-			1
Subtotals	Incompatible	44		55		86		185
	Compatible	-		316		376		693
TOTAL		**44**		**371**		**462**		**877**

Notes:
All contour areas on-installation are excluded from the counts.
[1] Incompatible with exceptions.
[2] Compatible with restrictions.
[3] Refer to Appendix A for details.

Figure 6-12

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Incompatible Future Development / Land Use for Noise at JBLE-Langley



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Noise Contour (dB DNL) (2020 AICUZ)

0 0.5 1 Miles

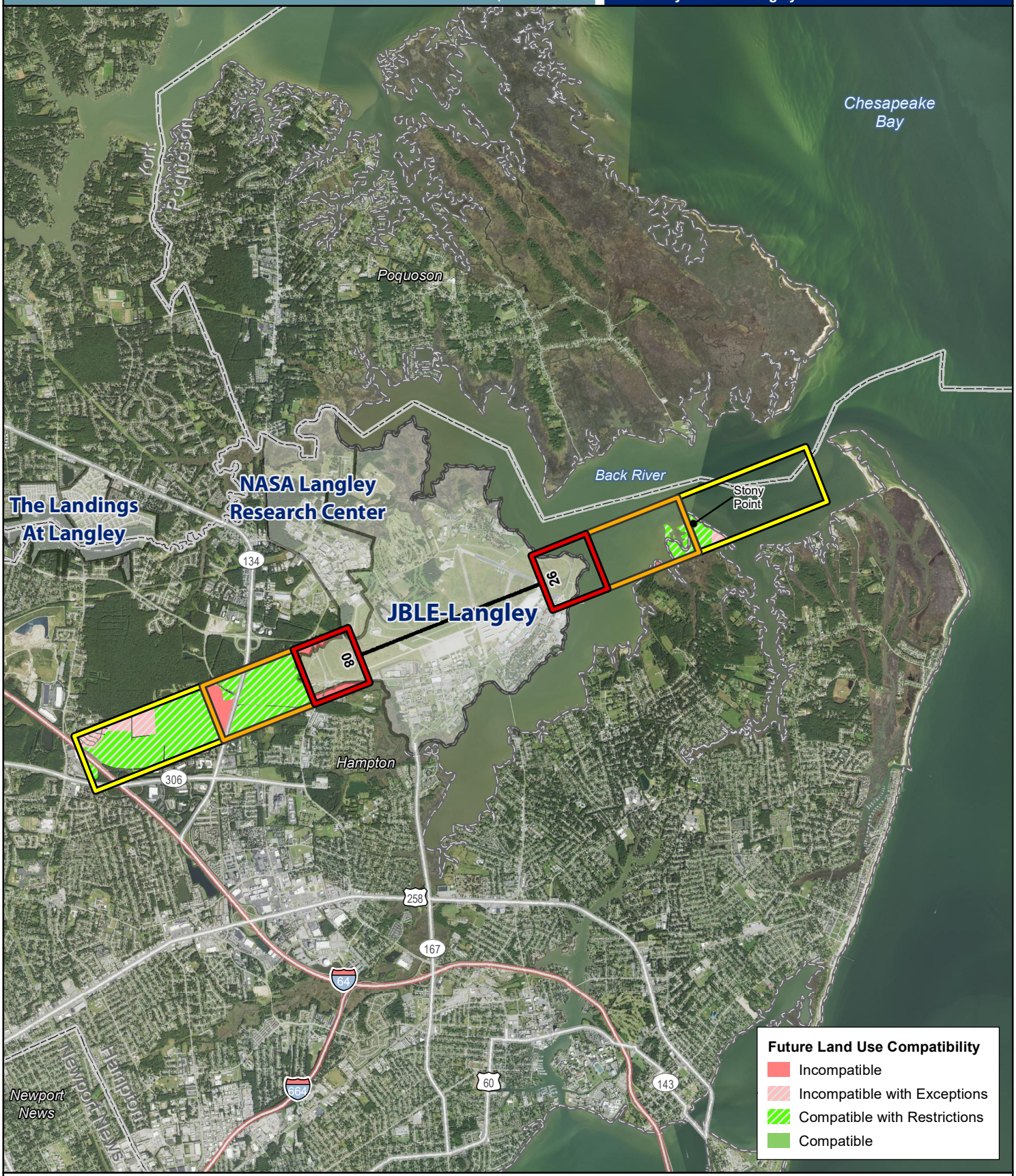
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-13

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Incompatible Future Development / Land Use for Safety at JBLE-Langley



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Interstate Highway
- State/U.S. Highway
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 0.5 1 Miles

N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

6.4.4 Existing Land Use Compatibility Concerns at JBLE-Eustis

Table 6-8 details the existing land use compatibility for off-installation areas within the 2020 JBLE-Eustis noise contours. Figures 6-14A and 6-14B illustrate the existing land use compatibility for the 2020 JBLE-Eustis noise contours. As shown in Table 6-8 and on Figures 6-14A and 6-14B, no off-installation areas within the 2020 JBLE-Eustis noise contours are considered incompatible. Outside the installation boundary, the 2020 JBLE-Eustis noise contours are either over military land or water.

As illustrated on Figure 6-15, no JBLE-Eustis CZs, APZs, or surface danger zones extend over land areas off-installation. APZs I and II of Felker Army Airfield's Runway 32 extend over the James River, as do the surface danger zones from several of the small arms ranges.

Table 6-8. Off-Installation Existing Land Use Acreage within AICUZ Noise Zones at JBLE-Eustis

Designation	Generalized Land Use Category[3]	Noise Zone (dB DNL)						Noise Zone (dB PK15)		
		65-69	Note	70-74	Note	75+	Note	87-104	Note	Total
Incompatible	Residential	-	-	-	-	-	-	-	-	-
	Mixed Use	-	-	-	-	-	-	-	-	-
	Commercial									
	Industrial									
	Institutional									
	Agriculture									
	Vacant									
	Parks, Open Space, & Greenways					-	-	-	-	-
	Military									
Compatible	Residential									
	Mixed Use									
	Commercial	-	-	-	-	-	-	-	-	-
	Industrial	-	-	-	-	-	-	-	-	-
	Institutional	-	-	-	-	-	-	-	-	-
	Agriculture	-	-	-	-	-	-	-	-	-
	Vacant	-	-	-	-	-	-	-	-	-
	Parks, Open Space, & Greenways	-	-	-	-					
	Military	<1	-	<1	-	<1	-	6.5	-	8.6
Subtotals	Incompatible	-		-		-		-		-
	Compatible	1		<1		<1		6.5		8.6
TOTAL		**1**		**<1**		**<1**		**6.5**		**8.6**

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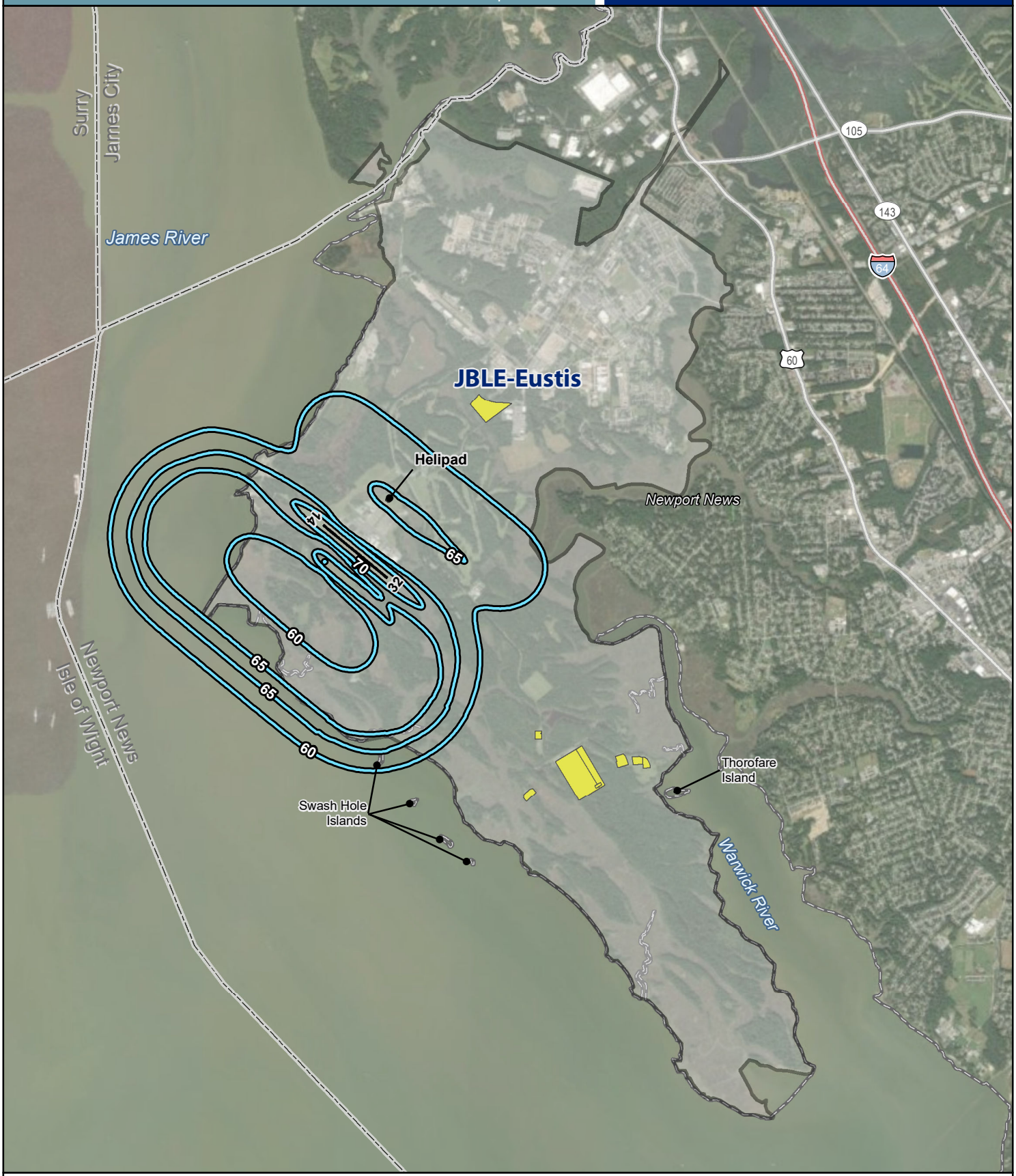
Figure 6-14A

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Incompatible Existing Land Use for Aircraft Operations Noise at JBLE-Eustis



Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Small Arms Range
- Interstate Highway
- State/U.S. Highway
- Aircraft Noise Contour (dB DNL)

0 0.5 1 Miles

N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-14B

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Incompatible Existing Land Use for Small Arms Operations Noise at JBLE-Eustis

Legend

- Airfield Runway
- City Boundary
- County Boundary
- Installation Boundary
- Small Arms Range
- Peak Noise Zone (dB PK15)

0 0.5 1 Miles

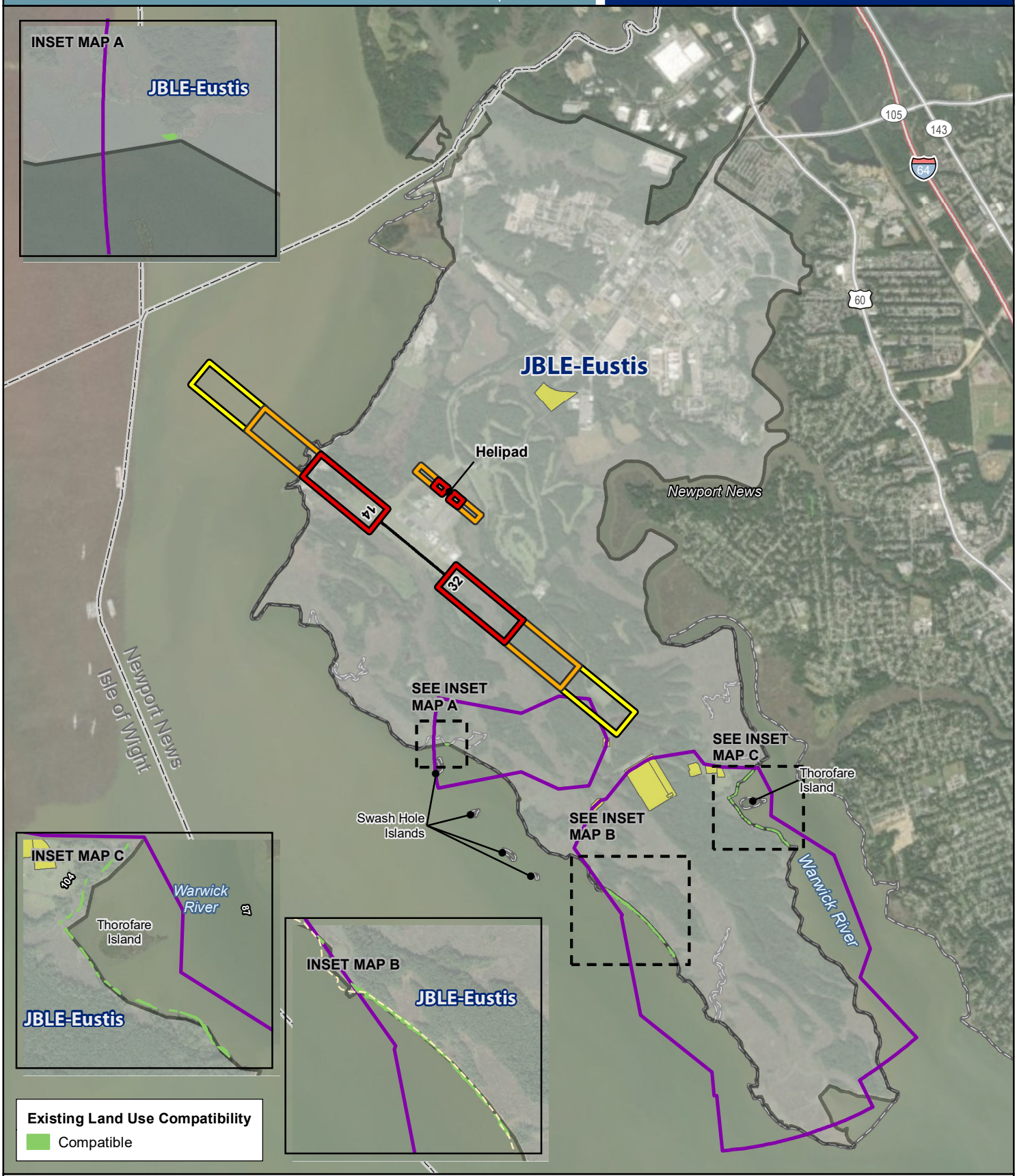
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-15

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Incompatible Existing Land Use for Safety at JBLE-Eustis



Legend

- Airfield Runway
- Interstate Highway
- State/U.S. Highway
- City Boundary
- County Boundary
- Installation Boundary
- Small Arms Range
- Surface Danger Zone
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 0.5 1 Miles

N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

6.4.5 Future Land Use Compatibility Concerns at JBLE-Eustis

Table 6-9 details the future land use compatibility for off-installation areas within the 2020 JBLE-Eustis noise contours. Figures 6-16A and 6-16B illustrate future land use compatibility within the 2020 JBLE-Eustis noise contours. As shown in Table 6-9 and Figures 6-16A and 6-16B, no off-installation areas within the 2020 JBLE-Eustis noise contours are considered incompatible. Outside the installation boundary, the 2020 JBLE-Eustis noise contours are either over military land or water.

As illustrated in Figure 6-17, no JBLE-Eustis CZs, APZs, or surface danger zones extend over land areas off of the installation. APZs I and II of Felker Army Airfield's Runway 32 extend over the James River, as do the surface danger zones from several of the small arms ranges.

Table 6-9. Off-Installation Future Land Use Acreage within AICUZ Noise Zones at JBLE-Eustis

Designation	Generalized Land Use Category[3]	Noise Zone (dB DNL)						Noise Zone (dB PK15)		
		65-69	Note	70-74	Note	75+	Note	87-104	Note	Total
Incompatible	Residential	-	-	-	-	-	-	-	-	-
	Mixed Use	-	-	-	-	-	-	-	-	-
	Commercial									
	Industrial									
	Institutional									
	Agriculture									
	Vacant									
	Parks, Open Space, & Greenways					-	-	-	-	-
	Military									
Compatible	Residential									
	Mixed Use									
	Commercial	-	-	-	-	-	-	-	-	-
	Industrial	-	-	-	-	-	-	-	-	-
	Institutional	-	-	-	-	-	-	-	-	-
	Agriculture	-	-	-	-	-	-	-	-	-
	Vacant	-	-	-	-	-	-	-	-	-
	Parks, Open Space, & Greenways	-	-	-	-					
	Military	<1	-	<1	-	<1	-	6.5	-	8.6
Subtotals	Incompatible	-		-		-		-		-
	Compatible	<1		<1		<1		6.5		8.6
TOTAL		**<1**	**-**	**<1**	**-**	**<1**	**-**	**6.5**	**-**	**8.6**

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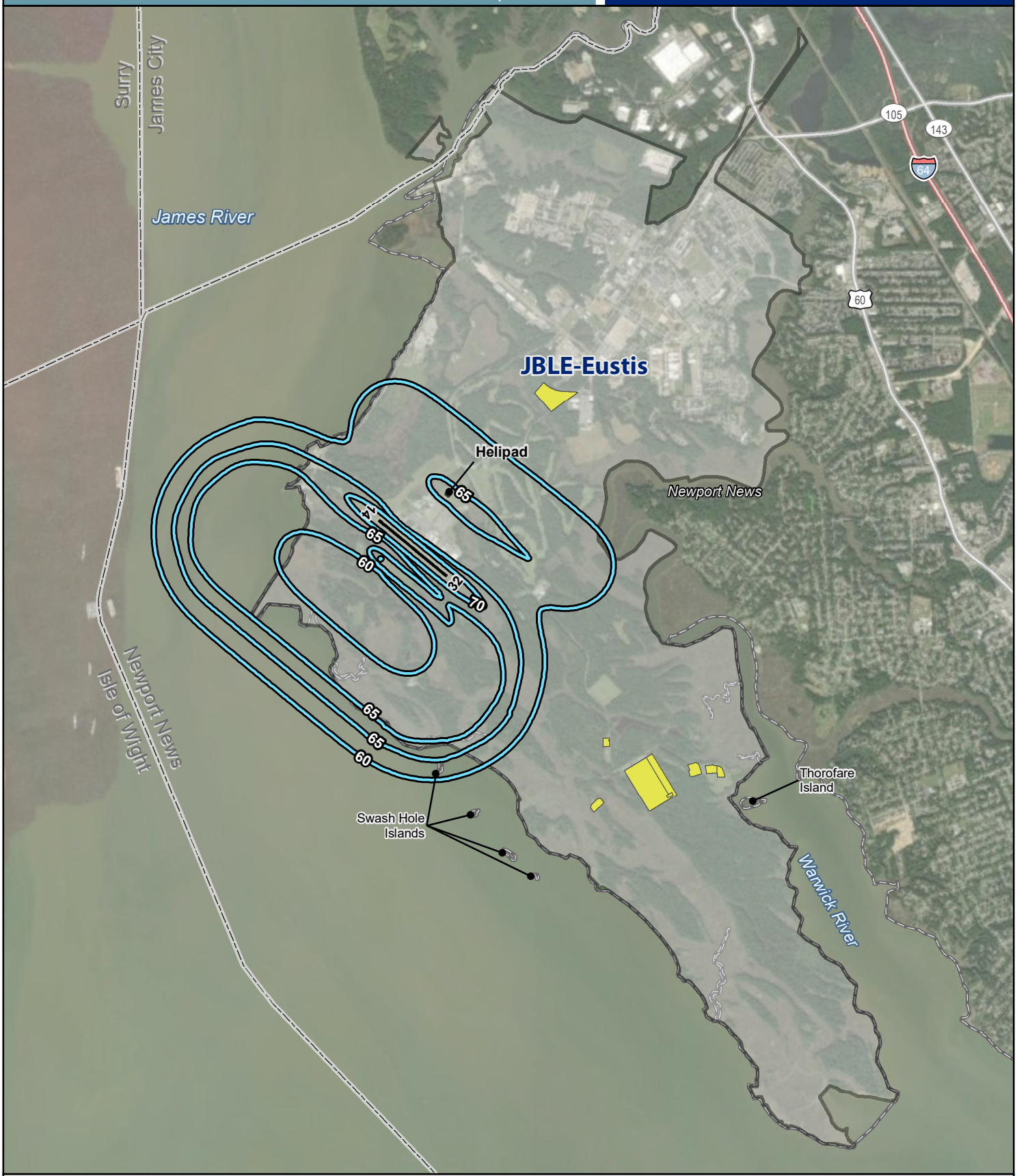
Figure 6-16A

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Incompatible Land Use for Aircraft Operations Noise at JBLE-Eustis



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- Small Arms Range
- Interstate Highway
- State/U.S. Highway
- Aircraft Noise Contour (dB DNL)

0 0.5 1 Miles

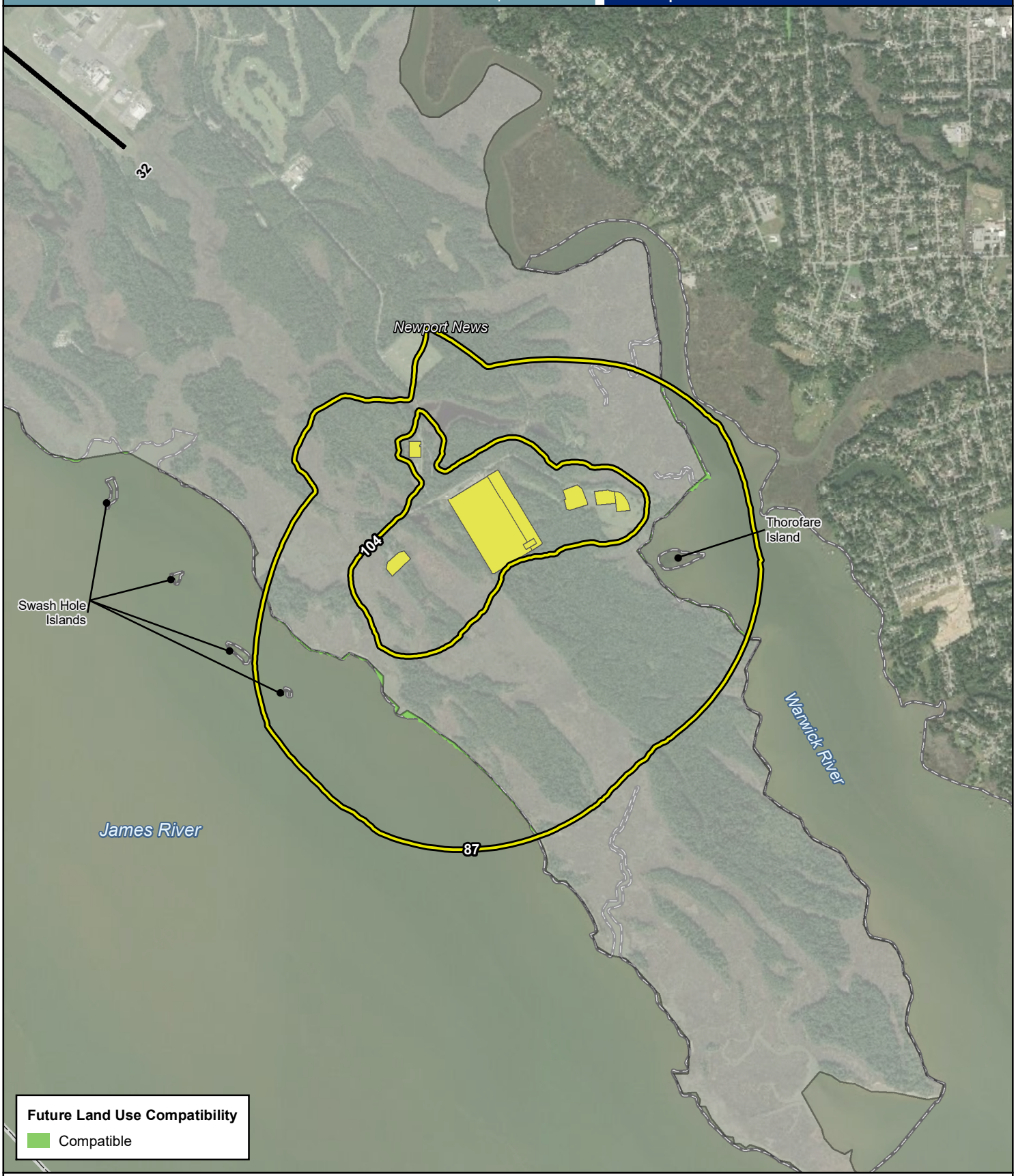
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-16B

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Incompatible Future Land Use for Small Arms Operations Noise at JBLE-Eustis



Legend

- Installation Boundary
- Airfield Runway
- County Boundary
- City Boundary
- Small Arms Range
- Peak Noise Zone (dB PK15)

0 0.5 1 Miles

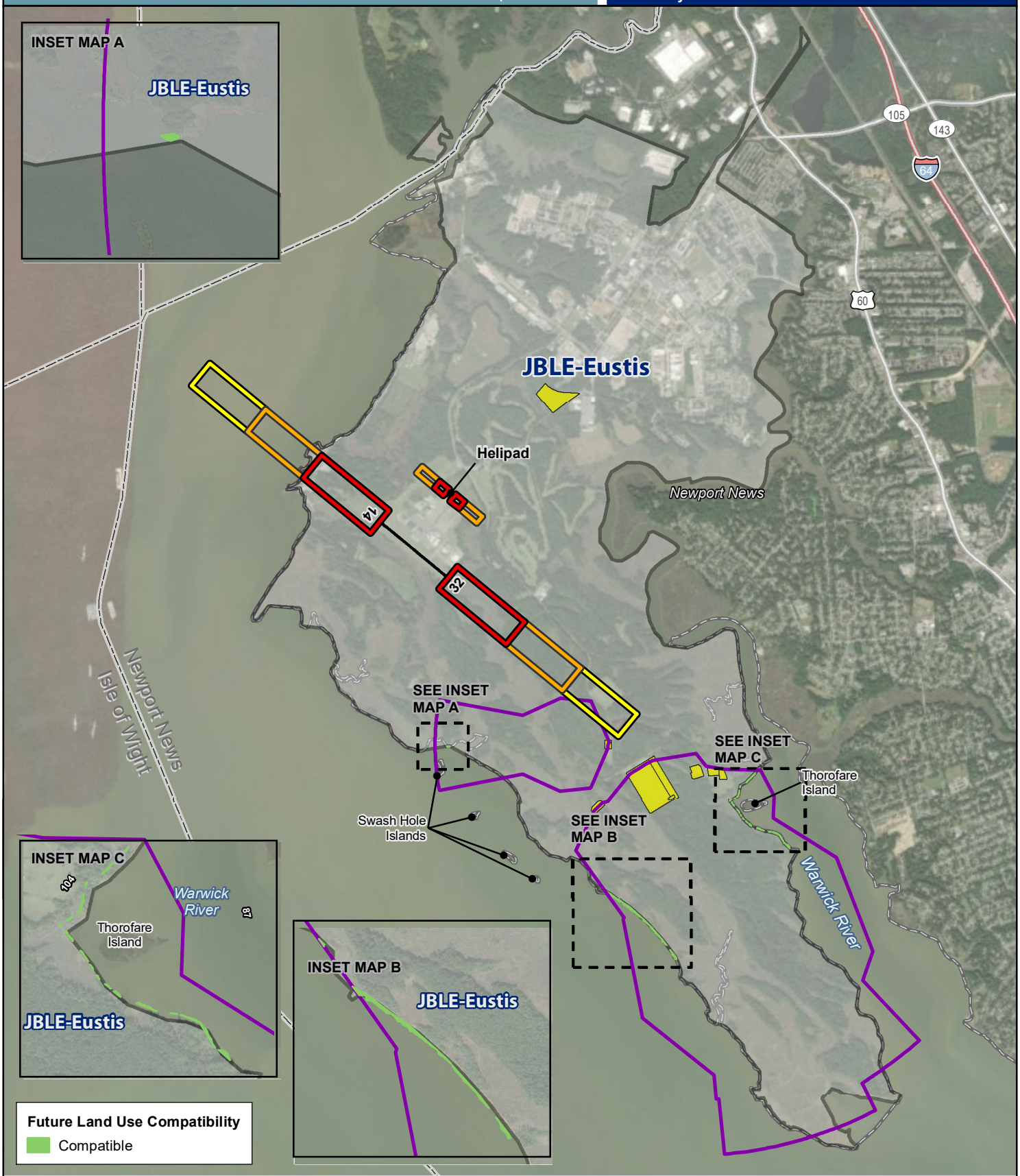
N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

Figure 6-17

Joint Base Langley-Eustis
Air Installation Compatible Use Zones

Incompatible Future Development / Land Use for Safety at JBLE-Eustis



Legend

- Airfield Runway
- Interstate Highway
- State/U.S. Highway
- City Boundary
- County Boundary
- Installation Boundary
- Small Arms Range
- Surface Danger Zone
- Clear Zone
- Accident Potential Zone I
- Accident Potential Zone II

0 0.5 1 Miles

N

Source: AFCEC 2018; Digital Globe 2017; FHWA 2017; Hampton Roads Planning District Commission 2019; U.S. Census Bureau 2018; VGIN 2018.

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7.0 Implementation

Implementation of the AICUZ Study must be a joint effort between JBLE 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 all partners in the collaborative planning. The strategies presented in this chapter are based on Air Force guidance and have been reviewed to ensure consistency with the two regional JLUSs and the JLUS implementation strategy.

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.

JBLE'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.

JBLE 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.

Preparation and presentation of this JBLE 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, JBLE must be ready to provide additional input, as needed.

7.2 State/Regional Roles

There are numerous statewide mechanisms in place to promote compatible land use surrounding military installations in Virginia. These are contained in the Code of Virginia, the statutory law of the state, codified in 1950. Within this code, the following mechanisms are available to the cities of Hampton, Newport News, and Poquoson, along with James City County and York County.

- Air Navigation Safety: For localities with a military air facility or the approach slopes and other safety zones of military air facility, Code of Virginia Section 15.2-2294 "Airport Safety Zoning," requires the regulation of structure heights and natural growth to protect the safety of air navigation and public investment in air navigation facilities. The Code allows this type of zoning to be adopted as an overlay zone superimposed on any pre-existing base zoning.

- Notice of Proposed Land Use Changes: Per the Code of Virginia, Section 15.2-2204 "Advertisement of Plans, Ordinances, Etc.; Joint Public Hearings; Written Notice of Certain Amendments," for parcels within 3,000 feet of the boundary of a military installation, if a locality proposes a comprehensive plan, amendment to a plan, or change in zoning, or is considering an application for a special exception for a change in use, the commander of the military base must receive written notice 30 days before the hearing in order to submit comments and recommendations.

- Real Estate Disclosure: The State requires that a property's location in a noise zone, CZ, or APZ be disclosed to prospective buyers and renters.

    - Owners of residential real property located in a noise zone, CZ, or APZ are required by the Code of Virginia Section 55-519.1 "Required Disclosures Pertaining to a Military Air Installation," to provide purchasers, via a form provided by the Real Estate Board, with written disclosure that the property is located in a noise zone, CZ, APZ, or all three, as designated by the locality's zoning map.

- For properties located in a noise zone, CZ, or APZ, Code of Virginia Section 55-248.12:1 "Required Disclosures for Properties Located Adjacent to a Military Air Installation; Remedy for Nondisclosure," requires landlords to provide prospective tenants with a written disclosure that the property is located in a noise zone, CZ, APZ, or all three, as designated by the locality's zoning map.

- Sound Attenuation Features: For localities with a military air facility, Code of Virginia Section 15.2-2295 "Aircraft Noise Attenuation Features in Buildings and Structures within Noise Zones," allows for the enforcement of building regulations that include sound attenuation features in residential structures and the adoption of noise overlay zones. More information on these standards may also be found in the Virginia Uniform Statewide Building Code.

- State and Regional Cooperation with DoD: The Code of Virginia Section 2.2-2666.1 "'Virginia Military Advisory Council; Composition, Compensation, and Expenses; Chairman's Executive Summary," of the code establishes the Virginia Military Advisory Council, which maintains a "cooperative and constructive" relationship between the State and DoD as a function within the State's executive branch. The council includes 11 members from various State agencies and committees, as well as representatives from the military commands and DoD installations located in Virginia.

In addition to these statewide tools, there are numerous regional tools available to enhance land use compatibility surrounding military installations in the Hampton Roads region.

- Regional Planning Coordination: As noted in Section 6.2.1, the HRPDC is a regional planning authority that provides planning assistance on local and regional issues, including those related to military installations. The commission, for example, published an economic impact report for the DoD in Hampton Roads, funded through the commission's Unified Planning Work Program for Fiscal Year 2012-2013 (HRPDC 2013). Additionally, the commission served as a liaison between local, state, and federal agencies and the military during recent JLUS efforts. These efforts include the Fort Eustis JLUS completed in 2018 and the Hampton-Langley JLUS completed in 2010.

- Hampton Roads Military and Federal Facilities Alliance: In addition to the regional JLUS effort, the Hampton Roads Military and Federal Facilities Alliance is a not-for-profit corporation that advocates, at the regional level, to attract, retain, and grow military and federal facilities in the Hampton Roads region (HRMFFA 2017).

- Hampton Roads Military Advisory Council: In November 2018, the Hampton Roads Military Advisory Council was established to advocate for military issues in the Hampton Roads area. The council began meeting quarterly in early 2020. Their goal is to bring together organizations that serve the military, their dependents, and the veteran population in Hampton Roads in order to provide a central access point and simplify processes that impact veterans, military spouses, and transitioning military members.

Individual JLUSs have been completed for military bases and neighboring communities in the Hampton Roads region over the past decade. In 2017, the Virginia Regional JLUS Implementation Strategy was published, providing an evaluation of statewide military compatibility issues and analyzing the strategies identified in previous JLUS studies, including the 2010 Hampton-Langley and 2018 Fort Eustis JLUS efforts (Commonwealth of Virginia 2017). This statewide strategy document identified eight broad goals recommended for the Commonwealth of Virginia, of which, four are directly related to implementation of AICUZ recommendations, including:

- Adoption of statewide military compatible land use planning guidelines for local governments to integrate into regional and local planning and zoning documents.
- Establishment of procedures for permitting renewable energy development (for example the construction of wind turbines near flight paths) in consideration of military compatibility.
- Establishment of permanent funding sources for military compatibility planning and assistance for local governments and other agencies.
- Enhancement of real estate disclosure laws in the Commonwealth of Virginia.

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 JBLE. Table 7-1 provides an overview of JLUS recommendations for local government related to compatible land use.

Table 7-1. Compatible Land Use-related JLUS Recommendations

	City of Hampton	City of Newport News	City of Poquoson	James City County	York County
Hampton-Langley JLUS (2010)					
Develop a land acquisition program to enhance compatibility in designated CZs associated with Langley AFB.	•				
Develop a program to acquire parcels within the CZ at risk for compatibility issues through Fee Simple Purchase. Priorities for acquisitions are developed and recommended by the JLUS Implementation Committee.	•				
Evaluate the feasibility of a volunteer program to acquire development rights for parcels at risk for incompatible uses using transfer of development rights.	•	•			
Langley AFB should work with local jurisdictions to obtain, through a volunteer program, the dedication of avigation easements when development is proposed on property within the CZ, APZ I, APZ II, and the noise military influence area.	•	•	•		•
Identify potential funding sources and/or partnerships among public agencies and/or private entities to leverage funds for property acquisition within the CZ and APZs that provide benefits to conservation efforts as well as land use compatibility. Priorities for acquisition and easement are developed and recommended by the JLUS Implementation Committee.	•	•	•		•
Evaluate opportunities to expand the use of real estate disclosures to be included in the titles to real property located within the Military Influence Overlay District.	•	•	•		•
To reduce non-compatible uses as defined by the compatible land use table within the current Langley AFB AICUZ. The JLUS Implementation Committee will provide policy and technical guidance to local jurisdictions regarding zoning code changes to increase land use compatibility with Langley AFB. The overall intent is to identify encroachment issues confronting both the civilian community and the military installation and to recommend strategies to address the issues in the context of local comprehensive/general planning programs.	•	•	•		•

Table 7-1. Compatible Land Use-related JLUS Recommendations

	City of Hampton	City of Newport News	City of Poquoson	James City County	York County
Evaluate building setbacks along the Langley AFB perimeter and identify options to increase consistency with Unified Facilities Criteria 4-101-01.	•				
Virginia Regional JLUS (2017)					
Consider developing a memorandum of understanding (MOU) to communicate/coordinate with military.	•	•	•	•	•
Consider monitoring effectiveness of communication/coordination procedures.	•	•	•	•	•
Consider a governmental liaison program.	•	•	•	•	•
Consider updating comprehensive plans to incorporate military compatibility policies.	•	•	•	•	•
Consider amending zoning ordinances to incorporate military compatibility regulations in land use planning documents.	•	•	•	•	•
Fort Eustis JLUS (2018)					
Prepare and adopt a communication MOU between Fort Eustis, Newport News, James City County, and York County outlining a procedure for future communication.		•		•	•
Expand communication efforts with all jurisdictions in the study area.		•		•	•
Establish an MOU between Fort Eustis Fire Department and Newport News area hospitals for transporting patients.		•			
Establish regularly scheduled meetings between local jurisdictions and Fort Eustis to discuss proposed land use changes, environmental concerns, construction projects, and other issues.		•		•	•
Establish coordination procedures for areas of concern within the Military Influence Overlay District to minimize future incompatibilities from proposed land use or zoning changes.		•		•	
Establish an Acquisition Committee responsible for developing an acquisition plan and for coordinating and prioritizing acquisition efforts.		•		•	•

Table 7-1. Compatible Land Use-related JLUS Recommendations

	City of Hampton	City of Newport News	City of Poquoson	James City County	York County
Develop a land acquisition strategy by identifying parcels that may be suitable for acquisition and that support the preservation of military readiness for existing and potential future missions.		•		•	•

In addition to the JLUS compatible land use recommendations, adoption of the following general recommendations for local governments during the revision of relevant land use planning 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 comprehensive plans and use AICUZ overlay maps and Air Force Land Use Compatibility Guidelines (see Appendix A) to evaluate existing and future land use proposals.

- Ensure that new development applications or "changed use of property" are submitted to JBLE to afford the opportunity to assess those applications for potential impacts on defense missions. The 633d Air Base Wing PA Office can provide a land use planning point of contact.

- Adopt or modify zoning ordinances to reflect the compatible land uses outlined in the AICUZ Study, including the creation of military airport overlay zones, such as the City of Hampton's LFA Districts and York County's airport safety management overlay district (see Section 6.2).

- Local governments review their capital improvement plan, infrastructure investments, and development policies to ensure they do not encourage incompatible land use patterns near JBLE, with particular emphasis on utility extension and transportation planning.

- Local governments implement height and obstruction ordinances that reflect current Air Force and 14 CFR 77 requirements, presented in this study as HAFZs.

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

- 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 JBLE has the recommended noise level reduction measures incorporated into the design and construction of structures.

- 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 JBLE. 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 JBLE on planning and zoning actions that have the potential to affect installation operations.

- Invite the Air Force leadership to be ex officio 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 JBLE representatives to discuss land use concerns and major development proposals that could affect aircraft operations.

7.4 Community Role

Neighboring residents and installation personnel have a long-established history of working together for the mutual benefit of the JBLE 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. In some cases, this can be done in conjunction with continuing education requirements to ensure mutual benefit for all participants.

    - As required under Virginia state laws, disclose noise impacts to all prospective buyers and renters of properties within areas greater than 65 dB DNL and/or within the CZs/APZs.

- Require the Multiple Listing Service to disclose noise zones and CZs/APZs for all listings.

- Encourage buyers to use online mapping tools to understand their purchase or rental location within designated noise zones and CZs/APZs. A sample local tool is available on the City of Hampton's website at: http://webgis.hampton.gov/sites/ParcelViewer/.

- **Developers:**

  - Know where the noise zones and CZs/APZs encumber land near the air installation. Consult with JBLE 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.

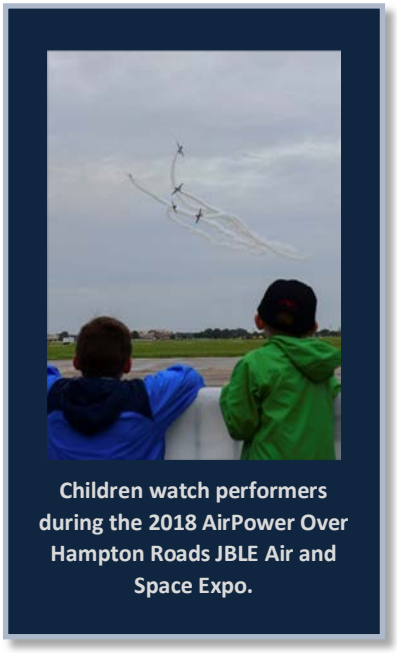
  - Consider becoming involved in the Langley Civic Leaders Association and/or Eustis Civic Leaders Association to help bridge the divide between DoD and private sector needs in the Hampton Roads region.

- **Local Citizens:**

  - Participate in local forums with the installation to learn more about the installation's missions. This may include public meetings, air shows, open houses, and other specialty events.

  - 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. Consider the use of online mapping tools to understand purchase and rental properties' locations within the noise zones and CZs/APZs. A sample tool for the City of Hampton is available online at: http://webgis.hampton.gov/sites/ParcelViewer/.



Children watch performers during the 2018 AirPower Over Hampton Roads JBLE Air and Space Expo.

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 (757) 764-5701.

8.0 References

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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	Childcare 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]	

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 percent of the PUD total area. PUD encourages clustered development that leaves large open areas.

3. Other factors to be considered: Labor intensity, structural coverage, explosive characteristics, air-pollution, electronic interference with aircraft, height of structures, and potential glare to pilots.

4. No structures (except airfield lighting and navigational aids necessary for the safe operation of the airfield when there are no other siting options), buildings, or above-ground utility and communications lines should normally be located in Clear Zone areas on or off the air installation. The Clear Zone (CZ) is subject to the most severe restrictions.

5. Roads within the graded portion of the CZ are prohibited. All roads within the CZ are discouraged, but if required, they should not be wider than two lanes and the rights-of-way should be fenced (frangible) and not include sidewalks or bicycle trails. Nothing associated with these roads should violate obstacle clearance criteria.

6. No above ground passenger terminals and no above ground power transmission or distribution lines. Prohibited power lines include high-voltage transmission lines and distribution lines that provide power to cities, towns, or regional power for unincorporated areas.

7. Development of renewable energy resources, including solar and geothermal facilities and wind turbines, may impact military operations through hazards to flight or electromagnetic interference. Each new development should to be analyzed for compatibility issues on a case-by-case basis that considers both the proposal and potentially affected mission.

8. Within SLUCM Code 52, maximum FARs for lumberyards (SLUCM Code 521) are 0.20 in APZ-I and 0.40 in APZ-11; the maximum FARs for hardware, paint, and farm equipment stores, (SLUCM Code 525), are 0.12 in APZ I and 0.24 in APZ II.

9. A shopping center is an integrated group of commercial establishments that is planned, developed, owned, or managed as a unit. Shopping center types include strip, neighborhood, community, regional, and super-regional facilities anchored by small businesses, a supermarket or drug store, discount retailer, department store, or several department stores, respectively.

10. Ancillary uses such as meeting places, auditoriums, etc. are not recommended.

11. 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 CZ 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	Childcare 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 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	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	Childcare 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 live- stock)	Y[4]	Y[5]
81.5, 81.7	Agriculture-Livestock farming including grazing and feedlots	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

[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.

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Appendix B. Key Terms

Aircraft Movement – An aircraft movement is defined as any aircraft activity that requires air traffic control's permission, even if the aircraft is just passing through the airfield's airspace. This term is used at JBLE-Eustis.

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 penalty 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 (i.e. altitude, speed, power setting, etc.) 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).

Peak Sound Pressure Level (Lpk) – The un-weighted peak sound pressure level (Lpk) noise descriptor is used to describe the noise environment for small arms (.50 caliber and below) ranges. Because the noise zones for small arms are based on the loudest weapon and not the number of annual operations conducted at the range, if there are multiple weapon types being fired at one or multiple firing locations, the peak contours reflect the loudest level that occurs at each receiver location.

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Appendix C. Comparison of Local and Generalized Land Use and Zoning in the AICUZ Footprint

Table C-1. Comparison of Local and Generalized Land Use and Zoning Designations for Parcels within the Joint Base Langley-Eustis AICUZ Footprint

Local Land Use or Zoning Designation	Generalized Land Use or Zoning Designation
Existing Land Use – Hampton Roads Planning Commission[1]	
Local Commercial	Commercial
Neighborhood Commercial	
Regional Commercial	
Light Industrial	Industrial
Heavy Industrial	
Utilities	
Public / Semi-Public	Institutional
Military	Military
Parks and Recreation	Parks, Open Space, Greenways
Resource Conservation	
Low Density Residential	Residential
Medium Density Residential	
Heavy Density Residential	
Rural Residential	
Undeveloped Land (vacant)	Vacant
Future Land Use – Hampton Roads Planning Commission[2]	
Local Commercial	Commercial
Neighborhood Commercial	
Light Industrial	Industrial
Public / Semi-Public	Institutional
Military	Military
Mixed Use Commercial / Residential	Mixed Use
Parks and Recreation	Parks, Open Space, Greenways
Resource Conservation	
Low Density Residential	Residential
Medium Density Residential	
Heavy Density Residential	
Rural Residential	

Table C-1. Comparison of Local and Generalized Land Use and Zoning Designations for Parcels within the Joint Base Langley-Eustis AICUZ Footprint

Local Land Use or Zoning Designation	Generalized Land Use or Zoning Designation
Zoning – City of Hampton[3]	
Neighborhood Commercial	Commercial
Limited Commercial	
General Commercial	
Light Manufacturing	Mixed Use
Limited Manufacturing	
One Family Residential	Residential
Multifamily Residential	
Zoning – City of Newport News[4]	
Military Eustis	DOD
Single Family	Residential
Zoning – City of Poquoson[5]	
General Business	Institutional
Conservation	Parks, Open Space, and Greenways
Medium Density, Single Family Residential	Residential
Zoning – York County[6]	
Low Density Single-Family Detached, Farming	Residential
Manufactured Homes	
Planned Development	

Notes:

[1] Hampton Roads Planning District Commission. 2019. "Hampton Roads Existing Land Use." Shapefile geospatial data. Accessed online at: http://www.hrgeo.org/datasets/hampton-roads-existing-land-use. Accessed on August 20, 2019. Site last updated in 2019.

[2] Hampton Roads Planning District Commission. 2019. "Hampton Roads Future Land Use." Shapefile geospatial data. Accessed online at: http://www.hrgeo.org/datasets/hampton-roads-future-land-use. Accessed on August 20, 2019. Site last updated in 2019.

[3] City of Hampton Roads. 2019. "City of Hampton." Shapefile geospatial data. Accessed online at: https://hampton.app.box.com/v/Zoning. Accessed on September 16, 2019. Site last updated in 2019.

[4] City of Newport News. 2019 "City of Newport News." Shapefile geospatial data.

[5] City of Poquoson. 2019. "City of Poquoson." Shapefile geospatial data.

[6] York County. 2019. "York County." Polygon Feature Class geospatial data.