

**BARKSDALE**  
Air Force Base  
JOINT LAND USE STUDY



January 2009

## ACKNOWLEDGEMENTS

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The Barksdale Air Force Base (AFB) Joint Land Use Study (JLUS) is a cooperative land use planning initiative between the U.S. Air Force and the surrounding communities in the region. Partners in the JLUS include: Bossier Parish, Caddo Parish, and the cities of the City of Bossier, Benton, Haughton, and Shreveport.

This document serves as an ongoing guide to local government and Air Force actions to enhance compatibility around Barksdale AFB and to strengthen the military-civilian relationship.

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# 1

## Background

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## INTRODUCTION

Barksdale Air Force Base (Barksdale AFB) is within the Shreveport-Bossier City metropolitan area in the northwest corner of Louisiana, 18 miles from the Texas border and within a short drive of Dallas, New Orleans, Houston, and Little Rock. Surrounding communities include the cities of Bossier City (located in Bossier Parish), Shreveport (located in Caddo Parish), Haughton and Benton (located in Bossier Parish). **See Figure 1.**

Established as a base in 1933, the 22,000-acre installation has long been a significant economic and cultural driver for the region. Since 1958, Barksdale AFB has been the home of the B-52 bomber and now hosts the United States Air Force's (USAF) only B-52H combat crew training school. Today, the installation is also home to the 2nd Bomb Wing, an Air Combat Command (ACC) unit and the oldest bomb wing in the USAF and serves as headquarters to the U.S. 8th Air Force, the unit responsible for air defense and strategic bombing capabilities in the Eastern United States and Europe. Other units include the 917th Wing, an Air Force Reserve Command (AFRC) tenant, the 548th Combat Training Squadron, and Green Flag East. In recent years, Barksdale troops have participated in missions in the Persian Gulf, Kosovo, Afghanistan, and Iraq.

Over the years, the cities and parishes around Barksdale AFB have grown along with the military, reinforcing a close economic and social relationship. This interdependence raises the central challenge of the Joint Land Use Study.

As military installations expand, they bring new people and economic activity to an area. Communities build houses, schools and infrastructure, and create new jobs to support soldiers, civilian workers, and their families.

More people begin to live and work in proximity to the noise and safety risks generated by military training. The presence of these civilian uses can in turn place pressure on installations to modify their operations, possibly compromising mission viability. This land use conflict, referred to as encroachment, threatens the ability of the U.S. military to conduct the realistic training activities necessary for combat readiness. Conversely, military training impacts such as noise from aircraft or weapons firing can diminish quality of life for affected local residents.

## STUDY PURPOSE AND GOALS

In 1985, the Department of Defense's Office of Economic Adjustment (OEA) initiated the Joint Land Use Study (JLUS) program to create a participatory, community-based framework for addressing land use issues around military installations.

The objectives of the JLUS are two-fold:

1. to encourage cooperative land use planning between military installations and the surrounding communities; and
2. to seek ways to reduce the operational impacts of military installations on adjacent land.

The JLUS is as much about the process as it is the final document. It creates a public dialogue around the complex issues of land use, economic and population growth, infrastructure delivery, environmental sustainability, and mission change. The intent of the study is to highlight common interests— attractive development, healthier environments, more efficient infrastructure, economic prosperity, and better quality of life—and to protect the military mission, while sustaining local growth.

The Bossier region was an early adopter of this coordinated approach to planning around military installations. Stakeholders conducted the initial Joint Land Use Study (JLUS) in 1995. Stakeholders joined in initiating this effort to build on the previous study by revisiting current development issues, growth trends, and evolving mission needs and strengthening planning practices at the military/civilian interface.

The purpose of this JLUS is to ensure that surrounding communities can sustain economic activity without compromising the military readiness activities of Barksdale Air Force Base.

The goals of the study are to:

- Clarify existing land use compatibility guidance and develop effective tools for assessing development around the base;
- Increase communication between the military and surrounding communities;
- Evaluate the potential impacts of current and future military operations on surrounding communities;
- Evaluate the potential impacts of community growth on the long-term viability of Barksdale AFB ; and
- Recommend action items to reduce encroachment and facilitate future collaboration.

## WHAT IS ENCROACHMENT?

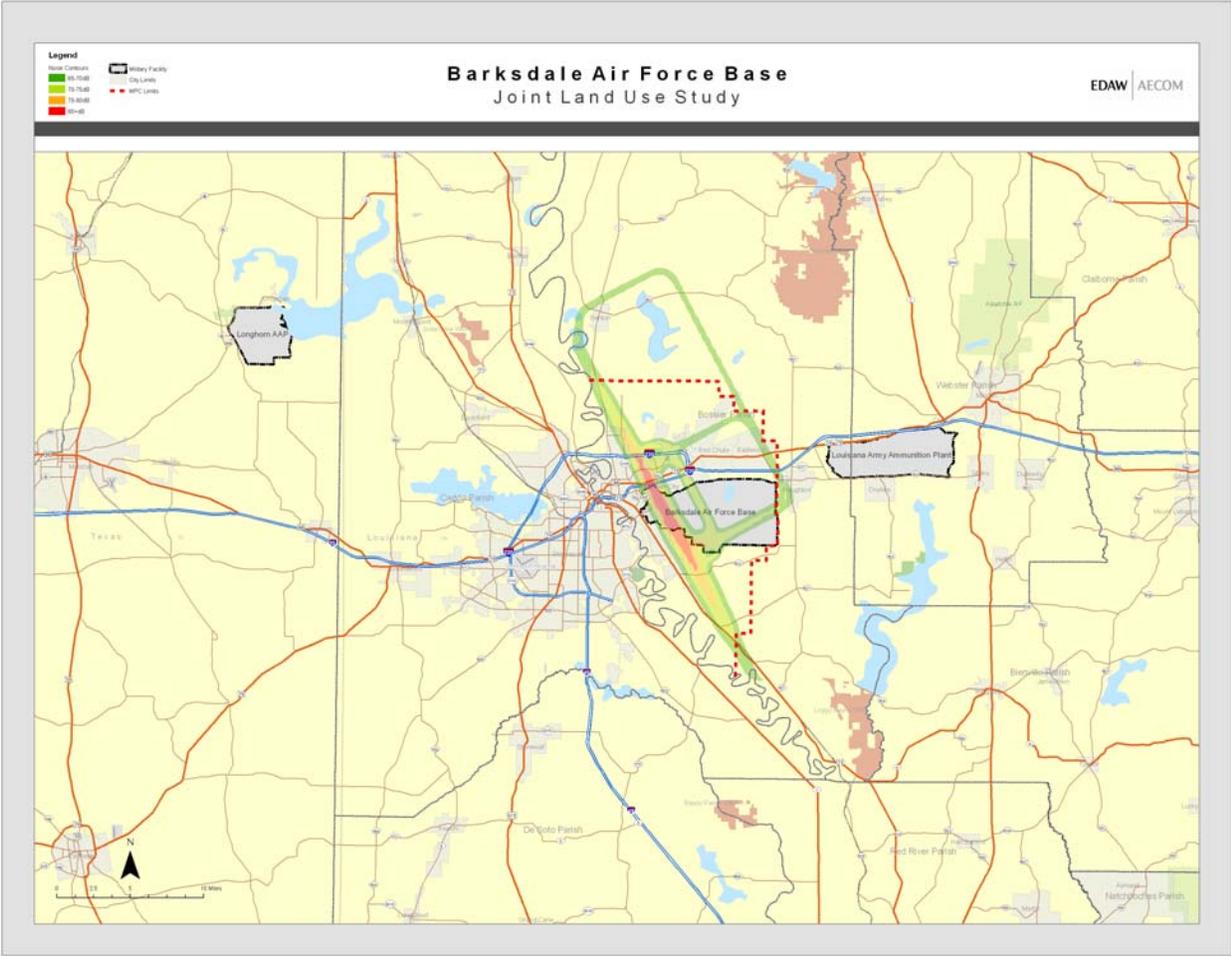
The long-term goal of the JLUS is to reduce potential encroachment and accommodate compatible local growth to sustain the regional economy. The term ‘encroachment’ describes the operational impacts of military activities on nearby communities and the reciprocal negative effects of adjacent and unmanaged community growth on training and aviation operations.

Designated geographic boundaries that represent noise and air safety impacts—the Accident Potential Zones (APZs) and Noise Zones—extend beyond property owned by Barksdale AFB and into surrounding communities. Later sections of this report explore the interaction of these areas with nearby land uses.

While noise and safety concerns can affect residents living and working around the base, certain nearby civilian land uses that concentrate people, such as higher density housing or public gathering places, can also threaten aviation operations. Ongoing complaints about noise and night flights can place pressure on Barksdale AFB to modify current operating procedures, thus reducing realistic training capabilities or curtailing business activity and economic growth.

Methods of reducing and preventing encroachment include a menu of tools, such as compatible land use planning, infrastructure planning, real estate disclosure, site development requirements, operational changes on the base, and wildlife habitat conservation. One of the purposes of the JLUS is to provide feasible and locally appropriate recommendations to minimize encroachment potential and develop clear guidance for assessing the compatibility of local growth options.

The JLUS report is not a binding document, but rather an advisory report that identifies best practices for ensuring compatible development around the base. The report includes a series of recommended policies and regulations for the Air Force and local governments to consider. It is the responsibility of each participating entity to review the proposals and implement recommendations appropriate for their local context.



# 2

## Communication

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## COMMITTEES

A successful JLUS requires active and broad participation to ensure that strategies reflect the diversity of the region and to build support for ongoing implementation. The JLUS planning team worked closely with two committees throughout the planning process. The Executive Oversight Committee (EOC), consisting of local elected officials and senior base leadership oversaw study efforts and accepted the final recommendations identified in this document.

Members of the Project Management Team (PMT) assisted in developing practical encroachment reduction tools and delivering study recommendations to the Executive Oversight Committee for their evaluation. The PMT members are also the key military and community professionals who will implement strategies as part of daily decision-making on the base and in the community. The planning team conducted the following committee meetings as shown in **Table 1**.

**Table 1: Committee Meeting Dates**

Meeting	Date
Kick-off Meeting	April 17
Stakeholder Interviews	May 19 -21
PMT #2	September 17
PMT #3	December 4
Executive Oversight Committee	December 10

## SURVEYS

The planning team surveyed Project Management Team MEMBERS and local officials participating in the study. All Bossier City and Shreveport City Council Members, Bossier and Shreveport MPC Board Members, Bossier and Caddo Parrish Commissioners, Town of Benton representatives, and a representative from Barksdale Forward received surveys. The surveys asked officials to rate items such as the level of

collaboration between the community and Barksdale AFB; the importance of Barksdale’s presence in the community; community concerns about noise and other impacts generated from base operations; and the need for certain tools to promote compatible development around Barksdale. Respondents completed a total of 16 surveys.

Overall, respondents felt communication and collaboration between Barksdale and the community were very strong, and that people living in the community experienced limited concerns about noise / other impacts generated by operations at the base. However, officials did not think that the boarder community was aware of the negative effects of incompatible growth on the Barksdale AFB mission. Nevertheless, respondents felt that policies had been very effective in limiting incompatible growth around the installation. Overwhelmingly, officials felt that Barksdale’s continued or expanded mission was vital to sustaining economic growth and job creation in the area. When evaluating the need for new or stronger tools to promote compatible development around the base, respondents cited improved communication with the military and the use of real estate disclosures as top priorities. **See Table 2**.



Surveys were also sent to the Project Management Team. Questions in the survey related to how effective the 1995 JLUS had been and what could be done to improve upon it as well as current development trends.

Main issues identified include:

- Communication between Barksdale AFB and Bossier City-Parish MPC has improved since the 1995 JLUS was published, as the MPC now regularly coordinates with the base and supplies them with notification of zoning changes within 3,000 feet of the base.
- Two new zoning classifications (Airbase Buffer Zones A-1 and A-2) have been formally adopted since the 1995 JLUS.
- Outreach in the form of distribution of the 1999 AICUZ study and education on noise environments in response to complaints has helped the community understand base operations and encroachment issues.
- Continued residential development, particularly north of Bossier City, is estimated to be the greatest source of potential friction between the community and Barksdale AFB. New infrastructure projects such as improvements to I-49 and the Arthur Teague Expressway and the development of I-69 and the Cyber Innovation Center will help increase housing demand further.
- Noise complaints are rare (at only a couple per month). When they do occur, the majority of these complaints come from housing immediately north and south of the base.
- It was suggested that several tools be investigated for inclusion in the new JLUS, including an AICUZ overlay zone,

real estate disclosure, and writing noise level reduction requirements into the building code, as well as developing better ways to communicate to the community regarding base operations and development sensitivities.

### Public Participation Opportunities

In addition to the Executive Oversight Committee and Project Management Team meetings, the JLUS planning team conducted two rounds of public involvement events in Bossier City and South Bossier on October 21 and 22 and December 15 and 16, 2008.

In addition to public meetings, the public can access a website that tracks the progress and results of the Joint Land Use Study at [www.barksdalejlus.com](http://www.barksdalejlus.com).

**Table 2: Local Officials Survey Summary**

	<b>% (out of possible 64)</b>	<b>Overall Response</b>
How would you characterize the overall level of collaboration between your community and Barksdale AFB?	95%	Strong Collaboration
How would you characterize the level of communication between your local community and Barksdale AFB?	94%	Strong Communication
How important is the continued or expanded mission of Barksdale AFB to your community in terms of sustaining economic growth and job creation?	97%	Strong Importance
How effective do you think that existing community policies have been in limiting incompatible growth around the installation?	78%	Very Effective
What is the level of concern in your community about noise or other impacts generated by operations and training activities at Barksdale AFB?	56%	Moderate Concern
What is the level of awareness in your community about the effects of incompatible development on the Barksdale AFB mission?	69%	Moderate Awareness
What do you think is the need for exploring or further strengthening the following tools to promote compatible development around Barksdale AFB?		
Land use / zoning	75%	Moderate Need
Improved communication with military	77%	Strong Need
Conservation / agricultural easements	70%	Moderate Need
Avigation easements	70%	Moderate Need
Real estate disclosure	78%	Strong Need
Outdoor lighting standards	69%	Moderate Need
Improved regional coordination	70%	Moderate Need
Indoor noise reduction standards	64%	Moderate Need
Controls on infrastructure improvements	67%	Moderate Need
Controls on transportation improvements	70%	Moderate Need

0-25% none

25-50% minimal

50-75% moderate

75-100% strong/very

# 3

## Military Mission

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## HISTORY



In the 1920s, the people of Shreveport lobbied to have a military flying field adjacent to the Red River. In 1933, they succeeded, and Barksdale Airfield (as the base was once called) was founded. The airfield, named for Lieutenant Eugene Hoy Barksdale of the Army Air Corps who lost his life in 1926 while flight testing an observation-type airplane, first served as a training facility for pursuit and fighter crews in the 1930s. The 1940s, however, brought many mission changes and the focus turned to training A-20 and B-24 bombardment groups for combat. In 1946, Barksdale became part of Strategic Air Command. During this time and through the 1950s, expansion and improvement to the installation was necessary to accommodate the new activity, including the arrival of the arrival of the B-52 bombers.

After base realignment in the 1960s, the 2nd Bomb Wing became the host unit in 1963. Eighth Air Force Headquarters moved to Barksdale AFB in 1974, where it remains today. In the 1990s, Barksdale troops were deployed to operations in the Middle East and Somalia, and in 1992 the Tactical Air Command and SAC were realigned as the Air Combat Command (ACC). Over the years Barksdale AFB has had many different aircraft in its inventory, but presently the men and women serving

primarily fly the B-52 Stratofortress and A-10 Thunderbolt.

## CURRENT ACTIVITIES

Barksdale AFB's principal role is to develop and maintain the capacity needed to conduct strategic warfare, which includes organizing and training a force capable of immediate and sustained long-range bombardment. As the host unit and the largest bomb wing in Air Combat Command (ACC), the 2nd Bomb Wing controls 53 B-52H Stratofortress Bombers assigned to three squadrons as well as oversees installation facilities by providing civil engineering, security, and air operations. Between 30 and 40 B-52s may typically be found on the main aircraft parking apron on any given day. However, Barksdale does not neglect its softer side and strives to maintain a public access policy to provide for maximum outdoor recreational opportunity within mission and resource constraints, allowing access to parks, picnic areas, and athletic fields.

The 2nd Bomb Wing plays a significant role in Air Combat Command and is composed of several groups:

- The Operations Group, which among other activities is responsible for B-52 training, composed of three active Bomb Squadrons (the 20th, 96th, and 11th BSs) and one support squadron (Operation Support);
- The Maintenance Group, which supports the 2nd Bomb Wing, the 8th Air Force, the 917th Wing and more than 34 other associated groups through planning and logistical programs involving maintenance, transportation, supply and contracting;
- The Mission Support Group, made up of approximately 2,600 personnel, which

provides the administrative and logistical assets required to support non-flight operations; and

- The Medical Group, which provides healthcare and dental services on base.

Two primary associate units reside on base: the 8th Air Force and 917th Wing. Other tenant units include the Defense Commissary Agency (DECA), Defense Reutilization and Marketing Office (DRMO), DET 1 307 Red Horse Civil Engineer Squadron, Federal Aviation Administration (FAA), Navy Resident Officer In Charge (ROIC) of Construction and Navy Seabees Reserve Unit.

The 8th Air Force, one of the three active-duty numbered air forces in ACC, is responsible for 11 wings and two direct reporting units comprised of 250 bomber, fighter and transport aircraft. The 8th Air Force team consists of more than 40,000 active-duty, Air National Guard and Reserve professionals operating and maintaining a variety of aircraft capable of deploying air power to any area of the world. In addition to three intelligence wings, the 8th Air Force controls the core of the country's heavy bomber force with the B-2 Spirit and B-52 Stratofortress aircraft. The A-10 Thunderbolt, E-8C Joint STARS, EC-130H Compass Call, E-3B Sentry, RC-135 Rivet Joint, RQ-4 Global Hawk and U-2S Dragon Lady reconnaissance aircraft round out their inventory.

The 917th Wing maintains 10 combat-ready B-52H bombers and 24 A1-10/OA-10 attack aircraft. Part of the 1,715-person strong Air Force Reserve's duties include training A-10 pilots in initial qualification and deploying B-52 bombers to conduct strategic heavy bombardments and maritime operations.

The 548th Combat Training Squadron, Green Flag East aircraft and troops also use Barksdale as a training area. The squadron's mission includes exercise planning, opportunities for live ordnance delivery, field training, and munitions replication.

## FORESEEABLE ACTIVITIES

### *Green Flag*

Barksdale AFB representatives anticipate that fighter activity will increase on the base as Green Flag activity, which simulates realistic combined arms training for events such as those occurring in Iraq and Afghanistan, grows. At least 10 exercises per year will be carried out. It is expected that the A-10s currently used will be replaced with new F-35s, a much noisier aircraft that will produce noise impacts on communities surrounding Barksdale.

### *Long-range Bomber Platform*

Future plans for Barksdale could also include hosting a long-range bomber platform, potentially by 2018. As B-2s and B-52s – in large part controlled by Barksdale's own 8th Air Force team – are targeted to be replaced by the next-generation long-range bomber, it is anticipated that some aircraft on the base may change within the next decade. Although the B-52s have a venerable history, the fleet's age is 40 – 50 years old; likewise, the B-2 fighter – although comparatively new – is becoming outmoded as it features only second-generation stealth capabilities, whereas the F-22 features fifth-generation stealth technologies. The future long-range bomber is anticipated to appear like a smaller, sleeker, sub-sonic B-2 bomber; however, if modeled after the newer F-22s or F-35s, could reach supersonic speed. Funding information about the new bomber, however, has been classified, so its exact future is uncertain.

Nonetheless, it is believed that the newer model bomber debuting by 2018 will only be a stopgap to shore up the aging air fleet, and that the revolutionary technology for long-range bombers will emerge around 2037.

*Cyber Command*

Perhaps the most significant potential activity to locate at Barksdale is the Air Force Cyber Command. Established in September 2007, Cyber Command is a new Air Force organization with the mission of protecting the nation from attacks on its computer, electronic and telecommunications systems. As a Homeland Security initiative, Cyber Command will organize, train and equip forces to preserve freedom of access to cyberspace. Having both offensive and defensive capabilities, it will be charged with protecting sensitive data underpinning the Nation’s infrastructure, economy and national security and preventing adversaries from using their own critical information. Cyber Command, however, will not control all military cyberspace activities; rather, it will seek to enhance the existing capabilities only of Air Force Major Commands and Department of Defense services and agencies. Cyber Command plans to work hand-in-hand with civilian agencies as well to integrate their efforts to protect the country from attacks.

The Cyber Command will consist of approximately 540 staff and is expected to form deep linkages with partner industrial and academic institutions developing new informational tools. In January of 2009, Air Force officials announced the list of proposed bases to host the Command: Barksdale Air Force Base, La.; Lackland AFB, Texas; Langley AFB, Va.; Offutt AFB, Neb.; Peterson AFB, Colo.; and Scott AFB, Ill.

Criteria which will influence the eventual site selection include the following:

- The existence of space / satellite and intelligence cyber activities on site;
- The existence of “state of the art” cable or fiber communications networks on site and in the local community;

- Proximity of the site to a “Silicon Valley-type” high-tech network, “technology corridors” and / or local universities or businesses which support an existing cyber-related workforce;
- The level of threat of terrorism or any other type of attack;
- How practical and economical access to the site is – by a network of roads, nearby railroad and international airport, and if the site has its own runway; and
- Susceptibility of the site to natural disasters such as tornadoes, hurricanes, blizzards or earthquakes.

Barksdale satisfies many of the criteria which would support its bid to become the permanent home of Cyber Command, including having a fiber optic cable running near the base; major interstate connections; and proximity to railroads and airports. Barksdale having its own runways and the construction of a new \$107 million Cyber Innovation Center (expected to draw up to 10,000 civilian contractor jobs) about a mile from the base also bodes well for the Air Force choosing the site as Cyber Command’s permanent home. The Air Force intends to make a final base selection no later than the end of June 2009.



The Cyber Innovation Center

## INSTALLATION FACILITIES AND PERSONNEL

Barksdale AFB is approximately 21,945 acres, divided into three overall areas: Main Base, Barksdale East, and the East Reservation. While Main Base is historic heart of the installation, due to ongoing base developmental needs, Barksdale East and the East Reservation have become focal points for future development. These areas are described in more detail below:

- Main Base (2,128 acres), or Main Cantonment Area, is west of Cooper Bayou and contains the airfield (comprised of one runway, taxiways, and parking aprons, measuring approximately 1,525 acres in total); main base industrial, administrative, community and housing facilities; and most of the urban forest. It is largely occupied by a Historic District French featuring Colonial Revival Style architecture, composed of 262 buildings and two structures built between 1932 and 1941, including family housing, officer quarters, and hangars;
- Barksdale East (1,921 acres) is the industrial and administrative area just east of Cooper Bayou, containing the Munitions Storage Area (MSA), Leadership School, RED HORSE Civil Engineer Squadron, and Navy Resident Officer in Charge of Construction. Land use activities adjacent to Barksdale East are agriculture/grazing; and
- East Reservation (17,896 acres) is east of Cooper Bayou but does not include the Barksdale East compound. The East Reservation is used for military training (light land use, no aerial gunnery or bombing ranges), which includes an ordnance demolition range. It also has several industrial and administrative, community facilities; Capehart and Heritage Heights housing areas; parks;

and oil/gas leases. About 17,300 acres of the East Reservation are forested. AF training on the East Reservation disturbs a small area, < 1 % disturbance.

The westernmost six square miles of Barksdale AFB are presently used to accommodate the activities of airfield, munitions storage, residential, administrative, commercial, and industrial buildings, and little space is available for future facility growth west of the runway. However, opportunities to further enhance operational readiness and quality of life at the base are being explored on lands east of the runway (totaling over 19,000 acres) and on the East Reservation (where 561 additional family housing units are being planned adjacent to the 128-unit Heritage Heights development). Such initiatives include:

- Barksdale East Redevelopment, where an Industrial Park to serve base logistical needs can be developed, rationalizing existing facilities that have become outdated;
- East Reservation Development, where the need more amenities for this expanding neighborhood will grow; and
- Flightline Redevelopment, where existing flightline hangars, facilities and loading operations might be moved as a result of future Military Construction (MILCON), according to the 2015 Flightline Move Plan, freeing up areas for development.

Additionally, the possibility of using rural land – within base boundaries but located miles from Main Base – for training and recreational uses

has been suggested. Further, it has been recommended that drilling activities for oil and natural gas, which has been undertaken for many years on the base, should be integrated into the overall land use objectives and compatible to mission requirements. It has been noted, however, that noise from industrial activities and the adverse effect on recreational values and wildlife habitat on the East Reservation is a concern.

Barksdale AFB currently accommodates approximately 14,638 personnel, of which 7,143 are active duty employed by the base. Most military personnel with family members live off base. An additional estimated 40,000 military retirees live within a 100-mile radius of the base. These people impact the base as they use base services such as non-appropriated funds facilities, medical, commissary, and Base Exchange. **Table 3** contains a breakdown of installation personnel.

**Table 3. Installation Population**

Personnel Population	
APF Military	
Active Duty	5,475
Air Force Reserve	7
Non-extended Active Duty Reserve	1,661
Trainees / Cadets	0
<i>Total APF Military</i>	<i>7,143</i>
Active Duty Military Dependents	5,620
Appropriated Fund Civilians	1,152
<b>TOTAL POPULATION</b>	<b>14,638</b>

**ECONOMIC IMPACTS OF BARKSDALE AFB**

As the second largest employer in the region, Barksdale AFB has a significant economic impact on the community. (Only the gaming industry has a larger economic impact in northwestern Louisiana.) Based on the Economic Impact Analysis carried out by Barksdale AFB for Fiscal Year 2007, the installation generated approximately \$676.6 million impact in the region. This includes base payroll to personnel

and civilian contractors, base expenditures for goods and services purchased, and an estimated dollar value of indirect jobs. Indirect jobs are those that provide goods and services to individuals who locate in the region due to Barksdale AFB’s presence. An example of an indirect job would be a teacher who is hired because more school-aged children have moved into the region with their military parents.

The FY07 payroll for Barksdale AFB was approximately \$375.7 million, of which \$248 million was paid to employees residing off-installation. Its annual expenditures for construction, services, materials, equipment and other supplies were estimated at \$197.4 million. It is estimated that Barksdale AFB generated 2,991 indirect jobs worth an annual dollar value of \$103.5 million.



The B-52

# 4

## Regional Profile

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## DEMOGRAPHICS AND GROWTH TRENDS

Bossier City and Parish have experienced rapid growth in recent years, with population increasing at a faster pace than in the rest of the state. According to the U.S. Census Bureau (2007), from 1990 to 2006 Bossier City grew by approximately 16% (by more than 8,500 people), bringing the 2006 population to over 61,000 people. Likewise, Bossier Parish grew by approximately 25% (by more than 21,000 people) during the same timeframe, bringing the 2006 population to over 107,000 people.

Like many municipalities, Bossier City has undertaken annexation in the last 30 years which has added population to the municipality. According to the Bossier City Comprehensive Plan, continued strong population growth is anticipated in the coming decades—populations of 85,000 persons in 2010 and 96,000 persons in 2020 are projected for the MPC Planning Area. This is a projected growth rate of approximately 13% for this decade and for next decade.

## REGIONAL INFRASTRUCTURE

The location and funding of public works projects can exert strong influences over land use trends and demands. Wastewater treatment capacity and roadways in particular tend to induce growth at intensities that typically exceed un-served surrounding areas. When exercised judiciously, such capital improvement projects can guide growth and thus act as a powerful tool for promoting compatible land use around military installations.

### *Utilities Infrastructure*

The Bossier City Comprehensive Plan describes the current state of utilities and infrastructure in the area in and around Barksdale AFB and recommends actions needed to maintain and improve this infrastructure. Several projects requiring attention are located near or adjacent

to the Barksdale AICUZ, which may help determine future compatible land uses. These infrastructure initiatives are:

1. Install new water lines to complete loops and connect water sub-systems at Shady Grove/Southgate Loop, Sun City/Golden Meadows Loop and Southern Gardens/Southgate Loop;
2. Acquire property, design and construct a new two million gallon (MG) elevated water storage tank on Kingston Road between Benton Road and Airline Drive in North Bossier;
3. Complete a water system loop on Village Lane to connect with the water line on Airline Drive;
4. Have the Bossier City Engineer's office and appropriate Barksdale AFB personnel develop a working relationship concerning mutually beneficial drainage and floodplain conservation and improvement projects;
5. Install new water and sanitary sewer systems at various locations, including the following in the study area (near flight paths): from the Swan Lake Road intersection with Airline Drive east to Benton Road; along the Greenacres Drive extension from Airline Drive to Swan Lake Road;
6. Relocate water system lines to accommodate widening Barksdale Boulevard to a five-lane cross section;
7. Extend the existing water line and sanitary sewer system along Swan Lake Road north and west to Airline Drive; and
8. The existing distribution system is capable of providing 2 MGD to Barksdale

Air Force Base (BAFB). An expansion of water treatment capacity would be required to safely provide this flow on a long-term basis.

In addition, utilities on base may have to be re-examined. Although a 2006 USAF study found that sanitary sewer and wastewater system is generally adequate for existing and forecasted future development, it recognizes that the system is reaching the end of its life cycle and major upgrades are required.



Development off of Airline Drive

### *Transportation Infrastructure*

Along with utilities infrastructure, the transportation network plays a major role in shaping the future development patterns of a community. Bossier City and Shreveport already form a major transportation hub, serviced by a series of interstates and federal highways which cross the parish east to west (I-20, I-220, U.S. 79 and U.S. 80), carrying traffic just north of Barksdale AFB as they traverse the parish. Major local arterials, however, are generally aligned north to south, such as Benton Road, Airline Drive and Swan Lake Road. Barksdale Boulevard, another major thoroughfare, runs parallel to the base on the western side of the base in a north-south-easterly direction.

Although several small- to mid-scale transportation projects are proposed in the Bossier City Comprehensive Plan which are in proximity to the base / AICUZ (such as widening Barksdale Boulevard to five lanes and constructing an interchange at I-20 for Bodcau Station Road), major projects such as the future construction of I-69 offer the strongest indicator of future development patterns. Also known as the NAFTA Trade Corridor and Corridor 18, the proposed I-69 is an ISTEA project designated by Congress in 1991. The legislation aimed to create highways of national importance. Currently, the corridor is proposed to run from Michigan through Indiana (at Indianapolis), Tennessee (through Memphis), and finally to Texas (ending at Houston), passing via Bossier Parish on the way. It is intended that the interstate would substantially enhance freight transportation and trade, improve economic efficiencies, and enhance access to intermodal facilities and military installations. Long-term plans include connecting Canada and Mexico through this route as well.

Current alignment plans (see [Figure 2](#)) suggest that I-69 would cross the Barksdale AICUZ, approximately where LA 527 meets U.S. 71. After crossing the Red River, I-69 would continue in a north-easterly direction towards the intersection of LA 167 and LA 527, turning north between Oakland and Koran, then continue to meet I-20 west of the Louisiana Army Ammunition Plant near Houghton. Another major project in addition to the I-69 corridor scheme is the proposed extension of the Arthur Ray Teague Parkway to connect with Curtis Sligo Road south of the base.

Completion of the I-69 project and other major road works will likely promote growth east and south of Barksdale AFB. While such growth appears promising in economic development terms, the construction of the roads highlights the increasing need for joint working between Barksdale and local government to ensure future land uses are compatible and encroachment is

avoided to ensure the Bossier City area reaps the maximum benefit from the presence of both the base and new infrastructure projects.

**Figure 2. Proposed I-69 Corridor Alignment**



Source: Northwest Louisiana Council of Government, 2007



Airline Drive

Figure 3. Master Thoroughfare Plan, Bossier City-Parish MPC



Source: Bossier Parish Metropolitan Planning Commission/Comprehensive Land Use and Development Master Plan, November 2002

## SUMMARY OF RECENT DEVELOPMENT

In July 2007, the application for \$100 million in bonds was approved by Bossier City Council to fund a number of projects around the area, including transportation improvements, upgrades to city parks and the construction of the Cyber Innovation Center at I-220. The financial undertaking represents the largest investment in capital projects in Bossier City's history. This significant level of investment signals the substantial residential (and income) growth that has occurred in the Bossier City metropolitan area during the past eight to ten years, and as the number of residents and supporting services continue to grow, the acreage needed to meet demand will likewise increase.

Generally, land development adjacent to Barksdale has followed a wedge pattern formed by the Red River and the AICUZ, although some housing, commercial, and industrial uses have developed past the AICUZ and into areas with limited noise impact. While some development in these areas is planned, other activity is reflective of growth in a general strip fashion.

However, the greater amount of development is occurring to the north and west of Barksdale. Several such recent developments are noteworthy as future potential constraints to base activity. These developments describe where major growth is taking place around Barksdale AFB and are detailed below.

### *Cyber Innovation Center*

To help encourage the Air Force's selection of Barksdale AFB as the permanent home for Cyber Command, Bossier City officials broke ground on the Cyber Innovation Center (CIC) in January 2008, located about a mile from the base. The CIC is being built to support existing cyber activities established at Barksdale AFB through providing expanded research facilities capable of developing emerging technologies. The presence

of the Center is also meant to foster collaboration between government, private industry and academia in the pursuit of furthering technologies and research related to cyber infrastructure.

In addition to \$50 million already committed to Bossier City and Bossier Parish towards the development of the CIC, Governor Bobby Jindal pledged another \$57 million in March 2008 from the state for continued development of the Center and future infrastructure improvements to I-20 / I-220, the interstates along which the CIC is located. Governor Jindal stated that funding for the project will not be limited, as he said the CIC is "the single most important economic development project for our entire state." It is expected the CIC will draw up to 10,000 civilian contractor jobs and could impact peripheral businesses related to Cyber Command activities within a 150-mile radius of Bossier City.

### *Benton Road / Airline Drive Corridor*

Major residential growth and supporting services has occurred along the Benton Road / Airline Drive Corridor, also located about a mile from Barksdale (to the northwest). Growth along this corridor is representative of the general development pattern of the city towards the north of Bossier. Some attribute this growth to Barksdale AFB's continued success as an economic driver in the region, or to the gaming industry's rise in the area, while others point to the Louisiana's shifting population due to Hurricane Katrina.

Regardless, residents have flocked to Bossier City in recent years, and new retail and numerous subdivisions along Benton Road and Airline Drive attest to the fact. For example, a 650,000-square foot shopping center – anchored by major national retailers such as Target, Best Buy and Office Depot – was recently developed by Stirling Properties at the intersection of the I-220 loop and Airline Drive. It is anticipated that the area

will grow to be a regional center that draws people from Shreveport, Bossier City and beyond for shopping and entertainment opportunities.

The State and Bossier Parish have plans to widen Airline Drive from two lanes to five lanes to cope with increasing traffic numbers, which have risen by over 31% on the thoroughfare during a five-year period. Adjacent, I-220's traffic has increased by over 105% at the same time. Additionally, Swan Lake Road (located to the east of Airline Drive) is being widened to four lanes to relieve traffic on Airline Drive and to channel industrial development occurring further north to nearby interstates.



Commercial development on Airline Drive near I-220

### *Haynesville Shale*

Recently, the Haynesville Shale – believed to hold as much as 20 trillion cubic feet of natural gas reserves – was discovered stretching across the entire area of Caddo and Bossier parishes. The shale, estimated to be twice the size of Barnett Shale in north Texas (which covers 6,000 square miles and 20 counties), extends beyond these parishes, however, and includes part of Sabine Parish, DeSoto, parts of the Red River and Natchitoches, and part of southwest Webster Parish.

Although the full extent of the Haynesville Shale has yet to be explored, if it rivals Barnett Shale, drilling operations will pump billions of dollars

into the local economy in only a few years. It has been reported that in Bossier / Caddo parishes, farmland believed to be part of the shale has been being sold for \$10-12 million. While the boost to the economy around Barksdale due to local land sales and drilling will likely have some knock-on effects to growth in the area, it will be important to track noise and safety regulations which accompany drilling operations to monitor their affect on surrounding residential areas and the base.

### *Haughton to Louisiana Tech University*

According to the Greater Bossier Economic Development Foundation (GBEDF), housing growth is increasing around Haughton, and supporting services (i.e. retail chains) are developing along Highway 80 to Louisiana Tech. While Airline Drive might be the hotspot for new residential subdivisions, Haughton – perennially a favorite with military families that work at nearby Barksdale AFB – is an older area but is proving increasingly attractive to buyers interested in more moderately priced homes.

As this node grows, the link eastward to Louisiana Tech is strengthening due largely to the university's high-tech focus (it is ranked 10th in the nation for commercializing nanotechnology inventions). Having developed this specialty, Louisiana Tech has the potential to play a role in emerging Cyber Command work at and around Barksdale. The state has recognized Louisiana Tech's potential and has invested more than \$200 million since 2002 in support of developing its information technology initiatives, facilities, and faculty development.

Situated along I-20, the university is also well-suited to become a major player in the area as it is able to tap into the Louisiana Optical Network Initiative (LONI), which runs adjacent to the interstate. LONI is a high-speed fiber optic network connecting supercomputers at Louisiana's research universities and the National LambdaRail (a nationwide network infrastructure), and is the most powerful regional

network and grid-computing environment in the country.

The emerging Haughton-Louisiana Tech corridor, therefore, linked by major roadways (i.e. Highway 80, Interstate I-20) but also the fiber optic networks of the potential Cyber Command at Barksdale AFB / Cyber Innovation Center and LONI, promises to bring increased growth in proximity to the base from an easterly direction, adding to growth pressures from the north as described above.

## REGIONAL ENVIRONMENT AND SUSTAINABILITY

Barksdale AFB lies within three physiographic regions: Tertiary uplands, Pleistocene terraces, and Red River alluvial plains. Tertiary uplands are found on the eastern side of the base and are characterized by sand to clay deposits, remnants of when the Gulf of Mexico extended into northern Louisiana. The Pleistocene terraces are alluvial surfaces, containing deposits from the Red River fluvial plain during the Pleistocene Epoch. The Red River alluvial floodplain, found on the western side of the base and occupying around half of the base area, also contains sediment from the Red River.

Wetlands present on the base are primarily found in the Red River alluvial floodplain. The most recent wetlands survey, completed by Stephen F. Austin State University for the East Reservation (2005), determined that Barksdale AFB has approximately 1,200 acres of wetlands, with the average size of a wetland measuring 12 acres, (the largest being 110 acres and the smallest 0.17 acres in size), although these numbers could change as the Corps of Engineers is currently updating their criteria for wetland delineation (USAF 2007a). The presence of wetlands is significant as Executive Order (EO) 11990, Protection of Wetlands directs all federal agencies, including the military, to avoid the destruction, loss or degradation of wetlands

whenever there is a practicable alternative. Because of this directive, wetlands and floodplains pose a significant constraint to facility development on the east side of Barksdale AFB.

Barksdale AFB is rich in plant and animal life. While most of the vegetation structure and composition at Barksdale AFB has been altered over the last 150 years, several ecologically significant natural areas remain. At least eleven sites possess high quality natural communities and are considered worthy of exemplary natural area (NA) designation (TNC 1997). Barksdale in fact has been nationally designated as a Tree City USA member for over 10 years and has the largest live oak collection in northwest Louisiana. A majority of the base acreage, therefore, remains undeveloped and supports bottomland and upland forest vegetation; approximately 17,300 acres of the base are forested. Falling within the Lower Mississippi Riverine Forest province, Barksdale contains 7,600 acres of oak-gum-cypress bottomlands (located in the western area of the base), in which most wetlands occur, and the 9,700 acres of pine-oak-hickory-maple forest which dominate the uplands (located in the eastern area of the base). While no plants are federally-listed threatened and endangered species, seven plants listed on the state rare list and ten uncommon “watch list” plants have been located on the base.

Likewise, no federally-listed threatened or endangered animals are found on the base, although the state-endangered bald eagle (*Haliaeetus leucocephalus*) is found on site at Flag Lake. The lake, which is located on the East Reservation approximately five miles east of the flightline, is considered to be an important wintering area for the bald eagle. Other “state-rare” animals found at Barksdale AFB include Cooper’s hawk (*Accipiter cooperii*) and Bachman’s sparrow (*Aimophila aestivalis*). More common, unthreatened species found on base include the white-tailed deer, the bobcat, and the

gray fox, along with numerous wading and song birds.

Animals occasionally interfere with base operations and may be harmed by military activity. While wildlife management is generally directed towards improving biodiversity, conserving resources, and enhancing wildlife, fish, and bird habitats, primarily through the implementation of its Integrated Natural Resources Management Plan (INRMP) (completed in 2007), animal and bird populations – particularly in the flightline area – must be controlled to prevent wildlife/aircraft collisions. It has been proposed that this be accomplished by habitat modification, fence maintenance around the flightline, noise and distress calls and as a last resort shooting or trapping. Flightline vegetation will be maintained to discourage birds and limit number of mowings required. The Bird Aircraft Strike Hazard (BASH) plan covers procedures and techniques for preventing bird aircraft strikes and hazards in particular.

Other ecological concerns revolve around flooding. Approximately half of the entire base lies within the Red River floodplain, and several areas of the base are within the 100-year floodplain. The Flat River and Red Chute Bayou (on the East Reservation) are the primary drainage bodies for the entire installation, and natural drainage is generally south and southwest for the western two-thirds of the base and to the southeast for the eastern portion of the base. Flooding is a concern, particularly along major drainage routes, and is seen as a major constraint to development. American beavers (*Castor canadensis*) can cause further problems, manipulating local hydrology from time to time to cause long-term flooding in some areas. Areas experiencing the most rapid growth are within flood-prone areas, particularly the large flood zone to the north of Barksdale AFB toward Benton, which only exacerbates drainage problems.



The Red River

# 5

## Operational Impacts

BARKSDALE  
Air Force Base  
JOINT LAND USE STUDY

## OPERATIONAL IMPACTS

Routine training and readiness activities at Barksdale Air Force Base produce various impacts that can affect the quality of life in surrounding communities. Examples of these impacts include noise and vibration or the risk of an aircraft accident. Conversely, military operations are susceptible to hazards created by certain proximate civilian activities that may concentrate people or noise sensitive users, obstruct air space, compete for electromagnetic spectrum use or generate light or other visual impairments. Understanding the overlapping spatial patterns of these impacts around the installation is essential for promoting compatible and fully coordinated land use decisions.

The Air Force's Air Installation Compatible Use Zone Study (AICUZ) is the principle document for evaluating the noise footprint of Barksdale AFB and the hazards associated with military training operations.

## AIRCRAFT OPERATIONS

Current operations at Barksdale AFB focus on two primary types of aircraft (A-10 aircraft and B-52 aircraft). Additionally, Green Flag activity includes sorties made by F-15 and F-16 aircraft (as well as A-10 aircraft). Beginning in May of each year, Green Flag East conducts a three-week exercise, operating Monday through Friday, utilizing these aircraft. Every month thereafter through the rest of the year, similar three-week exercises continue to be carried out.

The following describes the nature and frequency of aircraft operations on the base:

### *A-10 Aircraft*

The 47th Fighter Squadron (part of the 917th Wing) operates the A-10 aircraft at Barksdale AFB. In addition to the existing 24 A-10 attack

aircraft on base, Barksdale recently received nine additional A-10 aircraft as a result of BRAC 2005.

Based on 2006 estimates, the 47th FS makes 13.33 sorties per day with the A-10s, Monday through Friday. In total, the 47th FS conducted 3,467 sorties in 2006. Additionally, the A-10 aircraft complete an average of 22 closed pattern operations per day, most of which take place during daytime hours (7:00 a.m. to 10:00 p.m.). Night operations (10:00 p.m. to 7:00 a.m.) only comprise 0.05 arrivals; there are no night departures or closed patterns. Night operations, therefore, only make up less than 1% of the total number of operations.



A-10 Aircraft

### *B-52 Aircraft*

The 2nd Bomb Wing (including the 11th Bomb Squad, 20th Bomb Squad, and the 96th Bomb Squad) and the 917th Wing fly the B-52 aircraft assigned to Barksdale AFB. Currently, the 2nd Bomb Wing controls 53 B-52s and the 917th Wing maintains 10 combat-ready B-52H bombers (with typically 30 to 40 B-52s being found on the main aircraft parking apron on any given day).

The majority of the B-52 sorties are flown by the 2 BW. The 2 BW flies Monday through Thursday and one Friday per month and occasionally on weekends. The activity of the individual units of

the 2BW and 917th Wing totaled 3,960 sorties in 2006, broken down as follows:

- 11 BS – flew six sorties per day, flying a total of 1,320 sorties;
- 20 BS and 96 BS – flew five sorties per day each, flying a total of 1,100 sorties each (2,200 total); and
- 917th Wing – flew two sorties per day, flying a total of 440 sorties in 2006.

There is an average of 18 arrival, 18 departure, and 48 closed pattern B-52 operations per day at Barksdale AFB. Approximately 79% of the operations occur during daytime hours (7:00 a.m. to 10:00 p.m.). During nighttime hours, there is far less activity, equating to approximately 6 arrivals and 12 closed pattern operations, with only an insignificant number of departures occurring. The huge bombers can be seen performing these operations as far away as Benton and Elm Grove. The circuit parallel to the runway at Barksdale also takes the planes over Houghton.

#### *Green Flag East*

In addition to the number and frequency of A-10 aircraft operations discussed above, Green Flag East utilizes A-10s in their exercises, along with F-15 and F-16 aircraft. These aircraft are not based at Barksdale but rather at other installations. In 2006, Green Flag East conducted 1,664 sorties (three weeks per month starting in May and continuing through the rest of the year) with the following aircraft:

- 96 sorties with A-10 aircraft;
- 960 sorties with F-16 aircraft; and
- 608 sorties with F-15 aircraft.

As evidenced above, the majority of Green Flag East operations utilize the F-16 aircraft, and the A-10s are utilized the least. There is an average

of 6.40 arrival and 6.40 departure Green Flag East operations per day at Barksdale AFB, 85% of which occur in the daytime. Green Flag East does not perform any closed pattern operations.

In addition to these planned aircraft maneuvers, numerous military transient aircraft arrive, depart, and perform closed pattern operations at Barksdale AFB, and it can be expected that transient operations will occur every day over the course of any given year (365 days/year). While a wide variety of aircraft use the base, logs of past visits can be used to estimate a sense of any further impacts on the community which might arise due to the added activity. Based on an average busy day of transient aircraft operations, it can be expected that approximately 3.4 arrivals, 3.4 departures, and 2.7 closed patterns occur on a regular basis in addition to planned aircraft maneuvers, according to the most recent AICUZ Study (August 2008). However, according to a representative from Barksdale AFB, there are no expected increases in aviation activity on the base associated with BRAC.

## AVIATION NOISE

### *Day-Night Sound Level and Decibels*

To measure environmental noise, the Department of Defense (DoD) uses a widely accepted evaluator, the day-night sound level (DNL). The DNL evaluator describes the average daily acoustic energy over the period of one year—meaning that it averages moments of quiet with moments when loud noises can be heard.

Noise levels are measured in terms of a quantity known as decibels (dB). Normal speech has a noise level of approximately 60 dBA and a busy street corner has a noise level of approximately 80 dBA. **Table 4** below expresses common sound levels in dBA for comparison.

**Table 4. Description of A-Weighted Decibel Level**

SOUND	dBa	EFFECT
Jet Engines (Near)	140	
Shotgun Firing	130	
Jet Takeoff (100-200 Fort)	130	Threshold of pain (125 dBA)
Thunderclap (Near)	120	Threshold of sensation (120 dBA)
Power Saw (Chain Saw)	110	
Jet Fly-over (1000 Fort)	103	
Garbage Truck/Cement Mixer	100	Regular exposure for 1 minute or more risks permanent hearing loss
Farm Tractor	98	
Lawnmower, Food Blender	85-90	Level at which hearing loss begins (8 hour exposure)
Recreational Vehicles, TV	70-90	
Diesel Truck (40 Mph, 50 Fort)	84	
Garbage Disposal	80	Annoyance; constant exposure may cause hearing loss
Washing Machine	78	
Dishwasher	75	
Vacuum Cleaner	70	Intrusive, interference with conversation
Hair Dryer	70	
Normal Conversation	60-65	Comfortable (under 60 dBA)
Refrigerator Humming	40	
Whisper	30	Very quiet
Rustling Leaves	20	Just audible
Normal Breathing	10	
	0	Threshold of normal hearing (1000-4000 Hz)

Source: National Institute of Deafness and Other Communication Disorders

### Noise Zones

To assist the surrounding communities in land use decisions, the DoD uses decibel noise contours to illustrate the exposure to noise associated with aviation activities. Below is a general definition of these zones:

- **Noise Zone III:** This is an area around the source of noise in which the DNL is greater than 75 dBA. This zone is considered an area of severe noise exposure and is deemed unacceptable for noise sensitive activities.
- **Noise Zone II:** This area is considered to have significant noise exposure and is normally unacceptable for noise-sensitive land uses. It consists of an area where the DNL is between 65 and 75 dBA.
- **Noise Zone I:** This area, considered to have minimal noise exposure, includes areas in which DNL is less than 65 dBA and is acceptable for all types of land uses.

### Noise Contours

Military aircraft operations are the primary source of noise at Barksdale AFB. Although the A-10 aircraft contributes to the noise environment of Barksdale AFB, the B-52 aircraft is the major contributor.

The existing AICUZ study for the Barksdale AFB provides recommended compatible land use activities within different noise zones. **Figure 4** shows noise contours for the base. Barksdale AFB is currently updating its AICUZ plan and noise contours to reflect future operations. The analysis and recommendations of this report are based on the noise contours available at the time of the study.

Noise contours from existing aircraft operations at Barksdale AFB show civilian residences inside of the 65, 70, 75, and 80 DNL contours north and south of the installation. Some military

residences are also inside 65, 70, 75, and 80 DNL contours.

Most of the residential use within the noise zones in Bossier City is located between the base and I-20 and surrounding the base's western boundary. In Bossier Parish, residential land is located north of the installation along Route 3, and north and south of Route 79. While the 65-69 dBA noise zone does not interfere with Benton as it is located two miles southwest of the town, it is located in the Benton-Parish MPC Planning Area. In Caddo Parish, this noise zone crosses over to the western side of the Red River but does not affect any populated areas.

Future activity at Barksdale is likely to increase noise significantly, as more fighter activity through Green Flag operations expands. The DoD plans to replace the quieter F-16 / A-10 with the F-35, and the new aircraft is reported to be noisier than all others. Likewise, the F-18 (the primary fighter within the air component of the Navy / Marine Corps) is noisier than its predecessors, as is the F-35, which will replace the A-10 currently on base. According to a Barksdale AFB representative, the base's noise contours will be impacted by these new jets. It is likely that the new AICUZ study currently being completed will reflect these new contours.

While most noise complaints today come from the area just south of the base (the Golden Meadows area), it is believed that they are the result of unusual activity and thus do not reflect current operations. Although noise complaints are currently infrequent (averaging one or two per month), new, noisier aircraft have the potential to increase their frequency. However, careful land use planning through the JLUS process can reduce the likelihood of such conflicts.



## AIR SAFETY

### *Runway Airspace Imaginary Surfaces*

Imaginary surfaces are three-dimensional areas around airfields that define the spaces that must be kept clear of obstacles to ensure safe aviation. The effect of noise on tall buildings is particularly relevant when referring to imaginary surfaces.

See Figure 5.

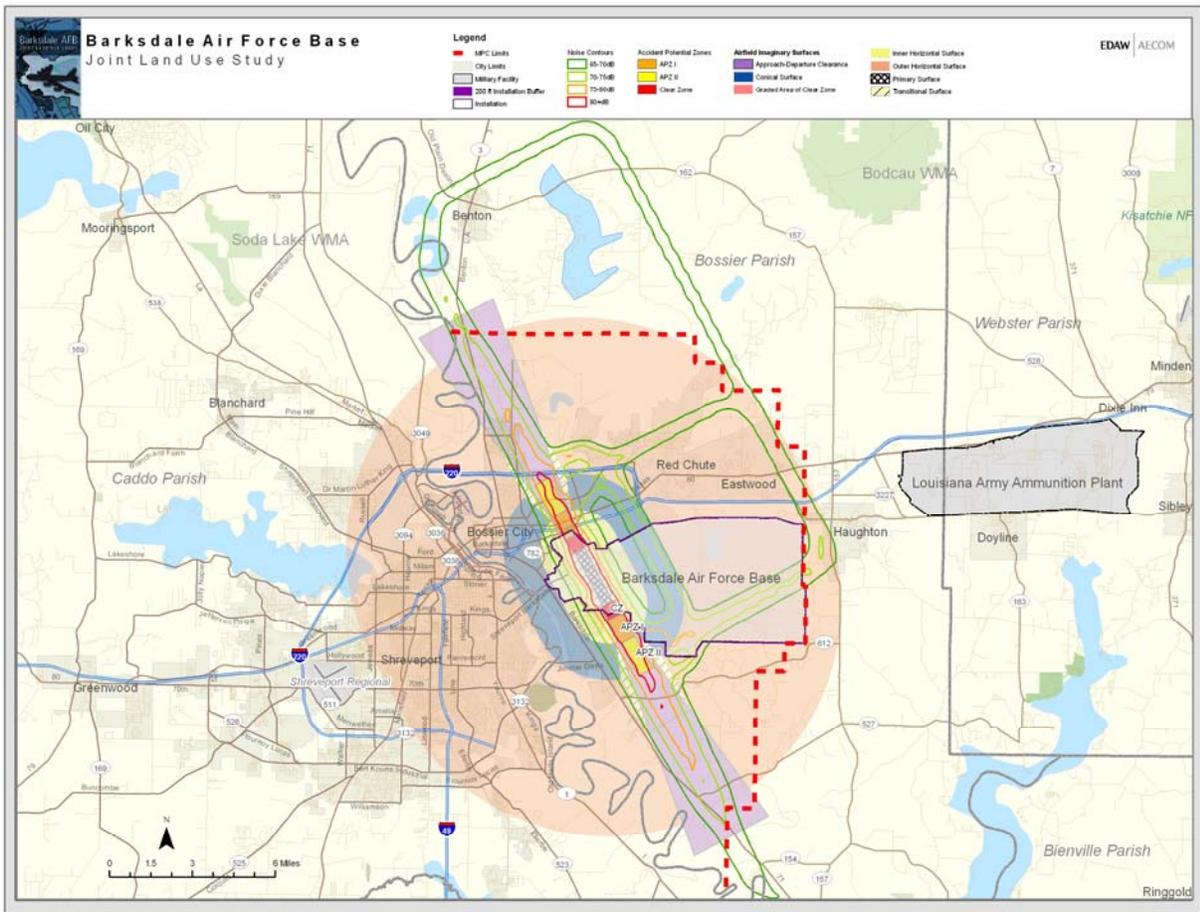
### *Military Clear Zones and Accident Potential Zones*

Clear Zones (CZ) and Accident Potential Zones (APZ) are established near military airfields based on the analysis of military aircraft accident history and a determination of where, within airfield environs, an accident is likely to take place and how large an impact area is likely to result from any single accident.

- **The Clear Zone (CZ)** is located at the end of the runway, extends outward 3,000 feet, and is 1,500 feet on either side of the runway centerline. The accident potential in this area is so high that all structures are incompatible.
- **Accident Potential Zone I (APZ I)** is less critical than the CZ, but still possesses significant potential for accidents. Located just beyond the CZ, APZ I extends an additional 5,000 feet from the end of the CZ. Like all runway zones, the APZ I is 3,000 feet wide.
- **Accident Potential Zone II (APZ II)** extends beyond APZ I, is less critical than APZ I, but still poses some risk for accidents. The APZ II extends 7,000 feet from the end of APZ I.

Figure 5 shows the Clear Zones and APZs associated with Barksdale Air Force Base. All three zones extend outside the installation boundary fence.

**Figure 5. Accident Potential Zones and Imaginary Air Surfaces**



# 6

## Compatibility Analysis

BARKSDALE  
Air Force Base  
JOINT LAND USE STUDY



## COMPATIBILITY GUIDELINES

Encroachment occurs when physically adjacent military and civilian land uses generate one or both of the following effects:

- Nearby community development interferes with the ability of the military to perform its mission or causes modifications to military operating procedures; or
- Members of the public are exposed to a higher than normal levels of operational impacts associated with military activities, such as noise or the risk of an aircraft mishap.

When compatible, land uses can exist next to each other without causing interference with military exercises or exposing people to undue safety risks or nuisance. In this JLUS context, aviation activities raise compatibility issues when next to the following nearby land uses:

- Noise sensitive uses, such as housing, schools, medical facilities or places of worship;
- Uses that tend to concentrate people (certain higher residential densities, schools, churches, hospitals);
- Uses that can interfere with safe air navigation, such as tall structures, or activities that throw off excessive lighting, smoke or dust and may impair vision; and/or
- Uses which attract birds and other wildlife that can interfere with safe aviation.

For purposes of evaluating compatibility in designated noise and air safety zones, the JLUS draws guidance from The Air Force Handbook 32-7084, 1 MARCH 1999, AICUZ Program Manager's Guide as shown in **Table 4** on the following

pages. Uses shown in green are compatible with the level of noise exposure or safety risk associated with each particular zone. Use depicted in yellow are conditionally compatible and may require further protection measures, such as indoor noise reduction. Activities shown in red are unacceptable within the given zones, indicating that strict prohibition of the use is the most appropriate regulatory action. These guidelines are only advisory in nature. Only local governments retain the authority to determine land uses around an installation.

**Table 4. Land Use Compatibility Guidance**

LAND USE		ACCIDENT POTENTIAL ZONES			NOISE ZONES (dB)			
SLUCM NO.	NAME	CLEAR ZONE	APZ 1	APZ 2	65-69	70-74	75-79	80+
10	Residential							
11	Household units							
11.11	Single units; detached	N	N	Y <sup>1</sup>	A <sup>11</sup>	B <sup>11</sup>	N	N
11.12	Single units; semi detached	N	N	N	A <sup>11</sup>	B <sup>11</sup>	N	N
11.13	Single units; attached row	N	N	N	A <sup>11</sup>	B <sup>11</sup>	N	N
11.21	Two units; side-by-side	N	N	N	A <sup>11</sup>	B <sup>11</sup>	N	N
11.22	Two units; stacked	N	N	N	A <sup>11</sup>	B <sup>11</sup>	N	N
11.31	Apartments; walk up	N	N	N	A <sup>11</sup>	B <sup>11</sup>	N	N
11.32	Apartments; elevator	N	N	N	A <sup>11</sup>	B <sup>11</sup>	N	N
12	Group quarters	N	N	N	A <sup>11</sup>	B <sup>11</sup>	N	N
13	Residential hotels	N	N	N	A <sup>11</sup>	B <sup>11</sup>	N	N
14	Mobile home parks or courts	N	N	N	N	N	C <sup>11</sup>	N
15	Transient lodgings	N	N	N	A <sup>11</sup>	B <sup>11</sup>	N	N
16	Other residential	N	N	N <sup>1</sup>	A <sup>11</sup>	B <sup>11</sup>	N	N
20	Manufacturing							
21	Food & kindred products; manufacturing	N	N <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
22	Textile mill products; manufacturing	N	N <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
23	Apparel and other finished products made from fabrics, leather, and similar materials; manufacturing	N	N	N <sup>2</sup>	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
24	Lumber and wood products (except furniture); manufacturing	N	Y <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
25	Furniture and fixtures; manufacturing	N	Y <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
26	Paper & allied products; manufacturing	N	Y <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
27	Printing, publishing, and allied industries	N	Y <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
28	Chemicals and allied products; manufacturing	N	N	N <sup>2</sup>	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
29	Petroleum refining and related industries	N	N	N	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>

LAND USE		ACCIDENT POTENTIAL ZONES			NOISE ZONES (dB)			
SLUCM NO.	NAME	CLEAR ZONE	APZ 1	APZ 2	65-69	70-74	75-79	80+
30	Manufacturing							
31	Rubber and miscellaneous plastic products	N	N <sup>2</sup>	N <sup>2</sup>	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
32	Stone, clay and glass products	N	N <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
33	Primary metal industris	N	N <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
34	Fabricated metal products	N	N <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
35	Professional, scientific, and controlling instruments; photographiic and optical goods; watches and clocks	N	N	N <sup>2</sup>	Y	A	B	N
39	Miscellaneous manufacturing	N	Y <sup>2</sup>	Y <sup>2</sup>	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
40	Transportation, communications and utilities							
41	Railroad, rapid rail transit and street railroad transportation	N <sup>3</sup>	Y <sup>4</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
42	Motor vehicle transportation	N <sup>3</sup>	Y	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
43	Aircraft transportation	N <sup>3</sup>	Y <sup>4</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
44	Marine craft transportation	N <sup>3</sup>	Y <sup>4</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
45	Highway & street right-way	N <sup>3</sup>	Y	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
46	Automobile parking	N <sup>3</sup>	Y <sup>4</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
47	Communications	N <sup>3</sup>	Y <sup>4</sup>	Y	Y	A <sup>15</sup>	B <sup>15</sup>	N
48	Utilities	N <sup>3</sup>	Y <sup>4</sup>	Y	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>
49	Other transportation communications and utilities	N <sup>3</sup>	Y <sup>4</sup>	Y	Y	A <sup>15</sup>	B <sup>15</sup>	N
50	Trade							
51	Wholesale trade	N	Y <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
52	Retail trade-building materials, hardware and farm equipment	N	Y <sup>2</sup>	Y	Y	Y <sup>12</sup>	Y <sup>13</sup>	Y <sup>14</sup>
53	Retail trade- general merchandise	N	N <sup>2</sup>	Y <sup>2</sup>	Y	A	B	N
54	Retail trade- food	N	N <sup>2</sup>	Y <sup>2</sup>	Y	A	B	N
55	Retail trade- automotive, marine craft, aircraft and accessories	N	Y <sup>2</sup>	Y <sup>2</sup>	Y	A	B	N
56	Retail trade- apparel and accessories	N	N <sup>2</sup>	Y <sup>2</sup>	Y	A	B	N
57	Retail trade- furniture, home furnishings and equipment	N	N <sup>2</sup>	Y <sup>2</sup>	Y	A	B	N
58	Retail trade- eating and drinking establishments	N	N	N <sup>2</sup>	Y	A	B	N
59	Other retail trade	N	N <sup>2</sup>	Y <sup>2</sup>	Y	A	B	N

Table 4 Footnotes:

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

Y - (Yes) - Land use and related structures are compatible without restriction.

N - (No) - Land use and related structures are not compatible and should be prohibited.

Y<sup>x</sup> - (yes with restrictions) - Land use and related structures generally compatible; see notes indicated by the superscript.

N<sup>x</sup> - (no with exceptions) - See notes indicated by the superscript.

NLR - (Noise Level Reduction) - NLR (outdoor to indoor) to be achieved through incorporation of noise attenuation measures A, B, or C - Land use and related structures generally compatible; measures to achieve NLR for A(DNL/CNEL 65-69), B(DNL/CNEL 70-74), C(DNL/CNEL 75-79), need to be incorporated into the design and construction of structures.

A\*, B\*, and C\* - Land use generally compatible with NLR. However, measures to achieve an overall noise level reduction do not necessarily solve noise difficulties and additional evaluation is warranted. See appropriate footnotes.

\* - The designation of these uses as "compatible" in this zone reflects federal agencies' and program considerations of general cost and feasibility, as well as past community experiences. Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider.

1. Suggested maximum density of 1-2 dwelling units per acre, possibly increased under a Planned Unit Development (PUD) where maximum lot coverage is less than 20 percent.
2. Within each land use category, further deliberating by local authorities may be needed due to the variation. Shopping malls and shopping centers are considered incompatible use in any accident potential zone (CZ< APX 1, or APZ 2).
3. The placing of structures above-ground utility lines in the clear zone is subject to sever restrictions
4. No passenger terminals and no major above-ground transmission lines in APZ 1.
5. Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.
6. Low-intensity office uses only. Meeting places, auditoriums, etc., are not recommended.
7. Excludes chapels.
8. Facilitates must be low intensity.
9. Clubhouses not recommended.
10. Areas for gatherings of people are not recommended.
11.
  - a. Although local conditions may require residential use, it is discourage in DNL/ CNEL 65-69 dB and strongly discouraged in DNL/CNEL 70-74 dB. The absence of viable alternative development options

should be determined and an evaluation indicating a demonstrated community need for residential use would both be met if development were prohibited in these zones should be conducted prior to approvals.

- b. Where the community determines the residential uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NRL) for DNL/CNEL 65-69 dB and DNL/CNEL 70-74 dB should be incorporated.
  - c. NRL criteria will not eliminate outdoor noise problems. However, building location and site planning can help mitigate outdoor exposure, particularly from near ground level sources. Measures that reduce outdoor noise should be used whenever practical in preference to measures which only protect interior spaces.
12. Measures to achieve the same NRL as required for facilities in DNL/CNEL 65-69 dB range much 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.
  13. Measures to achieve the same NRL as required for facilities in DNL/CNEL 70-74 dB range much 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
  14. Measures to achieve the same NRL as required for facilities in DNL/CNEL 75-79 dB range much 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
  15. If noise sensitive, use indicated NRL; if not, the use is compatible.
  16. No buildings.
  17. Land use is compatible provided special sound reinforcement systems are installed.
  18. Residential buildings require the same NRL as required for facilities in DNL/CNEL 65-69 dB range.
  19. Residential buildings require the same NRL as required for facilities in DNL/CNEL 70-74 dB range.
  20. Residential buildings are not permitted
- Land use is not recommended. If the community decides the use is necessary, hearing protection devices should be worn by personnel.

While aircraft noise and air safety hazards are the major operational issues generated by Barksdale

Air Force Base, impacts from the surrounding community can also interfere with military training operations.

#### *Air Space Intrusion*

Cell towers can act as a physical intrusion into active air space, particularly for aircraft participating in low altitude operations. Communications towers may also be a source of electromagnetic 'noise,' which may affect military avionics and radio frequency (RF) dependant weapons systems and communications.

#### *Radio Frequency Spectrum*

Adequate radio frequency spectrum is essential to almost all aviation operations. Civilian radio frequency devices (e.g. radios, radars, keyless entry devices) can sometimes transmit in military assigned frequencies, affecting electronic systems and communications equipment.

#### *Exterior Lighting*

Outdoor lighting systems, especially interstate interchange streetlights or exterior security lighting associated with large buildings, often allow significant light to travel upward into an otherwise darkened sky. The resulting "light pollution" can obscure pilot vision or interfere with the use of night vision training devices.

Night vision flight training, in which aviators use night vision goggles (NVGs) or other types of night vision systems, is essential to the missions of the modern military. Night vision systems are designed to operate away from civilization and electric lighting. Exposure to stray light can cause the vision screen to white-out, temporarily robbing the aviator of vision. In some cases, light pollution can hinder night training resulting in a relocation of training routes or rendering it infeasible.

## LAND USE COMPATIBILITY ANALYSIS

An analysis was conducted to assess the compatibility of land use conditions surrounding Barksdale AFB with military operations. The object of the analysis is to identify the locations of potential land use conflicts. The two primary operational impacts occurring outside the boundary of Barksdale AFB are loud noises and military clear zones and accident potential zones. Both impacts are associated with airfield operations. The Department of Defense provides land use compatibility guidelines for each of these impacts: Guidelines for Considering Noise in Land Use Planning and Control (FICUN, 1980) and the DoD Compatible Land Use Guidelines for Clear Zones and Accident Potential Zones (US Army, 1981). The land use compatibility analysis applies these guidelines to both existing and future land use conditions, as expressed in the Bossier City Comprehensive Land Use Development Master Plan.

#### *Methodology*

The methodology employed for the land use compatibility analysis is relatively straightforward. Using Geographic Information Systems (GIS), spatial data representing military operational impacts - in this case AICUZ noise contour data and Military Clear Zones and Accident Potential Zones - is overlaid with Bossier City land use data. Areas in the land use data that do not overlap with the operational data are assumed to be "compatible" by default. Likewise, all areas in which overlap does occur are selected for further analysis.

The Bossier City land use data used in this analysis was produced as part of the Bossier City Comprehensive Land Use Development Master Plan process. The data extends outside of the city limits to the north, south and west, approximately four miles, to include virtually all of the territory within the Metropolitan Planning Commission (MPC) Planning Area. It should be

noted, however, that the land use data used in the analysis presents land use conditions at two different levels of detail depending upon whether the land is within the city limits or outside. Within the city limits, parcel-level detail is provided for land uses, while outside the city limits, land use conditions is presented in swaths that may include more than one property at a time.

For the analysis, existing and future land use classification descriptions were reviewed in the Bossier City Comprehensive Land Use and Development Master Plan. Each land use classification in the Bossier City comprehensive plan was then linked to a corresponding land use description in the DoD guidelines. The guidelines were then applied to each case in which a given land use was found to intersect with one of the operational impacts. Depending upon the level of operational impact (i.e. noise level, accident potential zone) and the compatibility of the given intersecting land use (according to the guidelines), the land use was re-coded as one of three potential compatibility conditions. A corresponding color code was also applied to graphically represent the condition.

**Compatible (Green)** – the character and intensity of land use does not conflict with the military impact

**Conditionally Compatible (Yellow)**– the character and intensity of the land use is appropriate only under certain conditions (For example: certain land uses are compatible only if specific structural conditions are met, such as noise attenuated roofing; or a land use classification may be broad enough to include both compatible and incompatible potential land uses)

**Incompatible (Red)** – The character and/or intensity of land use is inappropriate given the military impact

Because of the discrepancy in detail between areas within the city limits and those outside, two different methods of coding land were employed. Within the city limits, where land use conditions are expressed at the parcel level, each parcel was coded with the appropriate compatibility level. In cases in which only a portion of a given parcel is intersected by a military impact, the compatibility code is applied to the entire parcel. For areas outside the city limits, in which land use is expressed in larger swaths, only the portion of a given land use area that is intersected by an operational impact is coded.

Tables 5 and 6 list the compatibility condition assigned to each land use under the various military impact intensities:

**Table 5. Existing Land Use Compatibility**

EXISTING LAND USE CLASSIFICATION	CLEAR ZONE	APZ I	APZ	65-70	70-75	75-80	80+ dB
Low Density Residential (LDR)	N	N	CC	CC	CC	N	N
High Density Residential (HDR)	N	N	N	CC	CC	N	N
Manufactured Housing (MH)	N	N	N	N	N	N	N
Commercial Office (CO)	N	N	Y	Y	CC	CC	N
Commercial Retail (CR)	N	CC	CC	Y	CC	CC	CC
Public/Semi-Public (PSP)	N	N	CC	CC	CC	CC	N
Light Industrial (LI)	N	CC	CC	Y	CC	CC	CC
Heavy Industrial (HI)	N	CC	CC	Y	CC	CC	CC
Park (PK)	N	CC	CC	CC	CC	N	N
Rural Development (RD)	CC	CC	CC	CC	CC	CC	CC
Vacant (V)	Y	Y	Y	Y	Y	Y	Y
N = Incompatible							
CC = Conditionally Compatible							
Y = Compatible							

**Table 6. Future Land Use Compatibility**

FUTURE LAND USE CLASSIFICATION	CLEAR	APZ I	APZ II	65-70	70-75	75-80	80+ dB
Village Development Area (VDA)	N	CC	CC	CC	CC	CC	N
Low Density Residential (LDR)	N	N	N	CC	CC	N	N
High Density Residential (HDR)	N	N	N	CC	CC	N	N
Manufactured Housing (MH)	N	N	N	N	N	N	N
Commercial Office (CO)	N	N	Y	Y	CC	CC	N
Commercial Retail (CR)	N	CC	CC	Y	CC	CC	CC
CO/CR	N	N	CC	Y	CC	CC	N
Public/Semi-Public (PSP)	N	N	CC	CC	CC	CC	N
Industrial (I)	N	CC	CC	Y	CC	CC	CC
Park (PK)	N	CC	CC	CC	CC	N	N
Rural Development (RD)	CC	CC	CC	CC	CC	CC	CC
Sensitive Development Area (SDA)	CC	CC	CC	CC	CC	CC	CC
N = Incompatible							
CC = Conditionally Compatible							
Y = Compatible							

### Findings

Because of the generality of many land use classifications, the most common compatibility condition for land uses within the study area that intersect military impacts from Barksdale AFB is “conditionally compatible.” For example, under some impact conditions, an elementary school may be incompatible, while a government office is compatible, although both uses may fall under the Public/Semi-Public (PSP) land use classification. In these cases, the condition is considered to be “conditionally compatible.”

Existing land use conditions are generally compatible or conditionally compatible, with a few notable exceptions. North of Barksdale AFB, pockets of residential and public/semi-public land uses coincide and conflict with the flight accident potential zones. Although no incompatible land uses are found within the clear zone, several are within both APZ I and APZ II. The majority of incompatible residential land use is classified as MH (Manufactured Housing). Manufactured housing tends to be the least compatible housing type due to its increased vulnerability to high levels of noise; however, rarely is any residential land use type compatible within accident potential zones. Outside of the APZs, three somewhat significant swaths of land classified as LDR (Low Density Residential) appear as incompatible because they exist within the 75-80 dB noise contour. These areas are located: 1) north of Barksdale AFB along Shed Road, 2) south of Barksdale AFB just west of Mike Wood Community Park, and 3) south of Barksdale AFB along Sligo Road. Mike Wood Community Park is also coded incompatible due to the high noise levels and overlap with the CZ. Additionally, a relatively large PSP land use area just south of I-222 is within the 80 dB noise level and is therefore incompatible. The remainder of incompatible land is classified as MH and HDR (High Density Residential) and conflict because of overlap with noise contours.

Under the future land use plan, the frequency of incompatible land use conditions is reduced, while the prevalence of conditionally compatible land use conditions is increased. This can particularly be seen just north of Barksdale AFB, where much of the area shown as “compatible” under the existing condition appears “conditionally compatible” under the future scenario. Furthermore, two additional land use classifications are introduced in the Future Land Use Plan section of the Bossier City Comprehensive Land Use Development Master Plan: SDA (Sensitive Development Area) and VDA (Village Development Area). Several of the existing incompatible MH areas are shown as VDA in the future land use plan. Because VDA can describe various land uses, including residential and commercial, VDA areas in the future land use plan are considered “conditionally compatible.” Likewise, the SDA classification assumes a land use condition that takes into account “natural or manmade constraints such as floodplains, wetlands and the flight paths associated with Barksdale AFB.” Therefore, SDA land is considered “conditionally compatible” as well.

**Figures 6 and 7** show the results of the compatibility analysis under existing and future land use scenarios.

**Figure 6. Compatibility Assessment, Existing Land Use**

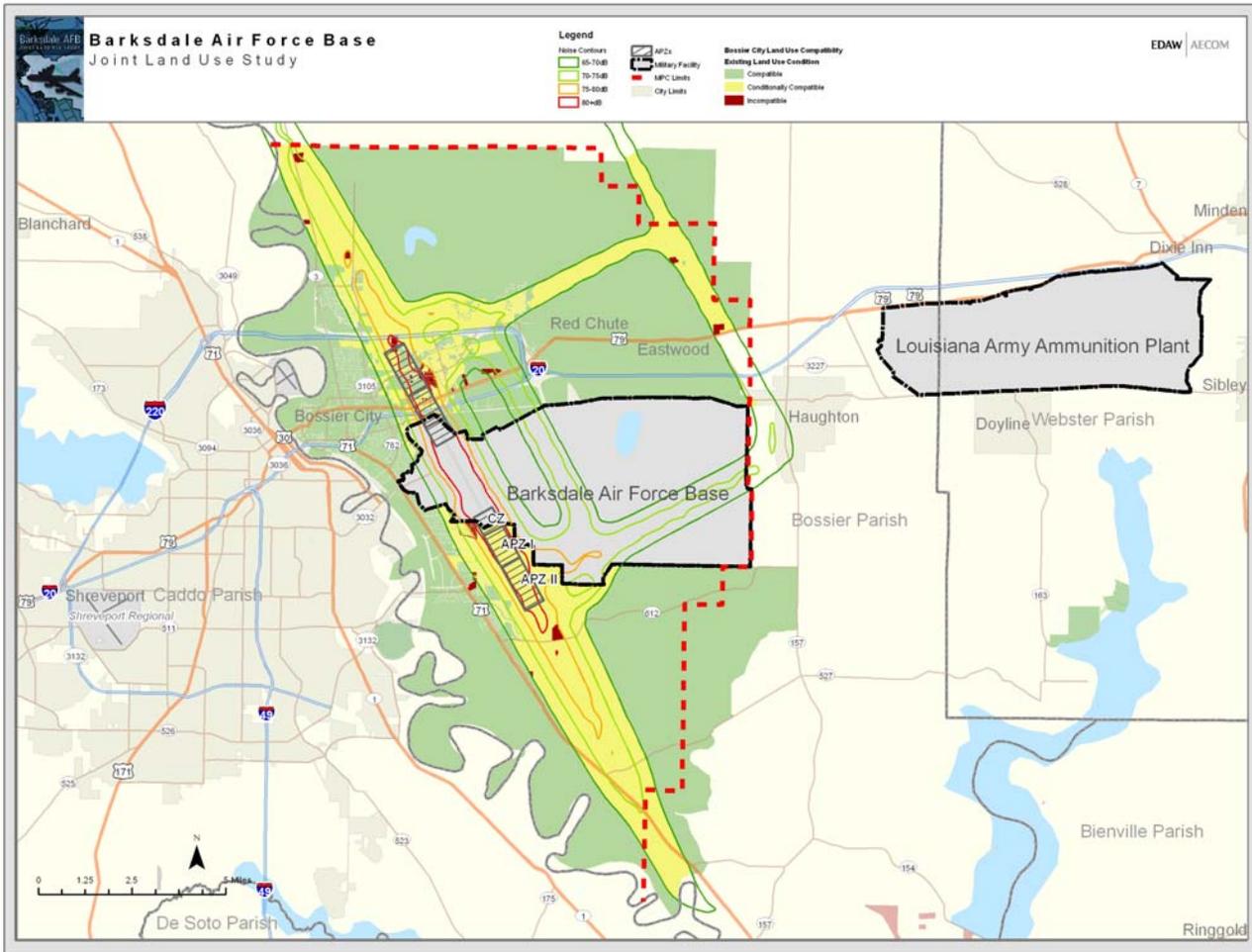
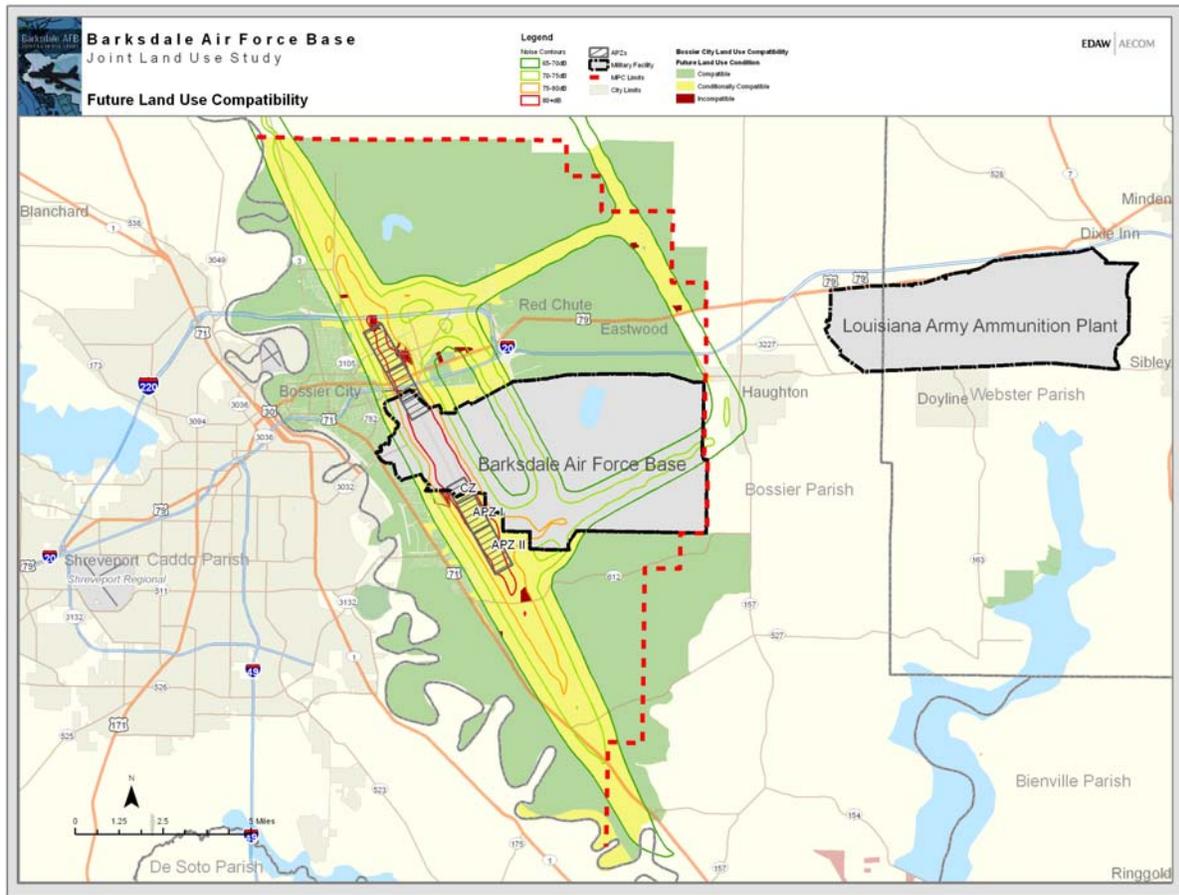


Figure 7. Compatibility Analysis, Future Land Use



## JLUS AREAS OF CONCERN

An analysis of overall land use compatibility indicates that incompatible land uses exist to the north and south of the airbase, as follows:

### North of BAFB:

- Public/semi-public uses found in the northern CZ / 80+ dBA noise zone, and north of I-20 in APZ I / 80+ dBA noise zone
- Residential uses in northern APZ I / 75 dBA noise zone
- Park land uses found in the western portion of Shed Road Community Playfield in northern APZ II / 75 dBA noise zone

### South of BAFB:

- Recreational / public/semi-public use in the southern CZ / 75 dBA noise zone
- Open space / low density use in southern APZs I and II / 80+ dBA noise zone

Industrial and commercial use will likely comprise the majority of new development to the northwest of Barksdale, with only a small amount of residential planned, which mirrors existing land use. However, two Village Development Areas (VDAs) are planned for potentially noise affected areas. Area south of the airbase is within the 100-year floodplain and therefore labeled as SDA. Planners must ensure that development in both the VDAs and SDAs adheres to USAF guidelines and regulations in these sensitive areas.

# 7

**BARKSDALE**  
Air Force Base  
JOINT LAND USE STUDY

## Overview of Compatibility Efforts

## FEDERAL COMPATIBILITY INITIATIVES

The Department of Defense (DoD) has three major programs designed to address potential conflicts between military and civilian land uses. In 1972, the DoD established the Air Installation Compatibility Use Zone (AICUZ) program to identify noise-affected areas around installations and to develop cooperative approaches for reducing adverse impacts. Barksdale Air Force Base is currently in the process of updating their AICUZ. The plan is scheduled for completion in the spring of 2009.

In 1985, the DoD initiated the Joint Land Use Study (JLUS) program to create a community-based framework for land use planning around military installations. The JLUS process, which has produced this document, encourages residents, local decision-makers, and installation representatives to examine current and foreseeable land use conflicts and develop collaborative solutions that balance military and civilian interests.

Once specifically sited in remote areas, military installations are now often in the path of advancing exurban development or have generated external growth through spin-off economic activities. Over the past decade, the DoD has increasingly recognized encroachment as a major constraint in safely and effectively carrying out the training and readiness activities of the military.

In an effort to protect the future use of installations and training land, the FY2003 National Defense Authorization Act authorized the Military Services (Army, Navy, Marine Corps and Air Force) to enter into agreements with non-federal conservation organizations to acquire real estate in the vicinity of military installations such as bases, posts and forts. The statutory authority can be found in the United States Code at 10 U.S.C. 2648a.

The Readiness and Environmental Protection Initiative (REPI) grants the military the ability to enter into agreements with eligible entities, such as local governments, non-governmental organizations, and willing land owners to secure conservation easements on property in the vicinity of, or ecologically related to, a military installation or military airspace.

The agreements enable private organizations to acquire, on a cost-shared basis, development interests in the properties of voluntary sellers. The property owner typically continues to hold the title for the land, but receives monetary compensation and tax breaks to maintain the encumbered property in a highly limited use that preserves habitat and avoids interference with the operational procedures of the nearby installation. REPI is the fastest growing conservation-based program in the federal government today.

The DoD has also formed a partnership with the United States Department of Agriculture (USDA) to conserve sensitive lands near military bases around the nation. Through the USDA, installation ACUB planners can now access the resources of existing easement programs, such as the Farm and Ranch Lands Protection Program, the Wetlands Reserve Program, and the Grassland Reserve Program. The DoD's promotion of conservation and integrated planning enhances the choice of encroachment reduction tools available to today's installations and defense communities and supplements smart growth land use strategies pursued by many local governments.

## STATE COMPATIBILITY INITIATIVES

Complementing federal policy efforts, states have increasingly mandated collaborative planning among military installations and local governments. The State of Louisiana requires that local jurisdictions considering a zoning request or variance affecting property within

three thousand feet of the boundary of a military installation notify the commander of the installation thirty days in advance of the action. The mandated notification enables military representatives to provide feedback to the community on any potentially adverse impacts of the proposed action on nearby military activity.

### LOCAL COMPATIBILITY INITIATIVES

#### *Unified Development Code, Bossier City/Parish, Louisiana (December 2006)*

Two Special Purpose Zoning Districts were created to help control the types of development permitted in and around Barksdale AFB. The Unified Development Code for Bossier City/Parish outlines these districts: A-1 Airbase Buffer Zone – North and A-2 Airbase Buffer Zone – South. **Figure 8** below shows the location of these districts. (Both districts are located towards the main entrance of the base, with A-1 shown in pink and A-2 shown in green.)

#### *Special Purpose Zoning District A-1 – Airbase Buffer Zone – North*

According to the Unified Development Code, the A-1 district was established to limit uses and development within and near the north-northwest approach to Barksdale AFB to those activities that reflect land uses recommended in the most current AICUZ Study. The recommended land uses in the AICUZ Study are uses that are less sensitive to aircraft activities and that will not hamper flight operations.

Uses allowed in the A-1 District include all industrial uses, most utilities / transportation uses (with the exception of ambulance services and telecommunications facilities / towers), and various other agricultural and temporary uses. Notably, the A-1 District does not allow residential uses and only one public / institutional use (cemeteries). A-1 District uses are described further in **Table 7**.

While some uses which are allowed are Permitted by Right, most are Provisional or Conditional uses (i.e. require oversight either by the Executive Director or Planning Commission). In the APZ I and APZ II areas, however, uses are allowed as Provisional and Conditional only. Additionally, there are restrictions on the number of people (employees and customers) allowed to gather in the APZs, not to exceed 50 persons per acre at any time.

The Unified Development Code stipulates that all uses allowed in both the A-1 and A-2 districts should follow the recommendations and guidelines in the most current AICUZ Study. In addition to AICUZ recommendations, the UDC mandates that uses allowed in the A-1 district cannot produce smoke emissions of a nature that could interfere with aircraft or conduct operations that would attract birds. Land uses in this district will not be allowed outdoor neon lighting, flashing lights, or lighting of an intense nature that would be detrimental to the operation of aircraft.

Requirements for development which does take place in the A-1 District include minimum lot areas of 10,000 sq ft. Building heights are restricted to 2.5 stories or 35 feet, whichever is less; this correlates to building height regulations in Commercial District B-3 General Business. Yard requirements for both A-1 and A-2 districts are detailed in **Table 8**.



Approved off-premise outdoor advertising displays, signs, or billboards may be constructed, erected and maintained in the A-1 District. This signage should be set back from the property lines on which they are located. Minimum rear and side setbacks should be 5 feet, and minimum front yard set-back (measured from the sign surface) should be as follows:

- For signs measuring less than 72 sqft: 10 ft setback
- For signs measuring 72-390 sqft: 15 ft setback
- For signs measuring 390-672 sqft: 15 ft setback

The maximum size for off-premise signage oriented toward 1-20 and 1-220 is 672 sqft and 390 sqft for signage on major streets. Height limits for all off-premise signage is 45 feet in the district. In addition to meeting the above standards on signage, any sign constructed in the A-1 district must also meet regulations set forth by the FAA and U.S. Air Force.

In addition, self-service accessory structures / vending machines such as free-standing ATM vestibules, ice making and vending machines are allowed in the district. Chain link fences facing a road are also permitted at a maximum of 8 feet. While barbed wire, razor wire, spiked posts, or similar fencing is permitted, their use is restricted within 30 feet of certain residential districts (R-E, R-LD, R-MD, R-HD).

#### *Special Purpose Zoning District A-2 – Airbase Buffer Zone – South*

The A-2 District was established to restrict development within and near the south-southeast approach to Barksdale AFB, which is an undeveloped area having no existing or planned municipal services. As this area abuts the Air Force Base and is currently largely untouched, few uses are permitted for future development

there: neither residential nor commercial nor industrial uses are allowed, and only cemeteries are allowed as a public / institutional use. Utilities, transport, and temporary uses comprise the bulk of the permitted uses in the A-2 District. **Table 9** describes this in further detail.

For the uses permitted in the district, the minimum lot area required is 1 acre, which correlates to the same standard as the R-A Residence-Agriculture District. Building height restrictions in the A-2 district are 3 stories or 45 feet, whichever is less, which again is the same as R-A Residence-Agriculture District. As with the A-1 District, chain link fences facing a road are permitted at a maximum of 8 feet and while barbed wire, razor wire, spiked posts, or similar fencing are permitted, they are not allowed within 30 feet of certain residential districts (R-E, R-LD, R-MD, R-HD).

#### *Land Use around the AICUZ*

The Unified Development Code also encourages conservation (cluster) subdivision development practices for areas located adjacent to Barksdale AFB AICUZ. The Code additionally states that land outside the AICUZ should be designated for residential development, and lands impacted by the AICUZ should be preserved as open space.

The Unified Development Code also requires the use of shielded, cut-off fixtures for exterior lighting applications, which significantly reduces the risk of light intrusion on nighttime training activities.

Table 7. Special Purpose Zoning District A-1 – Airbase Buffer Zone – North Uses

A-2 District Uses		
	Permitted Uses (Provisional / Conditional Uses unless noted)	Unpermitted Uses
<b>Residential</b>	n/a	All residential
<b>Public and Institutional</b>	Cemeteries	Schools, government facilities, medical centers, parks, and religious institutions
<b>Commercial</b>	n/a	All commercial
<b>Industrial</b>	n/a	All industrial
<b>Utilities and Transportation</b>	Rail lines and utility corridors, major utilities, minor utilities ( <i>Permitted by Right</i> )	Ambulance service, radio frequency transmission facilities, telecommunications facilities/towers, vehicle storage
<b>Other</b>	Agriculture, mining	Kennel/boarding
<b>Temporary Uses</b>	Christmas tree sales, construction site contractor's office ( <i>Permitted by Right</i> ), concrete/asphalt batch plant, produce sales ( <i>Permitted by Right</i> ), public interest and special events	Various

Table 8. Yard Requirements for A-1 and A-2 Districts

Yard Requirements							
	Lot width	Minimum Bldg Setback Required			Maximum Yard Permitted		Minimum Landscape Surface
		Front	Side	Rear	Front	Side	
A-1 District	60 ft	25 ft	10 ft	25 ft	n/a		15% of lot area
A-2 District	60 ft	25 ft	10 ft	25 ft			80% of lot area

Table 9. Special Purpose Zoning District A-2 – Airbase Buffer Zone – South Uses

A-2 District Uses		
	Permitted Uses (Provisional / Conditional Uses unless noted)	Unpermitted Uses
<b>Residential</b>	n/a	All residential
<b>Public and Institutional</b>	Cemeteries	Schools, government facilities, medical centers, parks, and religious institutions
<b>Commercial</b>	n/a	All commercial
<b>Industrial</b>	n/a	All industrial
<b>Utilities and Transportation</b>	Rail lines and utility corridors, major utilities, minor utilities ( <i>Permitted by Right</i> )	Ambulance service, radio frequency transmission facilities, telecommunications facilities/towers, vehicle storage
<b>Other</b>	Agriculture, mining	Kennel/boarding
<b>Temporary Uses</b>	Christmas tree sales, construction site contractor’s office ( <i>Permitted by Right</i> ), concrete/asphalt batch plant, produce sales ( <i>Permitted by Right</i> ), public interest and special events	Various

### *Other Locally Adopted Encroachment Tools*

#### *Bossier Comprehensive Land Use and Development Master Plan (2003)*

The Bossier Comprehensive Plan identifies Barksdale AFB as a major economic and cultural institution in the parish and region and sets out policy recommendations to help maintain and improve the base's important role in the community. **See Figure 9.** In the land use section of the document, several goals are articulated, meant to help secure the base's mission through curtailing encroachment as well as protect areas impacted by its aircraft operations through noise or accident risk.

In sum, these goals highlight that areas which fall within the AICUZ are sensitive environments, which require special attention when developing, such as with wetlands or floodplains. The plan states that sites within the AICUZ should be developed as low-density, and that alternative uses such as agricultural activity, natural areas, and low intensity recreational opportunities should be explored in these areas. The plan also states that the majority of residential development should occur outside the AICUZ. However, the plan particularly highlights an area within the AICUZ north of Barksdale but south of I-20 to include expanded industrial activity, residential development, and limited open space as an exception. The Comprehensive Plan also emphasizes that ongoing communication between Barksdale AFB, Bossier City, and Bossier Parish is essential to ensuring future JLUS and AICUZ studies reflect the needs of all parties.

#### *Town of Benton*

Land use in Benton, located about 10 miles north of Barksdale AFB and within Bossier Parish, is guided by regulations outlined in the Bossier Parish Code of Ordinances, Chapter 126: Zoning, Article III (Bossier Parish 2006). All of the land within five miles of the Benton corporate limits is

overseen by the Benton-Parish Metropolitan Planning Commission, except for the common boundary between the Benton-Parish MPC and Bossier Parish MPC. Land within this area must conform to the zoning regulations as laid out in Article III.

In this document, nine zoning districts are outlined with permitted uses and height restrictions for each. As the 65 dBA noise zones cross into Benton-Parish MPC territory, the town should consider regulations relating to this noise zone when considering zoning amendments or land use plans. Through the use of these regulations, the Town of Benton should be able to apply zoning criteria which allows Barksdale AFB to perform its operations yet protect the land and people within the Benton-Parish MPC jurisdiction.

#### *Caddo Parish*

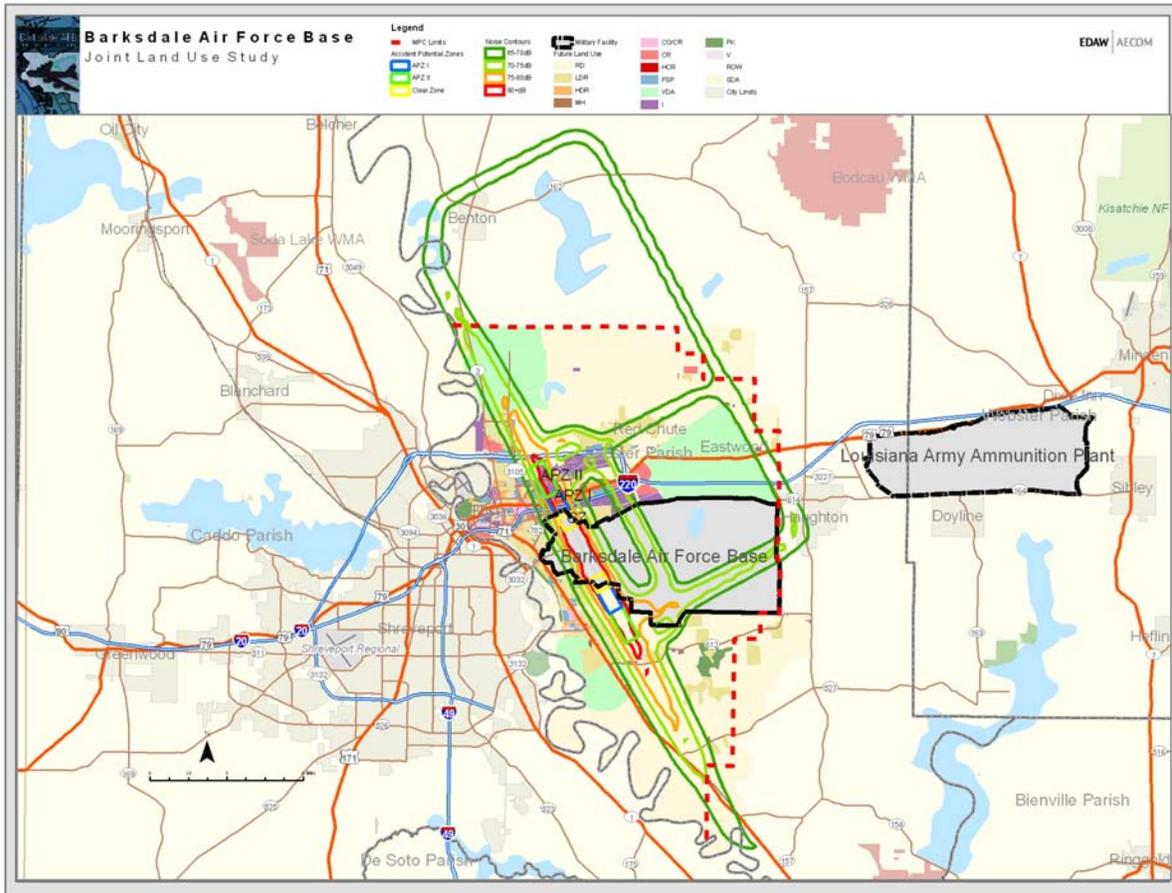
The city of Shreveport, situated to the west of Barksdale, is located in Caddo Parish. Land use in Caddo Parish is governed by the Caddo Parish Code of Ordinances, Chapter 51: Zoning (Caddo Parish 2007). Zoning districts are established in the Code and apply to unincorporated areas of the parish within five miles beyond the City of Shreveport.

Although 2007 noise zones encroach into Caddo Parish, they are east of Shreveport, where land is unzoned. Because Barksdale AFB noise zones do not affect Caddo Parish zoning districts, zoning for the parish is not considered further as part of this study.

#### *Town of Haughton*

The 2007 noise zones do not impact the Town of Haughton, located east of the Air Force Base.

Figure 9. Future Land Use



# 8

## Compatibility Tools

BARKSDALE  
Air Force Base  
JOINT LAND USE STUDY



## OVERVIEW

The JLUS Update document is intended as a series of tools that the Air Force and the local governments can choose to adopt during the implementation phase of the JLUS process. All of the entities participating in the JLUS, including the Air Force and cities and parishes, retain the responsibility of selecting those compatibility tools that best reflect the specific issues, concerns, and needs of each stakeholder.

The tools identified below are the result of a thorough, good-faith effort on the part of the Project Management Team (PMT) and the Executive Oversight Committee (EOC) to assess the existing and foreseeable effects of Barksdale AFB on adjacent land and to develop a set of options that promote collaborative regional decision-making and balance community and military interests while meeting the following goals:

- Protect the military mission
- Protect the health, safety and welfare of the military and civilian communities
- Sustain economic development and protect property rights
- Protect the environment
- Secure proper funding and administrative resources for implementation
- Maintain political feasibility

This section organizes findings into three parts:

1. An overview of available encroachment reduction strategies;
2. A description of the JLUS planning areas and recommended land use policies and

communication strategies within each area;

3. A prioritized list of feasible encroachment reduction measures.

The supporting Appendices include land use compatibility guidelines, specific examples of recommended ordinances and agreements.

## AVAILABLE ENCROACHMENT REDUCTION STRATEGIES

The PMT evaluated a wide range of tools based on criteria such as: feasibility; likely effectiveness; the availability of resources for implementation; the ability to protect the military mission and base sustainability; the ability to protect the economic health of the region and individual property rights; and the overall ability to protect health, safety, welfare, and quality of life.

The tools are also intended to address a variety of possible land use and operational issues, including physical adjacency to Barksdale AFB, conservation or natural resource value, noise, air safety (both for people on the ground and for aviators), and light pollution.

The descriptions below include strategies that have not yet been adopted by the cities and parishes around the base. In other cases, the participating entities have partially adopted available strategies and the prioritized recommendations focus on enhancing these current measures. As development conditions and mission impacts evolve, the JLUS encourages local officials and planners to revisit this list of strategies to further refine and strengthen their set of encroachment reduction tools.

### *Planning Documents and Policies*

As part of this option, local governments include specific language about JLUS coordination as part of any Comprehensive Plan update or small area plans such as corridor studies. These plans establish a firm legal basis for the implementation of compatibility actions. The plan can emphasize the relationship between the community and the military, the desire to promote cooperative land use planning such as agricultural conservation and environmental protection, and clear guidelines about appropriate future land use in areas vulnerable to encroachment.

### *Infrastructure*

As part of this strategy, local governments would consider the impacts of both public and private infrastructure installation/extension (e.g. water and sewer facilities) into noise and safety affected areas around Barksdale AFB. New infrastructure can induce or support incompatible growth patterns, such as denser residential development, especially if compatible zoning and land use guidelines are not in place.

A method for ensuring the consistency of infrastructure planning with desired goals of the community and the prevention of future incompatible growth is to link the Comprehensive Plan with the Capital Improvement Plan, the region's Transportation Improvement Plan, and other infrastructure plans.

### *Consultation*

Under this approach, local governments would share information on community development proposals with Barksdale AFB. Military representatives would then advise the local government on the potential impacts of the proposed development on installation training and readiness activities.

### *Memorandum of Understanding*

The Memorandum of Understanding (MOU) is a "good faith" document that lays out procedures for communication among affected parties and formalizes collaboration among multiple stakeholders. All participating local governments and Barksdale AFB would sign a general MOU.

### *Communications/Information*

These tools establish clear mechanisms for information exchange among residents, local governments, and the military. Under this communications option, participating jurisdictions would develop appropriate mechanisms to ensure that residents, developers, businesses, and local decision-makers have adequate information about Air Force operations, possible impacts on lands surrounding the base, procedures to submit comments, and any additional local measures to promote land use compatibility around the airfield. Examples of communication tools could include:

- Joint creation and distribution with the military of materials explaining base activities and compatibility issues. Governments should use all available media, including posters and web sites to convey the information;
- Post maps on local and regional government websites to assist in identifying properties within designated noise, air safety and planning buffers;
- Create a web site where people can search individual parcels for information on noise or air safety issues/conditions and any easements or special development requirements attached to the property.

### *Real Estate Disclosure*

Disclosure requires the release of information on possible impacts (dust, smoke, noise/vibration, air safety zones) to prospective buyers or renters as part of real estate transactions for properties close to Barksdale AFB. Having a real estate disclosure ordinance/resolution in place educates individuals about the potential hazards and nuisances of nearby aircraft operations and it allows them to make well-informed decisions about property investment around military uses. Typically, the strongest disclosures take place at the earliest possible point of interaction between the realtor/real estate agent and the interested buyer/renter, such as the initial advertisement or listing of the affected property.

To ensure the full and effective release of information, jurisdictions requiring disclosure would work with the local real estate community to develop standard language on noise and other possible operational impacts. Local governments would implement this tool by adopting a local real estate disclosure ordinance and seeking the participation of real estate professionals.

Along with adopting a local ordinance to require disclosures, communities can also play a facilitator role by supporting voluntary disclosure in the real estate sector through the use of maps and searchable property databases that identify affected properties, which are described in the Communications/ Information recommendation above.

### *Avigation and Noise Easements*

An easement is the right granted to a third party to use private real property in a specified manner. An easement may be given, for example, for overhead wires, underground gas lines or roads. A noise or avigation easement is a property right acquired from a land owner that grants the right of military training impacts, including the right to:

- cause noise, vibration, dust, etc.
- ensure unobstructed airspace over the property above a specified height
- restrict or prohibit certain lights, electromagnetic signals, or land uses that could interfere with communications technology and safe aircraft operation.

The easement runs in perpetuity with the deed to the property and protects against lawsuits for military related impacts. Local governments, for example, may establish the granting of a noise easement by the developer as a condition for the approval of a proposed new home subdivision in areas subject to military training impacts.

### *Sound Attenuation*

Attenuation refers to design and construction practices intended to lower the amount of noise that penetrates the windows, doors, and walls of a building. Local governments can require attenuation as part of building codes for new residential and other noise sensitive construction in certain noise affected areas.

### *Cluster Developments*

Cluster subdivisions are intended to protect landscape features, such as wetlands and wildlife habitat. Local governments would implement a special provision for cluster zoning that recognizes those portions of a parcel within a noise/safety zone as prime candidates for the application of clustering. The site design would set aside areas subject to noise and safety constraints and allow denser, but compatible, development in areas outside of noise and hazard zones. This approach is density-neutral, so it allows the developer to build an equal number of housing units as would otherwise be permitted under conventional zoning.

### *Height Restrictions*

In addition to density and site location, local governments may use zoning controls to regulate the impacts of tall structures such as cell towers on navigable airspace in flight corridors used by the military. Regulation would ensure that such structures are properly sited so as not to interfere with safe aircraft operation.

### *Outdoor Lighting Standards*

Outdoor lighting systems, especially lighting associated with billboards, gas stations, major roadways, athletic fields, and large commercial or industrial uses often allow significant light to travel upward into an otherwise darkened sky. The resulting “light pollution” can obscure pilot vision or interfere with the use of night vision training devices. A lighting ordinance that requires fully shielded, cut-off exterior lighting applications can reduce the excess illumination and thereby improve pilot navigation.

### *Land Use Regulations*

These tools control the densities and placement of land use activities within established noise and safety zones around the base to protect the health, safety, and welfare of the public. These options are intended to accommodate future growth while minimizing the concentrations of people and uses that may trigger conflicts with noise and operations. Since local jurisdictions exercise land use control through zoning, any of the regulatory actions described would be implemented through the established local government legislative process.

## **PLANNING AREAS**

Members of the JLUS PMT established four planning areas in which specific recommendations related to land use, communication and coordination are identified. **See Figure 10.** Each of the planning areas is based on proximity to training activities, noise

impacts, safety risks, or other operational impacts:

- Clear Zones and Accident Potential Zones;
- Noise Contours;
- Base perimeter buffer (200 feet); and
- North and south approach and departure zones

### *Clear Zones*

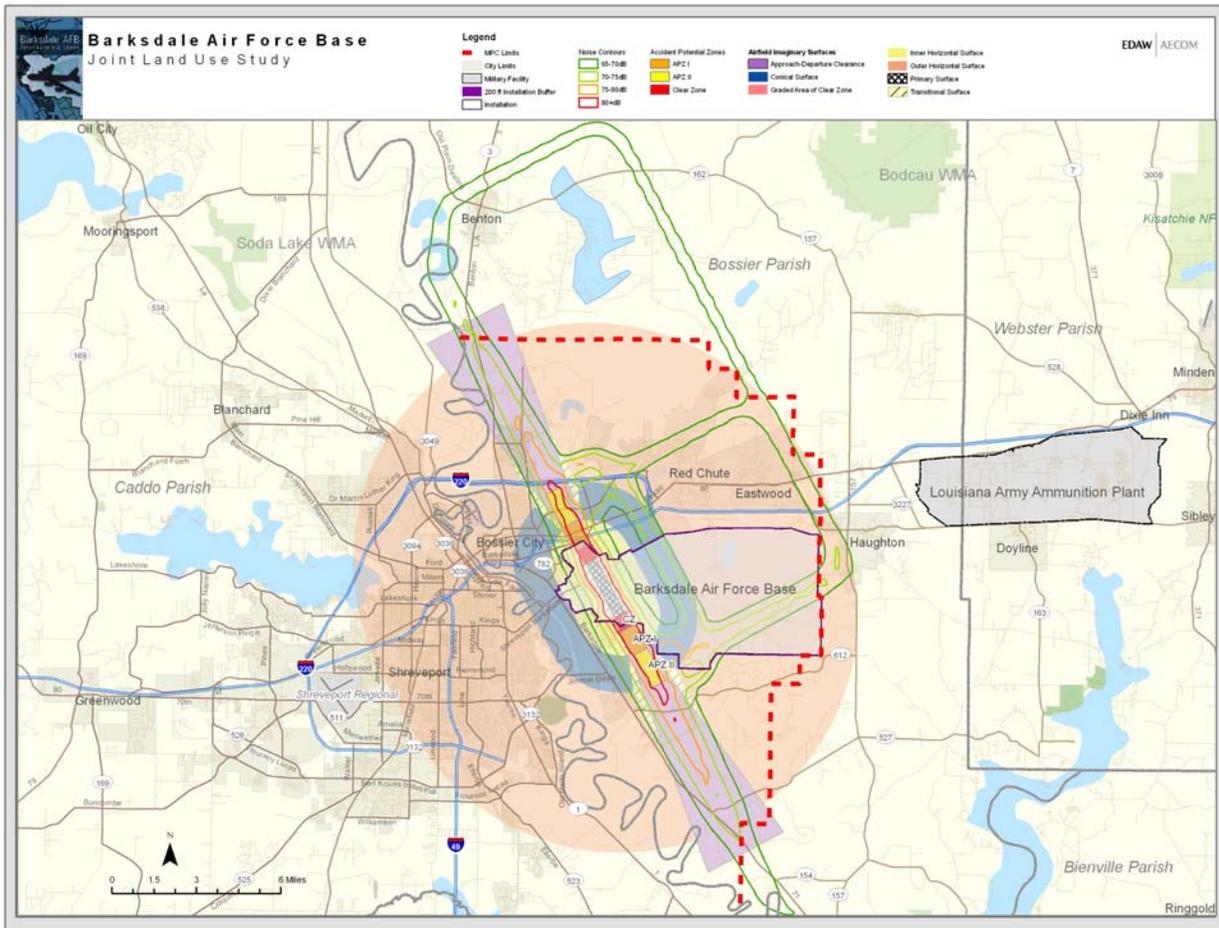
The Clear Zone is the most stringently regulated of all air safety zones and should contain no uses other than roads, underground utilities, agriculture, livestock grazing, and permanent passive open space.

### *Accident Potential Zone 1*

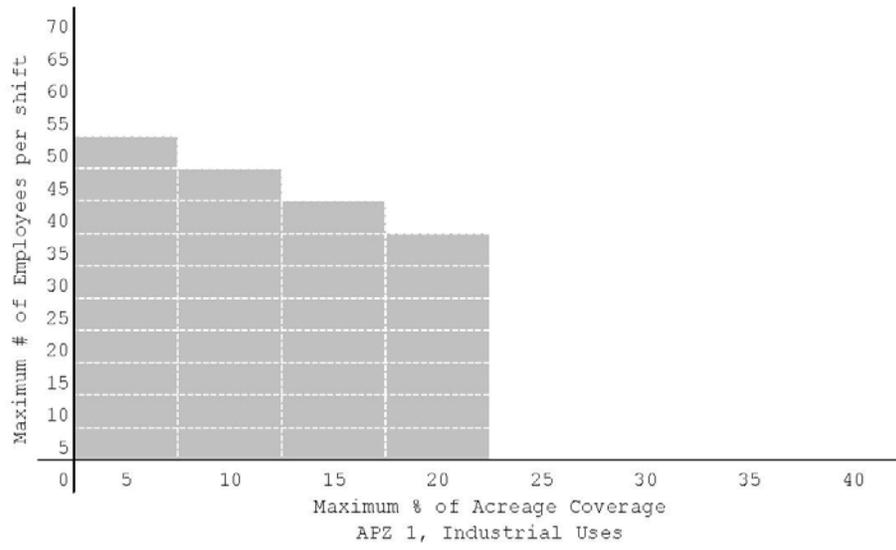
The Unified Development Code for Bossier City/Parish strongly regulates land uses in the APZ 1, specially prohibiting potentially incompatible development, such as housing, and limiting rezoning activity. The JLUS recommends adding clarity to current development standards with the following land use intensities recommended for APZ I:

- The maximum gross acreage coverage for all industrial uses should be 20% and have no more than 50 employees per shift. A sliding scale of employment density per shift and maximum acreage cover should apply. (**See Figure 11**). A Planned Development approach is encouraged to maximize flexibility in layout and guide buildings away from the centerline of the runway.
- The maximum building footprint for all commercial uses including office, business, retail and wholesale trade shall be 8,000 square feet. Strip commercial centers should be explicitly prohibited.

Figure 10. JLUS Planning Areas



**Figure 11. Sliding Scale of Industrial Acreage Coverage and Employees in APZ 1**



The Metropolitan Planning Commission (MPC) should also provide any variance applications, major changes to the future land use map, or corridor or infrastructure plans affecting land inside APZ I to Barksdale AFB representatives for a compatibility review.

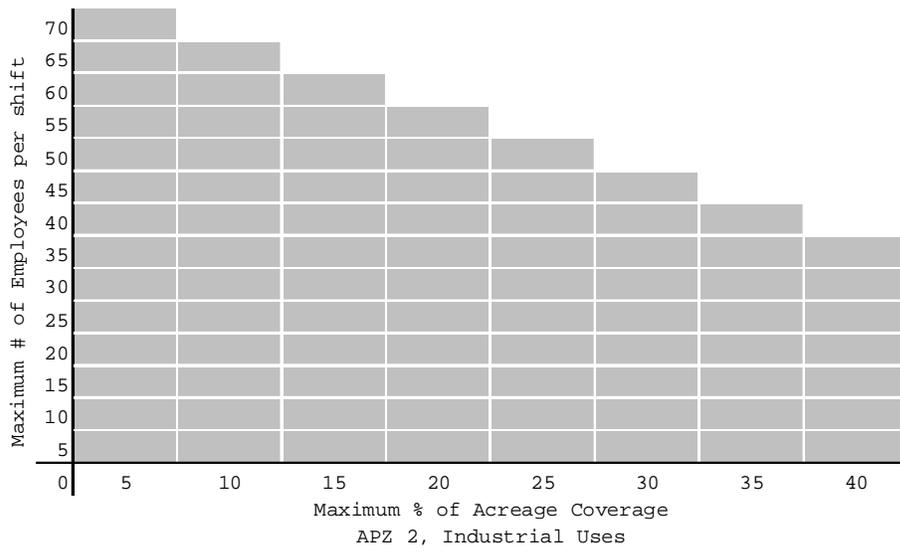
#### *Accident Potential Zone 2*

The JLUS recommends adding clarity to current development standards with the following land use intensities recommended for APZ 2:

- The maximum gross acreage coverage for all industrial uses should be 40% and have no more than 70 employees per shift. A sliding scale of employment density per shift and maximum acreage cover should apply. (See Figure 12). A Planned Development approach is encouraged to maximize flexibility in layout and guide buildings away from the centerline of the runway.
- The maximum building footprint for all commercial uses including office, business, retail and wholesale trade shall be 15,000 square feet. Strip commercial centers should be explicitly prohibited.

Development applications, major subdivision plats, major changes to the future land use map, and corridor and infrastructure plans affecting land in APZ II should also be subject to review by Barksdale AFB representatives.

**Figure 12. Sliding Scale of Industrial Acreage Coverage and Employees in APZ 2**



### Noise Contours

This area includes lands within the Barksdale AFB 65 Ldn or higher noise contours. Stakeholders identified the lack of noise mitigation as one of the major gaps in current encroachment reduction policy. To protect against nuisance and diminished quality of life resulting from high average noise exposure, the cities and parishes should adopt the following mitigation measures within the noise contours as follows:

- Require noise easements to be granted to the local jurisdiction on all major subdivisions and rezoning requests. Require notes on all subsequent subdivision plats that property is near a military base and airfield and therefore subject to operational noise impacts.
- Prohibit outdoor amphitheaters and mobile home parks in all noise contours.
- Require noise attenuation standards to achieve indoor to outdoor noise level reduction within portions of industrial structures in noise contours 70 and above. The portion of industrial structures where noise attenuation is applicable includes offices and reception areas. When property is located within an APZ and a noise contour, maximum acreage coverage and/or employment densities should be met in addition to noise attenuation measures.
- Require noise attenuation standards to achieve NRL of at least 25 dB on all new commercial construction including office, business, retail and wholesale trade within noise contours 70-75. When property is located within an APZ and a noise contour, maximum acreage coverage and/or employment densities should be met in addition to noise attenuation measures.
- When hospitals and clinics, nursing homes, child care centers, schools, movie theaters, auditoriums, churches and places of worship are not prohibited within the APZ, noise attenuation standards should be used to achieve a noise reduction level (NRL) of 25 dB within Noise Contour 65-70 and 30 dB within Noise Contour 70-75. These uses should not be permitted in noise contours greater than 75.
- Require noise attenuation standards to achieve NRL of at least 30 dB within the noise contours 70-75 and 25 dB within noise contours 65-70 on all new residential construction, including hotels.
- Require real estate disclosure for residential real estate transactions inside all noise contours.
- In addition to requiring noise attenuation, consider exploring the stricter measure of limiting new residential development to a maximum density of two dwelling unit per acre within noise contour 65-70; one dwelling unit per acre within noise contour 70-75; and prohibiting residential uses in noise zones in excess of 75 dB.

### Base Perimeter Buffer

This area includes all lands within a 200 foot buffer around the perimeter of Barksdale AFB. The purpose of the buffer is to reinforce the Anti-Terrorism/Force Protection goal of a physically secure and visually permeable perimeter around the installation.

Land use recommendations for the buffer include:

- No structures higher than 3 stories, or 35 feet above ground level;

- No mobile home parks, multifamily residential, group homes or hotels; and
- A maximum density of two single-family dwelling units per acre.

#### *Approach and Departure Zones*

Approach and departure zones around the base are currently subject to height limitations to ensure safe, navigable airspace for operating aircraft.

The cities and parishes should also reduce the risk of an aircraft accident caused by a bird strike by:

- Prohibiting certain land uses that attract a significant bird or water fowl population, including: solid waste landfills, recycling centers, and large man-made bodies of open water that are two surface acres or larger.

#### **PRIORITIZED LIST OF ENCROACHMENT REDUCTION MEASURES**

As noted earlier, Bossier City/Parish has adopted some of the best compatibility practices available to defense communities throughout the country. A review of current measures, however, indicates critical gaps in the region's encroachment reduction approach, both in the form of geographic areas that remain unregulated and or in existing policies that require stronger provisions.

The following is a list of feasible, near-term measures developed on the basis of the planning team's compatibility findings and feedback from area stakeholders and officials. While the communities and the Air Force should continue to broaden and refine their array of compatibility planning tools, these high priority actions seek to address the most pressing land use issues around Barksdale AFB.

#### *1. Establish a new Zoning Overlay District in the Unified Development Code*

The most effective regulatory vehicle for reducing the risk of encroachment around Barksdale AFB is to create a Military Influence Zoning Overlay District that includes the following sub-areas as described earlier:

- APZs
- Noise contours (65 dB+)
- Approach and departure zones
- Installation perimeter buffer

The intent of the overlay is to clearly articulate prohibited uses and establish standards for the scale and intensity of permissible uses, such as dwelling units per acre for residential and building square footage and employee concentration for non-residential uses. The overlay should also combine intensity controls with additional safety and communication measures, such as real estate disclosure and building sound attenuation.

The actions below describe specific elements that can be combined in an overlay or adopted separately.

#### *2. Update The Unified Development Code to Include Recommended Land Use Intensities in APZ I and APZ II*

Bossier City/Parish should strengthen existing land use regulations in the Special Purpose Zoning Districts by incorporating the specific development intensities described in the previous section. The adoption of clear and consistent criteria to assess compatibility will make for sounder and more predictable land use decision-making in the Accident Potential Zones.

### 3. *Adopt Noise Attenuations Standards in Building Codes*

While comprehensive planning and zoning can limit the number of people living in high noise areas, , another technique to reduce the effects of aircraft noise on people is to establish sound attenuation requirements for new construction. Typically the sound attenuation requirements are incorporated into the building code of the affected jurisdiction(s).

Combined with zoning, noise insulation standards offer a means of achieving land use compatibility in areas exposed to high levels of noise without causing any undue disruption to existing land use and future plans.

Bossier City/Parish and the Benton-Parish Metropolitan Planning Commission should require noise attenuation practices for residential and other noise-sensitive construction (schools, hospitals, child care facilities) in noise zones in excess of 65 dB.

Tables 10 through 12 provide a summary of general construction requirements to achieve specific noise level reductions and the Sound Transmission Class (STC) of various types of building construction elements.

These tables were reproduced from a study prepared by Wyle Research and Consulting for Wright-Patterson Air Force Base. It should be noted that a structure can be designed to achieve the maximum acceptable interior noise level from exterior sources in many ways. Construction methods should be chosen by the builder, subject to other building and safety regulations.

**Table 10. General Construction Requirements to Achieve 25 dB Noise Level Reduction**

Element	Location	STC	Requirement
Exterior walls	All perimeter walls	39	2 x 4 stud wall required with 5/8-inch exterior sheathing and 5/8-inch gypsumboard or plaster interior
Exterior walls	All perimeter walls		Insulation grade R-9 required
Exterior walls	All perimeter walls		No thru-wall HVAC
Windows	All habitable rooms	30	Stucco, brick, or siding homes - STC 30
Windows	All bedrooms		Window area max. 20% of floor area
Exterior doors	All doors to house	28	1-3/4-inch prime solid-core wood or insulated metal
Exterior doors	All doors to house		No thru-door openings
Roof construction	Entire house	39	Rafter depth 6 inches or more
Attic and kneewall	Vented attic and pitched roof		Insulation grade R-19 required
Ceiling	All habitable rooms	28	1/2-inch-thick gypsumboard or plaster
Ceiling under roof	All habitable rooms		Skylights STC-28
Floor	Over crawl space		Max vent area 2% of floor area
Ventilation	Entire house		Fresh air requirements met with windows and doors closed
Ventilation	Kitchen		Baffle vents to exterior
Ventilation	Attic		Code Minimum Number Gravity Vents

**Table 11. General Construction Requirements to Achieve 30 dB Noise Level Reduction**

Element	Location	STC	Requirement
Exterior walls	All perimeter walls	44	2 x 4 stud wall required with 5/8-inch exterior sheathing and 5/8-inch gypsumboard or plaster interior
Exterior walls	All perimeter walls		Interior walls resiliently mounted
Exterior walls	All perimeter walls		Insulation grade R-11 required
Exterior walls	All perimeter walls		No thru-wall HVAC
Windows	All habitable rooms	36/40	Stucco or brick homes - STC 36; siding homes - STC 40
Windows	All bedrooms		Window area max. 20% of floor area
Exterior doors	All doors to house	35	1-3/4-inch prime and storm door
Exterior doors	All doors to house		No thru-door openings
Roof construction	Entire house	44	Rafter depth 6 inches or more
Attic and kneewall	Vented attic and pitched roof		Insulation grade R-19 required
Ceiling	Habitable rooms under pitched roof with attic	44	5/8-inch-thick gypsumboard or plaster
Ceiling under roof	All habitable rooms		No skylights
Floor	Lowest occupied rooms	49	Slab or enclosed basement/crawlspace
Floor	Over crawl space		Insulation grade R-9 required
Ventilation	Entire house		Fresh air requirements met with windows and doors closed
Ventilation	Kitchen		Baffle vents to exterior
Ventilation	Attic		No gravity vents
Miscellaneous	All habitable rooms		No vented fireplaces

**Table 12. General Construction Requirements to Achieve 35 dB Noise Level Reduction**

Element	Location	STC	Requirement
Exterior walls	All perimeter walls	49	2 x 4 staggered stud wall required with 5/8-inch exterior sheathing and sealed top and bottom and 1-inch gypsumboard or plaster interior
Exterior walls	All perimeter walls		Interior wall not rigidly connected to exterior wall studs
Exterior walls	All perimeter walls		Insulation grade R-11 required
Exterior walls	All perimeter walls		No thru-wall HVAC
Windows	All habitable rooms	40/24	Brick homes - STC 40; stucco or siding homes - STC 42
Windows	All bedrooms		Window area max. 20% of floor area
Exterior doors	All doors to house	38	1-3/4-inch prime and storm door
Exterior doors	All doors to house		No thru-door openings
Roof construction	Entire house	49	Rafter depth 6 inches or more
Attic and kneewall	Vented attic		Insulation grade R-30 required
Ceiling	Habitable rooms under cathedral ceiling, flat or pitched roof without attic		Resilient ceiling attachment
Ceiling	All habitable rooms		1-inch-thick gypsumboard or plaster
Ceiling under roof	All habitable rooms		No skylights
Floor	Lowest occupied rooms	49	Slab or enclosed basement/crawlspace
Floor	Over crawl space		Insulation grade R-11 required
Ventilation	Entire house		Fresh air requirements met with windows and doors closed
Ventilation	Kitchen		No vents direct to exterior
Ventilation	Attic		No gravity vents
Miscellaneous	All habitable rooms		No vented fireplaces

### *Cost Implications for New Construction*

The cost to build a new home with additional sound attenuation is usually slightly higher than the cost to build a standard home. Variables that affect the cost of building a sound attenuated home versus a standard home include home design, availability and cost of construction materials, climate, desired exterior to interior noise level reduction (NLR), and local construction techniques. While some design considerations (e.g., locating bedrooms away from potential noise sources) have no cost associated with them other design considerations (e.g., using double or triple pane windows) have obvious cost implications. While costs will vary on a case by case basis it is estimated that the cost of constructing a sound attenuated home would be between \$5,000 and \$10,000 more than constructing a standard home assuming a desired NLR of 25 decibels.

#### *4. Require Avigation and Noise Easements on Major Subdivisions and/or Rezonings*

Expansion of the Barksdale AFB mission will result in additional economic activity and therefore regional growth. The continued viability of the base is dependent on compatible development and cooperative nearby landowners. Avigation and noise easements are sound legal devices created to protect against lawsuits.

Local jurisdictions increasingly rely on avigation and noise easements to protect airfields as well as to inform property owners of potential operational impacts. Sample easements are provided in the Appendix.

#### *5. Adopt Real-Estate Disclosure Policy for Properties in the APZs and Noise Contours*

Notifying potential renters and buyers of a property's proximity to Barksdale AFB at the

earliest possible point in the transaction will protect military aircraft operations as the residential population expands. Having a real estate disclosure ordinance/resolution in place educates individuals about the potential hazards and nuisances of nearby aircraft operations and encourages sound decisions about property investment around military uses.

Local governments should implement this tool by adopting a local real estate disclosure ordinance. To ensure the full and effective release of information, jurisdictions requiring disclosure should work with the local real estate community to develop standard language on noise and other possible operational impacts. A sample disclosure is included in the Appendix.

#### *6. Expand state mandated notification to include APZs I and II*

Louisiana state law requires that local governments consult with the military regarding rezonings and variances on land within 3,000 feet of the military installation. This procedure is currently effectively implemented in Bossier City.

The JLUS, however, recommends that the Metropolitan Planning Commission expand notification to include rezonings, variances, major development proposals and significant land use and infrastructure policy changes on all property within the APZ I and APZ II. Enhanced notification will help ensure that stakeholders, developers, and private residents are fully aware of air safety risks associated with the designated Accident Potential Zones.

#### *7. Sign Memoranda of Understanding with Regional Stakeholders*

Memoranda of understanding (MOUs) lay out procedures for sharing information and promoting land use compatibility around the base. These agreements, though not binding, are

essential for maintaining continuity in regional actions to reduce encroachment.

The JLUS recommends that the local governments and Air Force develop MOUs that address items such as:

- clearly designated points of contact;
- the sharing of community and base plans;
- notification of meetings and procedures for joint consultation on development applications;
- conservation and sustainability partnerships;
- public infrastructure improvements;

#### 8. *Strengthen Outdoor Lighting Measures to Regulated On-Premise Signs*

The MPC currently requires shielded, cut-off lighting fixtures that should significantly reduce the risk of light intrusion and glare that can interfere with aviator vision.

To enhance existing regulations, the JLUS recommends that the MPC explore controls on the use of on-premises signs that generate excess light and glare, particularly Light Emitting Diode or LED signs.

Effective controls could include a prohibition on LED signs within the APZs and approach/departure zones. As an alternative, the Unified Development Code could be modified to regulate the size and intensity of LED signs.

Communities are increasingly modifying their sign ordinances to reduce the visual distraction associated with LED signs. The MPC should consult with the Air Force to determine the level of brightness and the area of lighted sign face that could pose a threat to aviator vision.

Basic controls on LED signs adopted in other communities include:

- the use of static messages only and restrictions on movement or varying light intensity during the display of any single message
- an established maximum brightness level, such as no more than 0.20 foot candles above ambient light levels
- an established maximum sign face, such as 300 square feet

#### 9. *Adopt Land Use Policies to Reduce Bird Air Strike Hazards*

Collisions between birds and airborne aircraft pose a common threat to aviation safety and have resulted in fatal accidents. To reduce the risk of bird air strike hazard (BASH), the JLUS recommends that the Unified Development Code specifically prohibit land uses that could attract major populations of birds and water fowl in the approach and departure zones around Barksdale AFB. Restricted land uses would include:

- solid waste landfills
- recycling centers
- open bodies of water that are 2 surface acres or larger

#### 10. *Enhance Communication*

Surrounding communities and stakeholders, including the MPC have a strong collaborative partnership with the Air Force. The JLUS recommends building on this relationship by enhancing communication in several critical areas, including:

- Encouraging a base planner to attend Metropolitan Planning Commission meetings and to provide firmer comment on the possible impacts of

surrounding development during meetings and as part of the consultation process; many communities receive written feedback from military representatives on potential compatibility issues

In addition to strengthening communication between the military and the city/parish, the local governments and Air Force must continue to educate the public about the military mission and the safety and economic impacts of incompatible development in proximity to the base and flight corridors.

Recommended strategies to increase community outreach should include:

- Use of posters, brochures, and city and parish web sites to convey JLUS information; maps should be readily accessible from highly visible links
- Posting of maps on websites of properties within the designated noise, safety and planning buffers and work to develop a searchable database of properties
- As feasible, publishing planned training schedules and operational guidelines for night training to reduce annoyance associated with unexpected noise events

*11. Continue with the existing JLUS Committees and hold bi-annual sessions to share information and coordinate major actions*

The JLUS is as much about the process as it is the final document. It creates a community-driven dialogue around the complex issues of land use, economic and population growth, infrastructure delivery, environmental sustainability, and mission change.

The stakeholders of the region have a history of collaboration dating back more than a decade to the 1995 Joint Land Use Study effort. The MPC and Air Force, as well as stakeholders from other participating communities in this current effort should establish the organizational framework to continue discussion of critical growth and development issues, particularly as Barksdale AFB's mission evolves in the years ahead.

The JLUS recommends that key members of the Executive Oversight Committee and Project Management Team form an ongoing JLUS Partnership and hold bi-annual sessions to share information and coordinate major actions.

*12. Conduct Special Area Planning*

As noted in the compatibility analysis section, growth north of Barksdale AFB, particularly along the Airline and Benton corridor poses the most significant future risk of encroachment into noise contours and flight paths.

Active planning is essential to counteract the common market tendency to evenly spread low density commercial in a linear pattern along road frontage. Corridor management plans can assist in controlling the vehicular, aesthetic, and development impacts of strip commercial activity.

Adherence to quality growth principles could, for example, reinforce green space separators along corridors and guide new commercial uses toward designated activity nodes at major intersections contiguous with developed areas and existing infrastructure. This nodal, rather than linear, form of growth could reduce commercial activity and housing under the flight paths, while still accommodating development.

In addition to corridor planning, the MPC should conduct small area plans for proposed Village Development Areas (VDA) north of the base and near noise contours.

The VDA plans should explore residential and commercial intensities appropriate for areas with noise exposure and lay out overall systems of green space and circulation to place housing and sensitive uses further away from areas of higher noise exposure.

### 13. Pursue Conservation Strategies

The conversion of rural lands to housing and other uses is one of the growth trends that puts America's military installations at risk. As market conditions change, property owners often seek economically viable alternative uses for their large land holdings.

The Readiness and Environmental Protection Initiative (REPI) grants the military the ability to enter into agreements with eligible entities, such as local governments, non-governmental organizations, and willing land owners to secure conservation easements on property in the vicinity of, or ecologically related to, a military installation or military airspace.

The agreements enable private organizations to acquire, on a cost-shared basis, development interests in the properties of voluntary sellers. The property owner typically continues to hold the title for the land, but receives monetary compensation and tax breaks to maintain the encumbered property in a highly limited use that preserves habitat and avoids interference with the operational procedures of the nearby installation. REPI is the fastest growing conservation-based program in the federal government today.

The DoD has also formed a partnership with the United States Department of Agriculture (USDA) to conserve sensitive lands near military bases around the nation.

The JLUS recommends that planners at Barksdale AFB begin the process of inventorying sensitive lands around the base and identifying potential areas of encroachment in support of an application for REPI funds. The Air Force should also identify potential funding partners, such as State of Louisiana agencies, land trusts or national conservation groups such as the Nature Conservancy.

### 14. Coordinate Planning Documents

As part of this option, cities/parishes would include specific language on JLUS coordination as part of Comprehensive Plan development or update. The Comprehensive Plan establishes a firm legal basis for the implementation of compatibility actions and sets the policy framework to regulate development through local land use regulations.

The plan can emphasize the relationship between the community and the military, the desire to promote cooperative land use planning and complementary land use goals, such as agricultural conservation and environmental protection, and clear guidelines about appropriate future land use in areas vulnerable to encroachment.

An increasingly popular strategy is for local governments to develop a Military Influence Planning District (MIPD) Element within the Comprehensive Plan. This element is devoted exclusively to the collaborative relationship between the local government and military installation and integrates all policies that may promote compatible development, including communication procedures, conservation and land use policy, and transportation and infrastructure policy.

The provision of infrastructure is typically based on public need and necessity and reflects the Comprehensive Plan of the city or parish. As part of this strategy, the MPC would consider the

impacts of both public and private infrastructure installation/extension (e.g. water and sewer facilities) into noise and safety affected areas around Barksdale AFB. New infrastructure can induce or support incompatible growth patterns, such as denser residential development, especially if compatible zoning and land use guidelines are not in place.

Since capital investment decisions in turn influence private market location decisions, it is critical that local governments link their Work Programs and Capital Improvement Plans to compatibility goals. Installing infrastructure such as water, sewer and roads in planned growth areas and away from areas of operational impact clearly reduces the conflicts associated with denser development near the installation. Regional Transportation Improvement Plans (TIP) should also reflect the need to limit road capacity projects in areas near the installation where development can interfere with the military mission. Community officials should also consult with military installation planners as part of the local planning and facilities programming decisions.

#### *15. Require Coordination to Reduce the Risk of Radio Frequency Interference*

Radio Frequency Interference (RFI) occurs when radio, radar and other equipment use the same frequencies at the same time and in the same geographic area. Various civilian transmitters can degrade the performance of the electronic systems and communications equipment of military aircraft. These sources may include two-way radios, emergency and public safety communications systems, power lines, transformers, and medical equipment.

Air Force representatives have indicated that the spectrum is very saturated in the Bossier City/Shreveport region, thus raising the risk of interference.

To share the electromagnetic spectrum and minimize the risk of RFI, major civilian spectrum users (industry, public safety agencies, telecommunications, broadcast media) should coordinate carefully with the spectrum manager at Barksdale AFB to identify technical parameters, such as maximum power authorized from the transmitter, the maximum antenna height, the amount of spectrum occupied by the transmitted signal and the geographic area to be served by the communication devices. Within a critical designated area, local governments may also require spectrum users to adopt filtering, shielding or other mitigation techniques if the transmission is beyond a certain frequency as defined by the Air Force.

#### *16. Pursue Directional Natural Gas Drilling in the APZs*

Stakeholders have indicated that the drilling of natural gas in the vicinity of Barksdale AFB poses a limited threat to military operations. However, when drilling targets deposits directly inside highly sensitive areas, such as Accident Potential Zones, stakeholders should request that the State of Louisiana approve of directional drilling techniques. The use of non-vertical wells can eliminate the presence of structures and associated lights in close proximity to the airfield and thus reduce the risk of visual and physical interference.